

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 23—Wood, Plastic, and Composite Fastenings**

**REPORT HOLDER:**

**SIMPSON STRONG-TIE COMPANY INC.**

**EVALUATION SUBJECT:**

**SIMPSON STRONG-TIE® STRONG-DRIVE SCREWS USED IN WOOD**

**1.0 EVALUATION SCOPE**

**Compliance with the following codes:**

- 2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2018, 2015, 2012, 2009 and 2006 *International Residential Code*® (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see [ESR-3046 LABC and LARC Supplement](#).

**Properties evaluated:**

- Structural
- Corrosion resistance

**2.0 USES**

The Simpson Strong-Tie® Strong-Drive screws described in this report, except for the SDWF screws, are dowel-type threaded, self-drilling fasteners used for steel-to-wood and wood-to-wood connections that are designed in accordance with the IBC and IRC. These structural wood fasteners deviate from [ANSI B18.2.1](#) and [B18.6.1](#) standards.

The Simpson Strong-Tie® Strong-Drive SDWF screws described in this report are dowel-type threaded, self-drilling fasteners used with the Simpson Take-Up Washer (TUW) as depicted in the SDWF installation diagram shown in [Figure 2](#). These structural fasteners deviate from ANSI B18.2.1 and B18.6.1 standards.

The Simpson Strong-Tie Strong-Drive SD, SD9SS, and SDWF screws may be used where fasteners are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in chemically treated wood (subject to the limitations of Sections [4.2.1](#), [5.2](#) and Tables [1D](#) and [2C](#), as applicable). The SD and SDWF screws are alternates to hot-dip zinc galvanized fasteners with a coating

weight in compliance with [ASTM A153](#), Class D. The SD and SDWF screws have been evaluated for use with wood chemically treated with waterborne alkaline copper quaternary, Type D (ACQ-D).

**3.0 DESCRIPTION**

**3.1 General:**

The Strong-Drive screws are manufactured using a standard cold-forming process, and are heat-treated.

**3.1.1 SD and SD9SS Screws:** The screws have rolled threads, spaced 8.5 threads per inch (0.335 thread per millimeter) for the SD9 and SD9SS screws and spaced 10 threads per inch (0.393 thread per millimeter) for the SD10 screws. They have a plain (unslotted) 1/4-inch (6.35 mm) hex washer head and a sharp point. The length of the threaded portion of the shank is approximately 1 inch (25.4 mm). See [Table 1](#) and [Figure 1](#) for screw descriptions, including dimensions, fastener strengths and references to other tables applicable to the SD and SD9SS screws.

**3.1.2 SDWF Screws:** The SDWF screws have rolled 3/8-inch-24 threads near the head, and 5/16-inch-12 threads near the point. The length of threads near the point is approximately 5 inches (127 mm). The screws have a plain (unslotted) 5/16-inch (7.94 mm) hex washer head and Type-17 point. See [Table 2](#) and [Figure 2](#) for screw descriptions, including dimensions, fastener strength and references to other tables applicable to the SDWF screws.

**3.1.3 SDCP Screws:** The SDCP screws have rolled threads, spaced 0.216 inches (5.5 mm) for the SDCP22### screws and 0.260 inches (6.6 mm) for the SDCP271400 screw. They have a ribbed countersinking head with a six-lobe drive recess, and a Type-17 point with notched threads. The screws are partially threaded and have a knurl between the primary threads and the smooth shank. See [Table 3](#) and [Figure 3](#) for screw descriptions, including dimensions, fastener strength and references to other tables applicable to the SDCP screws.

**3.1.4 SDCF Screws:** The SDCF screws are fully threaded with rolled threads, spaced 0.15 inch (3.8 mm) for SDCF22### screws and 0.177 inch (4.5 mm) for SDCF27### screws. They have a ribbed countersinking head with a six-lobe drive recess, and a proprietary point. See [Table 4](#) and [Figure 5](#) for screw descriptions, including dimensions, fastener strength and references to other tables applicable to the SDCF screws.

**3.1.5 SDHR Screws:** The SDHR screws are partially threaded screws, with rolled threads spaced 0.177 inch (4.5 mm) for SDHR27### screws and 0.236 inch (6 mm) for

SDHR31### screws, and a knurl between the primary threads and the smooth shank. They have a large hex head with a six-lobe drive recess, and a Type-17 point. See [Table 5](#) and [Figure 7](#) for screw descriptions, including dimensions, fastener strength and references to other tables applicable to the SDHR screws.

### 3.2 Materials:

**3.2.1 SD and SD9SS Screws:** The SD screws are manufactured from [ASTM A510](#), Grade 10B18, steel wire. The screws are mechanically galvanized per [ASTM B695](#), Type II, Class 55, except for the SD10112DBB screw which has a proprietary corrosion-resistant coating. The SD9SS are manufactured from stainless steel Type 316 using a standard cold-forming process.

**3.2.2 SDWF Screws:** The SDWF screws are manufactured from ASTM A510, Grade 10B21, steel wire. The screws are coated with a proprietary black electrocoat base coat.

**3.2.3 SDCP Screws:** The SDCP screws are manufactured from ASTM A510, Grade C10B21, steel wire. The screws have a yellow zinc coating.

**3.2.4 SDCF Screws:** The SDCF screws are manufactured from ASTM A510, Grade 10B21, steel wire. The screws have a yellow zinc coating.

**3.2.5 SDHR Screws:** The SDHR screws are manufactured from ASTM A510, Grade 10B21, steel wire. The screws have either a blue-zinc coating or zinc-nickel coating.

### 3.2.6 Wood Members:

**3.2.6.1 General:** For the purposes of connection design, solid-sawn wood members and wood structural panels must have a minimum assigned specific gravity as indicated in the tables in this report. Assigned specific gravity for solid-sawn lumber and wood structural panels must be determined in accordance with Tables 12.3.3A and 12.3.3B, respectively, of the ANSI/AWC National Design Specification ([NDS](#)) for Wood Construction® (Tables 11.3.3A and 11.3.3B of [NDS-12](#) for the 2012 IBC, Tables 11.3.2A and 11.3.2B of [NDS-05](#) for the 2009 and 2006 IBC). Unless otherwise noted, solid-sawn wood members must have a moisture content of 19 percent or less.

For the purposes of connection design, structural glued laminated timber (GL) must have a Specific Gravity for Fastener Design (addressed in Tables 5A through 5D of the NDS Supplement), as indicated in the tables in this report. Unless otherwise noted, glued laminated timber must have a moisture content of less than 16 percent.

When designing connections with screws installed into the face of cross-laminated timber (CLT) panels all of the laminations must have a minimum assigned specific gravity in accordance with the NDS as indicated in the tables in this report. Moisture content must be less than 16 percent.

Structural composite lumber (SCL) is defined in the IBC and includes products such as LVL, PSL and LSL. For the purposes of connection design, SCL must be addressed in an ICC-ES evaluation report and must have a minimum equivalent specific gravity of 0.50. The moisture content at the time of screw installation and in service must be in accordance with the applicable ICC-ES evaluation report on the SCL.

Use of the fasteners in engineered wood products (EWP) other than those addressed above is outside the scope of this report.

**3.2.6.2 Wood Members Used with SD and SD9SS Screws:** Wood main members may be either solid-sawn lumber, GL, CLT or SCL. Wood side members must be either solid-sawn lumber or wood structural panel (OSB or

plywood). Moisture content of solid-sawn lumber may exceed 19 percent, but requires the application of the  $C_M$  factor in the NDS. SCL must have a minimum grade of 0.8E for lateral loading and a minimum grade of 1.55E for withdrawal loading. The thickness of the wood main member,  $t_m$ , must be equal to or greater than the screw length less the thickness of the side member.

**3.2.6.3 Wood Members Used with SDWF Screws:** Wood top plates into which the SDWF screws are installed are solid-sawn lumber. See [ESR-2320](#) for additional requirements.

