EVALUATION SUBJECT:

SIMPSON STRONG-TIE STRONG-DRIVE® SDW, SDWS, SDWH, and SDWV SCREWS

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.
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CSI Division: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES
CSI Section: 06 05 23 – Wood, Plastic, and Composite Fastenings

1.0 SCOPE EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012, and 2009 International Building Code® (IBC)
- 2021, 2018, 2015, 2012, and 2009 International Residential Code® (IRC)
- 2023 City of Los Angeles Building Code (LABC) – attached supplement
- 2023 City of Los Angeles Residential Code (LARC) – attached supplement

1.2 Evaluated in accordance with:

- ICC-ES AC233
- ICC-ES AC257

1.3 Properties assessed:

- Structural
- Corrosion Resistance

2.0 PRODUCT USE

Simpson Strong-Tie Strong-Drive® SDW TRUSS-PLY and SDW EWP-PLY Screws (SDW22); SDWS TIMBER Exterior Screws (SDWS22DB and SDWS25DB); SDWH TIMBER-HEX Screws (SDWH19DB); SDWS Timber Interior Screws (SDWS22 and SDWS19); SDWH TIMBER-HEX HDG Screws (SDWH27G); SDWS FRAMING Screws (SDWS16); SDWV SOLE-TO-RIM Screws (SDWV13); SDWS TIMBER SS Screws (SDWS27SS); and SDWS DEFLECTOR Screws (SDWS14) described in this report are dowel-type threaded and self-drilling fasteners used for wood-to-wood and steel-to-wood connections.

The Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWS16, SDWV13, and SDWS14 screws have proprietary corrosion-resistant coatings and may be used where fasteners are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in chemically preservative-treated wood. These fasteners are alternatives to hot-dipped, zinc-coated galvanized fasteners with a coating weight in compliance with ASTM A153, Class D as specified in 2021 IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5, 2012 and 2009 IBC Section 2304.9.5), and are subject to the limitations of Section 3.2.1, Section 5.3, and Table 37 of this report. Screws with these proprietary corrosion-resistance coatings were evaluated for contact with wood chemically preservative-treated with waterborne alkaline copper quaternary, Type D (ACQ-D), to a maximum retention level of 0.40 pcf (6.4 kg/m^3), which was shown to be more corrosive than Chromated Copper Arsenate, Type C (CCA-C), Micronized Copper Azole (MCA), and Copper Azole (CA-C). The SDWH27G screws are coated with a hot-dipped, zinc-coated, galvanized finish in accordance with ASTM A153, Class C. The SDWS27SS Type 316 stainless steel screws are not coated.

3.0 PRODUCT DESCRIPTION

3.1 General: The SDW22, SDWS22DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, and SDWS14 are manufactured using a standard cold-forming process and consist of heat-treated carbon steel complying with ASTM A510. The SDWS27SS screws consist of Type 316 stainless steel and are manufactured using a standard cold-forming process. All screws have serrated threads and a proprietary point, except for SDWV13 and SDWS14, which have a sharp point and type-17 point, respectively. The drive systems for the screw products are: SDW22, T40; SDWS22DB, SDWS25DB, T40; SDWH19DB, $^5/_{16}$"-in hex; SDWS22, T40; SDWS19, T40; SDWH27G, $^3/_8$-in hex; SDWS16, T25; SDWV13, T25; SDWS27SS, T50; and SDWS14, T25. Table 1 of this report provides a description of the screws recognized in this report and specifies the allowable bending yield strengths as well as allowable tensile and shear loads.

3.2 Materials

3.2.1 Wood Members: Wood side and main members shall consist of sawn lumber species or species combinations with a specific gravity of 0.42 to 0.55 or structural composite lumber (e.g. LVL, PSL, and LSL) having a minimum 0.8E designation for lateral and withdrawal loading. The structural composite lumber shall be recognized in evaluation reports and shall have an equivalent specific gravity of 0.50 minimum for lateral and 0.42 for withdrawal loading. Tables 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 32, 34, and 35 of this report include design values. Wood side members shall be as specified in those tables.

Chemicals used for preservative-treated solid-sawn wood and structural composite lumber are limited to the following:

1. Alkaline Copper Quaternary Type D (ACQ-D), with a maximum retention level of 0.4 pcf (6.4 kg/m^3)

2. Wood treatments that have been demonstrated to have lower levels of corrosivity compared to ACQ-D.

3.2.2 Steel Member: Steel side members shall have minimum tensile strength, F_u, equal to 45 ksi with a steel member design thickness (base-metal thickness exclusive of any coatings) of 0.0966 inch for No.12 gage steel. The hole in the steel side member for the SDWS22312DBB and SDWS22512DBB shall be predrilled or pre-punched and shall have a standard round hole diameter no greater than 0.5625 inch when used with STN22.

4.0 DESIGN AND INSTALLATION

4.1 Design

4.1.1 General: Reference lateral and withdrawal design values in the report are for allowable stress design, and shall be multiplied by all applicable adjustment factors specified in the ANSI/AWC NDS (NDS) to determine adjusted design values, including wet service condition specified in Section 11.3.3 of the NDS - 2018 and 2015 (Section 10.3.3 of the NDS - 2012 and 2005). Local stresses in connections using multiple fasteners shall be checked in accordance with Section 11.1.2 and Appendix E of NDS – 2018 and 2015 (Section 10.1.2 and Appendix E of the NDS – 2012 and 2005). Structural members forming the connection shall be designed in accordance with the IBC or IRC.

SDW, SDWS SDWH, and SDWV screws have corrosion-resistant coatings that are recognized for use in wood members with chemical preservative treatments as set forth in Sections 2.0 and 3.2.1 of this report. These fasteners shall be limited to use in applications and limitations defined in Section 5.3 and Table 38 of this report. SDWH27G screws conform to the coating requirements of Section 2304.10.6 of the 2021 IBC (Section 2304.10.5 of the 2018 and 2015 IBC or Section 2304.9.5 of the 2012 and 2009 IBC).

4.1.2 Lateral Design Values: Reference lateral (Z) design values for SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws for single shear wood-to-wood connections loaded perpendicular and parallel to grain are shown in Tables 2, 5, 6, 9, 10, 13, 14, 17, 18, 21, 24, 27, 30, 31, and 34 of this report. Minimum connection geometries shall comply with Tables 4, 8, 8A, 12, 16, 20, 23, 26, 29, 33, and 36 of this report, as applicable.

4.1.3 Reference Withdrawal Design Values: Reference withdrawal (W) design values for SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWS27SS, and SDWS14 screws are shown in Tables 3, 7, 11, 15, 19, 22, 25, 28, 32, and 35 of this report, respectively. Edge distance, end distance, and spacing requirements for screws loaded in withdrawal and not loaded laterally are shown in Table 39 of this report. Loads are given in pounds per inch of thread penetration into the main member and maximum withdrawal load.

4.1.4 Pull-through Design Values: Pull-through design values are incorporated into the reference withdrawal design tables shown in Tables 3, 7, 11, 15, 19, 22, 25, 28, 32, and 35 of this report.

4.1.5 Framing Connections: The SDWS16 screws may be used for framing connections as given in the nail fastening schedules of Table R602.3(1) of the IRC and Table 2304.10.2 of the 2021 IBC (Section 2304.10.1 of the 2018 and 2015 IBC, Table 2304.9.1 of the 2009 and 2012 IBC), as applicable. For conventional construction, the SDWS16212 is an alternative to 8d common nails and 10d common nails, and the SDWS16300 is an alternative to 10d common and 16d common nails.

4.2 Installation: The SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws shall be installed in accordance with the manufacturer's installation instruction, the evaluation report, and the codes listed in Section 1.0, using a low-speed drill. Installation may be performed without predrilling with pilot holes. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, or as required by Tables 4, 8, 8A, 12, 16, 20, 23, 26, 29, 33, and 36 of this report, whichever is more restrictive. The bottom of the screw head shall be installed flush with the surface of the member being connected.

4.2.1 STN22: The SDWS22312DBB, SDWS22512DBB, and SDWS25200DBB may be used in conjunction with the STN22 Hex-Head Washer, which has a proprietary black corrosion-resistant coating referenced in Section 2.0 of the report. The STN22 is manufactured using a standard cold-forming process from low-carbon steel, Grade AISI 1008 to 1022. When installing the SDWS222312DBB, SDWS22512DBB, and SDWS25200DBB, the STN22 shall be placed onto wood or steel side plate members prior to screw installation. Reference lateral (Z) design values for SDWS22312DBB, SDWS22512DBB, and SDWS25200DBB screws when used with the STN22 are shown in Table 6A of this report. Figure 10 of this report illustrates the STN22 Hex-Head Washer.

4.2.2 SDPWXX: The SDPW Deflector screws are designed to facilitate differential vertical displacements between non-loadbearing partition walls and supporting framing members. The SDWS14350, SDWS14500, and SDWS19600 screws may be used in conjunction with the SDPWXX which consists of 3 colored plastic sleeves. The colored sleeves are manufactured from polypropylene material. Reference lateral (Z) design values for SDPWXX are shown in Table 37

of this report. Figure 11 of this report illustrates the SDPWXX Deflector screws.

