ICC-ES Evaluation Report

ESR-3006

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This report also contains:

- LABC Supplement

- FBC Supplement

DIVISION: 05 00 00—METALS **Section: 05 05 23—Metal Fastenings**	**REPORT HOLDER:** **SIMPSON STRONG-TIE COMPANY INC.**	**EVALUATION SUBJECT:** **SIMPSON STRONG-TIE® STRONG-DRIVE® X METAL, FPHSD FRAMING-TO-CFS, AND SHOULDERED SELF-DRILLING TAPPING SCREWS**	

1.0 EVALUATION SCOPE

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)

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see ESR-3006 LABC and LARC Supplement.

Property evaluated:

- Structural

2.0 USES

The Simpson Strong-Tie® Strong-Drive® X Metal Screws (X Metal screws) and FPHSD Framing-to-CFS Self-drilling Tapping Screws (FPHSD screws) are used to resist shear and tension loads in engineered connections of combinations of cold-formed or hot-rolled steel with thicknesses ranging from 27 mils (0.069 mm) to $^1/_2$ inch (12.7 mm) and in steel-to-steel connections prescribed in the code.

The Strong-Drive® Shouldered Self-Drilling Tapping Screws (Shouldered screws) are used to resist shear and tension loads in engineered connections between Simpson Strong-Tie® cold-formed steel curtain wall clips and cold-formed steel with thicknesses ranging from 33 mils (0.838 mm) to 97 mils (3.00 mm).

3.0 DESCRIPTION

3.1 General:

The X Metal screws and FPHSD screws, illustrated in Figure 1, and the Shouldered screws illustrated in Figure 2 are case hardened after being manufactured from carbon steel conforming to ASTM A510, Grades 1018 to 1024, and comply with the performance requirements of ASTM C1513. Refer to Table 1 for screw designations, dimensions, head styles, point numbers, drilling capacities, minimum required protrusion lengths and coating descriptions.

3.1.1 X Metal Screws: The X Metal screws are #10-16TPI, #12-14TPI, and #12-24TPI self-drilling tapping screws and are available with a proprietary Quik Guard® coating or a blue-bright zinc coating. The model numbers of Quik Guard® coated screws have a "Q" in the designation, while those coated with blue-bright zinc

do not. Screws are available in collated strips, designated by an "S" in the model number, or in boxes of individual screws (bulk), designated by a "B" in the model number. Model numbers for packages of individual screws also include the number of fasteners (e.g., 5K).

3.1.2 FPHSD Screws: The FPHSD screws are #10-16TPI and #12-14TPI self-drilling tapping screws and are available with blue-bright zinc coating. The FPHSD screws are available in collated strips or in boxes of individual screws (bulk). See Section 3.1.1 for an explanation of packaging designations included in the model numbers.

3.1.3 Shouldered Screws: The Shouldered screws are #14-14 TPI self-drilling tapping screws with integral washers and have a yellow zinc coating. The shouldered screws are available in $^{3}/_{4}$ inch (19.1 mm) and $^{7}/_{8}$ inch (22.2 mm) lengths.

3.2 Framing Steel:

For the design values listed in Tables 3A, 3B, 4A, 4B and 5 of this report, steels used to produce the connected steel members must have the minimum base steel thickness, yield and tensile strengths shown in the tables. Cold-formed framing steel must comply with one of the ASTM specifications noted in Section A3.1 of the AISI North American Specification for Design of Cold-Formed Steel Structural Members (AISI S100) (Section A2.1 of AISI S100 for the 2015, 2012 and 2009 IBC). Base steel thickness must comply with Section B7.1 of AISI S100 (Section A2.4 of AISI S100 for the 2015, 2012 and 2009 IBC), and this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

1.1.1 General: Selection of screw length must be based on the thickness of the fastened steel members plus the minimum required protrusion past the back of the supporting steel. Point selection must be based on the drilling capacity of the screw. See Table 1 for minimum required protrusion lengths and drilling capacities.

When tested for corrosion resistance in accordance with ASTM B117, screws with coatings described in Table 1 met the minimum requirement listed in ASTM F1941, as required by ASTM C1513, with no white corrosion after three hours and no red rust after 12 hours.