**3.2.6.4 Wood Members Used with SDCP Screws:** Wood main and side members must be solid-sawn wood, GL, CLT or SCL. SCL must have a minimum grade of 1.3E for both lateral and withdrawal loading. The thickness of the wood main member,  $t_m$ , must be equal to or greater than the screw length, less the thickness of the wood side member.

**3.2.6.5 Wood Members Used with SDCF Screws:** Wood main and side members must be solid-sawn wood, GL, CLT or SCL. SCL must be a minimum grade of 1.3E for both lateral and withdrawal loading. The thickness of the wood main member,  $t_m$ , must be equal to or greater than the screw length, less the thickness of the wood side member.

**3.2.6.6 Wood Main Members used with SDHR Screws:** Wood main members must be solid-sawn wood, GL, CLT or SCL. SCL must be a minimum grade of 1.3E for both lateral and withdrawal loading. The thickness of the wood main member,  $t_m$ , must be equal to or greater than the screw length less the thickness of the side member.

### 3.2.7 Steel Members:

**3.2.7.1 Steel Side Members Used with SD and SD9SS Screws:** For connections using the SD and SD9SS screws, steel side members must have a minimum tensile strength,  $F_u$ , equal to 45 ksi (310.1 MPa), and design thickness (base-metal thickness exclusive of any coatings) ranging from 0.0352 inch to 0.1026 inch (0.894 mm to 2.606 mm), i.e., No. 20 gage to No. 12 gage. The hole in the steel side member for the SD and SD9SS screws must be predrilled or prepunched, and must have a standard round hole no greater than 0.156 inch (3.962 mm) in diameter for the SD9 and SD9SS screws, and no greater than 0.171 inch (4.343 mm) in diameter for the SD10 screws. Hole sizes may deviate from these limitations when the screws are specified in a current ICC-ES evaluation report for use with a specific steel member with larger holes.

**3.2.7.2 Steel Side Members Used with SDHR Screws:** For connections using the SDHR screws, steel side members must have a minimum tensile strength,  $F_u$ , equal to 45 ksi (310.1 MPa), and design thickness (base-metal thickness exclusive of any coatings) ranging from 0.0566 inch to 0.2405 inch (1.438 mm to 6.109 mm), i.e., No. 16 gage to No. 3 gage. The hole in the steel side member for the SDHR screw must be predrilled or prepunched, and must be a standard round hole no greater than 0.4375 inch (11.11 mm) in diameter for the SDHR27 screws, and no greater than 0.500 inch (12.7 mm) in diameter for the SDHR31 screws.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General:** The design values in this report are intended to aid the designer in meeting the requirements of IBC Section [1604.2](#). For connections not completely described in this report, determination of the suitability of the Strong-Drive screws for the specific application is the responsibility of the designer and is outside the scope of this report. The designer is responsible for determining the available strengths for the connection, considering all applicable limit states, and for considering serviceability

issues. This report provides the following design information:

1. SD and SD9SS screws strengths and reference design values for SD and SD9SS screws used in wood-to-wood and steel-to-wood connections. See [Table 1](#) for screw shear and tension strengths; minimum specified bending yield strength and reference to the applicable tables for other design information.
2. SDWF screw tension strength and reference withdrawal design values for SDWF screws. See [Table 2](#) for screw tension strength and reference to the applicable tables for other design information.
3. SDCP screw strengths and reference design values for SDCP screws used in wood-to-wood connections. See [Table 3](#) for screw shear and tension strengths; minimum specified bending yield strength and reference to the applicable tables for other design information.
4. SDCF screw strengths and reference design values for SDCF screws used in wood-to-wood connections. See [Table 4](#) for screw shear and tension strengths; minimum specified bending yield strength and reference to the applicable tables for other design information.
5. SDHR screw strengths and reference design values for SDHR screws used in two-member steel-to-wood connections. See [Table 5](#) for screw shear and tension strengths; minimum specified bending yield strength and reference to applicable tables for other design information.

#### 4.1.2 Adjustments to Reference Design Values:

Reference lateral and withdrawal design values in the report must be multiplied by all applicable adjustment factors specified in Section 11.3 of the NDS (Section 10.3 of the NDS for the 2012, 2009 and 2006 IBC) for dowel-type fasteners, including the wet service factor,  $C_M$ , where applicable, to determine allowable loads for use with ASD and/or design loads for use with LRFD. For the SDWF, SDCP, SDCF and SDHR screws, use is limited to dry in-service conditions, such that the wet service factor,  $C_M$ , is 1.0 in accordance with the NDS. The reference design values must also be adjusted in accordance with the requirements in Section 12.5 of the NDS (Section 11.5 of NDS-12 for the 2012 IBC and of NDS-05 for the 2009 and 2006 IBC).

**4.1.3 Design of Metal Parts:** Design of connections using steel side plates must comply with Section 11.2.3 of the NDS (Section 10.2.3 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC).

#### 4.1.4 Capacity Requirements for Wood Members:

When designing a connection, the structural members must be checked for load-carrying capacity in accordance with Section 11.1.2 of the NDS (Section 10.1.2 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC), and local stresses within multiple-fastener connections must be checked against Appendix E of the NDS to ensure the capacity of the connection and fastener group.

**4.1.5 Connections with Multiple Screws:** Connections containing multiple screws must be designed in accordance with Sections 11.2.2 and 12.6 of the NDS (Sections 10.2.2 and 11.6 of the NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC).

**4.1.6 Reference Withdrawal and Pull-through Design Values:** Reference withdrawal ( $W$ ) design values in pounds per inch (unless otherwise specified) of thread penetration

and reference head pull-through values ( $W_H$ ) are shown in tables in this report.

#### 4.1.7 Lateral Connections in Accordance with the NDS:

The reference lateral design strength for connections of two or more wood members using the Strong-Drive screws other than the SDWF screws may be designed in accordance with the NDS, subject to the following conditions:

1. The applicable specified bending yield strength from the tables in this report must be used for design.
2. The minor thread diameter,  $D_r$ , must be used to determine  $R_d$  and  $K_D$  in accordance with Table 12.3.1B of the NDS, the dowel bearing strength in accordance with Table 12.3.3 of the NDS and the reference lateral design value based on Table 12.3.1A of the NDS (Tables 11.3.1B, 11.3.3 and 11.3.1 A of the 2012 NDS for the 2015 IBC; Tables 11.3.1B, 11.3.2 and 11.3.1 A of the 2005 NDS for the 2009 and 2006 IBC).
3. The screw penetration into the main member must be a minimum of 6 times the shank diameter.
4. Spacing, edge and end distance must be in accordance with the applicable connection geometry table in this report, and as needed to prevent splitting of the wood.

#### 4.1.8 Two-member Wood-to-wood and Steel-to-wood Connections Based on Testing:

For select connection configurations with SD, SD9SS, SDCP, SDCF and SDHR screws, testing has been conducted to determine reference lateral design values which exceed those determined in accordance with the NDS. These reference lateral design values based on testing are shown in tables in this report, as referenced in [Tables 1, 3, 4 and 5](#) and shall be adjusted by all applicable adjustment factors.

**4.1.8.1 Governing Design Values:** The allowable lateral load for a single-screw connection is the lesser of: (a) the reference lateral design value, adjusted by all applicable adjustment factors, and (b) the allowable screw shear strength. The allowable load for a single-screw connection in which the screw is subject to tension is the least of: (a) the reference withdrawal design value, adjusted by all applicable adjustment factors; (b) the reference head pull-through design value, adjusted by all applicable adjustment factors; and (c) the allowable screw tension strength.

**4.1.8.2 Combined Loading:** Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC).

**4.1.9 Design Provisions for SDWF Screws:** Connections utilizing SDWF screws have allowable tension design values that are limited by the lesser of: (a) the reference withdrawal design value multiplied by the length of thread penetration within the wall top plate and adjusted by all applicable adjustment factors; (b) the allowable load for the TUW, as given in ESR-2320, and (c) the allowable screw tension strength. The SDWF screws must be limited to applications in which they will be loaded in direct axial withdrawal/tension only (within a tolerance of  $\pm 2$  degrees). Structural members forming the connection must be designed in accordance with the code.

