

ICC-ES Evaluation Report

ESR-3046

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This report also contains:

- [City of LA Supplement](#)

- [FL Supplement w/HVHZ](#)

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<p>DIVISION: 06 00 00— WOOD, PLASTICS AND COMPOSITES</p> <p>Section: 06 05 23 – Wood, Plastic, and Composite Fastenings</p> <p>Section: 06 05 23.20 – Screws</p>	<p>REPORT HOLDER: SIMPSON STRONG-TIE COMPANY INC.</p> 	<p>EVALUATION SUBJECT: SIMPSON STRONG-TIE® STRONG-DRIVE SCREWS USED IN WOOD</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2024, 2021, 2018, 2015 and 2012 [International Residential Code® \(IRC\)](#)

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 3](#). These structural fasteners deviate from ANSI B18.2.1 and B18.6.1 standards.

The Simpson Strong-Tie Strong-Drive SD, SD9SS, SDWF, SDCF8, SDCF10, SDCF12, SDCFC8, SDCFC10, SDHR10 and SDHR12 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](#) and [5.5](#) and [Table 1D](#)). 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).

For structures regulated under the IRC, the Strong-Drive screws may be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 Notation and Symbols:

C_M	=	Wet-service factor
D	=	Outside thread diameter
D_H	=	Diameter of fastener head or integral washer
D_r	=	Minor thread (root) diameter
D_s	=	Unthreaded shank diameter
F_u	=	Minimum specified tensile strength of steel material
$F_{yb,spec}$	=	Minimum specified bending yield strength, determined in accordance with ASTM F1575 using D_r .
L	=	Fastener length measured from the bottom of the head or integral washer to the tip or from the top of the head to tip for embedded head designs, as shown in Figures 1, 3, 4, 6, 8 and 10 and in Figures A1, A3 and A5 .
$L_{emb,l}$	=	Minimum required embedded thread length in main member, including tip, applicable to tabulated lateral design values
$L_{emb,w}$	=	Minimum required embedded thread length in holding member applicable to tabulated withdrawal design values, which may or may not include the tip length. See the footnotes to withdrawal capacity tables.
L_{thread}	=	Length of thread including tip
L_{tip}	=	Length of tip
N_a	=	Allowable tension strength of the fastener for use in ASD
SG_{eq}	=	Equivalent specific gravity for structural composite lumber, as reported by ICC-ES
SG_{NDS}	=	Assigned specific gravity (See Section 3.3.6.1 .)
$t_{s,w}$	=	Thickness of wood side member
$t_{s,s}$	=	Base metal thickness of steel side member
V_a	=	Allowable shear strength of the fastener for use in ASD
W	=	Reference unit withdrawal design value for fasteners installed perpendicular to face of the wood
W_H	=	Reference head pull-through design value
Z	=	Reference lateral design value

3.2 Strong-Drive Screws:

3.2.1 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, except for the SD9112WDBB screw which has a wafer head. The length of the threaded portion of the shank is approximately 1 inch (25.4 mm). See [Table 1](#) and [Figure 1](#) for more information.

3.2.2 SDWF Screws: The SDWF screws have rolled $3/8$ -inch threads spaced 0.041 inch (1.05 mm) near the head, and $5/16$ -inch threads spaced 0.083 inch (2.1 mm) 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 3](#) for more information.

3.2.3 SDCP Screws: The SDCP screws have rolled threads, spaced 0.216 inch (5.5 mm) for the SDCP22 screws and 0.260 inch (6.6 mm) for the SDCP27 screws. 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 reamer knurl between the primary threads and the smooth shank. See [Table 3](#) and [Figure 4](#) for more information.

3.2.4 SDCF Screws: The SDCF screws are fully threaded with rolled threads, spaced 0.15 inch (3.8 mm) for SDCF8 and SDCF22 screws, 0.177 inch (4.5 mm) for SDCF10 and SDCF27 screws, and 0.244 inch (6.2 mm) for SDCF12 screws. They have a ribbed countersinking head with a six-lobe drive recess, and a proprietary point. See [Table 4](#) and [Figure 6](#) for more information regarding the SDCF8, SDCF10 and SDCF12 screws. See [Table A1](#) and [Figure A1](#) in Appendix A to this report for more information regarding the SDCF22 and SDCF27 screws.

3.2.5 SDCFC Screws: The SDCFC screws are fully threaded with rolled threads, spaced 0.15 inch (3.8 mm) for SDCFC8 screws and 0.177 inch (4.5 mm) for SDCFC10 and SDCFC27 screws. They have a cylinder head with a six-lobe drive recess, and a proprietary point. See [Table 5](#) and [Figure 8](#) for more information regarding the SDCFC8 and SDCFC10 screws. See [Table A6](#) and [Figure A3](#) in Appendix A to this report for more information regarding the SDCFC27 screws.

3.2.6 SDHR Screws: The SDHR screws are partially threaded screws, with rolled threads spaced 0.177 inch (4.5 mm) for SDHR10 and SDHR27 screws and 0.236 inch (6 mm) for SDHR12 and 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, under-head shoulder, and a Type-17 point. See [Table 6](#) and [Figure 10](#) for more information regarding the SDHR10 and SDHR12 screws. See [Table A11](#) and [Figure A5](#) in Appendix A to this report for more information regarding the SDHR27 and SDHR31 screws.

3.3 Materials:

3.3.1 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, or have a proprietary corrosion-resistant coating indicated by "DBB" in the fastener designation. The SD9SS are manufactured from stainless steel Type 316 using a standard cold-forming process.

3.3.2 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.

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

3.3.4 SDCF and SDCFC Screws: The SDCF and SDCFC screws are manufactured from ASTM A510, Grade 10B21, steel wire. The SDCF8, SDCF10, SDCF12, SDCFC8 and SDCFC10 screws are coated with a proprietary black electrocoat base coat and have a maximum core hardness of 36 HRC. The SDCF22, SDCF27 and SDCFC27 screws have a yellow zinc coating.

3.3.5 SDHR Screws: The SDHR screws are manufactured from ASTM A510, Grade 10B21, steel wire. The SDHR10 and SDHR12 screws are coated with a proprietary black electrocoat base coat and have a maximum core hardness of 36 HRC. The SDHR27 and SDHR31 screws have either a blue-zinc coating or zinc-nickel coating.

3.3.6 Wood Members:

3.3.6.1 General: Wood members may be sawn lumber; structural glued laminated timber (glulam); wood structural panels and structural composite lumber (SCL). Screws may also be used in the face of cross-laminated timber (CLT) panels. Use of the screws in engineered wood products (EWP) other than those addressed above is outside the scope of this report.

For the purposes of connection design, solid-sawn wood members, glulam, CLT members and wood structural panels must have SG_{NDS} as indicated in the tables in this report, and the moisture content must be less than or equal to 19 percent at the time of screw installation and while in service, unless otherwise noted. SG_{NDS} for solid-sawn lumber must be determined in accordance with Table 12.3.3A of the ANSI/AWC National Design Specification (NDS) for Wood Construction[®] (Table 11.3.3A of NDS-12 for the 2012 IBC) or the latest NDS Supplement. SG_{NDS} for glulam members is the Specific Gravity for Fastener Design addressed in Tables 5A through 5D of the NDS Supplement. When designing connections with screws installed into CLT panels, all of the laminations must have a minimum SG_{NDS} as indicated in the tables in this report.

Wood structural panels must comply with DOC PS1 or PS2. For purposes of lateral connection design, wood structural panels have SG_{NDS} of 0.42 or 0.50 in accordance with Table 12.3.3B of the NDS (Table 11.3.3B of NDS-12).

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 SG_{eq} of 0.50. The minimum grade must be in accordance with Sections [3.3.6.2](#) and [3.3.6.4](#) through [3.3.6.6](#), as applicable. 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.

For wood-to-wood connections, the tabulated side member thickness is an absolute value (not a minimum or maximum value). The thickness of the wood main member must be sufficient to ensure that the tip of the screw is fully embedded in the wood.

3.3.6.2 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.

3.3.6.3 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.

3.3.6.4 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.

3.3.6.5 Wood Members Used with SDCF and SDCFC 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.

3.3.6.6 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.

3.3.7 Steel Members:

3.3.7.1 General: Steel side plates must be designed in accordance with AISI S100 or AISC 360, as applicable. If the connection capacity is controlled by the steel member, the design values must not be increased by the adjustment factors described in Section [4.1.5](#).

3.3.7.2 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.

3.3.7.3 Steel Side Members Used with SDCP22 Screws: For connections using the SDCP22 screws, steel side members must have a minimum tensile strength, F_u , equal to 58 ksi (400 MPa), and minimum design thickness (base-metal thickness exclusive of any coatings) of 0.360 inch (9.1 mm). The hole in the steel side member for the SDCP screw must be predrilled or pre-punched. The top of the hole must have a diameter of between 0.605 and 0.625 inch (15.4 and 15.9 mm) and be countersunk with an angle of 90 degrees centered on the axis of the screw, with a 10 degree tolerance, with the remainder of the hole having a constant diameter of 0.375 inch (9.5 mm).

3.3.7.4 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 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 pre-punched, and must be a standard round hole no greater than 0.4375 inch (11.11 mm) in diameter for the SDHR10 and SDHR27 screws, and no greater than 0.500 inch (12.7 mm) in diameter for the SDHR12 and 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. The designer is responsible for determining the required spacing, edge distance and end distance for the screws, based on the characteristics of the connected building materials. This report provides the following design information:

1. SD and SD9SS screw strengths and reference design values for SD and SD9SS screws used in wood-to-wood and steel-to-wood connections. See [Table 1](#) for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.

2. SDWF screw tension strength (N_a) and reference withdrawal design values (W) for SDWF screws. See [Table 2](#) for N_a and reference to the applicable tables for other design information.
3. SDCP screw strengths and reference design values for SDCP screws used in steel-to-wood and wood-to-wood connections. See [Table 3](#) for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.
4. SDCF8, SDCF10 and SDCF12 screw strengths and reference design values for these screws used in wood-to-wood connections. See [Table 4](#) for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.
5. SDCFC8 and SDCFC10 screw strengths and reference design values for these screws used in wood-to-wood connections. See [Table 5](#) for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.
6. SDHR10 and SDHR12 screw strengths and reference design values for these screws used in two-member steel-to-wood connections. See [Table 6](#) for N_a , V_a , $F_{yb,spec}$ and reference to applicable tables for other design information.
7. SDCF22 and SDCF27 screw strengths and reference design values for these screws used in wood-to-wood connections. See [Table A1](#) in Appendix A to this report for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.
8. SDCFC27 screw strengths and reference design values for these screws used in wood-to-wood connections. See [Table A6](#) in Appendix A to this report for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.
9. SDHR27 and SDHR31 screw strengths and reference design values for these screws used in two-member steel-to-wood connections. See [Table A11](#) in Appendix A to this report for N_a , V_a , $F_{yb,spec}$ and reference to the applicable tables for other design information.

4.1.2 Reference Withdrawal and Pull-through Design Values: Reference withdrawal (W) design values in pounds per inch of thread penetration and reference head pull-through values (W_H) are shown in tables in this report. The tabulated W values must be multiplied by the embedded thread length, including or excluding the tip length (as indicated in the footnotes to the withdrawal design value tables), to determine the total reference withdrawal design value in lbf (N). Tabulated reference withdrawal design values apply to screws installed into the side grain of the wood main member with the screw axis at a 90-degree angle to the surface of the wood. For screws used with wood side members, reference head pull-through values (W_H) apply to screws installed into the side grain of the wood side member with the screw axis at an angle between 30° and 90° to the grain. For screws with threads embedded in the side member, the reference pull-through design value is the greater of the tabulated value and the reference withdrawal design value in the side member. Spacing, edge and end distance for axially loaded screws must be in accordance with the footnotes to the applicable load table and as needed to prevent splitting of the wood.

4.1.3 Lateral Connections in Accordance with the NDS – SD and SD9SS Screws: The reference lateral design strength for connections of two or more wood members using the Strong-Drive SD and SD9SS screws may be designed in accordance with the NDS, subject to the following conditions:

1. The applicable $F_{yb,spec}$ from the tables in this report must be used for design.
2. D_r must be used where 'D' is referenced in Tables 12.3.1A, 12.3.1B and 12.3.3 of the NDS (Tables 11.3.1A, 11.3.1B and 11.3.3 of the 2012 NDS for the 2012 IBC).
3. Wood must have SG_{NDS} of 0.55 or less.
4. Wood side members must have a thickness equal to or greater than the minimum side member thickness shown in [Table 1A](#).
5. The screw penetration into the main member must be a minimum of $6D$.
6. The dowel bearing length in the main member is the length of fastener penetration less $E/2$, where E is 2 times the major thread diameter of the screw.
7. Spacing, edge and end distance must be in accordance with [Table 7A](#) or the connection geometry table applicable to the screw model, whichever is smaller, and as needed to prevent splitting of the wood.

4.1.4 Lateral Connections in Accordance with the NDS – SDCP, SDCF, SDCFC and SDHR Screws: The reference lateral design strength for connections of two or more wood members using the SDCP, SDCF and SDCFC screws and for steel-to-wood connection using the SDCP or SDHR screws may be determined in accordance with the NDS, subject to the following conditions:

1. The applicable $F_{yb,spec}$ from the tables in this report must be used for design.

2. D_r must be used where 'D' is referenced in Tables 12.3.1A, 12.3.1B and 12.3.3 of the NDS (Tables 11.3.1A, 11.3.1B and 11.3.3 of the 2012 NDS for the 2012 IBC).
3. Wood must have SG_{NDS} of 0.55 or less.
4. For wood-to-wood connections with the SDCP, SDCF and SDCFC screws, the side member must have a thickness equal to or greater than $5D$, and the screw penetration into the main member must be a minimum of $6D$.
5. For steel-to-wood connections with SDCP or SDHR screws, steel side members must comply with Section 3.3.7, and the screw penetration into the main member must be a minimum of $6D$.
6. For the SDCP screws, the dowel bearing length in the main member is the length of fastener penetration less $E/2$, where E is 2 times the major thread diameter of the screw. For the SDCF, SDCFC and SDHR screws, the dowel bearing length in the main member is the length of fastener penetration less the tip length, L_{tip} , given in Tables 4, 5 and 6, respectively.
7. Spacing, edge and end distance must be in accordance with Table 7B and as needed to prevent splitting of the wood.