4.1.1 Prescriptive Design: The X Metal screws and FPHSD screws have been evaluated for use where ASTM C1513 screws of the same size are prescribed in the IRC and in the AISI Standards referenced in IBC Section 2211 (2009 IBC Section 2210) for steel-to-steel connections.

4.1.2 Engineered Design: The X Metal screws, FPHSD screws, and Shouldered screws have been evaluated for use in engineered connections of cold-formed steel light-frame construction.

The nominal, allowable, and design tensile and shear strength values of the screws used in steel-to-steel connections are given in Table 2. Steel-to-steel member connection shear, pull-over, and pull-out strength values are given in Table 3A and 3B, 4A and 4B, and 5, respectively, for steel complying with AISI S100 and Section 3.2 of this report.

For connections subject to tension, the least of the tensile strength of screws, the connection pull-over strength, and the connection pull-out strength found, respectively, in Tables 2, 4A or 4B, as applicable, and 5 of this report, must be used for design. For connections subject to shear, the lesser of the fastener shear strength and the connection shear capacity found, respectively, in Tables 2 and 3A or 3B, as applicable, of this report, must be used for design. Design provisions for tapping screw connections subjected to combined shear and tension loading are outside the scope of this report.

Under the 2021 IBC, for screws used in framing connections, in order for the screws to be considered fully effective, the minimum spacing between the fasteners must be 3 times the nominal screw diameter and the minimum edge distance must be 1.5 times the nominal screw diameter. Under the 2018, 2015, 2012 and 2009 IBC, for screws used in framing connections, in order for the screws to be considered fully effective, the minimum spacing between the fasteners and the minimum edge distance must be 3 times the nominal diameter of the screws, except when the edge is parallel to the direction of the applied force, the minimum edge distance must be 1.5 times the nominal screw diameter. When the spacing between screws is less than 3 times the nominal screw diameter, but at least 2 times the nominal screw diameter, the connection shear strength values in Table 3A and 3B must be reduced by 20 percent [Refer to Section B1.5.1.3 of AISI S240 (Section D1.5 of AISI S200 for the 2015, 2012 and 2009 IBC)].

For screws used in applications other than framing connections, the minimum spacing between the fasteners must be 3 times the nominal screw diameter and the minimum edge and end distance must be 1.5 times the nominal screw diameter. Additionally, under the 2009 IBC, when the distance to the end of the connected part is parallel to the line of the applied force, the allowable connection shear strength determined in accordance with Section E4.3.2 of Appendix A of AISI S100-07 or AISI–NAS, as applicable, must be considered. The connection shear strengths are for connections where the connected steel elements are in direct contact with

one another. Connected members must be checked for rupture in accordance with Section J6 of AISI S100 (Section E6 of AISI S100 for the 2015 IBC, Section E5 of AISI S100 for the 2012 and 2009 IBC).

4.2 Installation:

Installation of the Simpson Strong-Tie® self-drilling tapping screws must be in accordance with the code, the manufacturer's published installation instructions and this report. The manufacturer's published installation instructions must be available at the jobsite at all times during installation.

The screw must be installed perpendicular to the work surface using a variable speed screw driving tool set to not exceed 2,500 rpm. The screw must penetrate through the supporting steel with a minimum of three threads protruding past the back side of the supporting steel.

5.0 CONDITIONS OF USE:

The Simpson Strong-Tie® self-drilling tapping 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 Screws must be installed in accordance with the manufacturer's published installation instructions and this report. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.2 The allowable loads (ASD) specified in Section 4.1 must not be increased when the screws are used to resist wind or seismic forces.

5.3 Evaluation of screws subjected to cyclic or fatigue loading is outside the scope of this report. Applicable Seismic Design Categories shall be determined in accordance with the code for the entire assembly constructed with the screws.

5.4 Drawings and calculations verifying compliance with this report and the applicable code must be submitted to the code official for approval. The drawings and calculations are to be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.

5.5 The use of the screws in engineered steel deck diaphragms has not been evaluated and is outside the scope of this evaluation report.