5.0 LIMITATIONS

The Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 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 limitations:

5.1 When designing a connection, the connection shall be analyzed for conformance to Sections 11.1.2, 11.2.2, and 12.6 of NDS – 2018 and 2015 (Sections 10.1.2, 10.2.2, and 11.6 of the NDS – 2012 and 2005) to ensure the capacity of the connection and fastener group.

5.2 Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of NDS – 2018 and 2015 (Section 11.4.1 of the NDS – 2012 and 2005).

5.3 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report for all screws except the SDWH27G and SDWS27SS screws.

5.4 The SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws are manufactured under a quality control program with inspections by IAPMO UES.

6.0 SUBSTANTIATING DATA

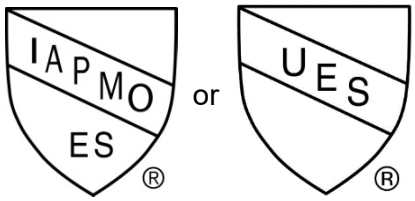
6.1 Data and test reports submitted are from laboratories in compliance with ISO/IEC 17025 and in accordance with the ICC-ES Acceptance Criteria for Alternate Dowel-type Threaded Fasteners (AC233, approved February 2022).

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Corrosion-Resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatment Chemicals (AC257, approved October 2009, editorially revised October 2022).

6.3 Test reports from laboratories in compliance with ISO/IEC 17025.

7.0 IDENTIFICATION

The packaging for the SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws are labeled with designations: "Simpson Strong-Tie Strong-Drive® SDW22", "Simpson Strong-Drive® SDWS22DB", "Simpson Strong-Drive® SDWS25DB", "Simpson Strong-Tie Strong-Drive® SDWH19DB", "Simpson Strong-Tie Strong-Drive® SDWS22", "Simpson Strong-Tie Strong-Drive® SDWS19", "Simpson Strong-Drive® SDWH27G", "Simpson Strong-Tie Strong-Drive® SDWS16", "Simpson Strong-Tie Strong-Drive® SDWV13, "Simpson Strong-Tie Strong-Drive® SDWS27SS", and "Simpson Strong-Tie Strong-Drive® SDWS14, respectively; the Simpson Strong-Tie Strong-Drive® name and address, the fastener size, and the IAPMO UES evaluation report number (ER-192). Each screw head is marked with the No-Equal symbol (≠) and the alpha-numeric letters "W22", "WS22", "WS25", "19", "27", "WS16", "WV13", "WS27", "PW14", or "PW19" indicating diameter and followed by a number designating screw length, as shown in Table 1 of this report. Either IAPMO UES Mark of Conformity shown below may also be used.



IAPMO UES ER-192

For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

TABLE 1 – SDW22, SDWS22DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 SCREW SPECIFICATIONS, ALLOWABLE BENDING YIELD STRENGTH, AND FASTENER ALLOWABLE STEEL STRENGTH (continued on next page)

FASTENER DESIGNATION	HEAD MARKING #.##	SCREW LENGTH[1] L (in.)	THREAD LENGTH[2] TL (in.)	UNTHREADED SHANK DIAMETER (in.)	MAJOR THREAD DIAMETER (in.)	MINOR THREAD (ROOT) DIAMETER (in.)	FASTENER ALLOWABLE STEEL STRENGTH[4]		
							Bending Yield Strength[3] (F_{yb}) (psi)	Tension (lbf)	Shear (lbf)
SDW22300	W22, 3.00	2.940	1 7/16	0.221	0.315	0.203	180,000	1,550	1,125
SDW22338	W22, 3.37	3.340	1 9/16						
SDW22438	W22, 4.37	4.375	1 7/16						
SDW22458	W22, 4.62	4.585	1 7/16						
SDW22500	W22, 5.00	5.040	1 9/16						
SDW22600	W22, 6.00	5.940	1 7/16						
SDW22638	W22, 6.37	6.315	1 7/16						
SDW22634	W22, 6.75	6.740	1 9/16						
SDWS22300DB	WS22, 3	3	1 1/2	0.221	0.315	0.203	160,000	1,505	910
SDWS22312DBB	WS22, 3.5	3.5	2						
SDWS22400DB	WS22, 4	4	2 3/8						
SDWS22500DB	WS22, 5	5	2 3/4						
SDWS22512DBB	WS22, 5.5	5.5	2 3/4						
SDWS22600DB	WS22, 6	6	2 3/4				175,000	1,575	1,055
SDWS22800DB	WS22, 8	8	2 3/4						
SDWS221000DB	WS22, 10	10	2 3/4						
SDWS25200DBB	WS25, 2	2	1 1/4	0.239	0.256	0.188	200,000	1,665	1,055
SDWH19300DB	193	3	1 1/2	0.199	0.275	0.182	165,000	1,210	770
SDWH19400DB	194	4	2 3/8						
SDWH19600DB	196	6	2 3/4				175,000	1,245	780
SDWH19800DB	198	8	2 3/4						
SDWH191000DB	1910	10	2 3/4						
SDWS22400	WS22, 4	4	2 3/8	0.221	0.315	0.203	160,000	1,505	910
SDWS22500	WS22, 5	5	2 3/4						
SDWS22512	WS22, 5.5	5.5	2 3/4						
SDWS22600	WS22, 6	6	2 3/4						
SDWS22800	WS22, 8	8	2 3/4						
SDWS22900	WS22, 9	9	2 3/4				175,000	1,575	1,055
SDWS221000	WS22, 10	10	2 3/4						
SDWS221100	WS22, 11	11	2 3/4						
SDWS221200	WS22, 12	12	2 3/4						
SDWS221500	WS22, 15	15	2 3/4						
SDWS19600	WS19, 6 or PW19, 6	6	2 3/4	0.199	0.275	0.182	175,000	1,245	780
SDWS19712	WS19, 7.5	7.5	2 3/4						
SDWH27400G	2704	4	3	0.276	0.398	0.245	146,000	2,050	1,465
SDWH27600G	2706	6	3						
SDWH27800G	2708	8	3						
SDWH271000G	2710	10	3						
SDWH271200G	2712	12	3						
SDWS16212	WS16, 2.5	2.40	1 1/8	0.159	0.216	0.145	175,000	920	570
SDWS16300	WS16, 3	2.90	1 5/8						
SDWS16312	WS16, 3.5	3.50	2						
SDWS16400	WS16, 4	4.00	2 1/2						

SDWV13400	WV13, 4	4.00	1 1/2	0.135	0.183	0.157	160,000	785	545
SDWS27300SS	WS27*,3	3	2	0.276	0.398	0.245	110,000	1,540	1,375
SDWS27400SS	WS27*,4	4	3						
SDWS27500SS	WS27*,5	5	3						
SDWS27600SS	WS27*,6	6	3						
SDWS27800SS	WS27*,8	8	3						
SDWS271000SS	WS27*,10	10	3						
SDWS271200SS	WS27*,12	12	3						
SDWS14350	PW14. 3.5	3.5	2	0.142	0.204	0.124	200,000	690	475
SDWS14500	PW14, 5	5	2						

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

1. For purposes of measuring overall fastener length, fasteners shall be measured from the underside of the head to the bottom of the point.
2. Thread length includes the point, as shown in Figure 1 of this report.
3. Bending yield strength was determined per methods specified in ASTM F1575 and based on the minor thread (root) diameter.
4. Allowable fastener loads are based on the steel properties of the screw. Refer to subsequent tables for allowable reference lateral (Z) and withdrawal (W) design values for using the screws in wood-to-wood connections.

FIGURE 1 – SDW22 SCREWS

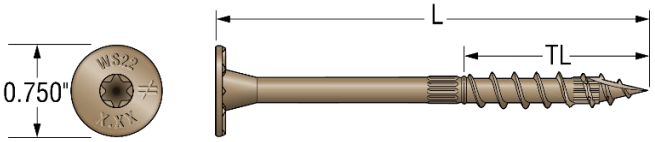


FIGURE 2 – SDWS22DB SCREWS (SDWS22 SCREWS similar)