4.1.5 Two-member Wood-to-wood and Steel-to-wood Connections Based on Testing: For select connection configurations with SD, SD9SS, SDCP, SDCF, SDCFC and SDHR screws, testing has been conducted to determine reference lateral design values. These reference lateral design values based on testing are shown in tables in this report, as referenced in Tables 1, 3, 4, 5 and 6 and Tables A1, A6 and A11A and must be adjusted by all applicable adjustment factors. Tabulated reference lateral design values apply to screws installed into the side grain of the wood main member with the screw axis at a 90-degree angle to the surface of the wood. Tabulated values apply to wood side and main members of the same assigned or equivalent specific gravity (SG). When the SG of the main and side members are different, the tabulated design values applicable to wood with the lower SG must be used.

4.1.6 Adjustments to Reference Design Values: Reference design values must be adjusted in accordance with the NDS provisions for dowel-type fasteners, including the wet service factor, C_M , where applicable, to determine allowable strengths for use with ASD and/or design strengths for use with LRFD. For the SDWF, SDCP, SDCF, SDCFC 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.

4.1.7 Connections with Multiple Screws: See Sections 11.1.2, 11.2.2 and 12.6 of the NDS (Sections 10.1.2, 10.2.2 and 11.6 of NDS-12 for the 2012 IBC) regarding multiple fastener connections and consideration of local stresses in the wood member.

4.1.8 Combined Loading: Where the screws are subjected to combined lateral and withdrawal loads, connections must be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of NDS-12 for the 2012 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 ± 2 degrees). Structural members forming the connection must be designed in accordance with the code.

4.2 Corrosion Resistance:

The SD, SDWF, SDCF8, SDCF10, SDCF12, SDCFC8, SDCFC10, SDHR10 and SDHR12 screws, which have a black e-coating, may be used in southern pine and other species groups grown and commercially available in the United States, when treated with waterborne alkaline copper quaternary, Type D (ACQ-D), preservatives with a maximum retention of 0.40 pcf (6.4 kg/m³), subject to the limitations described in Table 1D. They may be used in other treated wood products that have been demonstrated to have lower levels of corrosivity. The SD9SS stainless steel screws may be used as prescribed in IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5, 2012 IBC 2304.9.5) and 2024 IRC Section R304.3 (2021, 2018, 2015 and 2012 IRC Section R317.3).

4.3 Installation:

4.3.1 General: The Strong-Drive screws must be installed in accordance with the report holder's published installation instructions and this report. In the case of a conflict between this report and the report holder's instructions, the more restrictive requirements govern. The screws must be installed at the angle required by the construction documents, with the minimum spacing, end distances, and edge distances needed to prevent splitting of the wood or as noted in 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 screws must not be overdriven. The screws must be installed with the applicable type of driver listed in the table below:

Screw Series	Driver
SD, SD9SS	1/4-inch (6.35 mm) hex head driver
SD9112WDBB	6-lobe T15
SDWF	5/16-inch (7.94 mm) hex head driver
SDHR10, SDHR27	6-lobe T40, or 19/32-inch (15mm) hex head driver
SDHR12, SDHR31	6-lobe T40, or 11/16-inch (17mm) hex head driver
SDCP22, SDCF8, SDCFC8	6-lobe T40
SDCP27, SDCF10, SDCF12, SDCFC10, SDCFC12	6-lobe T50

Installation may be performed without predrilling. When predrilling is desired to facilitate installation, mitigate the potential for splitting or to achieve reduced connection geometry requirements, it must be performed in accordance with the table below:

Screw Model Series	Pre-drill Bit Diameter (inch)
SD9, SD10	3/32
SDCP22, SDCF8, SDCF22, SDCFC8	3/16
SDCP27, SDCF10, SDCF27, SDCFC10, SDCFC27, SDHR10, SDHR27	7/32
SDCF12, SDHR12, SDHR31	15/64

4.3.2 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. SD and SD9SS screws must be installed such that the threaded portion of the shank is fully embedded within the main member.

4.3.3 SDWF Screws: The SDWF screw must be installed through the hole in the center of the TUV, normal to the plane of the TUV, 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 TUV side tabs downward, thereby engaging the shank of the screw. The go/no-go gage, supplied with the TUV, must be used in accordance with the manufacturer's installation instructions to ensure proper installation. See [Figure 3](#) for a typical installation detail of the SDWF.

4.3.4 SDCP Screws: When installing SDCP screws, the top of the screw head must be flush to the surface of the member being connected. SDCP screws must be installed such that the threaded portion of the shank is fully embedded within the main member.

4.3.5 SDCF and SDCFC Screws: When installing SDCF and SDCFC screws, the top of the screw head must be flush to the surface of the member being connected. The portion of the screw length less the side member thickness must be fully embedded in the main member.

4.3.6 SDHR Screws: When installing SDHR screws, the bottom of the screw head must bear on 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 Calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.3 Connection design for lateral loading applications using inclined fasteners is outside the scope of this report.
- 5.4 Connection geometry for inclined fastening must be justified to the satisfaction of the code official, including the minimum required wood thickness between crossing fasteners.
- 5.5 The SD, SD9SS, SDWF, SDCF8, SDCF10, SDCF12, SDCFC8, SDCFC10, SDHR10 and SDHR12 screws may be used in treated wood and corrosion conditions as described in section [4.2](#). Except for the SD9SS screws, use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.

- 5.6 The SDWF screws are limited to use with the Simpson Take-Up Washer (TUW), as described in ESR-2320.
- 5.7 The SDWF, SDCP, SDCF, SDCFC and SDHR screws must be limited to use in dry conditions, with wood having a moisture content of 19 percent or less at the time of screw installation and while in service.
- 5.8 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 June 2023 (editorially revised June 2024).
- 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 June 2023 (editorially revised May 2024).
- 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 (editorially revised February 2024).

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-3046) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, packages of fasteners are labeled with the fastener designation and the fastener size. Each SD, SD9SS, SDWF, SDCF22 and SDCF27 screw head is marked with the No-Equal[®] symbol (≠), and an alpha-numeric designation for the screw size and length, as shown in [Tables 1, 2 and 4](#) and [Table A1](#). Each SDCP screw head is marked with a “G” and an “X” and numbers designating the screw length (mm), as shown in [Table 3](#). Each SDCF8, SDCF10 and SDCF12 screw head is marked with a “G”, the No-Equal[®] symbol (≠), a number designating the screw size (mm) and numbers designating the screw length (mm), as shown in [Table 4](#). The SDCFC27 screw head is unmarked. The SDCFC8 and SDCFC10 screw head is marked with the No-Equal[®] symbol (≠), and numbers designating the screw length (mm), as shown in [Table 5](#). Each SDHR screw head is marked with a “G”, the No-Equal[®] symbol (≠), and numbers designating the screw length (mm), as shown in [Table 6](#) or [Table A11](#), as applicable. The SDWF screw is packaged with the Take-Up Washer (TUW) and a go/no-go gage for use in installation.
- 7.3 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

TABLE 1—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SD AND SD9SS SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW DIMENSIONS (inches)						$F_{yb,spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H	L	L_{thread}	D_s	D	D_r		N_a	V_a
SD9112 / SD9112DBB / SD9112WDBB	915	0.378	1.5	1.0	0.132	0.177	0.113	188,000	510	425
SD9212 / SD9212DBB	925		2.5		0.139	0.169	0.121	155,000	530	440
SD9112SS	915		1.5							
SD9212SS	925		2.5							
SD10112/SD10112DBB	1015		1.5							
SD10212	1025		2.5							

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

¹Refer to [Table 1A](#) for reference lateral (Z) design values for steel-to-wood and wood-to-wood connections determined from testing. For connections not addressed in Table 1A, refer to [Section 4.1.3](#) for determination of reference lateral design values in accordance with the NDS. 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 2024 and 2018 NDS. Refer to [Table 1D](#) for applicable exposure conditions for the SD screws.

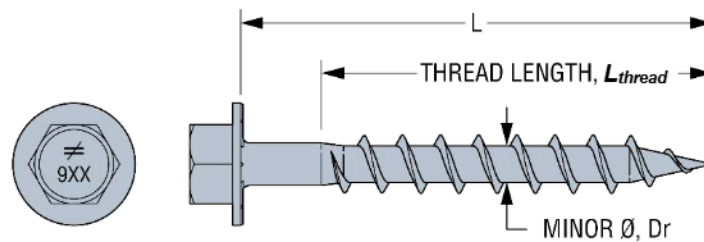


FIGURE 1—SD AND SD9SS SCREWS

TABLE 1A—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR STEEL-TO-WOOD AND WOOD-TO-WOOD CONNECTIONS WITH SD AND SD9SS SCREWS^{1,2,3,6}

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
	Steel-to-Wood ⁴		Wood-to-Wood ⁵					
	$0.42 \leq SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.50$	$0.42 \leq SG_{NDS} < 0.50$			$SG_{NDS} \geq 0.50$		
			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 / SD9112DBB / SD9112WDBB / SD9112SS	112	171	93	—	—	105	—	—
SD9212 / SD9212DBB / 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.

¹Unless otherwise noted, the main member and wood side members must be solid-sawn wood, GL or CLT. Main members must have a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in Sections [3.3.6.1](#) and [3.3.6.2](#).

²Minimum fastener penetration must be equal to the screw length less the thickness of the metal side plate or wood side member.

³Tabulated reference lateral design values apply to both parallel- and perpendicular-to-grain loading.

⁴See Section [3.3.7.2](#) for steel side member requirements.

⁵The nominal 15/32- and 23/32-inch-thick side members must be plywood or OSB with SG_{NDS} of either 0.42 or 0.50, as indicated in the table above.

⁶Refer to [Table 1C](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 1B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SD AND SD9SS SCREWS^{1,2}

FASTENER DESIGNATION	L (inches)	L _{thread} (inch)	L _{emb,w} (inch) ³	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
				0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS}
SD9112 / SD9112DBB / SD9112WDBB / SD9112SS	1.5	1.0	1	122	173
SD9212 / SD9212DBB / SD9212SS	2.5				
SD10112/SD10112DBB	1.5			122	173
SD10212	2.5				

For SI: 1 inch = 25.4 mm, 1 lbf/inch = 0.175 N/mm.

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into engineered wood products described in Sections 3.3.6.1 and 3.3.6.2.

²Refer to Table 7A for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, W, must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE 1C—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SD AND SD9SS SCREWS ADDRESSED IN TABLE 1A

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)	
			Main Member	Wood Side Member
Edge Distance	Perpendicular	①	1	1
	Parallel	①	1/2	1/2
End Distance	Perpendicular	②	2	2 7/16
	Parallel	②	2	2 7/16
Spacing Between Fasteners in a Row	Perpendicular	③	2	2 7/16
	Parallel	④	2	2 7/16
Spacing Between Rows of Fasteners	Perpendicular	⑤	1/2	13/16
	Parallel	⑥	1/2	13/16
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	1/2	1/2

For SI: 1 inch = 25.4 mm.

¹Edge 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 2 for a depiction of the required geometry.

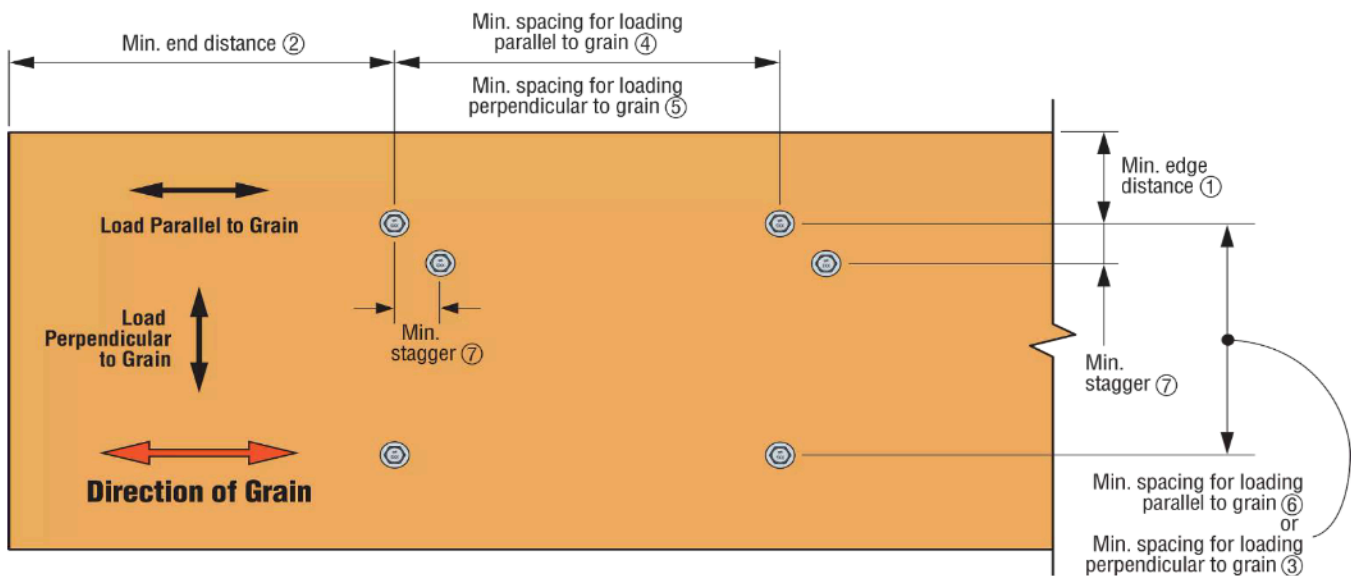


FIGURE 2—SD SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE 1C

TABLE 1D—APPLICABLE EXPOSURE CONDITIONS FOR SIMPSON STRONG-TIE SD, SDWF, SDCF8, SDCF10, SDCF12, SDCFC8, SDCFC10, SDHR10 AND SDHR12 SCREWS

EXPOSURE CONDITION	TYPICAL APPLICATIONS	APPLICATION LIMITATIONS ¹
1	Treated wood in dry use applications	Limited to use where equilibrium moisture content of the chemically treated wood meets the dry service conditions as described in the NDS with occasional exposure to high humidity.
3	General construction	Limited to freshwater and chemically treated wood exposure, without saltwater exposure

¹Treated wood refers to the specific wood species, treatment and retention level described in [Section 4.2](#).