#### 4.2 Installation:

**4.2.1 General:** The Strong-Drive screws must be installed with the applicable type of driver listed in the table below:

Screw Series	Driver
SD and SD9SS	1/4-inch (6.35 mm) hex head driver
SDWF	5/16-inch (7.94 mm) hex head driver
SDCP, SDCF and SDHR	6-lobe T40 (T50 for SDCF27 & SDCP27)

Installation must be performed without predrilling wood members. Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by the applicable table of this report, whichever is more restrictive. When use is in engineered wood products, the minimum fastener end and edge distances and spacing must be in accordance with the applicable table of this report or in accordance with the recommendations of the engineered wood product manufacturer, whichever is more restrictive.

The SD and SDWF screws have corrosion-resistant coatings that have been evaluated for use in wood treated with waterborne alkaline copper quaternary, Type D (ACQ-D), to a maximum retention level of 0.40 pcf (6.4 kg/m<sup>3</sup>). They may be used in other treated wood products that have been demonstrated to have lower levels of corrosivity. These fasteners must be limited to use in accordance with [Table 1D](#) and [2C](#), respectively.

The SD9SS screws may be used in the applications described in IBC Section [2304.10.5](#) (2012, 2009 and 2006 IBC Section [2304.9.5](#)) and IRC Section [R317.3](#) (2006 IRC Section [R319.3](#)), where stainless steel fasteners are prescribed.

**4.2.2 SD and SD9SS Screws:** When installing SD and SD9SS screws, the bottom of the screw head must be flush to the surface of the member being connected. The screws must not be overdriven. SD and SD9SS screws must be installed such that the threaded portion of the shank is fully embedded within the main member.

**4.2.3 SDWF Screws:** The SDWF screw must be installed through the hole in the center of the TUW, normal to the plane of the TUW, through the sole plate and floor cavity, and into the top plate of the floor below, until the head of the SDWF screw pulls the TUW side tabs downward, thereby engaging the shank of the screw. The screws must not be overdriven. The go/no-go gage, supplied with the TUW, must be used in accordance with the manufacturer's installation instructions to ensure proper installation. See [Figure 2](#) for a typical installation detail of the SDWF.

**4.2.4 SDCP Screws:** When installing SDCP screws, the top of the screw head must be flush to the surface of the member being connected. The screws must not be overdriven. SDCP screws must be installed such that the threaded portion of the shank is fully embedded within the main member.

**4.2.5 SDCF Screws:** When installing SDCF screws, the top of the screw head must be flush to the surface of the member being connected. The screws must not be overdriven. The portion of the screw length less the side member thickness must be fully embedded in the main member.

**4.2.6 SDHR Screws:** When installing SDHR screws, the bottom of the screw head must be flush to the surface of the steel side member.

## 5.0 CONDITIONS OF USE

The Simpson Strong-Drive screws described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section [1.0](#) of this report, subject to the following conditions:

- 5.1** The Strong-Drive screws must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. The most restrictive governs if there are any conflicts between the manufacturer's published installation instructions and this report.
- 5.2** Except for the SD9SS screws, use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 5.3** The SDWF, SDCP, SDCF and SDHR screws must be limited to use in dry conditions, with solid-sawn wood having a moisture content of 19 percent or less, both at the time of screw installation and in service or engineered wood complying with the applicable ICC-ES evaluation report.
- 5.4** The SDWF screws are limited to use with the Simpson Take-Up Washer (TUW), as described in ESR-2320.
- 5.5** The Strong-Drive screws are manufactured under a quality control program with inspections by ICC-ES.

## 6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Dowel-type Threaded Fasteners Used in Wood (AC233), dated February 2020.
- 6.2** Data in accordance with the ICC-ES Acceptance Criteria for Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatments (AC257), dated October 2009 (editorially revised March 2018).
- 6.3** Provisions related to steel pull-over strength in the ICC-ES Acceptance Criteria for Tapping Screw Fasteners Used in Steel-to-steel Connections (AC118) dated January 2018.

## 7.0 IDENTIFICATION

- 7.1** Packages of fasteners are labeled with the fastener designation, the Simpson Strong-Tie Company name and address, the fastener size, and the ICC-ES evaluation report number (ESR-3046). Each SD, SD9SS, SDWF and SDCF screw head is marked with the not-equal-to symbol ( $\neq$ ), and numbers designating the screw size and length, as shown in [Tables 1, 2](#) and [4](#). Each SDCP screw head is marked with a "G" and an "X" and numbers designating the screw length, as shown in [Table 3](#). Each SDHR screw head is marked with a "G", the not-equal-to symbol ( $\neq$ ), and numbers designating the screw length, as shown in [Table 5](#). The SDWF screw is packaged with the Take-Up Washer (TUW) and a go/no-go gage for use in installation.
- 7.2** The report holder's contact information is the following:

**SIMPSON STRONG-TIE COMPANY INC.**  
**5956 WEST LAS POSITAS BOULEVARD**  
**PLEASANTON, CALIFORNIA 94588**  
**(800) 999-5099**  
[www.strongtie.com](http://www.strongtie.com)

TABLE 1—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SD AND SD9SS SCREWS<sup>5</sup>

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						SPECIFIED BENDING YIELD STRENGTH <sup>3</sup> , $F_{yb}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH <sup>4</sup> (lbf)	
		Head Diameter, $D_H^1$	Screw Length, $L$	Thread Length <sup>1</sup> , $T$	Shank Diameter	Major Thread Diameter	Minor Thread (root) Diameter <sup>2</sup> , $D_r$		Tension	Shear
SD9112	915	0.378	1.5	1.0	0.132	0.177	0.109	188,000	510	425
SD9212	925		2.5							
SD9112SS	915		1.5		0.139	0.169	0.117			
SD9212SS	925		2.5							
SD10112/SD10112DBB	1015		1.5		0.161	0.200	0.122			
SD10212	1025		2.5							

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

<sup>1</sup> $D_H$  refers to the diameter of the integral washer. Length of thread includes tip. See Figure 1.

<sup>2</sup>Minor thread diameter shown in the table is the minimum minor diameter.

<sup>3</sup>Bending yield strength determined in accordance with [ASTM F1575](#) using the minor thread (root) diameter,  $D_r$ .

<sup>4</sup>Allowable fastener strengths are based on steel properties of the screw.

<sup>5</sup>Refer to Table 1A for reference lateral ( $Z$ ) design values for steel-to-wood and wood-to-wood connections. Refer to [Table 1B](#) for reference withdrawal ( $W$ ) design values. Reference head pull-through design values ( $W_h$ ) must be determined in accordance with Section 12.2.5 of the [2018 NDS](#). Refer to [Table 1C](#) for connection geometry parameters. Refer to [Table 1D](#) for applicable exposure conditions for the SD screws.

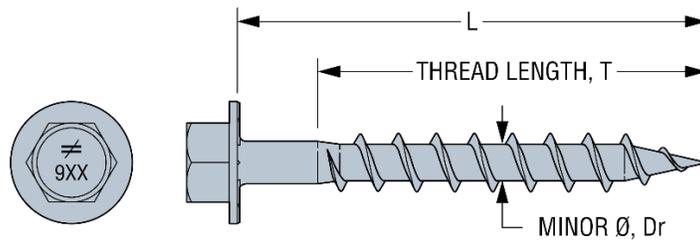


FIGURE 1—SD AND SD9SS SCREWS

TABLE 1A—REFERENCE LATERAL DESIGN VALUES ( $Z$ ) FOR SINGLE SHEAR STEEL-TO-WOOD AND WOOD-TO-WOOD CONNECTIONS WITH SD AND SD9SS SCREWS<sup>1,2,3,4,5</sup>

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, $Z$ (lbf)							
	Steel-to-Wood <sup>6</sup>		Wood-to-Wood <sup>7</sup>					
	0.42 ≤ SG < 0.50	SG ≥ 0.50	0.42 ≤ SG < 0.50			SG ≥ 0.50		
			15/32" Side Member	23/32" Side Member	1 1/2" Side Member	15/32" Side Member	23/32" Side Member	1 1/2" Side Member
SD9112 / SD9112SS	112	171	93	—	—	105	—	—
SD9212 / SD9212SS	112	200	99	94	109	118	133	130
SD10112/SD10112DBB	138	173	102	—	—	127	—	—
SD10212	165	215	106	126	123	147	168	152

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 ksi = 6.89 MPa.