5.6 Shouldered screws must only be used in conjunction with Simpson Strong-Tie curtain wall connectors addressed in ICC-ES Evaluation Report ESR-4294.

5.7 The screws are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Tapping Screw Fasteners Used in Steel-to-steel Connections (AC118), dated January 2018 (editorially revised December 2020).

7.0 IDENTIFICATION

7.1 The Simpson Strong-Tie® self-drilling tapping screws are marked with a "≠" on the top surface of the screw heads, as shown in Figure 1 and Figure 2. Packages of Simpson Strong-Tie® self-drilling tapping screws are labeled with the report holder's name (Simpson Strong-Tie Company Inc.) and address, the screw type and size, and the evaluation report number (ESR-3006).

7.2 The report holder's contact information is the following:

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

TABLE 1—SIMPSON STRONG-TIE® STRONG-DRIVE® SELF-DRILLING TAPPING SCREW SPECIFICATIONS

MODEL NO.		DESIGNATION (Size - TPI)	NOMINAL SHANK DIAMETER (in.)	NOMINAL SCREW LENGTH (in.)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER (in.)	POINT (number)	DRILLING CAPACITY (in.)	MINIMUM REQUIRED PROTRUSION (in.)	COATING
Collated Strip	Bulk									
X Metal Screws										
XQ1S1016	XQ1B1016-4K	#10-16	0.190	1	HW	0.415	3	0.175	0.502	Proprietary Quik Guard®
XQ1S1214	XQ1B1214-3.5K	#12-14	0.216	1	HW	0.415	3	0.210	0.568	
XQ78S1224	XQ78B1224-3K	#12-24	0.216	7/8	HW	0.415	4	0.250	0.515	
XQ114S1224	XQ114B1224-2.5K	#12-24	0.216	1 1/4	HW	0.415	5	0.500	0.755	
XQ112S1224	XQ112B1224-2K	#12-24	0.216	1 1/2	HW	0.415	5	0.500	0.755	
-	X34B1016-5K	#10-16	0.190	3/4	HW	0.415	3	0.175	0.488	Blue-bright Zinc
X1S1016	X1B1016-4K	#10-16	0.190	1	HW	0.415	3	0.175	0.502	
X1S1214	X1B1214-3.5K	#12-14	0.216	1	HW	0.415	3	0.210	0.568	
FPHSD Screws										
FPHSD34S1016	FPHSD34B1016, FPHSD34B1016-5K	#10-16	0.190	3/4	FP/SQ	0.365	3	0.175	0.464	Blue-bright Zinc
FPHSD34S1214	FPHSD34B1214, FPHSD34B1214-5K	#12-14	0.216	3/4	FP/SQ	0.365	3	0.210	0.490	
Shouldered Screws										
—	XLSH34B1414	#14-14	0.242	3/4	HW	0.625	3	0.280	0.533	Yellow Zinc
—	XLSH78B1414	#14-14	0.242	7/8	HW	0.625	3	0.280	0.533	

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

[1]Head Styles: HW = Hex Washer; FP/SQ = Flat Pan with #3 Square Drive Reces

TABLE 2—SIMPSON STRONG-TIE® STRONG-DRIVE® SCREW STRENGTHS (lbf)[1,2,3,4]

MODEL NO.	SIZE	NOMINAL STRENGTH		ALLOWABLE STRENGTH (ASD)		DESIGN STRENGTH (LRFD)	
		Shear: P_{ss}	Tension: P_{ts}	Shear: P_{ss}/Ω	Tension: P_{ts}/Ω	Shear: ΦP_{ss}	Tension: ΦP_{ts}
X34B1016-5K	#10-16 x 3/4"	1,625	2,930	540	975	810	1,465
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"						
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	2,525	3,750	840	1,250	1,265	1,875
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	2,800	4,260	935	1,420	1,400	2,130
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"						
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"						
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	1,710	2,215	570	740	855	1,110
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	2,535	3,380	845	1,125	1,265	1,690
XLSH34B1414	#14-14 x 3/4"	3050	3010	1015	1005	1525	1505
XLSH78B1414	#14-14 x 7/8"	3540	4100	1180	1365	1770	2050

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

[1]The tabulated ASD allowable strength and LRFD design strength values are based on a safety factor of $\Omega = 3.0$ and a resistance factor of $\Phi = 0.5$, respectively.