TABLE 2—SCREW SPECIFICATIONS AND FASTENER STRENGTH FOR SDWF SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						FASTENER ALLOWABLE STEEL TENSION STRENGTH, N_a (lbf)
		D_H	L	L_{thread}	Unthreaded Shank Length, $L - L_{thread}$	D	D_r	
SDWF2716	16	0.750	16.0	5.0	11.0	0.322	0.245	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.

¹Refer to [Table 2A](#) for reference withdrawal (W) design values. Refer to [Table 1D](#) for applicable exposure conditions.

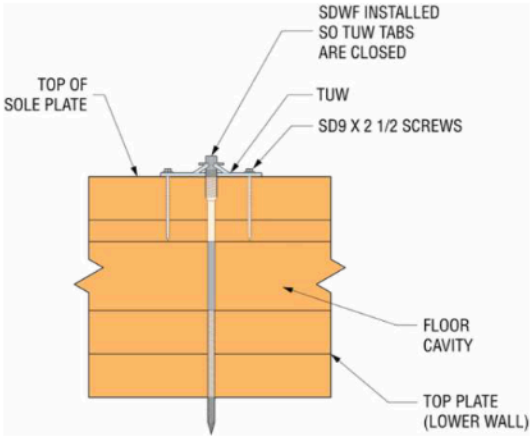
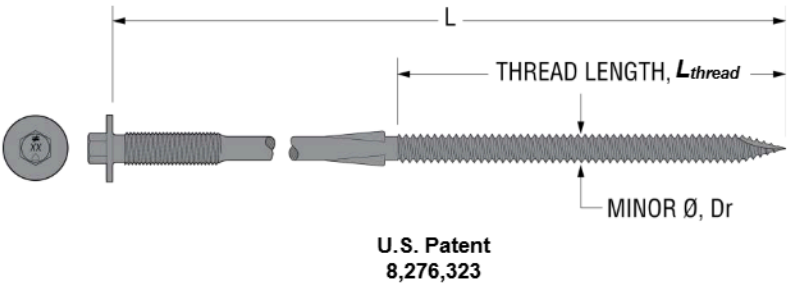


FIGURE 3—SDWF SCREWS AND INSTALLATION

TABLE 2A—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDWF SCREWS¹

FASTENER DESIGNATION	L (inches)	L _{thread} (inches)	L _{emb,w} (inches) ³	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴		
				0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS} < 0.55	SG _{NDS} ≥ 0.55
SDWF2716	16.0	5.0	3	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 = 0.175 N/mm.

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. See Section 3.3.6.3 for additional wood material requirements.

²Refer to Table 2B for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, W, must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE 2B—CONNECTION GEOMETRY FOR AXIALLY-LOADED SDWF SCREWS ADDRESSED IN TABLE 2A^{1,2}

CONDITION ¹		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.

¹Edge 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.

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

TABLE 3—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCP SCREWS¹

FASTENER DESIGNATION	HEAD MARKING 'LLL'	SCREW SPECIFICATIONS (inches)						F _{yb,spec} (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D _H	L	L _{thread}	D _s	D	D _r		N _a	V _a
SDCP22318	80	0.577	3.15	1.97	0.228	0.309	0.208	185,000	2045	1335
SDCP22434	120		4.72	3.15						
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						
SDCP221134	300		11.81	3.15						
SDCP27400	100	0.701	3.94	1.97	0.276	0.394	0.246	195,000	2885	1860
SDCP27614	160		6.30	3.15						
SDCP27778	200		7.87	3.15						
SDCP27912	240		9.45	3.15						
SDCP271100	280		11.02	3.15						
SDCP271212	320		12.60	3.15						
SDCP271400	360		14.17	3.15						

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

¹Refer to Table 3A for reference lateral (Z) design values for steel-to-wood connections and Table 3B for reference lateral (Z) design values for wood-to-wood connections determined from testing. For connections not addressed in Table 3A or 3B, refer to Section 4.1.4 for determination of reference lateral design values in accordance with the NDS. Refer to Table 3C for reference withdrawal (W) design values. Refer to Table 3D for reference pull-through (W_t) design values.

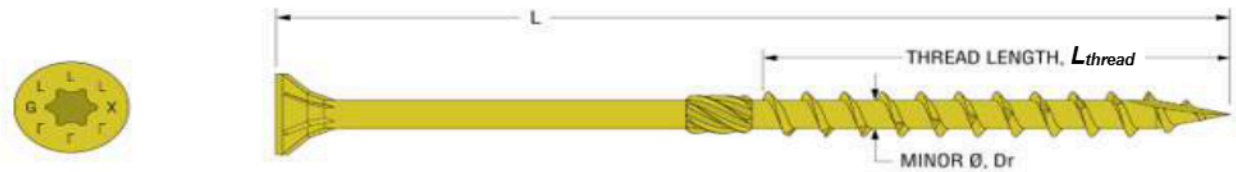


FIGURE 4—SDCP SCREWS

TABLE 3A—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR STEEL-TO-WOOD CONNECTIONS FOR SDCP SCREWS^{1,2,3,4}

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)	
	0.50 ≤ SG	0.42 ≤ SG < 0.50
SDCP22318	535	410

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

¹The main member 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 [3.3.6.1](#) and [3.3.6.4](#).

²See Section [3.2.7.2](#) for steel side member requirements.

³Minimum fastener penetration must be equal to the screw length less the thickness of the metal side plate.

⁴Refer to [Table 3E](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 3B—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS FOR SDCP SCREWS^{1,2,3,4}

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
	$t_{s,w}$ (inches)							
	1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
0.42 ≤ SG_{NDS} < 0.50								
SDCP22318	245	—	—	—	—	—	—	—
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	—
SDCP27400	255	—	—	—	—	—	—	—
SDCP27614	255	415	415	—	—	—	—	—
SDCP27778	255	415	415	415	—	—	—	—
SDCP27912	255	415	415	415	415	—	—	—
SDCP271100	255	415	415	415	415	415	415	—
SDCP271212	255	415	415	415	415	415	415	—
SDCP271400	255	415	415	415	415	415	415	415
0.50 ≤ SG_{NDS}								
SDCP22318	340	—	—	—	—	—	—	—
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	—
SDCP27400	360	—	—	—	—	—	—	—
SDCP27614	360	600	600	—	—	—	—	—
SDCP27778	360	600	600	600	—	—	—	—
SDCP27912	360	600	600	600	600	—	—	—
SDCP271100	360	600	600	600	600	600	600	—
SDCP271212	360	600	600	600	600	600	600	—
SDCP271400	360	600	600	600	600	600	600	600

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

¹The main member and side members must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in Sections 3.3.6.1 and 3.3.6.4.

²Minimum fastener penetration, $L_{emb,i}$, must be equal to the screw length less the thickness of the wood side member.

³Tabulated 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.

⁴Refer to Table 3E for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 3C—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCP SCREWS^{1,2}

FASTENER DESIGNATION	L (inches)	L_{thread} (inches)	$L_{emb,w}$ (inches) ³	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
				$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCP22318	3.15	1.97	1.97	179	184
SDCP22434	4.72	3.15	2.2	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			
SDCP27400	3.94	1.97	1.97	179	184
SDCP27614	6.30	3.15	3.15	200	200
SDCP27778	7.87	3.15			
SDCP27912	9.45	3.15			
SDCP271100	11.02	3.15			
SDCP271212	12.60	3.15			
SDCP271400	14.17	3.15			

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

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in Sections 3.3.6.1 and 3.3.6.4.

²Refer to Table 7B for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, W , must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE 3D—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (W_H) FOR SDCP SCREWS^{1,2}

FASTENER DESIGNATION	$t_{s,w}$ (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, W_H (lbf)	
		$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCP22318	1.5	220	330
SDCP22434			
SDCP22512			
SDCP22614			
SDCP22700			
SDCP22858			
SDCP22912			
SDCP221100			
SDCP221134			
SDCP27400	1.5	290	420
SDCP27614			
SDCP27778			
SDCP27912			
SDCP271100			
SDCP271212			
SDCP271400			

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

¹The side member must be solid-sawn lumber with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above.

²Refer to Table 7B for connection geometry parameters associated with the tabulated values for axially loaded screws.

TABLE 3E—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDCP SCREWS ADDRESSED IN TABLES 3A AND 3B¹

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

For SI: 1 inch = 25.4 mm.

¹Edge 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 5](#) for a depiction of the required geometry.

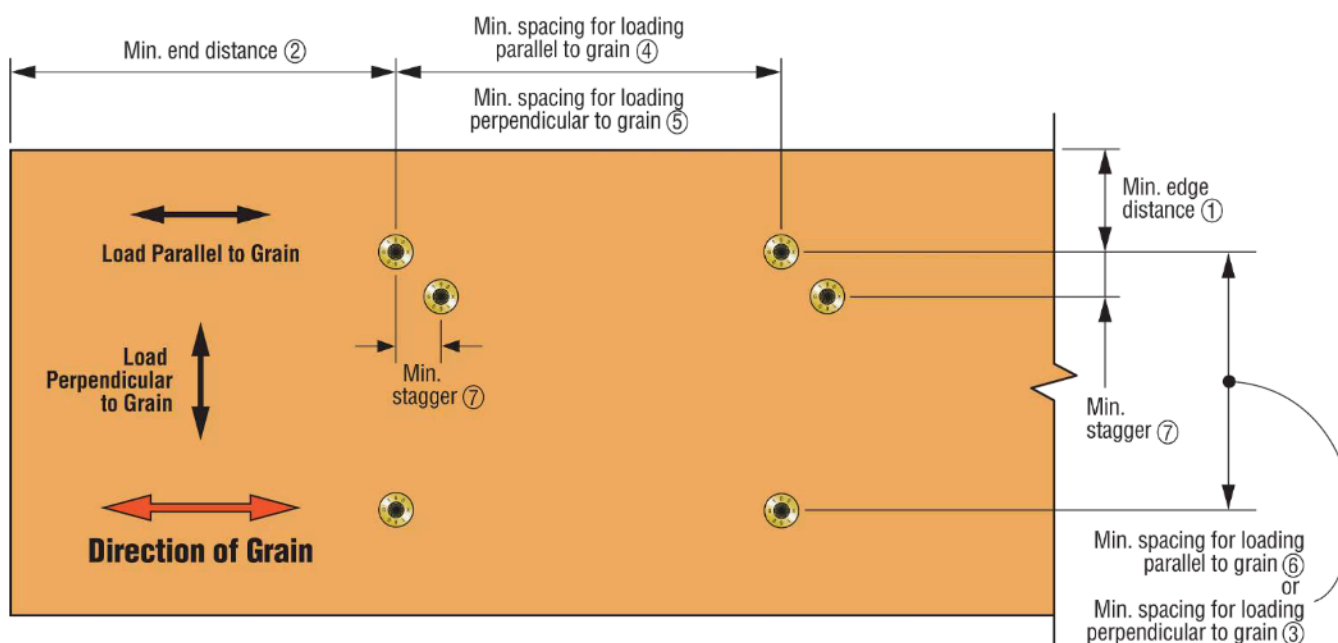


FIGURE 5—SDCP SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE 3E

TABLE 4—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCF8, SDCF10 and SDCF12 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						$F_{yb,spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H	L	L_{thread}	D	D_r	L_{tip}		N_a	V_a
SDCF8X120	120	0.591	4.72	4.33	0.315	0.205	0.383	185,000	1,710	1,025
SDCF8X140	140		5.51	5.12						
SDCF8X160	160		6.30	5.91						
SDCF8X180	180		7.09	6.69						
SDCF8X200	200		7.87	7.48						
SDCF8X220	220		8.66	8.27						
SDCF8X240	240		9.45	9.06						
SDCF8X260	260		10.24	9.84						
SDCF8X300	300		11.81	11.42						
SDCF8X350	350		13.78	13.39						
SDCF10X100	100	0.728	3.94	3.47	0.394	0.245	0.457	190,000	2,735	1,545
SDCF10X160	160		6.30	5.83						
SDCF10X200	200		7.87	7.40						
SDCF10X240	240		9.45	8.98						
SDCF10X280	280		11.02	10.55						
SDCF10X360	360		14.17	13.70						
SDCF10X400	400		15.75	15.28						
SDCF10X450	450		17.72	16.77						
SDCF12X200	200	0.874	7.87	7.09	0.472	0.268	0.500	190,000	2,895	1,715
SDCF12X240	240		9.45	8.66						
SDCF12X280	280		11.02	10.24						
SDCF12X350	350		13.78	12.99						
SDCF12X450	450		17.72	16.73						
SDCF12X600	600		23.62	22.64						

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

¹Refer to [Table 4A](#) for reference lateral (Z) design values for wood-to-wood connections determined from testing. For connections not addressed in [Table 4A](#), refer to [Section 4.1.4](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table 4B](#) for reference withdrawal (W) design values. Refer to [Table 4C](#) for reference pull-through (W_H) design values.