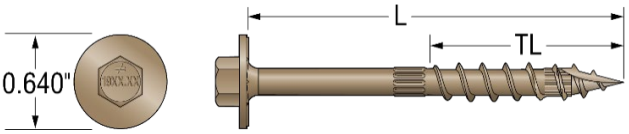


FIGURE 3 – SDWH19DB SCREWS

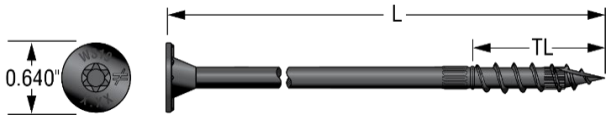


FIGURE 4 – SDWS19 SCREWS

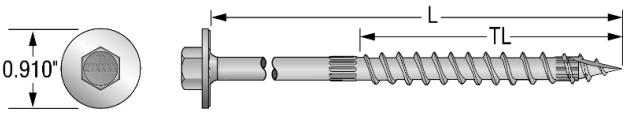


FIGURE 5 – SDWH27G SCREWS

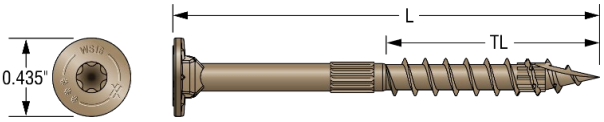


FIGURE 6 – SDWS16 SCREWS

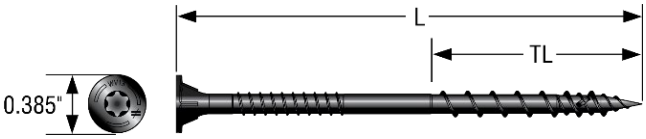


Figure 7 – SDWV13 SCREWS

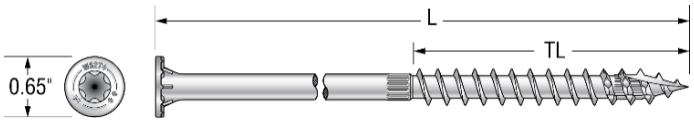


Figure 8 – SDWS27SS SCREWS

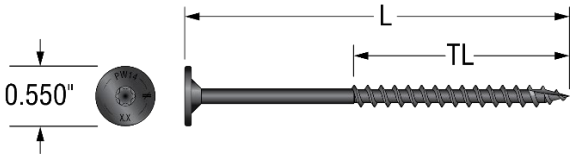


Figure 9 – SDWS14 SCREWS

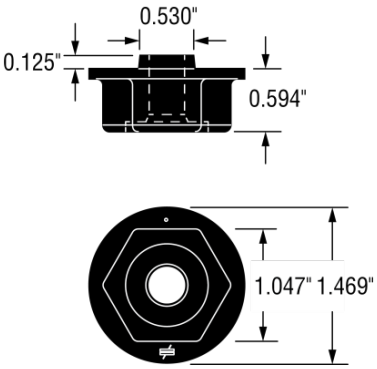


FIGURE 10 – STN22 HEX-HEAD WASHER

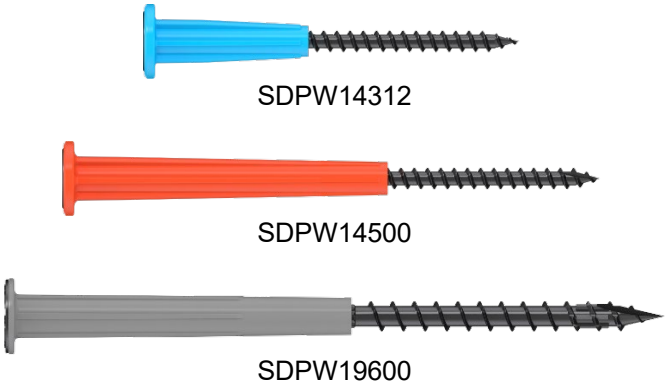


FIGURE 11 – SDPWXX SCREWS

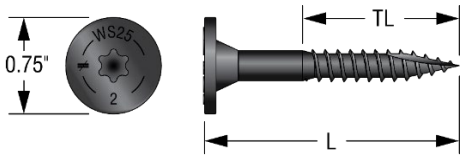


FIGURE 12 – SDWS25DBB SCREWS

TABLE 2 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDW22 SCREWS[1,2,3,4,5]

MODEL	SIDE MEMBER THICKNESS (in.)	MAIN MEMBER PENETRATION (in.)	ALLOWABLE SHEAR LOADS (lbf)	
			DF/ SP Members	HF/SPF Members
SDW22300	1 ½	1 3/8	325	255
SDW22338	1 ¾	1 5/8	400	255
SDW22438	1 ½	2 7/8	400	325
SDW22458	1 ½	2 7/8	400	325
SDW22500	1 ¾	3 1/4	400	325
SDW22600	1 ½	4 1/2	400	340
SDW22638	1 ½	4 1/2	400	340
SDW22634	1 ¾	5	400	385
	3 ½	3 1/4	400	-

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated lateral design values (Z) shall be multiplied by all applicable adjustment factors, including the load duration factor, C_D, from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 3 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDW22 SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			DF/SP MAIN MEMBER	HF/SPF MAIN MEMBER	DF/SP MAIN MEMBER	HF/SPF MAIN MEMBER
SDW22300	2.940	1 7/16	139	104	200	150
SDW22338	3.340	1 9/16	128	96		
SDW22438	4.375	1 7/16	139	104		
SDW22458	4.585	1 7/16	128	96		
SDW22500	5.040	1 9/16	139	104		
SDW22600	5.940	1 7/16	128	96		
SDW22638	6.315	1 7/16	139	104		
SDW22634	6.740	1 9/16	128	96		

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

1. The main members shall be wood having a minimum NDS referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W) and (W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.
7. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 4 – CONNECTION GEOMETRY FOR THE SDW22 SCREWS

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1 7/16
	Parallel	①	1 7/16
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rowsof Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing BetweenStaggered Rows	Perpendicular orParallel	⑦	5/8

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

[1] Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

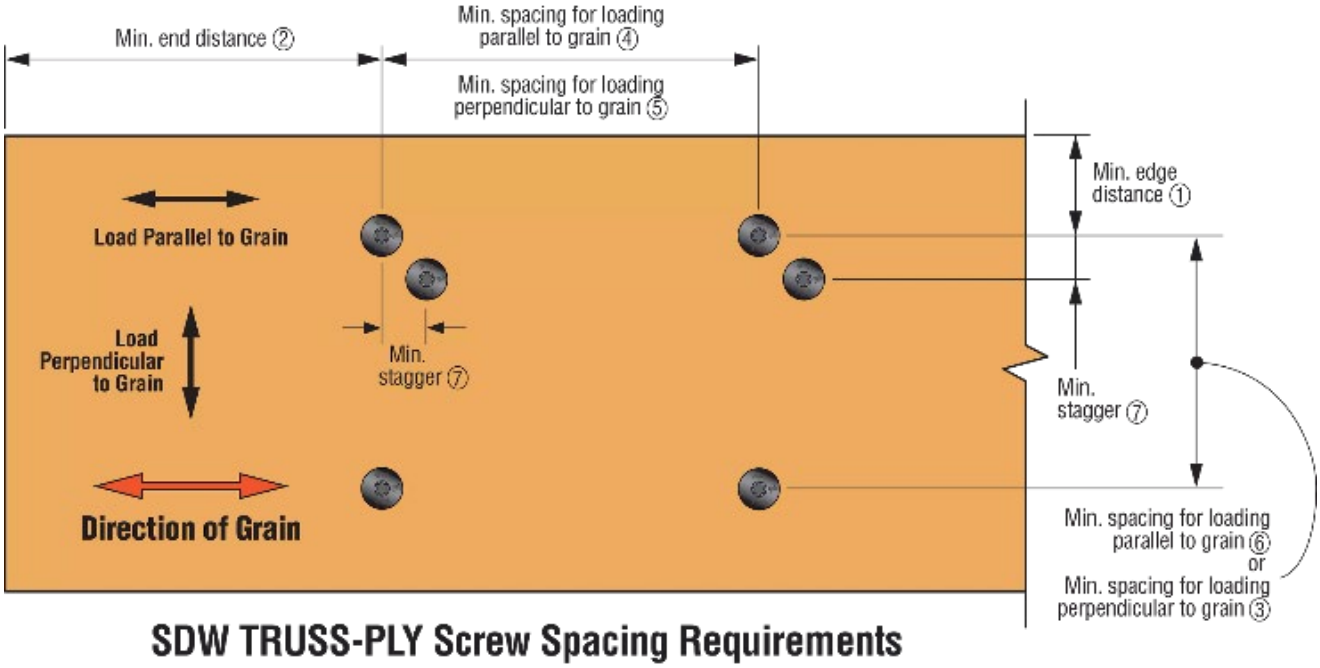


FIGURE 13 – CONNECTION GEOMETRY – SDW22 SCREWS

TABLE 5 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22DB SCREWS FOR DF AND SP WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	DF/SP ALLOWABLE SHEAR LOADS (lbf)								
		WOOD SIDE MEMBER THICKNESS (in.)								
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0
SDWS22300DB	1.5	255	-	-	-	-	-	-	-	-
SDWS22312DBB	2.0	255[6]	285	-	-	-	-	-	-	-
SDWS22400DB	2.375	405	405	305	-	-	-	-	-	-
SDWS22500DB	2.75	405	405	360	360	325	-	-	-	-
SDWS22512DBB	2.75	405	405	360	360	325[6]	300	-	-	-
SDWS22600DB	2.75	405	405	405	405	365	365	355	-	-
SDWS22800DB	2.75	405	405	405	405	395	395	395	395	-
SDWS221000DB	2.75	405	405	405	405	395	395	395	395	395

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine.
6. For Western Cedars $1^1/_2$-inch-thick side members, an allowable design value of 225 lbf is assigned for SDWS22312DBB; for Western Cedars 2-inch-thick side members, an allowable design value of 205 lbf is assigned for SDWS22312DBB; for Western Cedars $3^1/_2$-inch-thick side members, an allowable design value of 230 lbf is assigned for SDWS22512DBB.

