

# IMPORTANT INFORMATION AND GENERAL NOTES

## TERMS AND CONDITIONS OF SALE

### PRODUCT USE

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

### INDEMNITY

Customers modifying products or installation procedures, 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 product applications for which there is no catalog information, or for anchors or fasteners for use in hostile environments, 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.

### SPECIAL ORDER PRODUCTS

Some products can be ordered as special sizes or with other modifications. Contact Simpson Strong-Tie for information on special order products. Additional lead time and charges may apply. Special order products are non-cancellable, non-refundable and non-returnable.

## LIMITED WARRANTY

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

Simpson Strong-Tie® products are designed to enable structures to resist the movement, stress, and loading that results from impact 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 substantially in accordance with the specifications set forth on the website or in the applicable Simpson 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

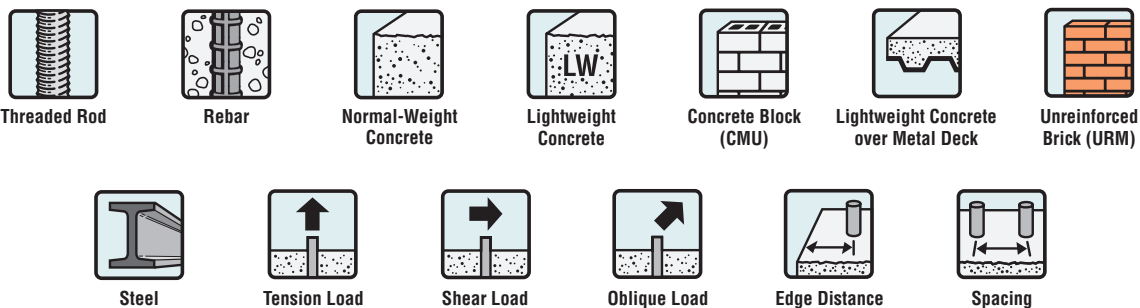
of construction, and the condition of the soils involved, damage may nonetheless result to a structure and its contents even if the loads resulting from the impact event do not exceed Simpson catalog specifications and Simpson Strong-Tie products are properly installed in accordance with applicable building 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 websites ([www.strongtie.com](http://www.strongtie.com) and [www.simpsonanchors.com](http://www.simpsonanchors.com)) for current information.**

## TABLE ICON SYSTEM

In order to allow easier identification of performance data, the following icon system has been incorporated into the sections of the catalog with multiple load tables. These icons will appear in the heading of the table to promote easier visual identification of the type of load, insert type and substrate addressed in the table. Icons are intended for quick identification. All specific information regarding suitability should be read from the table itself.



## IMPORTANT INFORMATION AND GENERAL NOTES



### TECHNICAL SUPPORT

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

- What Simpson Strong-Tie® catalog are you using? (See the front cover for the form number).
- Which Simpson Strong-Tie product are you considering?
- What are the design requirements? (e.g. loads, anchor diameter, base material, edge/spacing distance, etc.).

**For the most up-to-date information about our products visit our website at:  
[www.simpsonanchors.com](http://www.simpsonanchors.com)**

**Our toll-free technical engineering support number is (800) 999-5099**

*This catalog reflects changes in the loads and configurations of some Simpson Strong-Tie Company Inc. products. This catalog is effective until December 31, 2010, and supersedes all information in all earlier publications, including catalogs, brochures, fliers, technical bulletins, etc. Information on loads and configurations is updated periodically.*

## KEEP THIS CATALOG – IT IS NOW VALID FOR TWO YEARS



Simpson Strong-Tie will now publish its *Anchoring and Fastening Systems* catalog every two years. In an effort to continue to provide our customers with current information on our ever-expanding product line, we will be publishing an addendum on years we don't print a catalog. The addendum will contain new product information, updated testing information and any other information needed to keep our customers up to date with our product line. As always, please be sure to visit our website regularly for updates that occur throughout the year – [www.simpsonanchors.com](http://www.simpsonanchors.com).

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## 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 maximum allowable design load and design strength, 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. If you do not understand the catalog, or if you have any questions, contact Simpson Strong-Tie Company Inc. for further information.