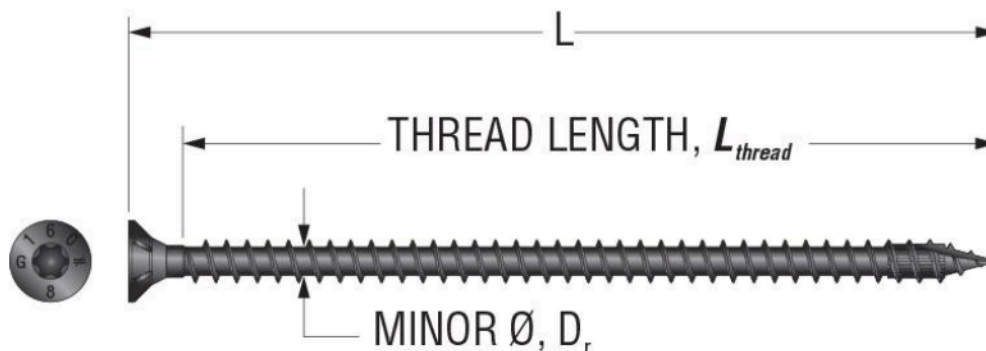


FIGURE 6—SDCF8, SDCF10 AND SDCF12 SCREWS (SDCF8X160 SHOWN)

TABLE 4A—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCF8, SDCF10 AND SDCF12 SCREWS^{1,2,3,4}

FASTENER DESIGNATION	L_{inches}	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
		$t_{s,w}$ (inches)							
		1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
0.42 ≤ SG_{NDS} < 0.50									
SDCF8X120	4.72	325	–	–	–	–	–	–	–
SDCF8X140	5.51	325	325	–	–	–	–	–	–
SDCF8X160	6.30	325	325	325	–	–	–	–	–
SDCF8X180	7.09	325	325	325	325	–	–	–	–
SDCF8X200	7.87	325	325	325	325	–	–	–	–
SDCF8X220	8.66	325	325	325	325	325	–	–	–
SDCF8X240	9.45	325	325	325	325	325	–	–	–
SDCF8X260	10.24	325	325	325	325	325	–	–	–
SDCF8X300	11.81	325	325	325	325	325	325	325	–
SDCF8X350	13.78	325	325	325	325	325	325	325	325
SDCF10X100	3.94	325	–	–	–	–	–	–	–
SDCF10X160	6.30	325	400	400	–	–	–	–	–
SDCF10X200	7.87	325	400	400	400	–	–	–	–
SDCF10X240	9.45	325	400	400	400	400	–	–	–
SDCF10X280	11.02	325	400	400	400	400	400	400	–
SDCF10X360	14.17	325	400	400	400	400	400	400	–
SDCF10X400	15.75	325	400	400	400	400	400	400	–
SDCF10X450	17.72	325	400	400	400	400	400	400	–
SDCF12X200	7.87	435	690	420	420	–	–	–	–
SDCF12X240	9.45	435	690	690	690	420	–	–	–
SDCF12X280	11.02	435	690	690	690	690	420	420	–
SDCF12X350	13.78	435	690	690	690	690	690	690	420
SDCF12X450	17.72	435	690	690	690	690	690	690	690
SDCF12X600	23.62	435	690	690	690	690	690	690	690

(continued on next page)

TABLE 4A—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCF8, SDCF10 AND SDCF12 SCREWS^{1,2,3,4} (cont.)

FASTENER DESIGNATION	L_{inches}	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
		$t_{s,w}$ (inches)							
		1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
0.50 ≤ SG _{NDS}									
SDCF8X120	4.72	425	-	-	-	-	-	-	-
SDCF8X140	5.51	425	425	-	-	-	-	-	-
SDCF8X160	6.30	425	425	425	-	-	-	-	-
SDCF8X180	7.09	425	425	425	550	-	-	-	-
SDCF8X200	7.87	425	425	425	550	-	-	-	-
SDCF8X220	8.66	425	425	425	550	550	-	-	-
SDCF8X240	9.45	425	425	425	550	550	550	-	-
SDCF8X260	10.24	425	425	425	550	550	550	-	-
SDCF8X300	11.81	425	425	425	550	550	550	550	-
SDCF8X350	13.78	425	425	425	550	550	550	550	550
SDCF10X100	3.94	425	-	-	-	-	-	-	-
SDCF10X160	6.30	425	650	650	-	-	-	-	-
SDCF10X200	7.87	425	650	650	650	-	-	-	-
SDCF10X240	9.45	425	650	650	650	650	-	-	-
SDCF10X280	11.02	425	650	650	650	650	650	650	-
SDCF10X360	14.17	425	650	650	650	650	650	650	-
SDCF10X400	15.75	425	650	650	650	650	650	650	-
SDCF10X450	17.72	425	650	650	650	650	650	650	-
SDCF12X200	7.87	585	870	550	550	-	-	-	-
SDCF12X240	9.45	585	870	870	870	550	-	-	-
SDCF12X280	11.02	585	870	870	870	870	550	550	-
SDCF12X350	13.78	585	870	870	870	870	870	870	550
SDCF12X450	17.72	585	870	870	870	870	870	870	870
SDCF12X600	23.62	585	870	870	870	870	870	870	870

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

¹The main member and side members must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Minimum fastener penetration, $L_{emb,i}$, must be equal to the screw length less the thickness of the wood side member.

³Tabulated reference lateral design values for two member connections apply to the following combinations of grain orientations in the side and main members: side parallel-main parallel, side parallel-main perpendicular, and side perpendicular-main parallel. For SDCF12 loaded with side perpendicular-main parallel, a ratio of 0.85 shall be applied.

⁴Refer to [Table 4D](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 4B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCF8, SDCF10 AND SDCF12 SCREWS^{1,2,3}

FASTENER DESIGNATION	L (inches)	L _{thread} (inches)	L _{tip} (inches)	L _{emb,w} ³ (inches)	REFERENCE UNIT WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
					0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS}
SDCF8X120	4.72	4.33	0.383	2.5	200	275
SDCF8X140	5.51	5.12				
SDCF8X160	6.30	5.91				
SDCF8X180	7.09	6.69				
SDCF8X200	7.87	7.48				
SDCF8X220	8.66	8.27				
SDCF8X240	9.45	9.06				
SDCF8X260	10.24	9.84				
SDCF8X300	11.81	11.42				
SDCF8X350	13.78	13.39				
SDCF10X100	3.94	3.47	0.457	3.5	200	290
SDCF10X160	6.30	5.83				
SDCF10X200	7.87	7.40				
SDCF10X240	9.45	8.98				
SDCF10X280	11.02	10.55				
SDCF10X360	14.17	13.70				
SDCF10X400	15.75	15.28				
SDCF10X450	17.72	16.77				
SDCF12X200	7.87	7.09	0.500	4	230	335
SDCF12X240	9.45	8.66				
SDCF12X280	11.02	10.24				
SDCF12X350	13.78	12.99				
SDCF12X450	17.72	16.73				
SDCF12X600	23.62	22.64				

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

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Does not include tip length.

⁴Reference withdrawal design values, W, must be multiplied by the embedded thread length not including tip length to determine the total withdrawal capacity. This must not exceed the available tension strength of the screw.

TABLE 4C—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (W_H) FOR SDCF8, SDCF10 AND SDCF12 SCREWS^{1,2,3}

FASTENER DESIGNATION	L (inches)	$t_{s,w}$ (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, W_H (lbf)	
			$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCF8X120	4.72	1.5	320	360
SDCF8X140	5.51			
SDCF8X160	6.30			
SDCF8X180	7.09			
SDCF8X200	7.87			
SDCF8X220	8.66			
SDCF8X240	9.45			
SDCF8X260	10.24			
SDCF8X300	11.81			
SDCF8X350	13.78			
SDCF10X100	3.94	1.5	320	360
SDCF10X160	6.30			
SDCF10X200	7.87			
SDCF10X240	9.45			
SDCF10X280	11.02			
SDCF10X360	14.17			
SDCF10X400	15.75			
SDCF10X450	17.72			
SDCF12X200	7.87	1.5	380	595
SDCF12X240	9.45			
SDCF12X280	11.02			
SDCF12X350	13.78			
SDCF12X450	17.72			
SDCF12X600	23.62			
SDCF12X200	7.87	3	755	1,000
SDCF12X240	9.45			
SDCF12X280	11.02			
SDCF12X350	13.78			
SDCF12X450	17.72			
SDCF12X600	23.62			

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

¹The side member must be solid-sawn lumber with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above.

²See [Section 4.1.2](#) for additional design provisions.

³Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

TABLE 4D—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDCF8, SDCF10 AND SDCF12 SCREWS ADDRESSED IN TABLE 4A¹

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)	
			SDCF8 and SDCF10	SDCF12
Edge Distance	Perpendicular	①	1 3/4	2 3/4
	Parallel	①	1 3/4	2 3/4
End Distance	Perpendicular	②	6	9
	Parallel	②	6	6
Spacing Between Fasteners in a Row	Perpendicular	③	4	6
	Parallel	④	8	12
Spacing Between Rows of Fasteners	Perpendicular	⑤	4	6
	Parallel	⑥	4	6
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8	1

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

¹Edge 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 7](#) for a depiction of the required geometry.

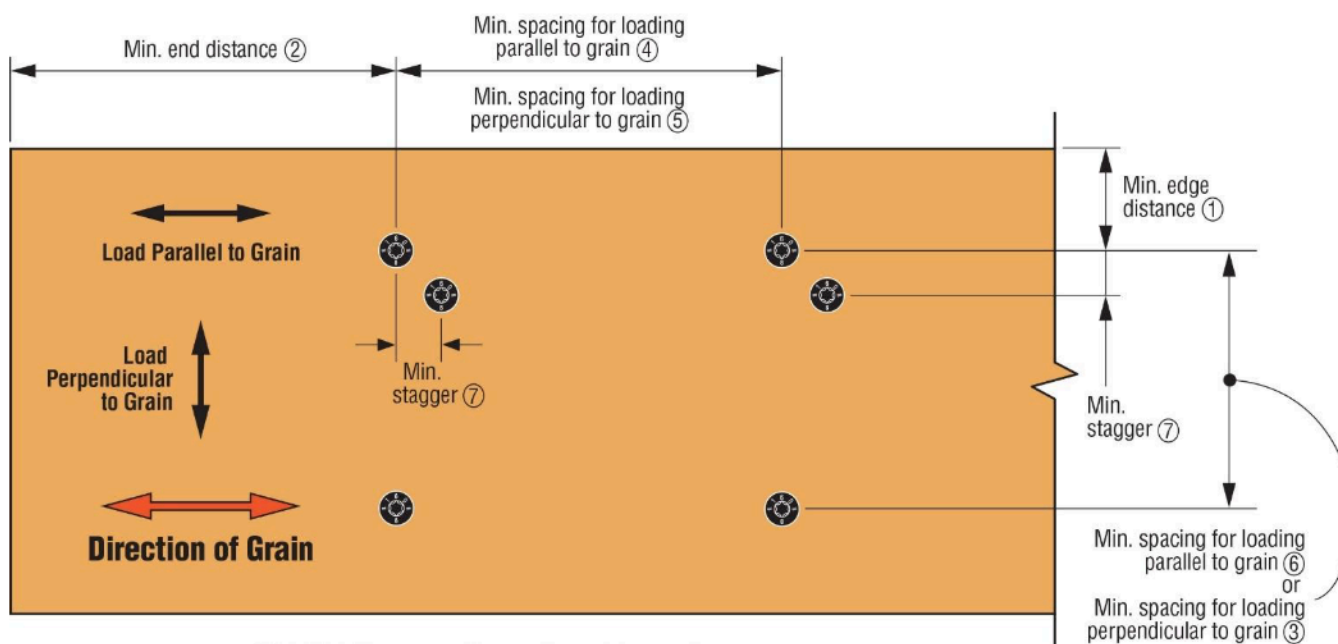


FIGURE 7—SDCF8, SDCF10 AND SDCF12 SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE 4D

TABLE 5—SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCFC8 AND SDCFC10 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						$F_{yb, spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H	L	L_{thread}	D	D_r	L_{tip}		N_a	V_a
SDCFC8X120	120	0.402	4.72	4.33	0.315	0.205	0.383	185,000	1,710	1,025
SDCFC8X160	160		6.30	5.91						
SDCFC8X200	200		7.87	7.48						
SDCFC8X240	240		9.45	9.06						
SDCFC8X280	280		11.02	10.63						
SDCFC8X330	330		12.99	12.60						
SDCFC8X350	350		13.78	13.39						
SDCFC8X380	380		14.96	14.57						
SDCFC8X430	430		16.93	16.02						
SDCFC8X580	580		22.84	21.93						
SDCFC10X240	240	0.528	9.45	8.98	0.394	0.245	0.457	190,000	2,735	1,545
SDCFC10X300	300		11.81	11.34						
SDCFC10X320	320		12.60	12.13						
SDCFC10X380	380		14.96	14.49						
SDCFC10X500	500		19.69	18.74						
SDCFC10X600	600		23.62	22.68						
SDCFC10X800	800		31.50	29.61						
SDCFC10X1000	1000		39.37	37.48						

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

¹Refer to [Table 5A](#) for reference lateral (Z) design values for wood-to-wood connections determined from testing. For connections not addressed in [Table 5A](#), refer to [Section 4.1.4](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table 5B](#) for reference withdrawal (W) design values. Refer to [Table 5C](#) for reference pull-through (W_p) design values.

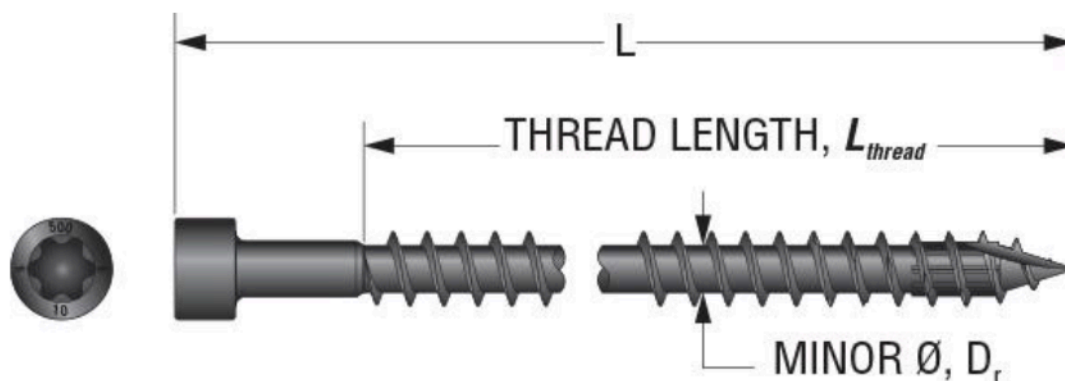


FIGURE 8—SDCFC8 AND SDCFC10 SCREWS

TABLE 5A—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCFC8 AND SDCFC10 SCREWS^{1,2,3,4}

FASTENER DESIGNATION	L (inches)	MINIMUM $t_{s,w}$ (inches)	$L_{emb,l}$ (inches)	REFERENCE LATERAL DESIGN VALUE, Z (lbf)	
				$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCFC8X120	4.72	3	3	325	425
SDCFC8X160	6.30				
SDCFC8X200	7.87				
SDCFC8X240	9.45				
SDCFC8X280	11.02				
SDCFC8X330	12.99				
SDCFC8X350	13.78				
SDCFC8X380	14.96				
SDCFC8X430	16.93				
SDCFC8X580	22.84				
SDCFC10X240	9.45	3	3	400	650
SDCFC10X300	11.81				
SDCFC10X320	12.60				
SDCFC10X380	14.96				
SDCFC10X500	19.69				
SDCFC10X600	23.62				
SDCFC10X800	31.50				
SDCFC10X1000	39.37				

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

¹The main member and side members must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Minimum fastener penetration, $L_{emb,l}$, must be equal to the screw length less the thickness of the wood side member.