[2]For tension connections, the lowest of the fastener tension strength, pull-over and pull-out capacities found in Tables 2, 4A or 4B, as applicable, and 5, respectively, must be used for design.

[3]For shear connections, the lesser of fastener shear strength and the connection shear strength found in Tables 2 and 3A or 3B, as applicable, respectively, must be used for design.

[4]P_{ss} and P_{ts} are nominal shear strength and nominal tension strength for the screw itself, respectively, and are the average (ultimate) value of all tests.

TABLE 3A—SIMPSON STRONG-TIE® STRONG-DRIVE® X METAL AND FPHSD SCREWS - CONNECTION SHEAR STRENGTH OF TWO-MEMBER JOINTS LIMITED BY TILTING AND BEARING (lbf)[1,2,3,4,5]

MODEL NO.	SIZE	NOMINAL SHANK DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS (mil)							
			27	33	43	54	68	97	1/8"	1/4"
NOMINAL STRENGTH, R_n										
X34B1016-5K	#10-16 x 3/4"	0.190	400	535	815	1,290	1,290	1,290	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"									
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	400	535	870	1,350	2,135	2,135	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	420	550	920	1,455	1,675	2,675	2,675	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"									2,675
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"									
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	395	535	860	1,305	1,305	1,305	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	485	610	930	1,385	1,385	1,385	-	-
ALLOWABLE STRENGTH (ASD), R_n/Ω										
X34B1016-5K	#10-16 x 3/4"	0.190	175	235	360	540	540	540	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"									
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	175	235	385	595	840	840	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	140	230	350	640	740	935	935	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"									935
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"									
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	175	235	380	570	570	570	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	205	260	410	610	610	610	-	-
DESIGN STRENGTH (LRFD), $\Phi * R_n$										
X34B1016-5K	#10-16 x 3/4"	0.190	280	375	570	810	810	810	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"									
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	280	375	610	950	1,265	1,265	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	210	365	560	1,025	1,175	1,355	1,355	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"									1,355
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"									
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	280	375	605	855	855	855	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	330	420	650	975	975	975	-	-

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

[1]The safety factor Ω and resistance factor Φ used to determine the ASD and LRFD strengths are based on AISI S100.
[2]For shear connections, the lesser of the allowable fastener shear strength and the allowable shear capacity found in Tables 2 and 3, respectively, must be used for design.
[3]The tabulated shear values are limited by the thinner steel member in the connection. Steel thickness for both members must be in the range of 27 mils to 1/4 inch.
[4]Values are based on steel members with a minimum yield strength of F_y = 33 ksi and a minimum tensile strength of F_u = 45 ksi for 27-mil to 43-mil thicknesses, a minimum yield strength of F_y = 50 ksi and a minimum tensile strength of F_u = 65 ksi for 54 mil to 97 mil thickness, and a minimum yield strength of F_y = 36 ksi and a minimum tensile strength of F_u = 58 ksi for 1/8-inch and thicker.
[5]See Section 4.1.3 for spacing and edge distance requirements.

TABLE 3B—SIMPSON STRONG-TIE® STRONG-DRIVE® SHOULDERED SCREWS LAP-JOINT CONNECTION SHEAR STRENGTH LIMITED BY TILTING AND BEARING (lbf)[1,2,3,4,5]