In addition to following all notes, warnings and instructions provided in the catalog, installers, designers, engineers and consumers should consult the Simpson Strong-Tie Company Inc. web site at [www.simpsonanchors.com](http://www.simpsonanchors.com) to obtain additional design and installation information.

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

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

## GENERAL NOTES

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

- a) Simpson Strong-Tie Company Inc. reserves the right to change specifications, designs, and models without notice or liability for such changes.
- b) Unless otherwise noted, dimensions are in inches and loads are in pounds.

- c) Do not overload, which will jeopardize the anchorage. Service loads shall not exceed published allowable loads. Factored loads shall not exceed design strengths calculated in accordance with published design data.
- d) Some hardened fasteners may experience premature failure if exposed to moisture. These fasteners are recommended to be used in dry interior applications.
- e) Do not weld products listed in this catalog. Some steel types have poor weldability and a tendency to crack when welded.

## GENERAL INSTRUCTIONS FOR THE INSTALLER

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

- a) Do not modify Simpson Strong-Tie Company Inc. products. The performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.
- b) Do not alter installation procedures from those set forth in this catalog.
- c) Drill holes for mechanical anchors with carbide-tipped drill bits meeting the diameter requirements of ANSI B212.15 shown in the table below. A properly-sized hole is critical to the performance of mechanical anchors. Rotary-hammer drills with light, high-frequency impact are recommended for drilling holes. When holes are to be drilled in archaic or hollow base materials, the drill should be set to "rotation-only" mode.
- d) For mechanical anchors that require a specific installation torque: Failure to apply the recommended installation torque can result in excessive displacement of the anchor under load or premature failure of the anchor. These anchors will lose pre-tension after setting due to pre-load relaxation. See Supplemental Topic M1 on page 14 for more information.
- e) Do not disturb, bolt up, or apply load to adhesive anchors prior to the full cure of the adhesive.
- f) For powder-actuated fastening, refer to the Important Information on page 183.
- g) Use proper safety equipment.

**Finished Diameters for Rotary and Rotary Hammer Carbide Tipped Concrete Drills per ANSI B212.15**

Nominal Drill Bit Diameter (in.)	Tolerance Range Minimum (in.)	Tolerance Range Maximum (in.)
1/8	0.134	0.140
5/32	0.165	0.171
3/16	0.198	0.206
7/32	0.229	0.237
1/4	0.260	0.268
5/16	0.327	0.335
3/8	0.390	0.398
7/16	0.458	0.468
1/2	0.520	0.530
9/16	0.582	0.592
5/8	0.650	0.660
11/16	0.713	0.723
3/4	0.775	0.787
13/16	0.837	0.849
27/32	0.869	0.881
7/8	0.905	0.917
15/16	0.968	0.980
1	1.030	1.042
1 1/8	1.160	1.175
1 3/16	1.223	1.238
1 1/4	1.285	1.300
1 5/16	1.352	1.367
1 3/8	1.410	1.425
1 7/16	1.472	1.487
1 1/2	1.535	1.550
1 9/16	1.588	1.608
1 5/8	1.655	1.675
1 3/4	1.772	1.792
2	2.008	2.028