<sup>1</sup>Unless otherwise noted, the main member and wood side members must be solid-sawn wood, GL or CLT. Main members must have a minimum assigned specific gravity (SG) of either 0.42 or 0.50, as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections [3.2.6.1](#) and [3.2.6.2](#). When the assigned specific gravities or equivalent specific gravity (SG) of the main and side members are different, the design values applicable to wood with the lowest specific gravity (SG) must be used.

<sup>2</sup>Tabulated lateral design values ( $Z$ ) must be multiplied by all applicable adjustment factors, including the load duration factor,  $C_D$ , from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Screws must be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the surface of the wood.

<sup>4</sup>Minimum fastener penetration must be equal to the screw length less the thickness of the metal side plate or wood side member.

<sup>5</sup>Tabulated reference lateral design values apply to both parallel- and perpendicular-to-grain loading.

<sup>6</sup>The side member must consist of steel having a minimum tensile strength ( $F_u$ ) of 45 ksi, and a design thickness ( $t_s$ ) no less than 0.0352 inches and no greater than 0.1026 inches. The uncoated minimum steel thickness of the cold-formed product delivered to the jobsite must not be less than 95 percent of the design thickness,  $t_s$ . Holes in the steel side member must be predrilled or pre-punched. Hole diameter must be no greater than 0.156 inch for the SD9 and SD9SS screws and no greater than 0.171 inch for the SD10 screws.

<sup>7</sup>The nominal 15/32- and 23/32-inch-thick side members must be plywood or OSB with minimum equivalent specific gravities (SG) of either 0.42 or 0.50, as indicated in the table above.

**TABLE 1B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SD AND SD9SS SCREWS INSTALLED IN THE SIDE GRAIN OF A WOOD MAIN MEMBER<sup>1,2,3</sup>**

FASTENER DESIGNATION	SCREW LENGTH, L (inches)	THREAD LENGTH, T (inch)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf)	
			0.42 ≤ SG < 0.50	0.50 ≤ SG
SD9112 / SD9112SS	1.5	1.0	122	173
SD9212 / SD9212SS	2.5			
SD10112/SD10112DBB	1.5		122	173
SD10212	2.5			

For SI: 1 inch = 25.4 mm, 1 lbf/inch = 175 N/m.

<sup>1</sup>The tabulated reference withdrawal design value, W, is in pounds for the full thread penetration into the side grain (or face grain) of the main member, including the screw tip for screws installed perpendicular to the surface of the wood. SD and SD9SS screws must be installed such that the threaded portion of the shank is fully embedded within the main member.

<sup>2</sup>The tabulated reference withdrawal design value, W, must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Wood main members must have a minimum assigned specific gravity (SG) as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into engineered wood products described in Sections 3.2.6.1 and 3.2.6.2.

**TABLE 1C—CONNECTION GEOMETRY FOR SD AND SD9SS SCREWS**

CONDITION <sup>1</sup>		MINIMUM DISTANCE OR SPACING (in.)	
		Main Member	Wood Side Member
Edge distance	Perpendicular to grain loading (Loaded or unloaded edge)	1	1
	Parallel to grain loading	1/2	1/2
End distance	Perpendicular to grain loading	2	2 <sup>7</sup> / <sub>16</sub>
	Parallel to grain loading (Loading toward or away from end)	2	2 <sup>7</sup> / <sub>16</sub>
Spacing (Loading parallel or perpendicular to grain)	Between fasteners in a row	2	2 <sup>7</sup> / <sub>16</sub>
	Between rows	1/2	1 <sup>3</sup> / <sub>16</sub>
	Between staggered rows	1/2	1/2

For SI: 1 inch = 25.4 mm.

<sup>1</sup>Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

**TABLE 1D—APPLICABLE EXPOSURE CONDITIONS FOR SIMPSON STRONG-TIE SD SCREWS**

EXPOSURE CONDITION	TYPICAL APPLICATIONS	APPLICATION LIMITATIONS
1	Treated wood in dry use applications	Limited to use where equilibrium moisture content of the chemically treated wood meets the dry services condition as described in the NDS
3	General construction	Limited to freshwater and chemically treated wood exposure, e.g., no saltwater exposure

**TABLE 2—SCREW SPECIFICATIONS AND FASTENER STRENGTH FOR SDWF SCREWS<sup>4</sup>**

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)					FASTENER ALLOWABLE STEEL TENSION STRENGTH <sup>3</sup> (lbf)
		Head Diameter, D <sub>H</sub> <sup>1</sup>	Screw Length, L	Thread Length <sup>1</sup> , T	Unthreaded Shank Length, L - T	Minor Thread (root) Diameter <sup>2</sup> , D <sub>r</sub>	
SDWF2716	16	0.750	16.0	5.0	11.0	0.240	2685
SDWF2720	20		20.0		15.0		
SDWF2724	24		24.0		19.0		
SDWF2726	26		26.0		21.0		
SDWF2730	30		30.0		25.0		

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

<sup>1</sup>D<sub>H</sub> refers to the diameter of the integral washer. Length of thread includes tip. See Figure 2.

<sup>2</sup>Minor thread diameter shown in the table is the minimum minor diameter.

<sup>3</sup>Allowable fastener strength is based on steel properties of the screw.

<sup>4</sup>Refer to Table 2A for reference withdrawal (W) design values. Refer to Table 2B for connection geometry parameters. Refer to Table 2C for applicable exposure conditions.

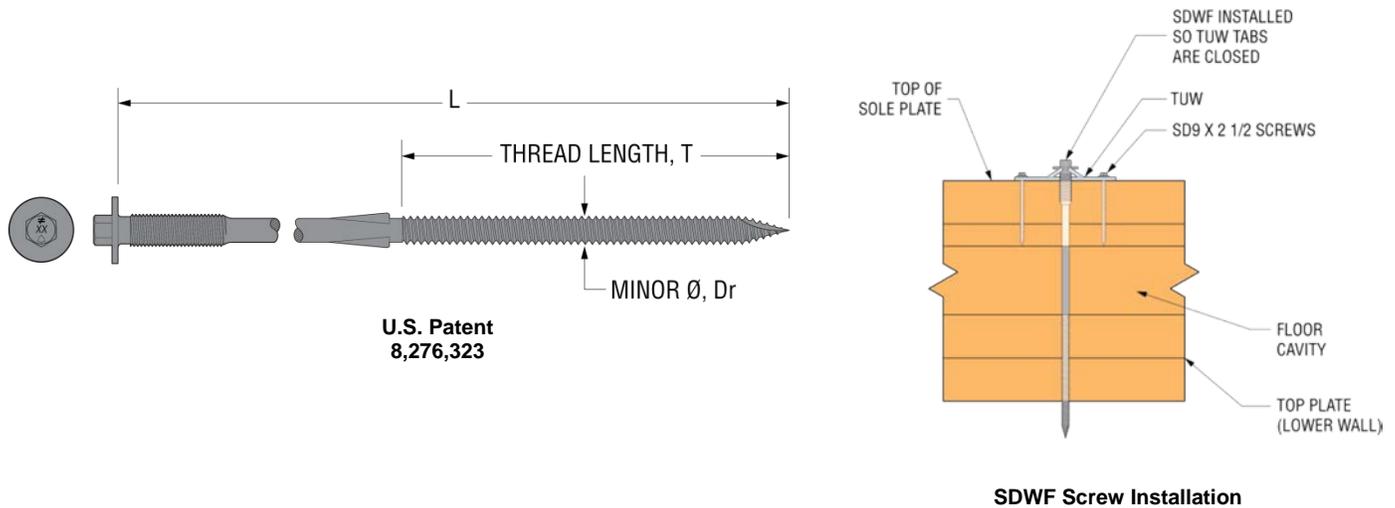


FIGURE 2—SDWF SCREWS AND INSTALLATION

TABLE 2A—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDWF SCREWS INSTALLED IN THE SIDE GRAIN OF A WOOD MAIN MEMBER<sup>1,2,3</sup>

FASTENER DESIGNATION	SCREW LENGTH, L	THREAD LENGTH, T	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch)		
			0.42 ≤ SG < 0.50	0.50 ≤ SG < 0.55	SG ≥ 0.55
SDWF2716	16.0	5.0	180	250	295
SDWF2720	20.0				
SDWF2724	24.0				
SDWF2726	26.0				
SDWF2730	30.0				

For SI: 1 inch = 25.4 mm, 1 lbf/inch = 4.44 kPa.