MODEL NO.	SIZE	NOMINAL SHANK DIA. (in.)	MEMBER IN CONTACT WITH SCREW HEAD (TOP MEMBER)[6]	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBER NOT IN CONTACT WITH SCREW HEAD[7]				
				33 (mil)	43 (mil)	54 (mil)	68 (mil)	97 (mil)
NOMINAL STRENGTH, R_n								
XLSH34B1414	#14-14 x 3/4"	0.242	54 mil, Gr. 40	880	1250	1585	2045	2665
			68 mil, Gr. 40	780	1565	1945	2175	2980
XLSH78B1414	#14-14 x 7/8"	0.242	97 mil, Gr. 50 with gap[3]	950	1710	2775	3015	3015
			97 mil, Gr. 50	900	1380	2265	2715	3455
			118 mil, Gr. 50	925	1445	2510	3380	3380
ALLOWABLE STRENGTH (ASD), R_n/Ω								
XLSH34B1414	#14-14 x 3/4"	0.242	54 mil, Gr. 40	360	510	645	835	1085
			68 mil, Gr. 40	310	640	790	885	1215
XLSH78B1414	#14-14 x 7/8"	0.242	97 mil, Gr. 50 with gap[3]	385	620	1130	1230	1230
			97 mil, Gr. 50	365	560	925	1045	1410
			118 mil, Gr. 50	375	590	1025	1265	1265
DESIGN STRENGTH (LRFD), $\Phi * R_n$								
XLSH34B1414	#14-14 x 3/4"	0.242	54 mil, Gr. 40	575	815	1035	1335	1740
			68 mil, Gr. 40	495	1020	1265	1420	1945
XLSH78B1414	#14-14 x 7/8"	0.242	97 mil, Gr. 50 with gap[3]	620	995	1810	1965	1965
			97 mil, Gr. 50	585	900	1480	1675	2255
			118 mil, Gr. 50	605	945	1640	2020	2020

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

[1]The safety factor Ω and resistance factor Φ used to determine the ASD and LRFD strengths are based on AISI S100.
[2]Unless otherwise noted, the tabulated shear values apply to fasteners installed through a 1/4-inch diameter hole pre-drilled in the steel member in contact with the screw head, with the steel member not in contact with the screw head snug with the shoulder of the screw.
[3]The tabulated shear values are based on fasteners installed through a 3/16 inch diameter hole pre-drilled in the top member, with a gap between the underside of the integral washer and the top sheet equal to approx. 1/8". The steel member not in contact with the screw head must be snug with the shoulder of the screw.
[4]For shear connections, the lesser of the allowable fastener shear strength and the allowable shear capacity found in Tables 2 and 3A, respectively, must be used for design.
[5]See Section 4.1.3 for spacing and edge distance requirements.
[6] Steel used for the top member must have a minimum yield strength of F_y =40 ksi and a minimum tensile strength of F_u = 55 ksi for 54-mil and 68-mil thicknesses, and a minimum yield strength of F_y=50 ksi and a minimum tensile strength of F_u=65 ksi for 97 mil and 118 mil thickness.
[7]Steel members not in contact with the screw head must have a minimum yield strength of F_y =33 ksi and a minimum tensile strength of F_u = 45 ksi for 33-mil and 43-mil thicknesses, and a minimum yield strength of F_y=50 ksi and a minimum tensile strength of F_u=65 ksi for 54 mil, 68 mil and 97 mil thickness.

TABLE 4A—SIMPSON STRONG-TIE® STRONG-DRIVE® X METAL AND FPHSD SCREWS – PULL-OVER STRENGTH (lbf)[1,2]

MODEL NO.	SIZE	NOMINAL HEAD DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBER IN CONTACT WITH THE SCREW HEAD (mil)[3]					
			27	33	43	54	68	97
NOMINAL STRENGTH, R_n								
X34B1016-5K	#10-16 x 3/4"	0.415	805	990	1,160	1,585	2,260	2,695
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"							
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.415	720	920	1,285	1,925	2,565	2,965
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.415	795	875	985	1,770	1,930	3,400
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"							
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"							
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.365	685	895	1,190	1,705	2,215	2,215
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.365	595	815	1,050	1,540	2,060	2,065
ALLOWABLE STRENGTH (ASD), R_n/Ω								
X34B1016-5K	#10-16 x 3/4"	0.415	330	400	475	645	925	975
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"							
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.415	295	375	525	785	1,045	1,210
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.415	265	290	400	720	790	1,390
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"							
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"							
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.365	280	365	485	695	740	740
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.365	240	330	430	630	840	1,125
DESIGN STRENGTH (LRFD), $\Phi * R_n$								
X34B1016-5K	#10-16 x 3/4"	0.415	525	640	755	1,035	1,465	1,465
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"							
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.415	470	600	835	1,255	1,670	1,875
XQ78S1224/XQ78B1224-3K	#12-24 x 7/8"	0.415	395	440	640	1,155	1,260	2,160
XQ114S1224/XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"							
XQ112S1224/XQ112B1224-2K	#12-24 x 1 1/2"							
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.365	445	585	775	1,110	1,110	1,110
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.365	390	530	685	1,005	1,340	1,690