TABLE 6 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22DB SCREWS FOR HF AND SPF WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	SPF/HF ALLOWABLE SHEAR LOADS (lbf)								
		WOOD SIDE MEMBER THICKNESS (in.)								
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0
SDWS22300DB	1.5	190	-	-	-	-	-	-	-	-
SDWS22312DBB	2.0	190	200	-	-	-	-	-	-	-
SDWS22400DB	2.375	385	285	215	-	-	-	-	-	-
SDWS22500DB	2.75	405	290	290	290	195	-	-	-	-
SDWS22512DBB	2.75	405	290	290	290	195	195	-	-	-
SDWS22600DB	2.75	405	365	365	365	310	310	210	-	-
SDWS22800DB	2.75	405	365	365	365	310	310	280	280	-
SDWS221000DB	2.75	405	365	365	365	310	310	280	280	280

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 6A – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD/STEEL CONNECTIONS WITH SDWS22DB AND SDWS25DB SCREWS AND STN22[1,2,3,4,5]

MODEL	THREAD LENGTH, TL(in)	ALLOWABLE SHEAR LOADS (lbf)							
		2x WOOD SIDE MEMBER				12-GA STEEL SIDE MEMBER			
		Western Cedars	SPF/HF	DF	SP	Western Cedars	SPF/HF	DF	SP
SDWS22312DBB	2.0	179	192	235	280	320	385	470	560
SDWS22512DBB	2.75	395	430	465	545	425	495	640	640
SDWS25200DBB	1.25	-	-	-	-	-	170	215	210

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.36 for Western Cedars, 0.42 for HF and SPF, 0.50 for DF, and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities of equivalent specific gravities of the main member and side member are different, the design values of the member with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D=1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood/steel side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir. DF is Douglas Fir-Larch. and SP is Southern Pine.

TABLE 7 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22DB AND SDWS25DB SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER	DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER
SDWS22300DB	3	1 1/2	164	151	245	225
SDWS22312DBB[8]	3.5	2	164	151	330	300
SDWS22400DB	4	2 3/8	179	160	425	380
SDWS22500DB	5	2 3/4	214	187	590	495
SDWS22512DBB[8]	5.5	2 3/4	214	187	590	495
SDWS22600DB	6	2 3/4	214	187	590	495
SDWS22800DB	8	2 3/4	214	187	590	495
SDWS221000DB	10	2 3/4	214	187	590	495
SDWS25200DBB	2	1 1/4	172	103	215	130

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

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) is in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) is in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W) and (W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of withdrawal from the main member or pull-through of a 1½-inch-thick side member.
8. For Western Cedar species, the reference withdrawal design value for the SDWS22DB is (W) of 142 lbf/inch of thread penetration.

TABLE 8 – CONNECTION GEOMETRY FOR THE SDWS22DB SCREWS

CONDITION	DIRECTION OF LOADTO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	◯1	1-7/16
	Parallel	◯1	1-7/16
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, 1 lbf = 4.45 N.

[1] Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable, as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

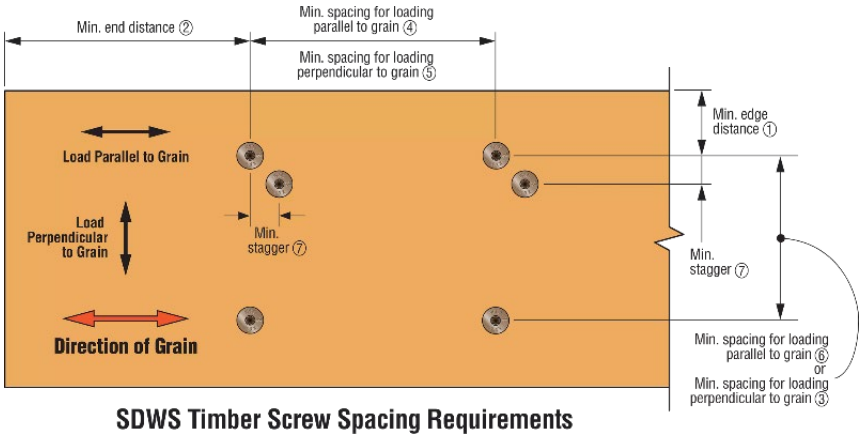


FIGURE 14 – CONNECTION GEOMETRY – SDWS22DB SCREWS

TABLE 8A – CONNECTION GEOMETRY FOR THE SDWS25DB SCREWS

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

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

[1.] Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

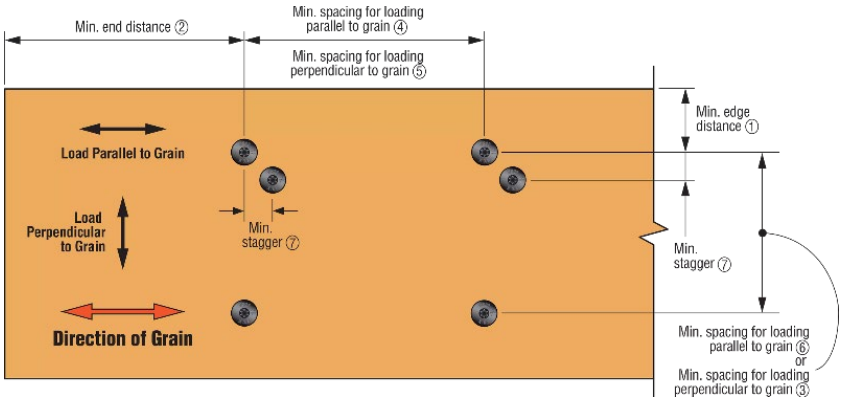


FIGURE 15 – CONNECTION GEOMETRY – SDWS25DB SCREWS

TABLE 9 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWH19DB SCREWS FOR DF AND SP WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	DF/SP ALLOWABLE SHEAR LOADS (lbf) WOOD SIDE MEMBER THICKNESS (in.)								
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0
SDWH19300DB	1.5	285	-	-	-	-	-	-	-	-
SDWH19400DB	2.375	370	300	300	-	-	-	-	-	-
SDWH19600DB	2.75	370	265	265	265	265	245	245	-	-
SDWH19800DB	2.75	370	265	265	265	265	265	260	245	-
SDWH191000DB	2.75	370	265	265	265	265	265	260	260	245

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine.

TABLE 10 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWH19DB SCREWS FOR HF AND SPF WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	SPF/HF ALLOWABLE SHEAR LOADS (lbf) WOOD SIDE MEMBER THICKNESS (in.)								
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0
SDWH19300DB	1.5	230	-	-	-	-	-	-	-	-
SDWH19400DB	2.375	330	235	195	-	-	-	-	-	-
SDWH19600DB	2.75	350	265	265	265	265	215	180	-	-
SDWH19800DB	2.75	350	265	265	265	265	265	215	215	-
SDWH191000DB	2.75	350	265	265	265	265	265	250	250	215

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 11 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWH19DB SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER	DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER
SDWH19300DB	3	1 1/2	177	120	265	180
SDWH19400DB	4	2 3/8	192	147	455	350
SDWH19600DB	6	2 3/4	197	164	545	445
SDWH19800DB	8	2 3/4	197	164	545	445
SDWH191000DB	10	2 3/4	197	164	545	445

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

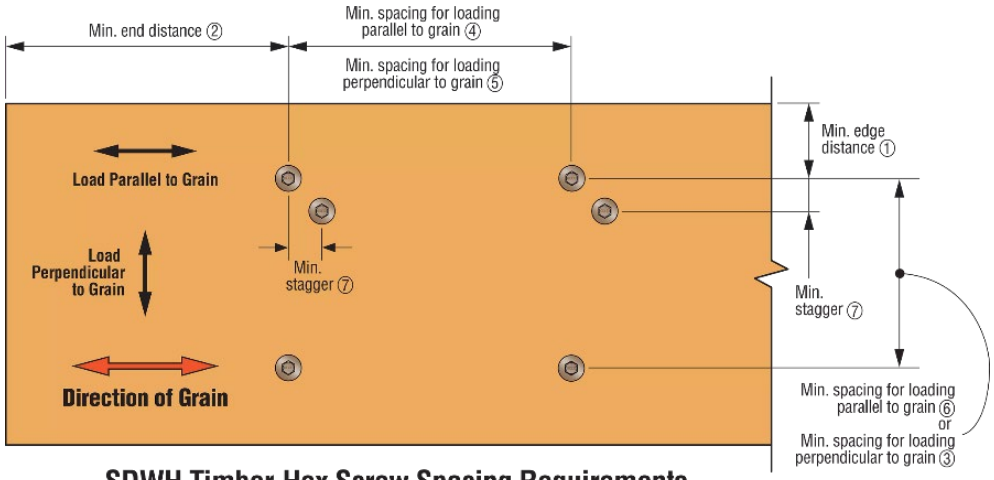
1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W and W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of withdrawal from the main member or pull-through of a 1½-inch-thick side member.