<sup>1</sup>The tabulated reference withdrawal design value, W, is in pounds per inch of the thread penetration into the side grain (or face grain) of the main member. Thread penetration is the portion of the threaded length held in the main member, including the screw tip. SDWF screws must be installed such that the threaded length embedded within the wall top plate is at least 3 inches.

<sup>2</sup>The tabulated reference withdrawal design value, W, must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Wood main members must have a minimum assigned specific gravity (SG) as indicated in the table above. See Section 3.2.6.3 for additional wood material requirements.

TABLE 2B—CONNECTION GEOMETRY FOR SDWF SCREWS<sup>1,2</sup>

CONDITION <sup>1</sup>		MINIMUM DISTANCE OR SPACING (inches)
		Main Member
Edge distance	Withdrawal loading	1
End distance	Withdrawal loading	4
Spacing	Between fasteners in a row	8

For SI: 1 inch = 25.4 mm.

<sup>1</sup>Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

<sup>2</sup>The SDWF screws must be used with the Take-Up Washer (TUW), as described in ESR-2320.

TABLE 2C—APPLICABLE EXPOSURE CONDITIONS FOR SDWF SCREWS

EXPOSURE CONDITION	TYPICAL APPLICATIONS	APPLICATION LIMITATIONS
1	Treated wood in dry use applications	Limited to use where equilibrium moisture content of the chemically treated wood meets the dry services condition as described in the NDS
3	General construction	Limited to freshwater and chemically treated wood exposure, e.g., no saltwater exposure

TABLE 3—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCP SCREWS<sup>4</sup>

FASTENER DESIGNATION	HEAD MARKING 'LLL'	SCREW SPECIFICATIONS (inches)						SPECIFIED BENDING YIELD STRENGTH <sup>2</sup> , $F_{yb}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH <sup>3</sup> (lbf)	
		Head Diameter	Screw Length, $L$	Thread Length <sup>1</sup> , $T$	Shank Diameter	Major Thread Diameter	Minor Thread (root) Diameter <sup>2</sup> , $D_r$		Tension	Shear
SDCP22434	120	0.577	4.72	3.15	0.278	0.309	0.208	185,000	2045	1335
SDCP22512	140		5.51	3.15						
SDCP22614	160		6.30	3.15						
SDCP22700	180		7.09	3.15						
SDCP22858	220		8.66	3.15						
SDCP22912	240		9.45	3.15						
SDCP221100	280		11.02	3.15						
SDSP221134	300	11.81	3.15							
SDCP271400	360	0.701	14.17	3.15	0.325	0.394	0.246	195,000	2885	1860

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

<sup>1</sup>Length of thread includes tip. See Figure 3.

<sup>2</sup>Bending yield strength determined in accordance with ASTM F1575 using the minor thread (root) diameter,  $D_r$ .

<sup>3</sup>Allowable fastener strengths are based on steel properties of the screws.

<sup>4</sup>Refer to [Table 3A](#) for reference lateral ( $Z$ ) design values for wood-to-wood connections. Refer to [Table 3B](#) for reference withdrawal ( $W$ ) design values. Refer to [Table 3C](#) for reference pull-through ( $W_t$ ) design values. Refer to [Table 3D](#) for connection geometry parameters.

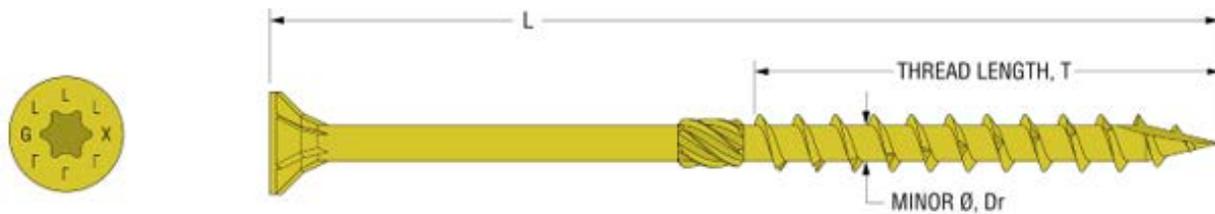


FIGURE 3-SDCP SCREWS

**TABLE 3A—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS FOR SDCP SCREWS<sup>1,2,3,4,5</sup>**

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
	Side Member Thickness (inches)							
	1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
<b>0.42 ≤ SG &lt; 0.50</b>								
SDCP22434	255	—	—	—	—	—	—	—
SDCP22512	255	320	—	—	—	—	—	—
SDCP22614	255	320	320	—	—	—	—	—
SDCP22700	255	320	320	320	—	—	—	—
SDCP22858	255	320	320	320	320	—	—	—
SDCP22912	255	320	320	320	320	—	—	—
SDCP221100	255	320	320	320	320	320	320	—
SDCP221134	255	320	320	320	320	320	320	—
SDCP271400	255	415	415	415	415	415	415	415
<b>0.50 ≤ SG</b>								
SDCP22434	360	—	—	—	—	—	—	—
SDCP22512	360	480	—	—	—	—	—	—
SDCP22614	360	480	480	—	—	—	—	—
SDCP22700	360	480	480	480	—	—	—	—
SDCP22858	360	480	480	480	480	—	—	—
SDCP22912	360	480	480	480	480	—	—	—
SDCP221100	360	480	480	480	480	480	480	—
SDCP221134	360	480	480	480	480	480	480	—
SDCP271400	360	600	600	600	600	600	600	600

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

<sup>1</sup>The main member and side members must be solid-sawn wood, GL or CLT with a minimum assigned specific gravity (SG) of either 0.42 or 0.50, as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections 3.2.6.1 and 3.2.6.4.

<sup>2</sup>Tabulated lateral design values (Z) must be multiplied by all applicable adjustment factors, including the load duration factor, C<sub>D</sub>, from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Screws must be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.

<sup>4</sup>Minimum fastener penetration must be equal to the screw length less the thickness of the wood side member.

<sup>5</sup>Tabulated reference lateral design values apply to loading parallel to the grain of the side member and either parallel or perpendicular to the grain of the main member.

**TABLE 3B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCP SCREWS INSTALLED IN THE SIDE GRAIN OF A WOOD MAIN MEMBER<sup>1,2,3</sup>**

FASTENER DESIGNATION	SCREW LENGTH, L (inches)	THREAD LENGTH, T (inch)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch)	
			0.42 ≤ SG < 0.50	0.50 ≤ SG
SDCP22434	4.72	3.15	185	200
SDCP22512	5.51	3.15		
SDCP22614	6.30	3.15		
SDCP22700	7.09	3.15		
SDCP22858	8.66	3.15		
SDCP22912	9.45	3.15		
SDCP221100	11.02	3.15		
SDCP221134	11.81	3.15		
SDCP271400	14.17	3.15	200	200

For SI: 1 inch = 25.4 mm, 1 lbf/inch = 175 N/m.