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

[1]The safety factor Ω and resistance factor Φ used to determine the ASD and LRFD strengths are based on AISI S100.
[2]For tension connection, the lowest of the fastener tension strength, pull-over and pull-out capacities found by Tables 2, 4A and 5, respectively, must be used for design.
[3]Values are based on steel members with a minimum yield strength of F_y=33 ksi and a minimum tensile strength of F_u=45 ksi for 27 mil to 43 mil thickness, and a minimum yield strength of F_y=50 ksi and a minimum tensile strength of F_u=65 ksi for 54 mil to 97 mil thickness.

TABLE 4B—SIMPSON STRONG-TIE® STRONG-DRIVE® SHOULDERED SCREWS – PULL-OVER STRENGTH (lbf)[1,2,3]

MODEL NO.	SIZE	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBER IN CONTACT WITH THE SCREW HEAD (mil)[4]			
		54	68	97	118
NOMINAL STRENGTH, R_n					
XLSH34B1414	#14-14 x $^3/_4$"	2445	2660	-	-
XLSH78B1414	#14-14 x $^7/_8$"	-	-	3426	3426
ALLOWABLE STRENGTH (ASD), Rn/Ω					
XLSH34B1414	#14-14 x $^3/_4$"	995	1085	-	-
XLSH78B1414	#14-14 x $^7/_8$"	-	-	1397	1397
DESIGN STRENGTH (LRFD), Φ^*R_n					
XLSH34B1414	#14-14 x $^3/_4$"	1595	1735	-	-
XLSH78B1414	#14-14 x $^7/_8$"	-	-	2235	2235

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

[1]The safety factor Ω and resistance factor Φ used to determine the ASD and LRFD strengths are based on AISI S100.
[2]The tabulated pull-over values are based on fasteners installed through a ¼ inch diameter hole pre-drilled in the steel member in contact with the screw head. Tabulated values do not apply to screws installed with a gap between the underside of the integral washer and the top member.
[3]For tension connections, the lowest of the fastener tension strength, pull-over and pull-out capacities found in Tables 2, 4B and 5, respectively, must be used for design.
[4]Steel members must have a minimum yield strength of F_y =40 ksi and a minimum tensile strength of F_u = 55 ksi for 54-mil and 68-mil thicknesses, and a minimum yield strength of F_y=50 ksi and a minimum tensile strength of F_u=65 ksi for 97 mil and 118 mil thicknesses.

TABLE 5—SIMPSON STRONG-TIE® STRONG-DRIVE® SELF-DRILLING TAPPING SCREWS – PULL-OUT STRENGTH, (lbf)[1,2]