TABLE 12 – CONNECTION GEOMETRY FOR THE SDWH19DB SCREWS

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	◯1	1-7/16
	Parallel	◯1	1-7/16
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 orParallel	◯7	5/8

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

1. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.



SDWH Timber-Hex Screw Spacing Requirements

FIGURE 16 – CONNECTION GEOMETRY – SDWH19DB SCREWS

TABLE 13 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22 SCREWS FOR DF AND SP WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	DF/SP ALLOWABLE SHEAR LOADS (lbf)														
		WOOD SIDE MEMBER THICKNESS (in.)														
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0	10.0	13.0
SDWS22400	2 3/8	405	405	305	-	-	-	-	-	-	-	-	-	-	-	-
SDWS22500	2 3/4	405	405	360	360	325	-	-	-	-	-	-	-	-	-	-
SDWS22512	2 3/4	405	405	405	360	360	325	-	-	-	-	-	-	-	-	-
SDWS22600	2 3/4	405	405	405	405	365	365	355	-	-	-	-	-	-	-	-
SDWS22800	2 3/4	405	405	405	405	395	395	395	395	395	395	-	-	-	-	-
SDWS22900	2 3/4	405	405	405	405	395	395	395	395	395	395	395	-	-	-	-
SDWS221000	2 3/4	405	405	405	405	395	395	395	395	395	395	395	395	-	-	-
SDWS221100	2 3/4	405	405	405	405	395	395	395	395	395	395	395	395	395	-	-
SDWS221200	2 3/4	405	405	405	405	395	395	395	395	395	395	395	395	395	395	-
SDWS221500	2 3/4	405	405	405	405	395	395	395	395	395	395	395	395	395	395	395

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine.

TABLE 14 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22 SCREWS FOR HF AND SPF WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	SPF/HF ALLOWABLE SHEAR LOADS (lbf)														
		WOOD SIDE MEMBER THICKNESS (in.)														
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0	10.0	13.0
SDWS22400	2 3/8	385	285	215	-	-	-	-	-	-	-	-	-	-	-	-
SDWS22500	2 3/4	400	290	290	290	195	-	-	-	-	-	-	-	-	-	-
SDWS22512	2 3/4	400	290	290	290	290	195	-	-	-	-	-	-	-	-	-
SDWS22600	2 3/4	400	365	365	365	310	310	210	-	-	-	-	-	-	-	-
SDWS22800	2 3/4	400	365	365	365	310	310	280	280	280	280	-	-	-	-	-
SDWS22900	2 3/4	400	365	365	365	310	310	280	280	280	280	280	-	-	-	-
SDWS221000	2 3/4	400	365	365	365	310	310	280	280	280	280	280	280	-	-	-
SDWS221100	2 3/4	400	365	365	365	310	310	280	280	280	280	280	280	280	-	-
SDWS221200	2 3/4	400	365	365	365	310	310	280	280	280	280	280	280	280	280	-
SDWS221500	2 3/4	400	365	365	365	310	310	280	280	280	280	280	280	280	280	280

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 15 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS22 SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER	DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER
SDWS22400	4	2 3/8	179	160	425	380
SDWS22500	5	2 3/4	214	187	590	495
SDWS22512	5.5	2 3/4	214	187	590	495
SDWS22600	6	2 3/4	214	187	590	495
SDWS22800	8	2 3/4	214	187	590	495
SDWS22900	9	2 3/4	214	187	590	495
SDWS221000	10	2 3/4	214	187	590	495
SDWS221100	11	2 3/4	214	187	590	495
SDWS221200	12	2 3/4	214	187	590	495
SDWS221500	15	2 3/4	214	187	590	495

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

Footnotes for Table 15 on next page

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W and W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.

TABLE 16 – CONNECTION GEOMETRY FOR THE SDWS22 SCREWS

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1-7/16
	Parallel	①	1-7/16
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 BetweenStaggered Rows	Perpendicular orParallel	⑦	5/8

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

[1] Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, or as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

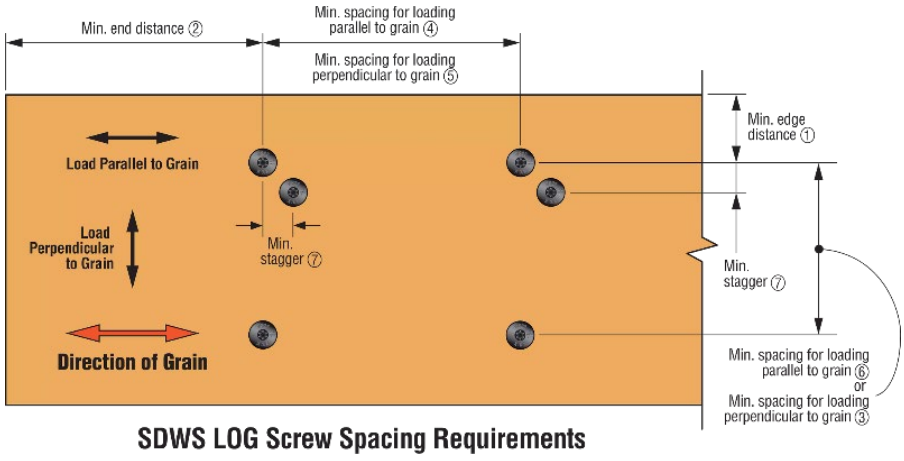


FIGURE 17 – CONNECTION GEOMETRY – SDWS22 SCREWS

TABLE 17 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS19 SCREWS FOR DF AND SP WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	DF/SP ALLOWABLE SHEAR LOADS (lbf)									
		WOOD SIDE MEMBER THICKNESS (in.)									
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
SDWS19600	2 3/4	370	265	265	265	265	245	245	-	-	-
SDWS19712	2 3/4	370	265	265	265	265	245	245	245	245	245

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.89 MPa, 1 lbf = 4.45 N.
1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine.

TABLE 18 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS19 SCREWS FOR HF AND SPF WOOD[1,2,3,4,5]

MODEL	THREAD LENGTH, TL (in.)	SPF/HF ALLOWABLE SHEAR LOADS (lbf)									
		WOOD SIDE MEMBER THICKNESS (in.)									
		1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
SDWS19600	2 3/4	350	265	265	265	265	215	180	-	-	-
SDWS19712	2 3/4	350	265	265	265	265	215	215	215	215	180

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.89 MPa, 1 lbf = 4.45 N.
1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 19 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS19 SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER	DF AND SP MAIN MEMBER	HF AND SPF MAIN MEMBER
SDWS19600	6	2 3/4	197	164	545	395
SDWS19712	7.5	2 3/4	197	164	545	395

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.89 MPa, 1 lbf = 4.45 N.
1. The main members shall be wood having a minimum NDS referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are applicable for fasteners installed into structural composite lumber described in Section 3.2.2.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W and W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.

TABLE 20 – CONNECTION GEOMETRY FOR THE SDWH19DB SCREWS[1]

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1-7/16
	Parallel	①	1-7/16
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 BetweenStaggered Rows	Perpendicular orParallel	⑦	5/8

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

[1]. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

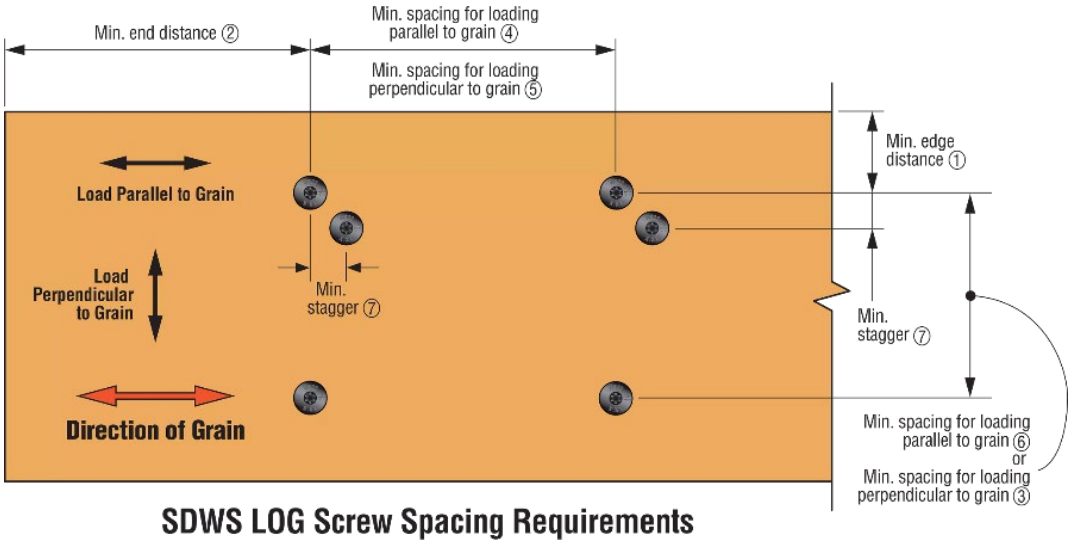


FIGURE 18 – CONNECTION GEOMETRY – SDWS19 SCREWS

TABLE 21 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWH27G SCREWS FOR SP, DF, AND HF/SPF WOOD[1,2,3,4,5,6]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	ALLOWABLE SHEAR LOADS (lbf)					
			WOOD SIDE MEMBER THICKNESS (in.)					
			SP		DF		HF/SPF	
			1.5	3.0	1.5	3.0	1.5	3.0
SDWH27400G	4	3	505	-	440	-	400	-
SDWH27600G	6	3	505	545	440	545	400	450
SDWH27800G	8	3	570	675	440	675	430	595
SDWH271000G	10	3	570	675	440	675	430	595
SDWH271200G	12	3	570	675	440	675	430	595

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.70.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
6. Table 23 of this report contains potential geometry reductions.