³Tabulated reference lateral design values for two member connections apply to the following combinations of grain orientations in the side and main members: side parallel-main parallel, side parallel-main perpendicular, and side perpendicular-main parallel.

⁴Refer to [Table 5D](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 5B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCFC8 AND SDCFC10 SCREWS^{1,2,3}

FASTENER DESIGNATION	L (inches)	L _{thread} (inches)	L _{tip} (inches)	L _{emb,w} ³ (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
					0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS}
SDCFC8X120	4.72	4.33	0.383	2.5	200	275
SDCFC8X160	6.30	5.91				
SDCFC8X200	7.87	7.48				
SDCFC8X240	9.45	9.06				
SDCFC8X280	11.02	10.63				
SDCFC8X330	12.99	12.60				
SDCFC8X350	13.78	13.39				
SDCFC8X380	14.96	14.57				
SDCFC8X430	16.93	16.02				
SDCFC8X580	22.84	21.93				
SDCFC10X240	9.45	8.98	0.457	3.5	200	290
SDCFC10X300	11.81	11.34				
SDCFC10X320	12.60	12.13				
SDCFC10X380	14.96	14.49				
SDCFC10X500	19.69	18.74				
SDCFC10X600	23.62	22.68				
SDCFC10X800	31.50	29.61				
SDCFC10X1000	39.37	37.48				

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

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Does not include tip length.

⁴Reference withdrawal design values, W, are to be multiplied by the embedded thread length not including tip length to determine the total withdrawal capacity. This must not exceed the available tension strength of the screw.

TABLE 5C—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (W_H) FOR SDCFC8 AND SDCFC10 SCREWS^{1,2,3}

FASTENER DESIGNATION	L (inches)	$t_{s,w}$ (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, W_H (lbf)	
			$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCFC8X120	4.72	1.5	275	380
SDCFC8X160	6.30			
SDCFC8X200	7.87			
SDCFC8X240	9.45			
SDCFC8X280	11.02			
SDCFC8X330	12.99			
SDCFC8X350	13.78			
SDCFC8X380	14.96	3	540	805
SDCFC8X120	4.72			
SDCFC8X160	6.30			
SDCFC8X200	7.87			
SDCFC8X240	9.45			
SDCFC8X280	11.02			
SDCFC8X330	12.99			
SDCFC8X350	13.78			
SDCFC8X380	14.96			
SDCFC8X430	16.93			
SDCFC8X580	22.84			
SDCFC10X240	9.45	1.5	210	290
SDCFC10X300	11.81			
SDCFC10X320	12.60			
SDCFC10X380	14.96			
SDCFC10X500	19.69			
SDCFC10X600	23.62			
SDCFC10X800	31.50			
SDCFC10X1000	39.37			

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

¹The side member must be solid-sawn lumber with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above.

²See [Section 4.1.2](#) for additional design provisions.

³Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

TABLE 5D—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDCFC8 AND SDCFC10 SCREWS ADDRESSED IN [TABLE 5A](#)¹

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

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

¹Edge 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 9 for a depiction of the required geometry.

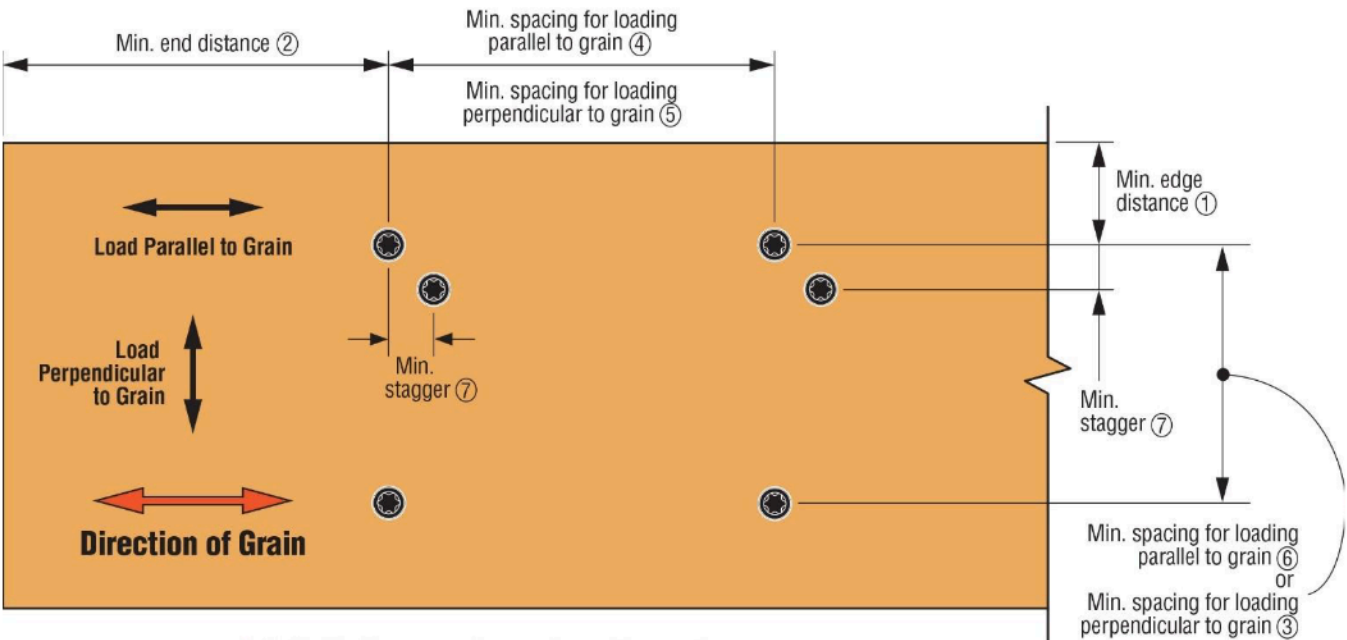


FIGURE 9—SDCFC8 AND SDCFC10 SCREW CONNECTION GEOMETRY DESCRIBED IN [TABLE 5D](#)

TABLE 6—SPECIFICATIONS AND FASTENER STRENGTHS FOR SDHR10 AND SDHR12 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)								$F_{yb, spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H^2	D_{sh}	L	L_{thread}	L_{tip}	D_s	D	D_r		N_a	V_a
SDHR10X100	100	0.587	0.397	3.94	2.17	0.415	0.280	0.394	0.242	185,000	2385	1535
SDHR10X160	160			6.30	4.33							
SDHR12X100	100	0.665	0.475	3.94	2.17	0.452	0.319	0.472	0.264	190,000	2970	1720
SDHR12X160	160			6.30	4.33							

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

¹Refer to [Table 6A](#) for reference lateral (Z) design values for steel-to-wood connections determined from testing. For connections not addressed in Table 6A, refer to [Section 4.1.3](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table 6B](#) for reference withdrawal (W) design values. Refer to [Table 6C](#) for pull-over design values.

²Measured across flats, as shown in [Figure 10](#).

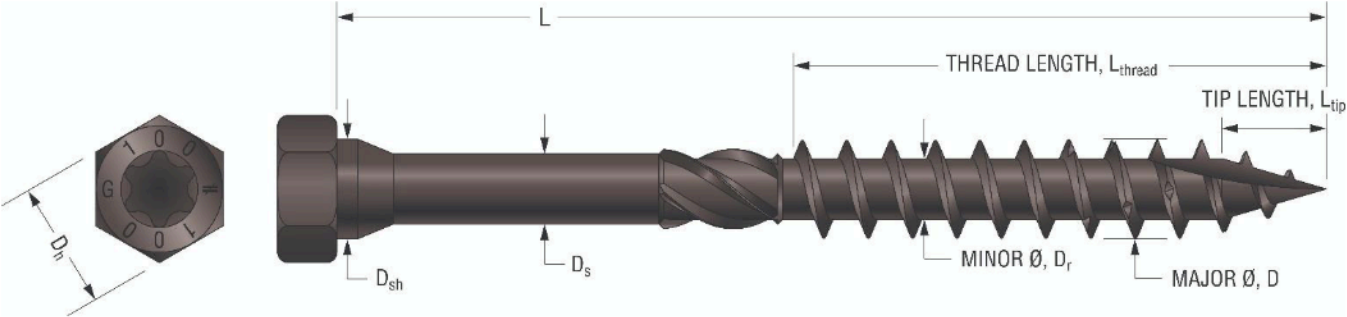


FIGURE 10—SDHR10 AND SDHR12 SCREW

TABLE 6A—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR STEEL-TO-WOOD CONNECTIONS WITH SDHR10 AND SDHR12 SCREWS^{1,2,3,4,5}

FASTENER DESIGNATION	L (inches)	REFERENCE LATERAL DESIGN VALUE, Z (lbf)					
		Side Member Thickness, ga (mils)					
		16 (54)	14 (68)	12 (97)	10 (118)	7 (171)	3 (229)
SDHR10X100	3.94	390	390	390	390	390	485
SDHR10X160	6.30	390	390	390	390	390	485
SDHR12X100	3.94	440	440	440	440	440	565
SDHR12X160	6.30	440	440	440	440	440	565

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

¹The main member must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of 0.42 or an engineered wood product with a minimum grade of 1.3E and SG_{eq} of at least 0.50.

²Steel side members must have the tabulated thickness and must comply with Section 3.3.7.4.

³Minimum fastener penetration must be equal to the screw length less the thickness of the side member.

⁴Tabulated reference lateral design values apply to parallel-to-grain and perpendicular-to-grain loading.

⁵Refer to Table 6D for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE 6B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDHR10 AND SDHR12 SCREWS IN A WOOD MAIN MEMBER^{1,2}

FASTENER DESIGNATION	L (inches)	L_{thread} (inches)	L_{tip} (inches)	$L_{emb,w}$ ³ (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
					$0.42 \leq SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.5$
SDHR10X100	3.94	2.15	0.415	2.15	235	250
SDHR10X160	6.30	4.30				
SDHR12X100	3.94	2.15	0.452	2.15	250	250
SDHR12X160	6.30	4.30				

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

¹The wood member must be solid-sawn wood, GL or CLT with SG_{NDS} as shown in the table. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in Sections 3.3.6.1 and 3.3.6.6.

²Refer to Table 7B for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Does not include tip length.

⁴Reference withdrawal design values, W, must be multiplied by the embedded thread length, not including the tip length, to determine the total withdrawal capacity. This must not exceed the available tension strength of the screw.

TABLE 6C—ALLOWABLE HEAD PULL-OVER DESIGN VALUES FOR SDHR SCREWS¹

FASTENER DESIGNATION	ALLOWABLE PULL-OVER DESIGN VALUE (lbf)
	$t_{s,s} \geq 16ga$ (54 mils)
SDHR10X100	500
SDHR10X160	
SDHR12X100	570
SDHR12X160	

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

¹Steel side members must have the tabulated thickness and must comply with Section 3.3.7.3.

²Connection geometry requirements are governed by the requirements for installation in the wood main member, given in Table 7B.

TABLE 6D—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDHR SCREWS ADDRESSED IN
TABLE 6A^{1,2}

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	3
	Parallel	④	4
Spacing Between Rows of Fasteners	Perpendicular	⑤	3
	Parallel	⑥	3
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	1 1/2

For SI: 1 inch = 25.4 mm.

¹Wood 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 11 for a depiction of the required geometry.

²Minimum steel edge distances, end distances and spacing of the screws must be determined in accordance with AISC 360.

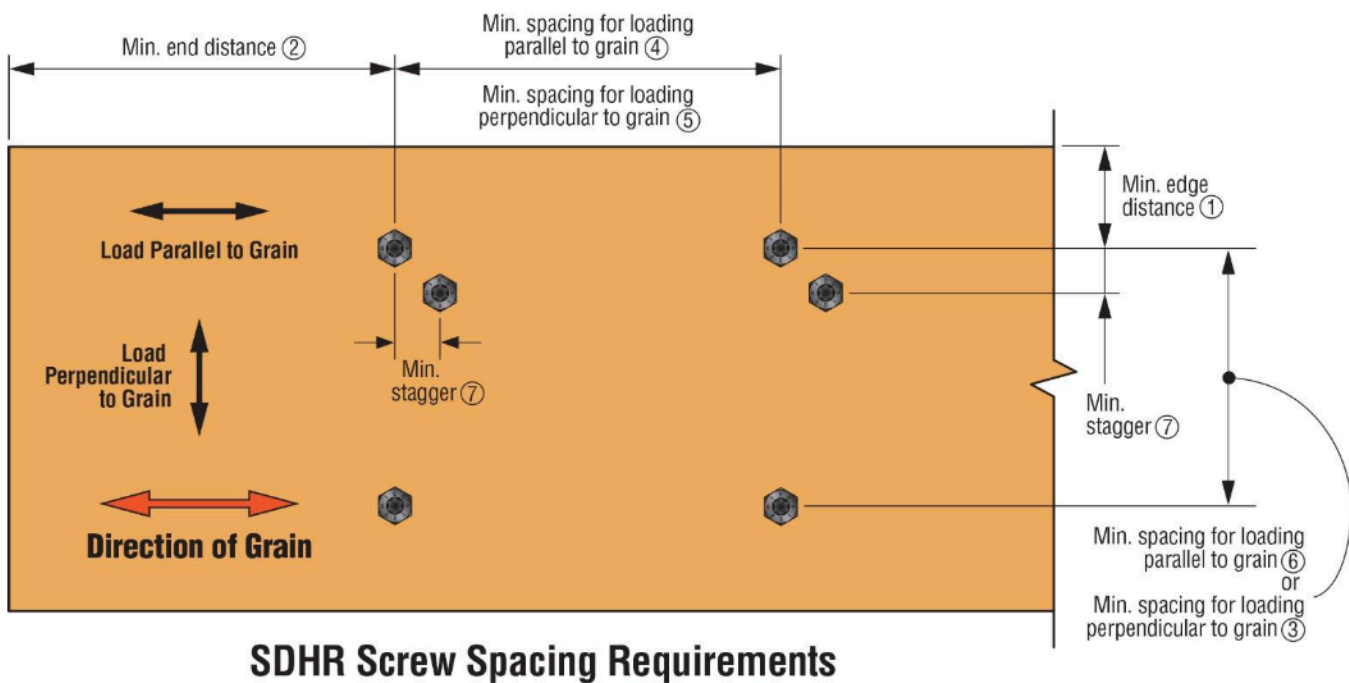


FIGURE 11—SDHR SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE 6D

TABLE 7A—CONNECTION GEOMETRY REQUIREMENTS FOR SD AND SD9SS FASTENERS INSTALLED PERPENDICULAR TO THE FACE OF WOOD MEMBERS AND INCLINED FASTENERS^{1,2,3,4}