<sup>1</sup>The tabulated reference withdrawal design value, W, is in pounds per inch of the thread penetration into the side grain (or face grain) of the main member. Thread penetration is the portion of the threaded length held in the main member, including the screw tip.

<sup>2</sup>The tabulated reference withdrawal design value, W, must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Wood main members must have a minimum assigned specific gravity (SG) as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections 3.2.6.1 and 3.2.6.4.

**TABLE 3C—REFERENCE HEAD PULL-THROUGH DESIGN VALUES ( $W_H$ ) FOR SDCP SCREWS<sup>1,2,3</sup>**

FASTENER DESIGNATION	SIDE MEMBER THICKNESS (Inches)	REFERENCE PULL-THROUGH DESIGN VALUE, $W_H$ (lbf)	
		$0.42 \leq SG < 0.50$	$0.50 \leq SG$
SDCP22434	1.5	220	330
SDCP22512			
SDCP22614			
SDCP22700			
SDCP22858			
SDCP22912			
SDCP221100			
SDCP221134	1.5	290	420
SDCP271400			

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

<sup>1</sup>The side member must be solid-sawn lumber with a minimum assigned specific gravity (SG) of either 0.42 or 0.50, as indicated in the table above.

<sup>2</sup>Tabulated reference pull-through design values ( $W_H$ ) must be multiplied by all applicable adjustment factors, including the load duration factor,  $C_D$ , from the NDS as referenced in the IBC or IRC.

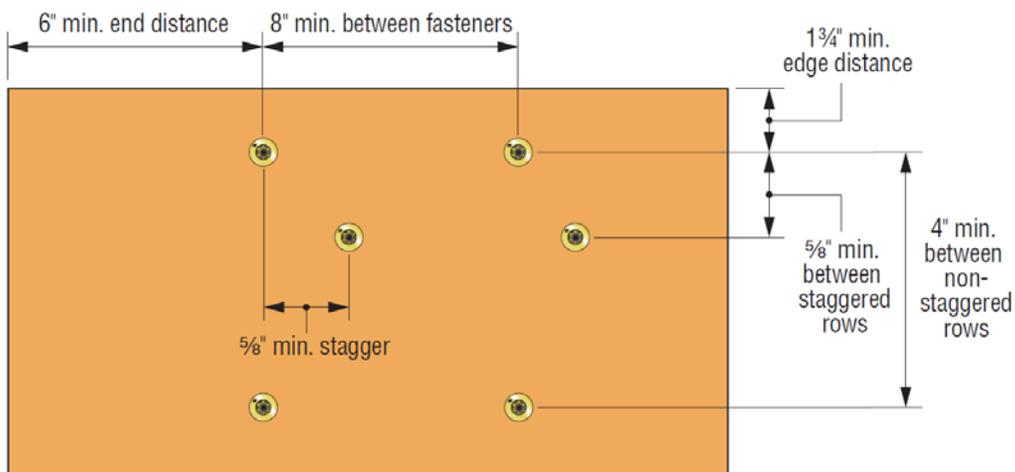
<sup>3</sup>Reference design values are for screws installed perpendicular to the face of the wood members.

**TABLE 3D—CONNECTION GEOMETRY FOR SDCP SCREWS<sup>1</sup>**

CONDITION		MINIMUM DISTANCE OR SPACING (in.)
Edge distance	Perpendicular to grain loading (Loaded or unloaded edge)	1.75
	Parallel to grain loading	1.75
End distance	Perpendicular to grain loading	6
	Parallel to grain loading (Loading toward or away from end)	6
Spacing (Loading parallel or perpendicular to grain)	Between fasteners in a row	8
	Between rows	4
	Between staggered rows	$\frac{5}{8}$ with a minimum stagger of $\frac{5}{8}$

For SI: 1 inch = 25.4 mm.

<sup>1</sup>Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive. See Figure 4 for a depiction of the required geometry.



**FIGURE 4—SDCP SCREW CONNECTION GEOMETRY**

TABLE 4—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCF SCREWS<sup>1,4</sup>

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)					SPECIFIED BENDING YIELD STRENGTH <sup>2</sup> , $F_{yb}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH <sup>3</sup> (lbf)	
		Head Diameter, $D_H$	Screw Length, $L$	Thread Length, $T$	Major Thread Diameter	Minor Thread (root) Diameter, $D_r$		Tension	Shear
SDCF22434	120	0.591	4.72	4.29	0.315	0.205	180,000	2000	1400
SDCF22512	140		5.51	5.08					
SDCF22614	160		6.30	5.87					
SDCF22700	180		7.09	6.65					
SDCF22858	220		8.66	8.23					
SDCF221014	260		10.24	9.80					
SDCF221134	300		11.81	11.38					
SDCF221334	350	13.78	13.35	0.394	0.240	200,000	3200	2300	
SDCF271958	500	19.69	19.02						
SDCF272358	600	23.62	22.95						

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

<sup>1</sup>Length of thread includes point. See Figure 5.

<sup>2</sup>Bending yield strength determined in accordance with ASTM F1575 using the minor thread (root) diameter,  $D_r$ .

<sup>3</sup>Allowable fastener strengths are based on steel properties of the screw.

<sup>4</sup>Refer to [Table 4A](#) for reference lateral ( $Z$ ) design values for wood-to-wood connections. Refer to [Table 4B](#) for reference withdrawal ( $W$ ) design values. Refer to [Table 4C](#) for reference pull-through ( $W_p$ ) design values. Refer to [Table 4D](#) for connection geometry parameters.

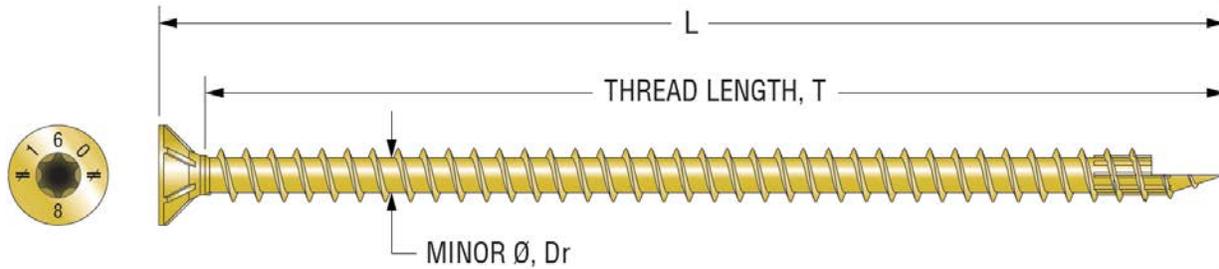


FIGURE 5—SDCF SCREWS (SDCF22614 Shown)

**TABLE 4A—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCF SCREWS<sup>1,2,3,4,5</sup>**

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
	Side Member Thickness (inches)							
	1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
<b>0.42 ≤ SG &lt; 0.50</b>								
SDCF22434	325	—	—	—	—	—	—	—
SDCF22512	325	325	—	—	—	—	—	—
SDCF22614	325	325	325	—	—	—	—	—
SDCF22700	325	325	325	325	—	—	—	—
SDCF22858	325	325	325	325	325	—	—	—
SDCF221014	325	325	325	325	325	—	—	—
SDCF221134	325	325	325	325	325	325	325	—
SDCF221334	325	325	325	325	325	325	325	325
SDCF271958	325	400	400	400	400	400	400	400
SDCF272358	325	400	400	400	400	400	400	400
<b>0.50 ≤ SG</b>								
SDCF22434	425	—	—	—	—	—	—	—
SDCF22512	425	425	—	—	—	—	—	—
SDCF22614	425	425	425	—	—	—	—	—
SDCF22700	425	425	425	550	—	—	—	—
SDCF22858	425	425	425	550	550	—	—	—
SDCF221014	425	425	425	550	550	550	—	—
SDCF221134	425	425	425	550	550	550	550	—
SDCF221334	425	425	425	550	550	550	550	550
SDCF271958	425	650	650	650	650	650	650	650
SDCF272358	425	650	650	650	650	650	650	650

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

<sup>1</sup>The main member and side members must be solid-sawn wood, GL or CLT with a minimum assigned specific gravity (SG) of either 0.42 or 0.50, as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections 3.2.6.1 and 3.2.6.5.