TABLE 22 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWH27G SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)			MAX REFERENCE WITHDRAWAL DESIGN VALUE, WMAX (lbf)		
			SP MAIN MEMBER	DF MAIN MEMBER	HF AND SPF MAIN MEMBER	SP MAIN MEMBER	DF MAIN MEMBER	HF AND SPF MAIN MEMBER
SDWH27400G	4	3	287	255	212	860	765	635
SDWH27600G	6	3						
SDWH27800G	8	3						
SDWH271000G	10	3						
SDWH271200G	12	3						

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

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W and W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M = 0.65.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.

TABLE 23 – CONNECTION GEOMETRY FOR THE SDWH27G SCREWS[1,2]

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)
Edge Distance	Perpendicular	①	1-7/16
	Parallel	①	1-1/2
End Distance	Perpendicular	②	6
	Parallel	②	8
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8[3]
Spacing Between Rows of Fasteners	Perpendicular	⑤	4[4]
	Parallel	⑥	4[4]
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8[5]

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N.
[1]. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, or as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.
[2]. Allowable shear loads shall be multiplied by the tabulated reduction factors when used in the corresponding geometry.
[3]. Table loads must be multiplied by an adjustment factor of 0.80.
[4]. Table loads must be multiplied by an adjustment factor of 0.89.
[5]. Table loads must be multiplied by an adjustment factor of 0.78.

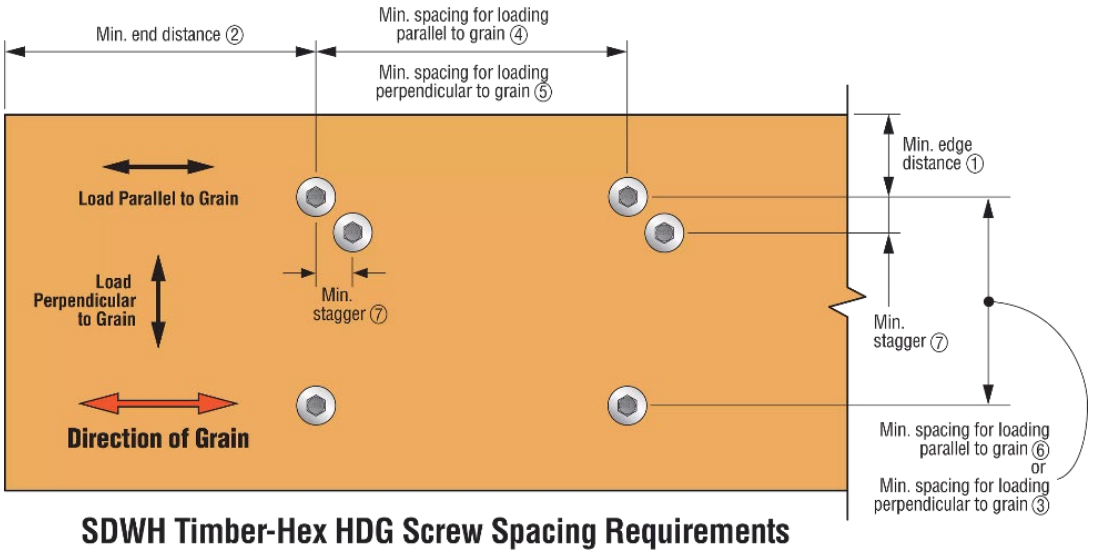


FIGURE 19 – CONNECTION GEOMETRY – SDWH27G SCREWS

TABLE 24 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS16 SCREWS[1,2,3,4,5]

MODEL	SIDE MEMBER THICKNESS (in.)	MAIN MEMBER PENETRATION (in.)	ALLOWABLE SHEAR LOADS (lbf)		
			SP	DFL	SPF/HF
SDWS16212	1 1/2	0.90	131	106	99
SDWS16300	1 1/2	1.40	229	150	150
	2	0.90	-	129	89
SDWS16312	1 1/2	2.0	254	254	199
SDWS16400	1 1/2	2.5	254	254	199
	2	2.0	262	262	199

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

1. The main and side members shall be wood having a minimum NDS referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF, When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.70.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
6. Table 26 of this report contains geometry reductions.

TABLE 25 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS16 SCREWS[1,2,3,4,5,6]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)			MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)		
			SP	DFL	SPF/HF	SP	DFL	SPF/HF
SDWS16212	2.40	1.125	177	132	103	199	149	116
SDWS16300	2.90	1.625	192	127	122	310	205	200
SDWS16312	3.50	2.000	181	169	127	345	300	200
SDWS16400	4.00	2.500	181	169	127	345	300	200

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

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W) and (W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.65.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch thick side member.

TABLE 26 – CONNECTION GEOMETRY FOR THE SDWS16 SCREWS

CONDITION	DIRECTION OF LOAD TO GRAIN	ID	MINIMUM DISTANCE OR SPACING (in.)	
			SDWS16212	SDWS16300 SDWS16312 SDWS16400
Edge Distance	Perpendicular	①	1	1
	Parallel	①	1/2	1
End Distance	Perpendicular	②	3-1/2	4
	Parallel	②	2	3
Spacing Between Fasteners in a Row	Perpendicular	③	2	2
	Parallel	④	2	2
Spacing Between Rows of Fasteners	Perpendicular	⑤	1[3]	1[4]
	Parallel	⑥	1[3]	1[4]
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	7/16	7/16

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

1. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable, as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.
2. Allowable shear loads shall be multiplied by the tabulated reduction factors when used in the corresponding geometry.
3. Table loads must be multiplied by an adjustment factor of 0.93.
4. Table loads must be multiplied by an adjustment factor of 0.91.

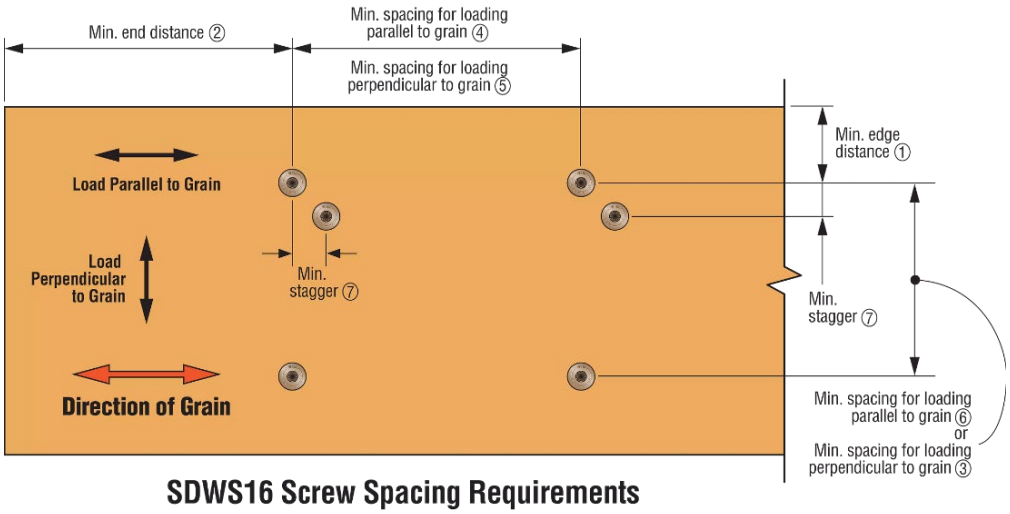


FIGURE 20 – CONNECTION GEOMETRY – SDWS16 SCREWS

TABLE 27– REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWV13 WOOD SCREWS[1-5]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	ALLOWABLE SHEAR LOADS (lbf)	
			SP/DF	SPF/HF
SDWV13400	4.00	1.500	205	195

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

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravity or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19%, C_M=0.70.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the 2x wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
6. Table 29 of this report contains geometry reductions.