CONDITION ⁵	ID	MINIMUM DISTANCE OR SPACING			
		Self-drilled		Predrilled Hole ⁶	
		$SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.50$		
For alternate dowel-type threaded fasteners with $D_r < 0.23$ inch, installed into sawn lumber, structural glued laminated timber (GL) and cross laminated timber (CLT) panels					
End distance (see Figures 12 and 14)	Loading toward end, $a_{end,1}$	①	15D	20D	12D
	Loading perpendicular to grain or away from end, $a_{end,2}$	②	10D	15D	7D
	Axial loading, a_{end}	③	10D	10D	7D
	Inclined fastener, $a_{end,CG}$	④			
Edge distance (see Figures 12 and 14)	Loading toward edge, $a_{edge,1}$	⑤	10D	12D	7D
	Loading parallel to grain or away from edge, $a_{edge,2}$	⑥	5D	7D	3D
	Axial Loading, a_{edge}	⑦	4D	4D	3D
	Inclined fastener, $a_{edge,CG}$	⑧			
Spacing between fasteners, parallel to grain (see Figures 13 and 14)	Loading parallel to grain, a_1	⑨	15D	15D	10D
	Loading perpendicular to grain, a_1	⑩	10D	10D	5D
	Axial loading, a_1	⑪	7D	7D	7D
	Inclined fastener, a_1	⑫			
Spacing between fasteners, perpendicular to grain (see Figures 13 and 14)	Loading parallel to grain, a_2	⑬	5D	7D	4D
	Loading perpendicular to grain, a_2	⑭	5D	7D	4D
	Axial loading, a_2	⑮	4D	4D	3D
	Inclined fastener, a_2	⑯			
	Inclined fastener, crossed screws, $a_{2,cross}$	⑰	1.5D	1.5D	1.5D
For alternate dowel-type threaded fasteners with $D_r \geq 0.23$ inch, installed into sawn lumber, GL and CLT panels					
End distance (see Figures 12 and 14)	Loading toward end, $a_{end,1}$	①	15D	20D	7D
	Loading perpendicular to grain or away from end, $a_{end,2}$	②	10D	15D	4D
	Axial loading, a_{end}	③	10D	10D	4D
	Inclined fastener, $a_{end,CG}$	④			
Edge distance (see Figures 12 and 14)	Loading toward edge, $a_{edge,1}$	⑤	10D	12D	4D
	Loading parallel to grain or away from edge, $a_{edge,2}$	⑥	5D	7D	3D
	Axial Loading, a_{edge}	⑦	4D	4D	3D
	Inclined fastener, $a_{edge,CG}$	⑧			
Spacing between fasteners, parallel to grain (see Figures 13 and 14)	Loading parallel to grain, a_1	⑨	15D	15D	5D
	Loading perpendicular to grain, a_1	⑩	10D	10D	5D
	Axial loading, a_1	⑪	7D	7D	5D
	Inclined fastener, a_1	⑫			
Spacing between fasteners, perpendicular to grain (see Figures 13 and 14)	Loading parallel to grain, a_2	⑬	5D	7D	5D
	Loading perpendicular to grain, a_2	⑭	5D	7D	5D
	Axial loading, a_2	⑮	5D	5D	5D
	Axial loading for crossed screws $a_{2,cross}$	⑯	1.5D	1.5D	1.5D

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

¹Tabulated requirements are applicable to lateral connections designed in accordance with the NDS and to axially-loaded screws. Connection geometry requirements associated with lateral load values determined by testing are shown in [Table 1C](#).

²End distances, edge distances and fastener spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

³Wood member stresses must be checked in accordance with Section 11.1.2 and Appendix E of the NDS, and end distances, edge distances and fastener spacing may need to be increased accordingly.

⁴Tabulated values are applicable to wood-to-wood and steel-to-wood connections.

⁵For CLT products, parallel and perpendicular-to-grain descriptions apply to the grain orientation at the shear plane for lateral loading and to the face grain orientation for withdrawal loading.

⁶Tabulated geometry is applicable to fasteners installed in holes predrilled in accordance with [Section 4.3.1](#).

**TABLE 7B—CONNECTION GEOMETRY REQUIREMENTS FOR SDCP, SDCF, SDCFC AND SDHR SCREWS
INSTALLED PERPENDICULAR TO THE FACE OF WOOD MEMBERS AND INCLINED FASTENERS^{1,2,3,4,5,6}**

CONDITION ⁷		ID	MINIMUM DISTANCE OR SPACING	
			SDCP	SDCF, SDCFC, SDHR
End distance (see Figures 12 and 14)	Loading toward end, $a_{end,1}$	①	Refer to Table 7A	7D
	Loading perpendicular to grain or away from end, $a_{end,2}$	②		7D
	Axial loading, a_{end}	③	7D	7D
	Inclined fastener, $a_{end,CG}$	④		
Edge distance (see Figures 12 and 14)	Loading toward edge, $a_{edge,1}$	⑤	Refer to Table 7A	4D
	Loading parallel to grain or away from edge, $a_{edge,2}$	⑥		3D
	Axial Loading, a_{edge}	⑦	3D	3D
	Inclined fastener, $a_{edge,CG}$	⑧		
Spacing between fasteners, parallel to grain (see Figures 13 and 14)	Loading parallel to grain, a_1	⑨	Refer to Table 7A	5D
	Loading perpendicular to grain, a_1	⑩		5D
	Axial loading, a_1	⑪	5D	5D
	Inclined fastener, a_1	⑫		
Spacing between fasteners, perpendicular to grain (see Figures 13 and 14)	Loading parallel to grain, a_2	⑬	Refer to Table 7A	5D
	Loading perpendicular to grain, a_2	⑭		5D
	Axial loading, a_2	⑮	5D(3D) ⁸	5D(3D) ⁸
	Inclined fastener, a_2	⑯		
	Inclined fastener, crossed screws, $a_{2,cross}$	⑰	1.5D	1.5D

¹Tabulated requirements are applicable to lateral connections designed in accordance with the NDS and to axially-loaded screws. Connection geometry requirements associated with lateral load values determined by testing are shown in [Tables 3E, 4D, 5D](#) and [6D](#) for the SDCP, SDCF, SDCFC and SDHR screws, respectively.

²End distances, edge distances and fastener spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

³Wood member stresses must be checked in accordance with Section 11.1.2 and Appendix E of the NDS, and end distances, edge distances and fastener spacing may need to be increased accordingly.

⁴Tabulated values are generally applicable to wood-to-wood connections, and are applicable to steel-to-wood connections with SDHR screws.

⁵Tabulated geometry is applicable to screws in wood installed without predrilled holes or in holes predrilled in accordance with Section [4.3.1](#).

⁶Tabulated geometry is applicable to screws in wood with $SG_{NDS} \leq 0.55$.

⁷For CLT products, parallel and perpendicular-to-grain descriptions apply to the grain orientation at the shear plane for lateral loading and to the face grain orientation for withdrawal loading.

⁸For SDCP27 screws and SDCF and SDCFC screws (except for SDCF8, SDCF22 and SDCFC8 screws), the spacing must be a minimum of 5D. For the SDCP22, SDCF8, SDCF22 and SDCFC8 screws, the spacing must be a minimum of 3D.