<sup>2</sup>Tabulated lateral design values (Z) must be multiplied by all applicable adjustment factors, including the load duration factor, C<sub>D</sub>, from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Screws must be installed straight into the side grain of wood members with the screw axis at a 90-degree angle to the wood surface.

<sup>4</sup>Minimum fastener penetration must be equal to the screw length less the thickness of the wood side member.

<sup>5</sup>Tabulated reference lateral design values for two member connections apply to combinations of grain orientations in the side and main members: side parallel-main parallel, side parallel-main perpendicular, and side perpendicular-main parallel.

**TABLE 4B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCF SCREWS INSTALLED IN THE SIDE GRAIN OF A WOOD MAIN MEMBER<sup>1,2,3</sup>**

FASTENER DESIGNATION	SCREW LENGTH, L (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch)	
		0.42 ≤ SG < 0.50	0.50 ≤ SG
SDCF22434	4.72	200	265
SDCF22512	5.51		
SDCF22614	6.30		
SDCF22700	7.09		
SDCF22858	8.66		
SDCF221014	10.24		
SDCF221134	11.81		
SDCF221334	13.78	200	265
SDCF271958	19.69		
SDCF272358	23.62		

For **SI**: 1 inch = 25.4 mm, 1 lbf/inch = 175 N/m.

<sup>1</sup>The tabulated reference withdrawal design value, W, is in pounds per inch of the thread penetration into the side grain (or face grain) of the main member. Thread penetration is the portion of the threaded length held in the main member, including the screw tip.

<sup>2</sup>The tabulated reference withdrawal design value, W, must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Wood main members must have a minimum assigned specific gravity or equivalent specific gravity (SG) as indicated in the table above. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections 3.2.6.1 and 3.2.6.5.

**TABLE 4C—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (W<sub>H</sub>) FOR SDCF SCREWS<sup>1,2,3</sup>**

FASTENER DESIGNATION	SIDE MEMBER THICKNESS (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, W <sub>H</sub> (lbf)	
		0.42 ≤ SG < 0.50	0.50 ≤ SG
SDCF22434	1.5	320	360
SDCF22512			
SDCF22614			
SDCF22700			
SDCF22858			
SDCF221014			
SDCF221134			
SDCF221334	1.5	320	360
SDCF271958			
SDCF272358			

For **SI**: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

<sup>1</sup>The side member must be solid-sawn lumber with a minimum assigned specific gravity (SG) of either 0.42 or 0.50, as indicated in the table above.

<sup>2</sup>Tabulated reference pull-through design values (W<sub>H</sub>) must be multiplied by all applicable adjustment factors, including the load duration factor, C<sub>D</sub>, from the NDS as referenced in the IBC or IRC.

<sup>3</sup>Reference design values are for screws installed perpendicular to the face of the wood members.

**TABLE 4D—CONNECTION GEOMETRY FOR SDCF SCREWS<sup>1</sup>**

CONDITION		MINIMUM DISTANCE OR SPACING (in.)
Edge distance	Perpendicular to grain loading (Loaded or unloaded edge)	1.75
	Parallel to grain loading	1.75
End distance	Perpendicular to grain loading	6
	Parallel to grain loading (Loading toward or away from end)	6
Spacing (Loading parallel or perpendicular to grain)	Between fasteners in a row	8
	Between rows	4
	Between staggered rows	0.625

For **SI**: 1 inch = 25.4 mm.

<sup>1</sup>Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive. See Figure 6 for a depiction of the required geometry.

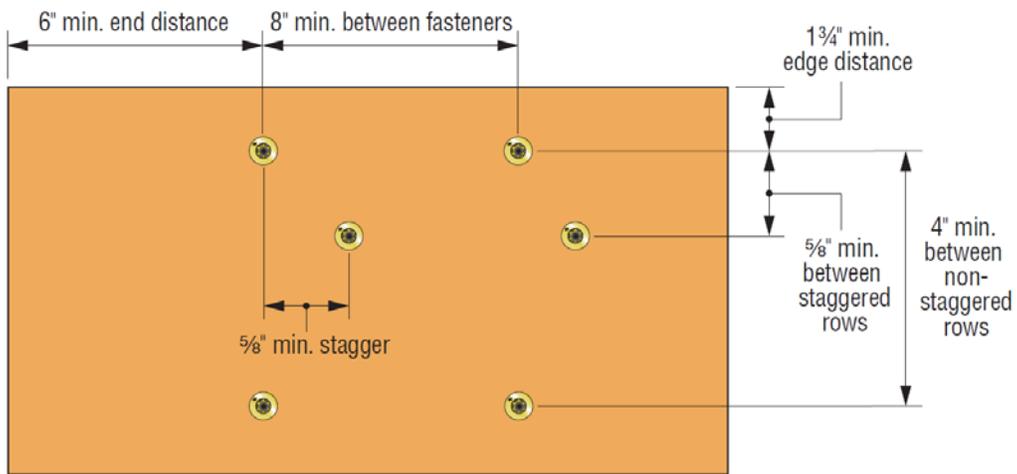


FIGURE 6—SDCF SCREW CONNECTION GEOMETRY

TABLE 5—SPECIFICATIONS AND FASTENER STRENGTHS FOR SDHR SCREWS<sup>1,6</sup>

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)							SPECIFIED BENDING YIELD STRENGTH <sup>4</sup> , $F_{yb}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH <sup>5</sup> (lbf)	
		Head Diameter, $D_h$ <sup>2</sup>	Shoulder Diameter, $D_s$	Screw Length, $L$ <sup>3</sup>	Thread Length <sup>1</sup> , $T$	Shank Diameter	Major Thread Diameter, $D$	Minor Thread (root) Diameter, $D_r$		Tension	Shear
SDHR27400	100	0.587	0.397	3.94	2.17	0.280	0.390	0.242	190,000	2500	1680
SDHR27614	160			6.30	4.33						
SDHR31400	100	0.665	0.475	3.94	2.17	0.319	0.469	0.270	200,000	3075	2150
SDHR31614	160			6.30	4.33						

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

<sup>1</sup>Length of thread includes point. See Figure 7.

<sup>2</sup>Measured across flats, as shown in Figure 7.

<sup>3</sup>The screw length excludes the head thickness.

<sup>4</sup>Bending yield strength determined in accordance with ASTM F1575 using the minor thread (root) diameter,  $D_r$ .

<sup>5</sup>Allowable fastener strengths are based on steel properties of the screws.

<sup>6</sup>Refer to [Table 5A](#) for reference lateral (Z) design values for steel-to-wood connections. Refer to [Table 5B](#) for reference withdrawal (W) design values. Refer to [Table 5C](#) for pull-over design values. Refer to [Table 5D](#) for connection geometry parameters.

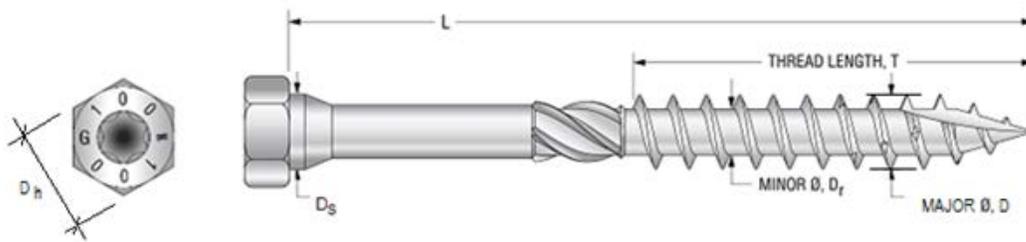


FIGURE 7—SDHR SCREW

**TABLE 5A—REFERENCE ALLOWABLE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR STEEL-TO-WOOD CONNECTIONS WITH SDHR SCREWS<sup>1,2,3,4,5</sup>**

FASTENER DESIGNATION	REFERENCE ALLOWABLE LATERAL DESIGN VALUE, Z (lbf)					
	Side Member Thickness, ga (mils)					
	16 (54)	14 (68)	12 (97)	10 (118)	7 (171)	3 (229)
SDHR27400	390	390	390	390	390	485
SDHR27614	390	390	390	390	390	485
SDHR31400	440	440	440	440	440	565
SDHR31614	440	440	440	440	440	565

For SI: 1 inch = 25.4 mm, 1 mil = 0.001 inch, 1 lbf = 4.45 N.