TABLE 28 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWV13 WOOD SCREWS[1-6]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)		MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)	
			SP/DF	SPF/HF	SP/DF	SPF/HF
SDWV13400	4.00	1.500	120	107	180	160

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

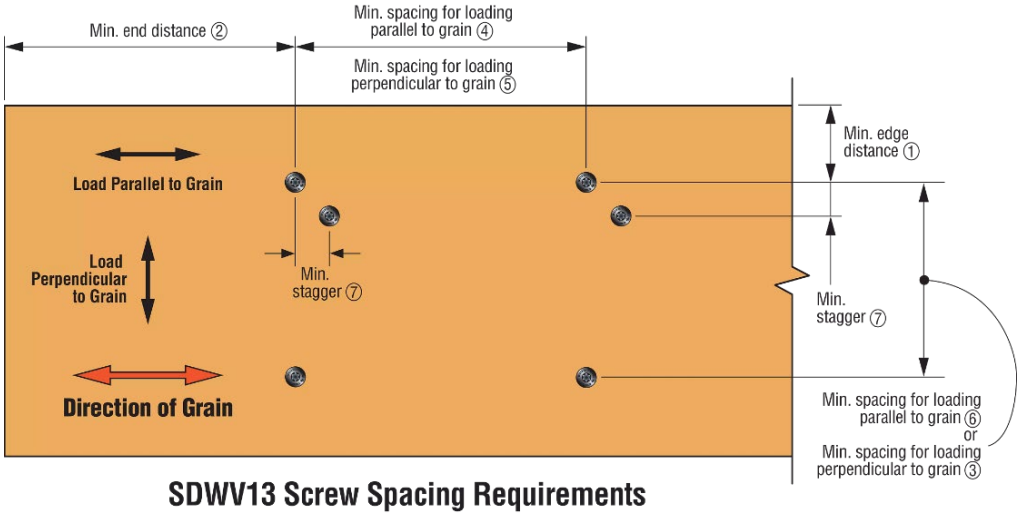
1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal values for sawn lumber are also applicable for fasteners installed into
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W) and (W_{MAX}) are shown at a CS = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19%, Cm=0.6.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½ inch side member. structural composite lumber described in Section 3.2.2 of this report.

TABLE 29 – CONNECTION GEOMETRY FOR THE SDWV13 WOOD SCREWS

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

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

1. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.
2. Allowable shear loads shall be multiplied by the tabulated reduction factors when used in the corresponding geometry.
3. Table loads must be multiplied by an adjustment factor of 0.91.



SDWV13 Screw Spacing Requirements

Figure 21 – CONNECTION GEOMETRY – SDWV13 SCREWS

TABLE 30 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS27SS SCREWS FOR SP and DF WOOD[1,2,3,4,5]

Fastener	Length (in.)	Thread Length (in.)	DF/SP Allowable Lateral Loads (lbs.)							
			Wood Side Member Thickness (in.)							
			1.5	2.5	3	3.5	4.5	6	8	10
SDWS27300SS	3	2	225	-	-	-	-	-	-	-
SDWS27400SS	4	3	375	220	-	-	-	-	-	-
SDWS27500SS	5	3	375	335	310	210	-	-	-	-
SDWS27600SS	6	3	375	335	335	335	210	-	-	-
SDWS27800SS	8	3	375	415	440	440	335	310	-	-
SDWS271000SS	10	3	375	415	485	485	485	335	310	-
SDWS271200SS	12	3	375	415	485	485	485	485	375	310

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

[1]. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.

[2]. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent, C_M=0.70 shall be used.

[3]. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.

[4]. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.

[5]. DF is Douglas Fir-Larch. SP is Southern Pine.

TABLE 31 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS27SS SCREWS FOR HF/SPF WOOD[1,2,3,4,5]

Fastener	Length (in.)	Thread Length (in.)	HF/SPF Allowable Lateral Loads (lbs.)							
			Wood Side Member Thickness (in.)							
			1.5	2.5	3	3.5	4.5	6	8	10
SDWS27300SS	3	2	215	-	-	-	-	-	-	-
SDWS27400SS	4	3	325	180	-	-	-	-	-	-
SDWS27500SS	5	3	325	285	235	175	-	-	-	-
SDWS27600SS	6	3	325	285	285	285	175	-	-	-
SDWS27800SS	8	3	325	350	390	470	285	235	-	-
SDWS271000SS	10	3	325	350	390	470	470	285	235	-
SDWS271200SS	12	3	325	350	390	470	470	470	285	235

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

1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF and 0.43 for HF. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.70.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 32 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS27SS SCREWS[1,2,3,4,5,6,7]

Fastener	Length (in.)	Thread Length (in.)	Allowable Withdrawal Loads			
			DF/SP (lb/in)	DF/SP (max.) (lbs.)	HF/SPF (lb/in)	HF/SPF (max.) (lbs.)
SDWS27300SS	3	2	222	410	182	365
SDWS27400SS	4	3	204	410	200	385
SDWS27500SS	5	3	204	410	200	385
SDWS27600SS	6	3	204	410	200	385
SDWS27800SS	8	3	204	410	200	385
SDWS271000SS	10	3	204	410	200	385
SDWS271200SS	12	3	204	410	200	385

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

1. The main members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.70.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
7. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.

TABLE 33 – CONNECTION GEOMETRY FOR THE SDWS27SS SCREWS[1]

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

For **SI:** 1 inch = 25.4 mm
1. Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, as required by this table, or when applicable, as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.

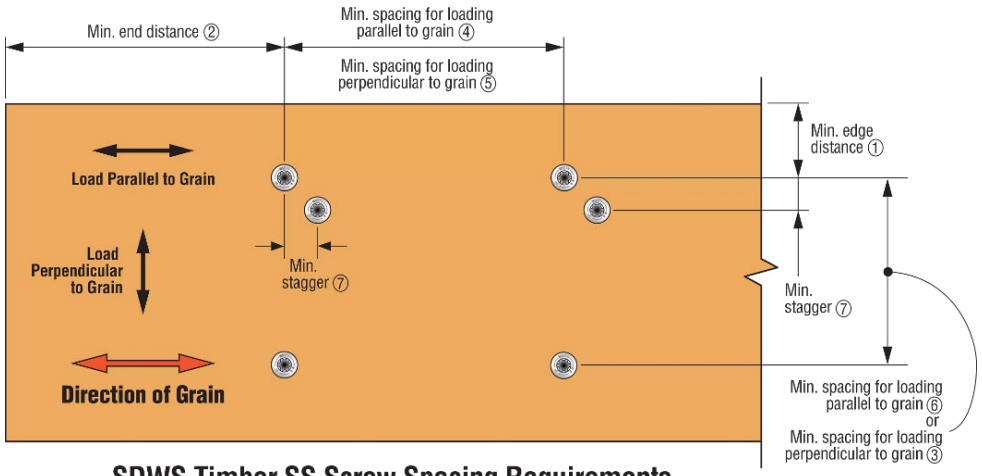


FIGURE 22 – CONNECTION GEOMETRY – SDWS27SS SCREWS

TABLE 34 – REFERENCE LATERAL (Z) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS14 SCREWS[1,2,3,4,5]

MODEL	SIDE MEMBER THICKNESS (in.)	MAIN MEMBER PENETRATION (in.)	ALLOWABLE SHEAR LOADS (lbf)		
			SP Members	DF Members	HF/SPF Members
SDWS14350	1 ½	2	135	125	105
SDWS14500	1 ½ - 3 ½	1 ½ - 3 ½	135	125	105

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.89 MPa, 1 lbf = 4.45 N.
1. The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated lateral design values (Z) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
3. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
4. Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.
5. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 35 – REFERENCE WITHDRAWAL (W) DESIGN VALUES FOR WOOD-TO-WOOD CONNECTIONS WITH SDWS14 SCREWS[1,2,3,4,5,6,7]

MODEL	FASTENER LENGTH, L (in.)	THREAD LENGTH, TL (in.)	REFERENCE WITHDRAWAL DESIGN VALUE, W (lbf/in.)			MAX REFERENCE WITHDRAWAL DESIGN VALUE, W_{MAX} (lbf)		
			SP MAIN MEMBER	DF MAIN MEMBER	HF/SPF MAIN MEMBER	SP MAIN MEMBER	DF MAIN MEMBER	HF/SPF MAIN MEMBER
SDWS14350	3.5	2	142	142	105	285	285	210
SDWS14500	5	2	142	142	105	285	285	210

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.89 MPa, 1 lbf = 4.45 N. **Footnotes for Table 35 on next page.**

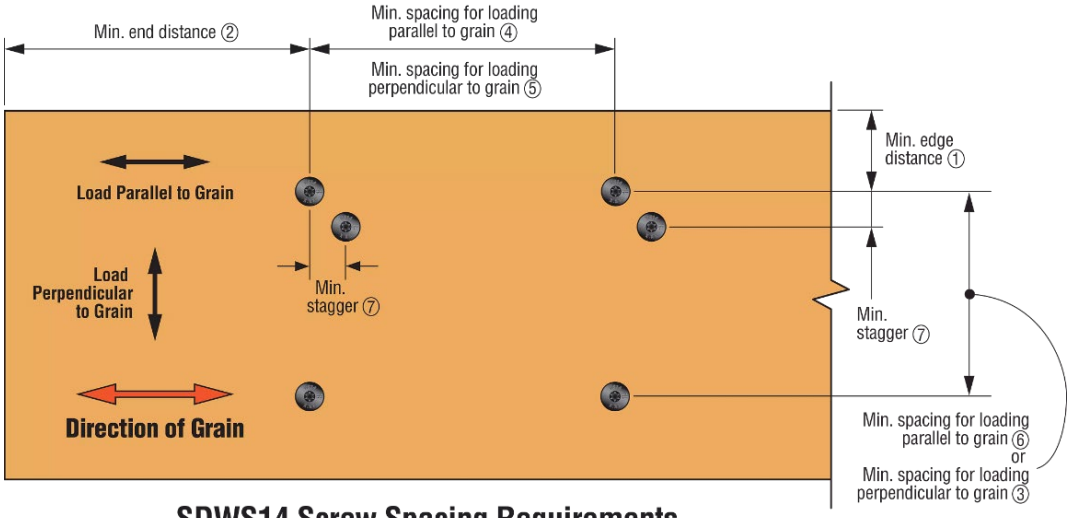
1. The main members shall be wood having a minimum NDS referenced specific gravity of 0.50 for DF, 0.55 for SP, and 0.42 for SPF and HF Withdrawal table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.2 of this report.
2. Tabulated reference withdrawal design values (W) are in pounds per inch of the thread penetration into the main member.
3. Tabulated reference withdrawal design values (W_{MAX}) are in pounds where the entire thread length shall penetrate into the main member.
4. Tabulated reference withdrawal design values (W) and (W_{MAX}) are shown at a C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
5. Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.
6. Values are based on the lesser of either withdrawal from the main member or pull-through of a 1½-inch-thick side member.
7. DF is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.