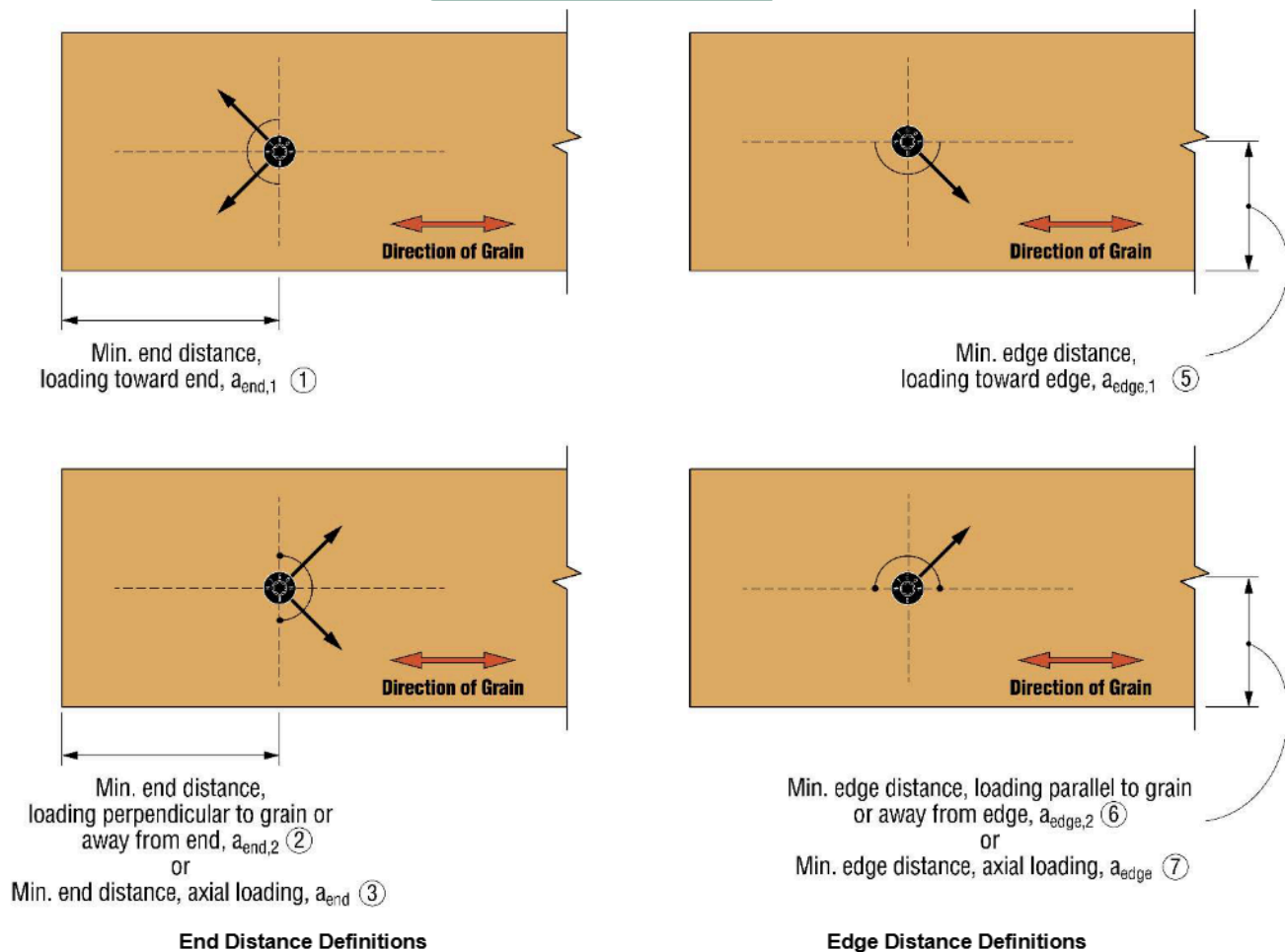


FIGURE 12—END AND EDGE DISTANCE DEFINITIONS FOR SCREWS INSTALLED PERPENDICULAR TO GRAIN

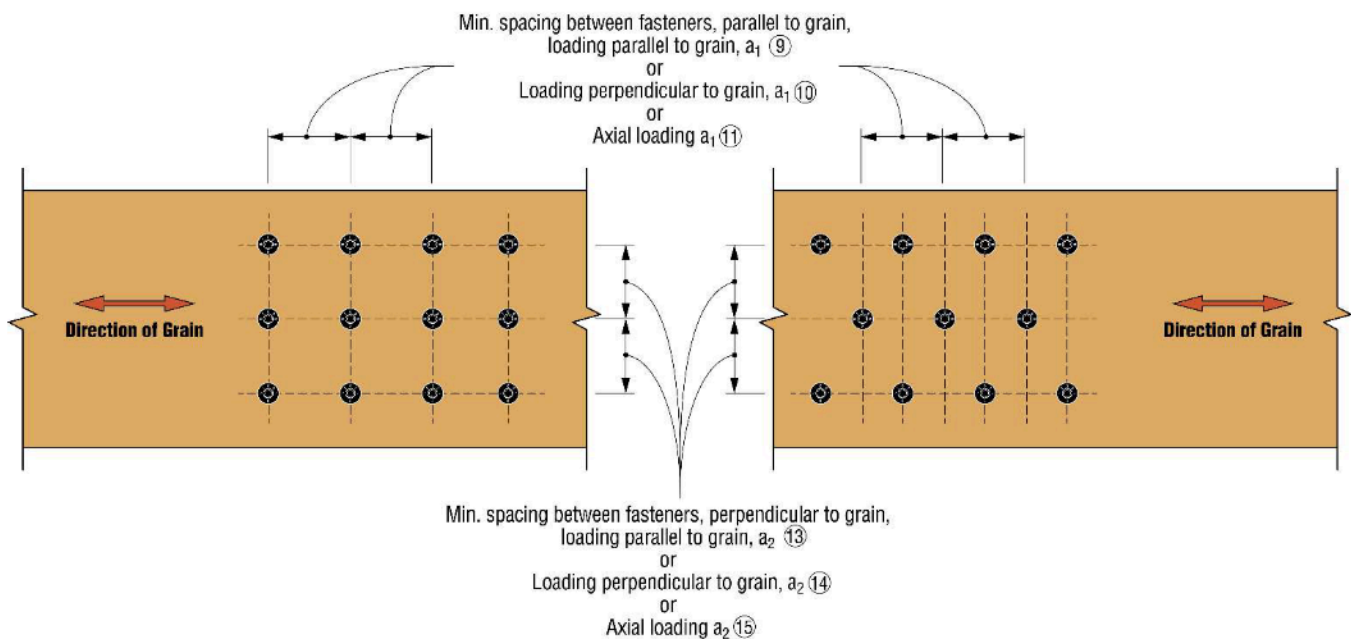


FIGURE 13—SPACING DEFINITIONS FOR SCREWS INSTALLED PERPENDICULAR TO GRAIN

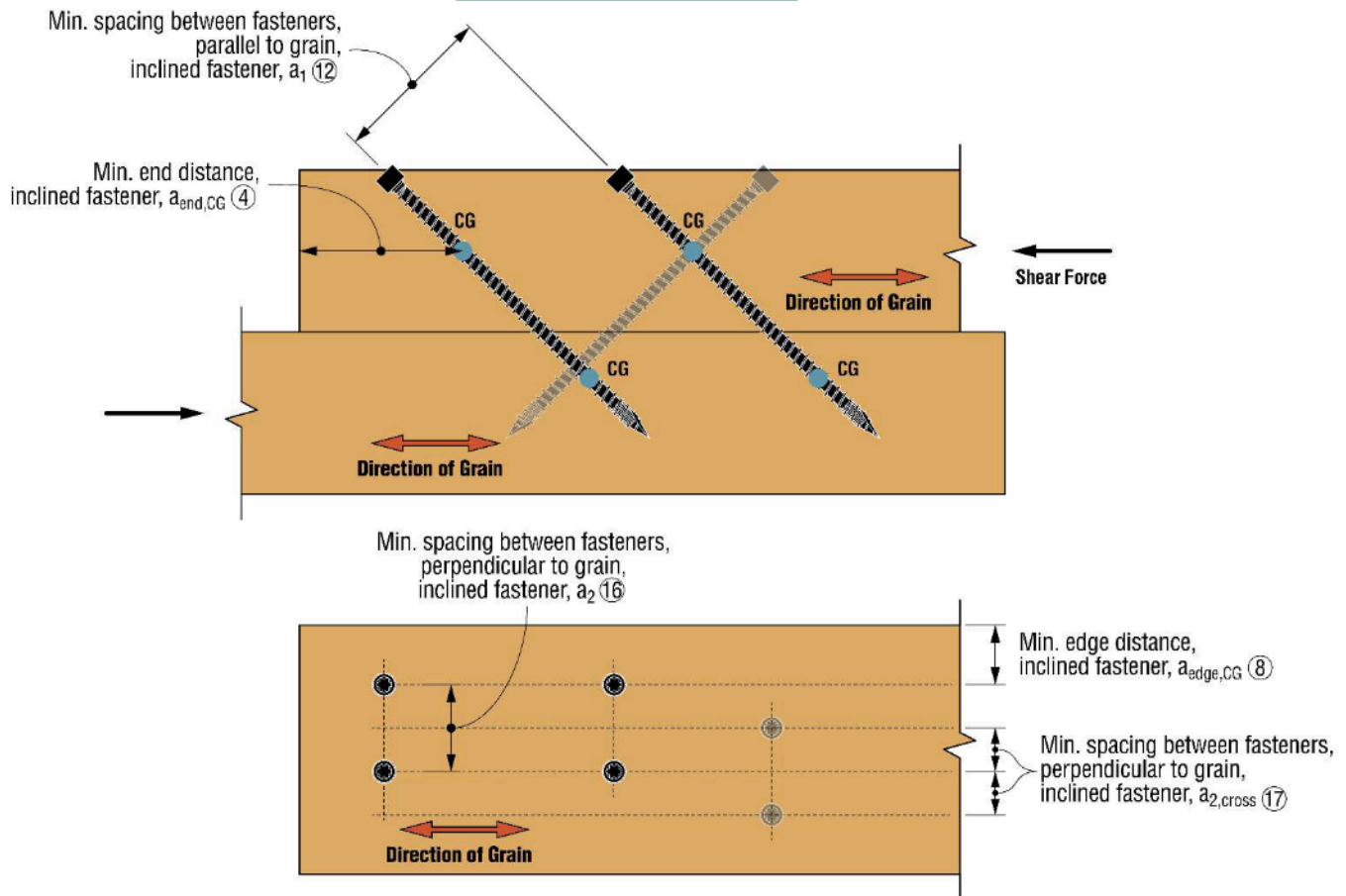


FIGURE 14—SPACING DEFINITIONS FOR INCLINED AND CROSSED SCREWS

APPENDIX A

TABLE A1—SCREW SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCF22 AND SDCF27 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						$F_{yb,spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H	L	L_{thread}	D	D_r	L_{tip}		N_a	V_a
SDCF22434	120	0.591	4.72	4.29	0.315	0.205	0.550	185,000	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						
SDCF27400	100	0.728	3.94	3.66	0.394	0.245	0.550	200,000	3200	2300
SDCF27614	160		6.30	6.02						
SDCF27778	200		7.87	7.60						
SDCF27912	240		9.45	9.17						
SDCF271100	280		11.02	10.75						
SDCF271958	500		19.69	18.74						
SDCF272358	600		23.62	22.68						

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

¹Refer to [Table A2](#) for reference lateral (Z) design values for wood-to-wood connections determined from testing. For connections not addressed in [Table A2](#), refer to [Section 4.1.4](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table A3](#) for reference withdrawal (W) design values. Refer to [Table A4](#) for reference pull-through (W_p) design values.

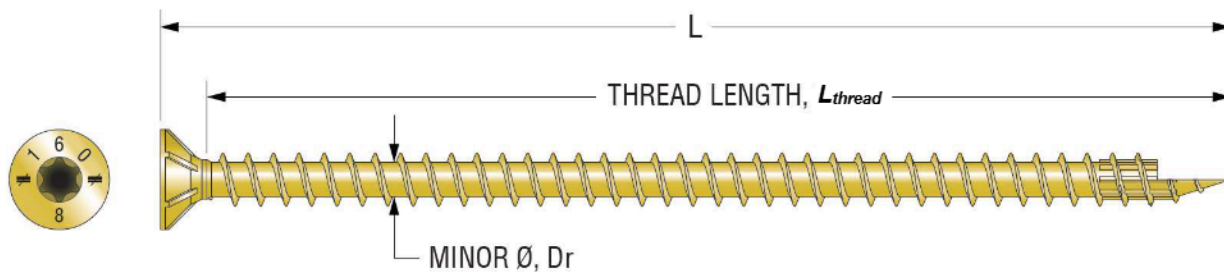


FIGURE A1—SDCF22 AND SDCF27 SCREWS (SDCF22614 Shown)

TABLE A2—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCF22 AND SDCF27 SCREWS^{1,2,3,4}

FASTENER DESIGNATION	REFERENCE LATERAL DESIGN VALUE, Z (lbf)							
	$t_{s,w}$ (inches)							
	1.5	3	3.5	4.125	5.5	6.875	7.25	9.625
0.42 ≤ SG_{NDS} < 0.50								
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
SDCF27400	325	—	—	—	—	—	—	—
SDCF27614	325	400	400	—	—	—	—	—
SDCF27778	325	400	400	400	—	—	—	—
SDCF27912	325	400	400	400	400	—	—	—
SDCF271100	325	400	400	400	400	400	400	—
SDCF271958	325	400	400	400	400	400	400	400
SDCF272358	325	400	400	400	400	400	400	400
0.50 ≤ SG_{NDS}								
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
SDCF27400	425	—	—	—	—	—	—	—
SDCF27614	425	650	650	—	—	—	—	—
SDCF27778	425	650	650	650	—	—	—	—
SDCF27912	425	650	650	650	650	—	—	—
SDCF271100	425	650	650	650	650	650	650	—
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.

¹The main member and side members must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Minimum fastener penetration, $L_{emb,i}$, must be equal to the screw length less the thickness of the wood side member.

³Tabulated reference lateral design values for two member connections apply to the following combinations of grain orientations in the side and main members: side parallel-main parallel, side parallel-main perpendicular, and side perpendicular-main parallel.

⁴Refer to [Table A5](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE A3—REFERENCE WITHDRAWAL DESIGN VALUES (*W*) FOR SDCF22 AND SDCF27 SCREWS^{1,2}

FASTENER DESIGNATION	<i>L</i> (inches)	<i>L</i> _{thread} (inches)	<i>L</i> _{emb,w} (inches) ³	REFERENCE WITHDRAWAL DESIGN VALUE, <i>W</i> (lbf/inch) ⁴	
				0.42 ≤ <i>SG</i> _{NDS} < 0.50	0.50 ≤ <i>SG</i> _{NDS}
SDCF22434	4.72	4.29	3	200	265
SDCF22512	5.51	5.08			
SDCF22614	6.30	5.87			
SDCF22700	7.09	6.65			
SDCF22858	8.66	8.23			
SDCF221014	10.24	9.80			
SDCF221134	11.81	11.38			
SDCF221334	13.78	13.35	3	200	265
SDCF27400	3.94	3.66			
SDCF27614	6.30	6.02			
SDCF27778	7.87	7.60			
SDCF27912	9.45	9.17			
SDCF271100	11.02	10.75			
SDCF271958	19.69	18.74			
SDCF272358	23.62	22.68			

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

¹Wood main members must have a minimum *SG*_{NDS} as indicated in the table above. Values for *SG*_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, *W*, must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE A4—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (*W_H*) FOR SDCF22 AND SDCF27 SCREWS^{1,2,3}

FASTENER DESIGNATION	<i>t</i> _{s,w} (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, <i>W_H</i> (lbf)	
		0.42 ≤ <i>SG</i> _{NDS} < 0.50	0.50 ≤ <i>SG</i> _{NDS}
SDCF22434	1.5	320	360
SDCF22512			
SDCF22614			
SDCF22700			
SDCF22858			
SDCF221014			
SDCF221134			
SDCF221334	1.5	320	360
SDCF27400			
SDCF27614			
SDCF27778			
SDCF27912			
SDCF271100			
SDCF271958			
SDCF272358			

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

¹The side member must be solid-sawn lumber with a minimum *SG*_{NDS} of either 0.42 or 0.50, as indicated in the table above.

²See [Section 4.1.2](#) for additional design provisions.

³Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

**TABLE A5—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDCF22 AND SDCF27 SCREWS
ADDRESSED IN [TABLE A2](#)¹**

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

For SI: 1 inch = 25.4 mm.

¹Edge 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 A2](#) for a depiction of the required geometry.

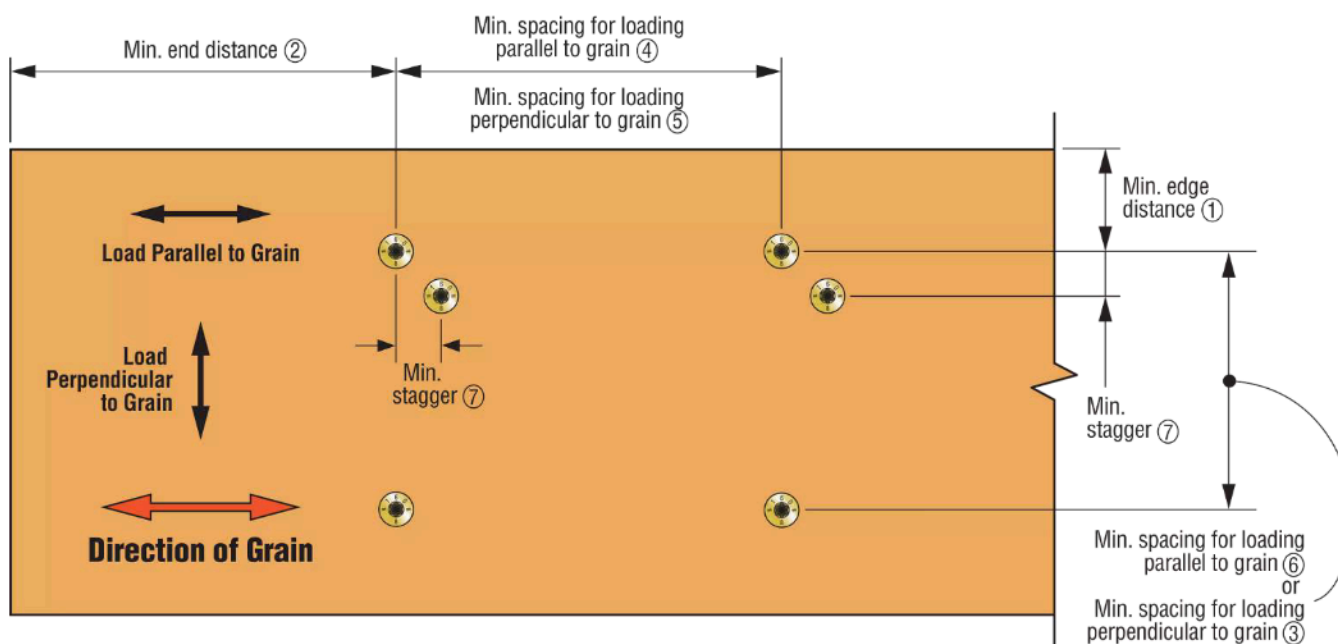


FIGURE A2—SDCF22 AND SDCF27 SCREW CONNECTION GEOMETRY DESCRIBED IN [TABLE A5](#)

TABLE A6—SPECIFICATIONS AND FASTENER STRENGTHS FOR SDCFC27 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)						$F_{yb,spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H	L	L_{thread}	D	D_r	L_{tip}		N_a	V_a
SDCFC271958	500	0.528	19.69	18.74	0.394	0.245	0.550	200,000	3200	2300
SDCFC272358	600		23.62	22.68						
SDCFC273112	800		31.5	30.55						
SDCFC273938	1000		39.37	38.43						

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

¹Refer to [Table A7](#) for reference lateral (Z) design values for wood-to-wood connections determined from testing. For connections not addressed in [Table A7](#), refer to [Section 4.1.4](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table A8](#) for reference withdrawal (W) design values. Refer to [Table A9](#) for reference pull-through (W_H) design values.