## GENERAL INSTRUCTIONS FOR THE DESIGNER

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

- a) The term "Designer" used throughout this catalog is intended to mean a licensed/certified building design professional, a licensed professional engineer, or a licensed architect.
- b) All connected members and related elements shall be designed by the Designer and must have sufficient strength (bending, shear, etc) to resist the loads imposed by the anchors.
- c) When the allowable stress design method is used, the design service loads shall not exceed the published allowable loads.
- d) When the ultimate strength design method is used, the factored loads shall not exceed the design strengths calculated in accordance with the published design data.
- e) Simpson Strong-Tie® strongly recommends the following addition to construction drawings and specifications: "Simpson Strong-Tie products are specifically required to meet the structural calculations of plan. Before substituting another brand, confirm load capacity based on reliable published testing data or calculations. The Engineer/Designer of Record should evaluate and give written approval for substitution prior to installation."
- f) Local and/or regional building codes may require meeting special conditions. Building codes often require special inspections of anchors installed in concrete or masonry. For compliance with these requirements, it is necessary to contact the local and/or regional building authority. Except where mandated by code, Simpson Strong-Tie® products do not require special inspection.
- g) Allowable loads and design strengths are determined from test results, calculations, and experience. These are guide values for sound base materials with known properties. Due to variation in base materials and site conditions, site-specific testing should be conducted if exact performance in a specific base material at a specific site must be known.
- h) Unless stated otherwise, tests conducted to derive performance information were performed in members with minimum thickness equal to 1.5 times the anchor embedment depth. Anchoring into thinner members requires the evaluation and judgment of a qualified Designer.
- i) Tests are conducted with anchors installed perpendicular ( $\pm 6^\circ$ ) to the surface of the base material. Deviations can result in anchor bending stresses and reduce the load carrying capacity of the anchor.
- j) Allowable loads and design strengths do not consider bending stresses due to shear loads applied with large eccentricities.
- k) Metal anchors and fasteners will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials. See Supplemental Topic G3.
- l) Mechanical anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of mechanical anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time of installation.
- m) Nominal embedment depth (embedment depth) is the distance from the surface of the base material to the installed end of the anchor and is measured prior to application of an installation torque (if applicable). Effective embedment depth is the distance from the surface of the base material to the deepest point at which the load is transferred to the base material.
- n) Drill bits shall meet the diameter requirements of ANSI B212.15. For adhesive anchor installations in oversized holes, see Supplemental Topic A1. For adhesive anchor installations into core-drilled holes, see Supplemental Topic A2.
- o) Threaded-rod inserts for adhesive anchors shall be UNC fully threaded steel.
- p) Allowable loads and design strengths are generally based on testing of adhesive anchors installed into dry holes. For installations in damp, wet and submerged environments, see Supplemental Topic A3.
- q) Adhesive anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of adhesive anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time load is applied.
- r) Adhesive anchors can be affected by elevated base material temperature. See Supplemental Topic A4.
- s) Anchors are permitted to support fire-resistive construction provided at least one of the following conditions is fulfilled: a) Anchors are used to resist wind or seismic forces only. b) Anchors that support gravity load-bearing structural elements are within a fire-resistance-rated envelope or a fire-resistance-rated membrane, are protected by approved fire-resistance rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards. c) Anchors are used to support nonstructural elements.
- t) Some adhesives are not qualified for resisting long-term sustained loads. These adhesives are for resisting short-term loads such as wind or seismic loads only. See Supplemental Topic A5.
- u) Exposure to some chemicals may degrade the bond strength of adhesive anchors. Refer to the product description for chemical resistance information. Information is also available in Simpson Strong-Tie Company Inc. Technical Bulletin T-SAS-CHEMRES.

## SUPPLEMENTAL TOPICS FOR ANCHORS

### GENERAL

#### G1. Base Materials

"Base material" is a generic industry term that refers to the element or substrate to be anchored to. Base materials include concrete, brick, concrete block (CMU) and structural tile, to name a few. The base material will determine the type of fastener for the application. The most common type of base material where adhesive and mechanical anchors are used is concrete.

**Concrete** – Concrete can be cast in place or precast concrete. Concrete has excellent compressive strength, but relatively low tensile strength. Cast-in-place (or sometimes called "poured in place") concrete is placed in forms erected on the building site. Cast-in-place concrete can be either normal-weight or lightweight concrete. Lightweight concrete is specified when it is desirable to reduce the weight of the building structure.

Lightweight concrete differs from normal-weight concrete by the weight of aggregate used in the mixture. Normal-weight concrete has a unit weight of approximately 150 pounds per cubic foot compared to approximately 115 pounds per cubic foot for lightweight concrete.

The type of aggregate used in concrete can affect the tension capacity of an adhesive anchor. Presently, the relationship between aggregate properties and anchor performance is not well understood. A recent study based on a limited test program has shown that in relative terms, concrete with harder and more dense aggregates tend to yield greater anchor tension capacities. Conversely, use of softer, less dense aggregates tends to result in lower anchor tension capacities. Research in this area is ongoing. Test results should not be assumed to be representative of expected performance in all types of concrete aggregate.