TABLE 36 – CONNECTION GEOMETRY FOR THE SDWS14 SCREWS[1]

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

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

1 Edge distances, end distances, and spacing of the screws shall be sufficient to prevent splitting of the wood, or as required by this table, or when applicable as recommended by the structural composite lumber manufacturer, whichever is the more restrictive.



SDWS14 Screw Spacing Requirements

FIGURE 23 – CONNECTION GEOMETRY – SDWS14 SCREWS

TABLE 37 – REFERENCE LATERAL (Z) DESIGN VALUES FOR SUPPORTING NON-LOADBEARING PARTITION WALLS AND SUPPORTING MEMBERS WITH SDPWXX SCREWS

MODEL	TOP PLATE	ALLOWABLE LATERAL LOAD (LB.), SPF/HF/DFL/SP (C_D = 1.6)							
		OFFSET = 0				OFFSET = ¾"			
		GAP				GAP			
		0"	1/2"	3/4"	1 1/2"	0"	1/2"	3/4"	1 1/2"
SDPW14312	2x	220	145	145	N/A	220	100	N/A	N/A
SDPW14500	2x +3/4" WSP	180	140	140	140	180	105	80	45
SDPW19600	(2) 2x	295	205	165	75	295	205	165	75

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

[1].Tabulated lateral design values (Z) have been increased C_D = 1.6. Reduce when other loads govern. Loads may be reduced for load duration per the building code down to a C_D = 1.0. Tabulated values shall be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC. For in-service moisture content greater than 19 percent use C_M=0.70.

[2].The main and side members shall be wood having a minimum NDS-referenced specific gravity of 0.42 for SPF, 0.43 for HF, 0.50 for DFL, and 0.55 for SP. Lateral table values for sawn lumber are also applicable for fasteners installed into structural composite lumber described in Section 3.2.1 of this report. When the specific gravities or equivalent specific gravities of the main member and side member are different, the design values of the wood with the lowest specific gravity shall be used.

[3].I-Joist shall have a minimum flange thickness of 1 1/2".

[4].Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers.

[5].Minimum fastener penetration shall be equal to the screw length less the thickness of the wood side plate.

[6].SPF is Spruce-Pine-Fir. HF is Hem-Fir, DFL is Douglas-Fir-Larch. SP is Southern Pine.

TABLE 38 – RECOGNIZED EXPOSURE CONDITIONS AND USE CATEGORIES FOR SIMPSON STRONG-TIE SDW, SDWS, SDWH, SDWV, AND SDWS14 SCREWS

EXPOSURE CONDITION	TYPICAL AWPA USE CATEGORY	TYPICAL APPLICATIONS	RECOGNITION LIMITATIONS
1	UC1 UC2	Treated wood in dry-use applications	Limited to use where the equilibrium moisture content of the chemically treated wood meets the dry services condition as described in NDS
3	UC3A UC3B UC4A	General Construction	Limited to freshwater and chemically treated wood exposure, e.g., no saltwater exposure

TABLE 39 – EDGE AND END DISTANCE AND SPACING REQUIREMENTS FOR SCREWS LOADED IN WITHDRAWAL

MODEL	END DISTANCE (in.)	EDGE DISTANCE (in.)	SPACING (in.)
SDW22	1.250	0.500	1.250
SDWS22DB	1.250	0.500	1.250
SDWS25DB	1.000	0.500	1.000
SDWH19	1.250	0.500	1.250
SDWS22	1.250	0.500	1.250
SDWS19	1.250	0.500	1.250
SDWH27G	1.625	0.625	1.625
SDWS16	0.875	0.375	0.875
SDWV13	0.750	0.375	0.750
SDWS27SS	1.625	0.625	1.625
SDWS14	0.875	0.375	0.875

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

CITY OF LOS ANGELES SUPPLEMENT

EVALUATION SUBJECT:

SIMPSON STRONG-TIE STRONG-DRIVE® SDW, SDWS, SDWH, and SDWV SCREWS

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.
5956 West Las Positas Boulevard
Pleasanton, California 94588
(800) 999-5099
www.strongtie.com

CSI Division: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES
CSI Section: 06 05 23 – Wood, Plastic, and Composite Fastenings

1.0 RECOGNITION

The Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 Screws described in ER-192 and this supplemental report are dowel-type threaded and self-drilling fasteners used for wood-to-wood and steel-to-wood connections. Simpson Strong-Drive Screws described in this report have been evaluated for structural performance properties, subject to the requirements in ER-192 and this supplemental report. Simpson Strong-drive products were evaluated for compliance with the following codes and regulations:

- 2023 City of Los Angeles Building Code (LABC)
- 2023 City of Los Angeles Residential Code (LARC)

2.0 LIMITATIONS

The Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws described in this report supplement comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report supplement, subject to the following limitations:

2.1 When designing a connection, the connection shall be analyzed for conformance to Sections 11.1.2, 11.2.2, and 12.6 of ANSI/AWC NDS – 2018.

2.2 Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of ANSI/AWC NDS – 2018.

2.3 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report for all screws except the SDWH27G screws.

2.4 The SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws are manufactured under a quality control program with inspections by IAPMO UES.

2.5 Prior to installation, calculations and details demonstrating compliance with this approval report and the Los Angeles Building Code or Los Angeles Residential Code shall be submitted to the structural plan check section for review and approval.

2.6 The calculations shall be prepared, stamped, and signed by a California registered design professional.

2.7 The design, installation, and inspection shall be in accordance with LABC Chapters 16 and 17, as applicable, due to local amendments to these chapters.

2.8 This supplement expires concurrently with ER-192.

FLORIDA SUPPLEMENT

EVALUATION SUBJECT:

SIMPSON STRONG-TIE STRONG-DRIVE® SDW, SDWS, SDWH, and SDWV SCREWS

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.
5956 West Las Positas Boulevard
Pleasanton, California 94588
(800) 999-5099
www.strongtie.com

CSI Division: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES
CSI Section: 06 05 23 – Wood, Plastic, and Composite Fastenings

1.0 RECOGNITION

Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws have been evaluated for structural performance properties, subject to the requirements in ER-192 and this supplemental report for compliance with the following codes and regulations:

- 2023 Florida Building Code, Building, 8th Edition, (FBC–Building)
- 2023 Florida Building Code, Residential, 8th Edition,
- (FBC–Residential)

2.0 LIMITATIONS

Use of the Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws recognized in ER-192 and this supplemental report for compliance with the FBC–Building and the FBC–Residential are subject to the following limitations in addition to the limitations shown in the ER-192:

2.1 The design and installation of Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws recognized in this supplement shall be in accordance with the 2021 International Building Code and the 2021 International Residential Code as noted in ER-192.

2.2 Load combinations shall be in accordance with Sections 1605.1 or 1605.2 of the FBC–Building, as applicable.

2.3 Design wind loads shall be in accordance with Section 1609.1.1 of the FBC–Building or Section R301.2.1.1 of the FBC–Residential, as applicable, and Section 1620 of the FBC–Building where used in High-velocity Hurricane Zones (HVHZ).

2.4 Use of Simpson Strong-Tie Strong-Drive® SDW22, SDWS22DB, SDWS25DB, SDWH19DB, SDWS22, SDWS19, SDWH27G, SDWS16, SDWV13, SDWS27SS, and SDWS14 screws recognized in this supplement complies with the High-Velocity Hurricane Zone (HVHZ) provisions set forth in Sections 2324.2 of the FBC–Building.

2.5 Simpson Strong-Tie Strong-Drive® structural miscellaneous connectors shall be manufactured, identified, and installed in accordance with ER-192 and the manufacturer's published installation instructions. A copy of the installation instructions shall be available at the job site continuously during installation. If there is a conflict between this report and the manufacturer's published installation instructions, the more restrictive prevails.

2.6 For products falling under Section (5)(d) of Florida Rule 61G20-3.008, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission) is required to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

2.7 This supplement expires concurrently with ER-192.