<sup>1</sup>The main member must be solid-sawn wood, GL or CLT with a minimum assigned specific gravity (SG) of 0.42 or an engineered wood product with a minimum grade of 1.3E and equivalent SG of at least 0.50.

<sup>2</sup>Steel side members must have the tabulated thickness and must comply with Section [3.2.7.2](#).

<sup>3</sup>Screws must be installed into the face or side grain of the wood main member with the screw axis at a 90-degree angle to the wood surface.

<sup>4</sup>Minimum fastener penetration must be equal to the screw length less the thickness of the side member.

<sup>5</sup>Tabulated reference lateral design values apply to parallel-to-grain and perpendicular-to-grain loading.

**TABLE 5B—REFERENCE ALLOWABLE WITHDRAWAL DESIGN VALUES (W) FOR SDHR SCREWS IN A WOOD MAIN MEMBER<sup>1-5</sup>**

FASTENER DESIGNATION	SCREW LENGTH, L (inches)	THREAD LENGTH, T (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch)	
			0.42 ≤ SG < 0.50	SG ≥ 0.5
SDHR27400	3.94	2.15	185	195
SDHR27614	6.30	4.30		
SDHR31400	3.94	2.15	195	195
SDHR31614	6.30	4.30		

For SI: 1 inch = 25.4 mm, 1 lbf/inch = 175 N/m.

<sup>1</sup>The tabulated reference allowable withdrawal design value, W, is in pounds per inch of the thread penetration into the side grain or face grain of the main member. Thread penetration is the portion of the threaded length held in the main member, including the screw point.

<sup>2</sup>The tabulated reference withdrawal design values, W, are shown for normal duration of load (C<sub>D</sub>=1.0) and must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.

<sup>3</sup>The wood member must be solid-sawn wood, GL or CLT with an assigned specific gravity (SG) as shown in the table. Values for SG ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections [3.2.6.1](#) and [3.2.6.6](#).

**TABLE 5C—REFERENCE ALLOWABLE HEAD PULL-OVER DESIGN VALUES FOR SDHR SCREWS<sup>1</sup>**

FASTENER DESIGNATION	REFERENCE PULL-OVER DESIGN VALUE (lbf)
	≥ 16ga (54 mils)
SDHR27400	500
SDHR27614	
SDHR31400	570
SDHR31614	

For SI: 1 inch = 25.4 mm, 1 mil = 0.001 inch; 1 lbf = 4.45 N.

<sup>1</sup>Steel side members must have the tabulated thickness and must comply with Section [3.2.7.2](#).

**TABLE 5D—CONNECTION GEOMETRY FOR SDHR SCREWS<sup>1,2</sup>**

CONDITION	MINIMUM DISTANCE OR SPACING (inches)	
Edge distance	Perpendicular to grain loading (Loaded or unloaded edge)	1.75
	Parallel to grain loading	1.75
End distance	Perpendicular to grain loading	6
	Parallel to grain loading (Loading toward or away from end)	6
Spacing (Loading parallel or perpendicular to grain)	Between fasteners in a row	4
	Between rows	3
	Between staggered rows	1.5

For SI: 1 inch = 25.4 mm.

<sup>1</sup>Wood edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

<sup>2</sup>Minimum steel edge distances, end distances and spacing of the screws shall be determined in accordance with [AISC 360](#).

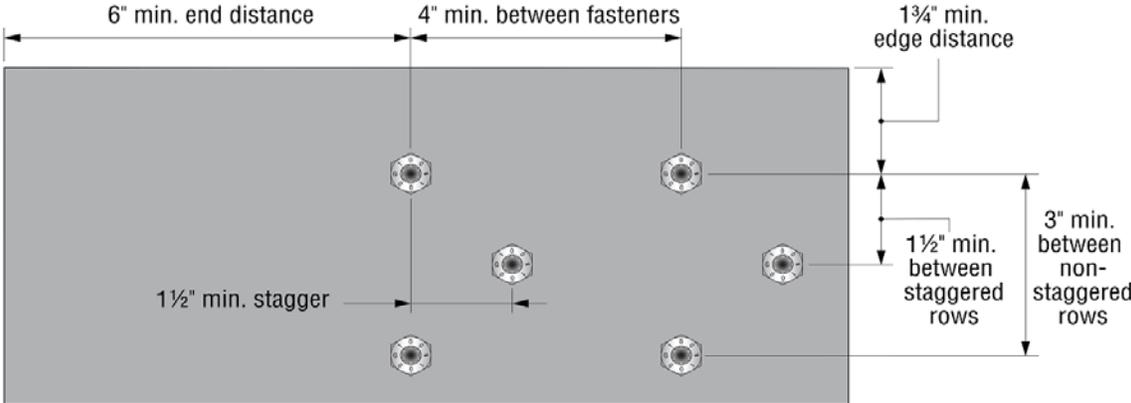


FIGURE 8—SDHR SCREW CONNECTION GEOMETRY

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 23—Wood, Plastic, and Composite Fastenings**

**REPORT HOLDER:**

**SIMPSON STRONG-TIE COMPANY INC.**

**EVALUATION SUBJECT:**

**SIMPSON STRONG-TIE® STRONG-DRIVE SCREWS USED IN WOOD**

**1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that the Simpson Strong-Tie® Strong-Drive screws used in wood, described in ICC-ES evaluation report [ESR-3046](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

**Applicable code editions:**

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

**2.0 CONCLUSIONS**

The Simpson Strong-Tie® Strong-Drive screws used in wood, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3046](#), comply with the LABC Chapter 23 and the LARC, and are subject to the conditions of use described in this supplement.

**3.0 CONDITIONS OF USE**

The Simpson Strong-Tie® Strong-Drive screws used in wood described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-3046](#).
- The design, installation, conditions of use and identification of the Simpson Strong-Tie® Strong-Drive screws used in wood are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-3046](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, 17 and 23, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued August 2020 and revised October 2020.

## ICC-ES Evaluation Report

## ESR-3046 FBC Supplement

Reissued August 2020

Revised October 2020

This report is subject to renewal August 2021.

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**DIVISION: 06 00 00—WOOD, PLASTIC AND COMPOSITES**  
**Section: 06 05 23—Wood, Plastic and Composite Fastenings**

### REPORT HOLDER:

**SIMPSON STRONG-TIE COMPANY INC.**

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**SIMPSON STRONG-TIE® STRONG-DRIVE SCREWS USED IN WOOD**

### 1.0 REPORT PURPOSE AND SCOPE

#### Purpose:

The purpose of this evaluation report supplement is to indicate that Simpson Strong-Tie® Strong-Drive Screws Used in Wood, described in ICC-ES evaluation report ESR-3046, have also been evaluated for compliance with the codes noted below.

#### Applicable code editions:

- 2020 and 2017 *Florida Building Code—Building*
- 2020 and 2017 *Florida Building Code—Residential*

### 2.0 CONCLUSIONS

The Simpson Strong-Tie® Strong-Drive Screws Used in Wood, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-3046, complies with the *Florida Building Code—Building* and *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-3046 for the 2018 and 2015 *International Building Code*® meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the Simpson Strong-Tie® Strong-Drive Screws Used in Wood have also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* with the following condition:

- a. For connections subject to uplift, the connection must be designed for no less than 700 pounds (3114 N).

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued August 2020 and revised October 2020.