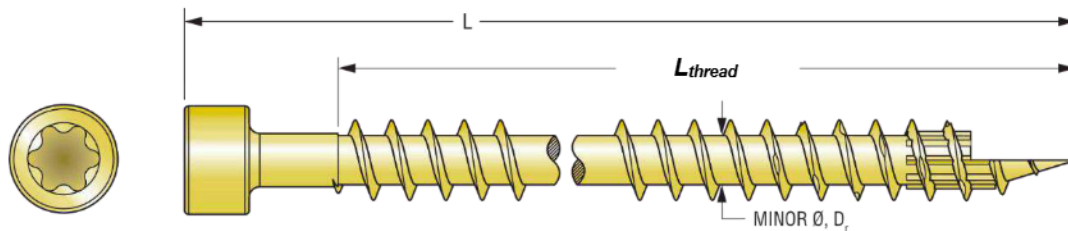


FIGURE A3—SDCFC27 SCREWS

TABLE A7—REFERENCE LATERAL DESIGN VALUES (Z) DETERMINED FROM TESTING FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH SDCFC27 SCREWS^{1,2,3,4}

FASTENER DESIGNATION	MINIMUM $t_{s,w}$ (inches)	$L_{emb,l}$ (inches)	REFERENCE LATERAL DESIGN VALUE, Z (lbf)	
			$0.42 \leq SG_{NDS} < 0.50$	$0.50 \leq SG_{NDS}$
SDCFC271958	3	3	400	650
SDCFC272358				
SDCFC273112				
SDCFC273938				

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

¹The main member and side members must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Minimum fastener penetration, $L_{emb,l}$, must be equal to the screw length less the thickness of the wood side member.

³Tabulated reference lateral design values for two member connections apply to the following combinations of grain orientations in the side and main members: side parallel-main parallel, side parallel-main perpendicular, and side perpendicular-main parallel.

⁴Refer to [Table A10](#) for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE A8—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDCFC27 SCREWS^{1,2}

FASTENER DESIGNATION	L (inches)	L _{thread} (inches)	L _{emb,w} (inches) ³	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/inch) ⁴	
				0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS}
SDCFC271958	19.69	18.74	3	200	265
SDCFC272358	23.62	22.67			
SDCFC273112	31.5	30.55			
SDCFC273938	39.37	38.43			

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

¹Wood main members must have a minimum SG_{NDS} as indicated in the table above. Values for SG_{NDS} ≥ 0.50 are also applicable for fasteners installed into the face of SCL described in [Sections 3.3.6.1](#) and [3.3.6.5](#).

²Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, W, must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE A9—REFERENCE HEAD PULL-THROUGH DESIGN VALUES (W_H) FOR SDCFC27 SCREWS^{1,2,3}

FASTENER DESIGNATION	t _{s,w} (inches)	REFERENCE PULL-THROUGH DESIGN VALUE, W _H (lbf)	
		0.42 ≤ SG _{NDS} < 0.50	0.50 ≤ SG _{NDS}
SDCFC271958	1.5	210	290
SDCFC272358			
SDCFC273112			
SDCFC273938			

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

¹The side member must be solid-sawn lumber with a minimum SG_{NDS} of either 0.42 or 0.50, as indicated in the table above.

²See [Section 4.1.2](#) for additional design provisions.

³Refer to [Table 7B](#) for connection geometry parameters associated with the tabulated values for axially loaded screws.

TABLE A10—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDCFC27 SCREWS ADDRESSED IN [TABLE A7](#)¹

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

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

¹Edge 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 A4](#) for a depiction of the required geometry.

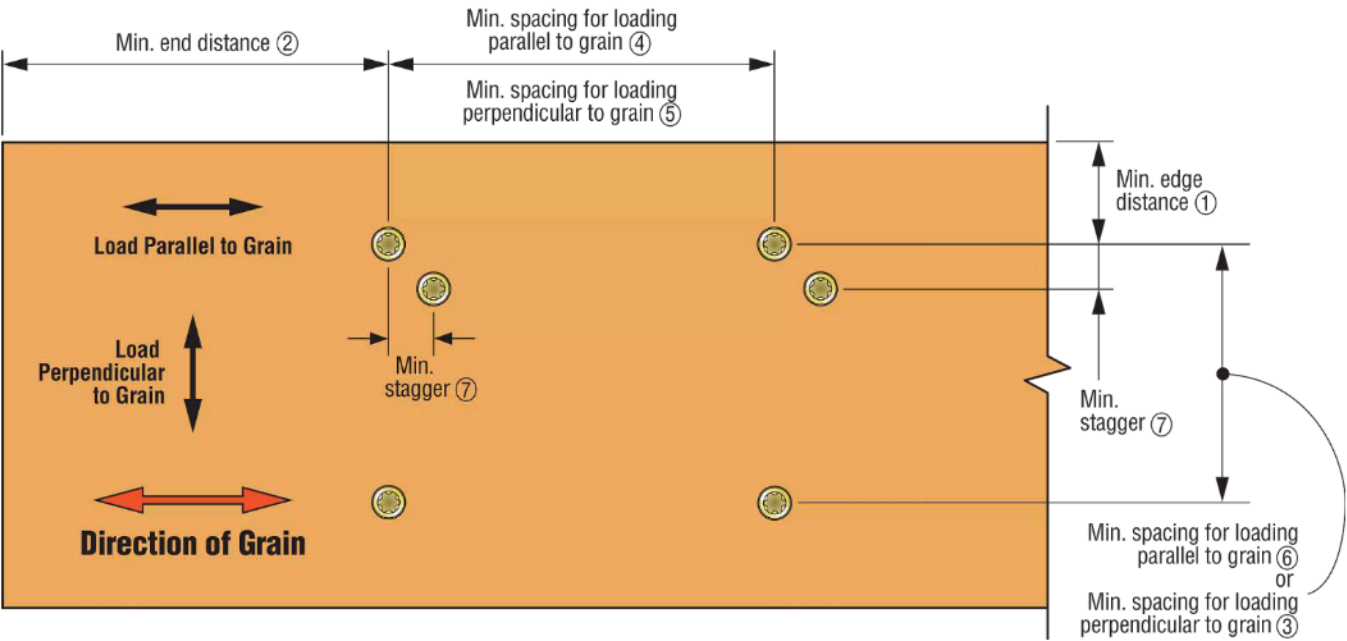


FIGURE A4—SDCFC27 SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE A10

TABLE A11—SPECIFICATIONS AND FASTENER STRENGTHS FOR SDHR27 AND SDHR31 SCREWS¹

FASTENER DESIGNATION	HEAD MARKING	SCREW SPECIFICATIONS (inches)							$F_{yb,spec}$ (psi)	FASTENER ALLOWABLE STEEL STRENGTH (lbf)	
		D_H^2	D_{sh}	L	L_{thread}	D_s	D	D_r		N_a	V_a
SDHR27400	100	0.587	0.397	3.94	2.17	0.280	0.394	0.242	190,000	2500	1680
SDHR27614	160			6.30	4.33						
SDHR31400	100	0.665	0.475	3.94	2.17	0.319	0.472	0.264	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.

¹Refer to [Table A11A](#) for reference lateral (Z) design values for steel-to-wood connections determined from testing. For connections not addressed in Table A11A, refer to [Section 4.1.3](#) for determination of reference lateral design values in accordance with the NDS. Refer to [Table A11B](#) for reference withdrawal (W) design values. Refer to [Table A11C](#) for pull-over design values.

²Measured across flats, as shown in [Figure A5](#).

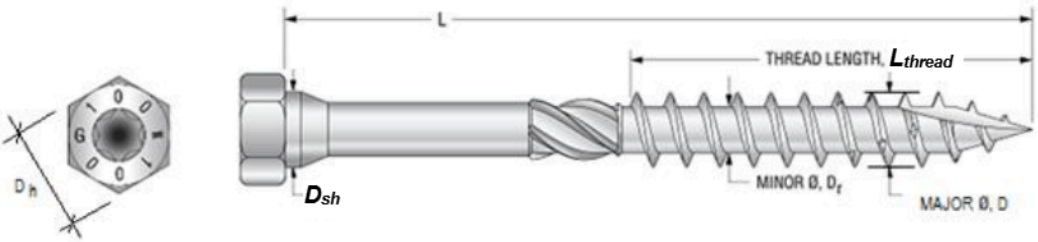


FIGURE A5—SDHR SCREW

TABLE A11A—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR STEEL-TO-WOOD CONNECTIONS WITH SDHR27 AND SDHR31 SCREWS^{1,2,3,4,5}

FASTENER DESIGNATION	REFERENCE 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.

¹The main member must be solid-sawn wood, GL or CLT with a minimum SG_{NDS} of 0.42 or an engineered wood product with a minimum grade of 1.3E and SG_{eq} of at least 0.50.

²Steel side members must have the tabulated thickness and must comply with Section 3.3.7.4.

³Minimum fastener penetration must be equal to the screw length less the thickness of the side member.

⁴Tabulated reference lateral design values apply to parallel-to-grain and perpendicular-to-grain loading.

⁵Refer to Table A11D for connection geometry parameters associated with the tabulated values for laterally loaded screws.

TABLE A11B—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR SDHR27 AND SDHR31 SCREWS IN A WOOD MAIN MEMBER^{1,2}

FASTENER DESIGNATION	L (inches)	L_{thread} (inches)	$L_{emb,w}$ (inches) ³	REFERENCE WITHDRAWAL DESIGN VALUE, W ⁴ (lbf/inch)	
				$0.42 \leq SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.5$
SDHR27400	3.94	2.15	2.15	185	195
SDHR27614	6.30	4.30			
SDHR31400	3.94	2.15	2.15	195	195
SDHR31614	6.30	4.30			

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

¹The wood member must be solid-sawn wood, GL or CLT with SG_{NDS} as shown in the table. Values for $SG_{NDS} \geq 0.50$ are also applicable for fasteners installed into the face of SCL described in Sections 3.3.6.1 and 3.3.6.6.

²Refer to Table 7B for connection geometry parameters associated with the tabulated values for axially loaded screws.

³Includes tip length.

⁴Reference withdrawal design values, W , must be multiplied by the embedded thread length, including the tip length, to determine the total withdrawal capacity.

TABLE A11C—ALLOWABLE HEAD PULL-OVER DESIGN VALUES FOR SDHR SCREWS¹

FASTENER DESIGNATION	ALLOWABLE PULL-OVER DESIGN VALUE (lbf)
	$t_{s,s} \geq 16ga$ (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.

¹Steel side members must have the tabulated thickness and must comply with Section 3.3.7.3.

²Connection geometry requirements are governed by the requirements for installation in the wood main member, given in Table 7B.

TABLE A11D—REQUIRED GEOMETRY FOR LATERAL CONNECTIONS WITH SDHR SCREWS ADDRESSED IN TABLE 6A^{1,2}

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 3/4
	Parallel	①	1 3/4
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	3
	Parallel	④	4
Spacing Between Rows of Fasteners	Perpendicular	⑤	3
	Parallel	⑥	3
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	1 1/2

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

¹Wood 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 11](#) for a depiction of the required geometry.

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

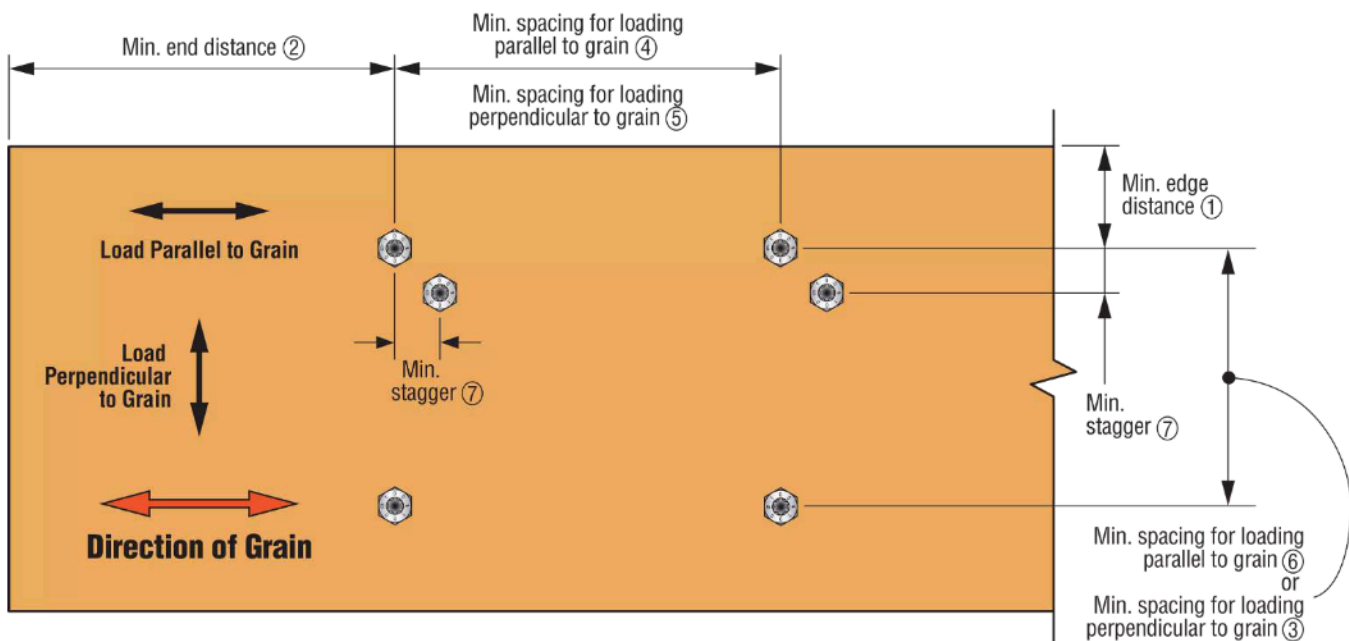


FIGURE 11—SDHR SCREW CONNECTION GEOMETRY DESCRIBED IN TABLE 6D

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings
Section: 06 05 23.20—Screws

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:

- 2023 *City of Los Angeles Building Code* ([LABC](#))
- 2023 *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 2021 *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 2025 and revised November 2025.

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

- 2023 *Florida Building Code—Building*
- 2023 *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*. The design requirements must be 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 2021 *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 2025 and revised November 2025.