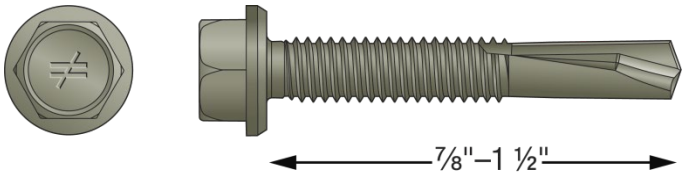
MODEL NO.	SIZE	NOMINAL SHANK DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBER NOT IN CONTACT WITH THE SCREW HEAD (mil)[3]								
			27	33	43	54	68	97	3/16"	1/4"	1/2"
NOMINAL STRENGTH, R_n											
X34B1016-5K	#10-16 x 3/4"	0.190	175	215	315	490	660	1,095	-	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"										
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	180	235	360	520	800	1,220	-	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	235	205	280	505	640	1,130	1,990	3,370	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"										4,260
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"										
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	190	230	385	585	840	1,235	-	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	190	230	390	590	845	1,295	-	-	-
XLSH34B1414	#14-14 x 3/4"	0.242	-	260	400	620	860	1330	-	-	-
XLSH78B1414	#14-14 x 7/8"	0.242	-	260	415	660	1020	1775	-	-	-
ALLOWABLE STRENGTH (ASD), R_n/Ω											
X34B1016-5K	#10-16 x 3/4"	0.190	70	85	130	200	270	445	-	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"										
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	75	95	145	215	325	500	-	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	75	80	115	200	260	460	730	1,375	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"										1,420
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"										
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	75	95	155	240	340	505	-	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	75	95	160	240	345	530	-	-	-
XLSH34B1414	#14-14 x 3/4"	0.242	-	100	160	250	350	540	-	-	-
XLSH78B1414	#14-14 x 7/8"	0.242	-	100	145	270	415	725	-	-	-
DESIGN STRENGTH (LRFD), Φ^*R_n											
X34B1016-5K	#10-16 x 3/4"	0.190	115	140	205	320	430	715	-	-	-
XQ1S1016, XQ1B1016-4K, X1S1016, X1B1016-4K	#10-16 x 1"										
XQ1S1214, XQ1B1214-3.5K, X1S1214, X1B1214-3.5K	#12-14 x 1"	0.216	115	155	235	340	520	795	-	-	-
XQ78S1224, XQ78B1224-3K	#12-24 x 7/8"	0.216	115	125	185	320	415	735	1,170	2,135	-
XQ114S1224, XQ114B1224-2.5K, X114S1224, X114B1224-2.5K	#12-24 x 1 1/4"										2160
XQ112S1224, XQ112B1224-2K	#12-24 x 1 1/2"										
FPHSD34S1016, FPHSD34B1016, FPHSD34B1016-5K	#10-16 x 3/4"	0.190	125	150	250	380	545	805	-	-	-
FPHSD34S1214, FPHSD34B1214, FPHSD34B1214-5K	#12-14 x 3/4"	0.216	125	150	255	385	550	855	-	-	-
XLSH34B1414	#14-14 x 3/4"	0.242	-	160	255	400	560	870	-	-	-
XLSH78B1414	#14-14 x 7/8"	0.242	-	160	235	430	665	1160	-	-	-

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

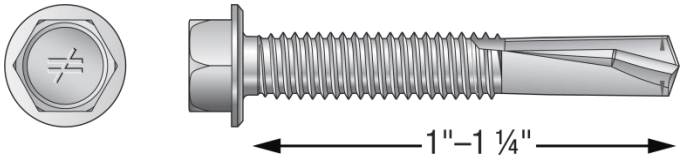
[1]The safety factor Ω and resistance factor Φ used to determine the ASD and LRFD strengths are based on AISI S100.

[2]For tension connections, the lowest of the fastener tension strength, pull-over and pull-out capacities found in Tables 2, 4A and 4B, as applicable, and 5, respectively, must be used for design.

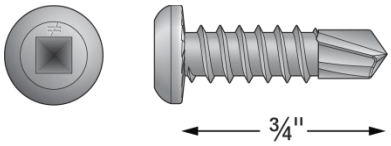
[3]Values are based on steel members with a minimum yield strength of F_y = 33 ksi and a minimum tensile strength of F_u =45 ksi for 27 mil to 43 mil thickness, a minimum yield strength of F_y = 50 ksi and a minimum tensile strength of F_u = 65 ksi for 54 mil to 97 mil thickness, and a minimum yield strength of F_y = 36 ksi and a minimum tensile strength of F_u = 58 KSI for 1/8" and thicker.



XQ Screw



X Screw



FPHSD Screw

FIGURE 1—SIMPSON STRONG-TIE® SELF-DRILLING TAPPING SCREWS

FIGURE 2—SIMPSON STRONG-TIE® STRONG-DRIVE® SHOULDERED SELF-DRILLING TAPPING SCREWS

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® STRONG-DRIVE® X METAL, FPHSD FRAMING-TO-CFS, AND SHOULDERED SELF-DRILLING TAPPING SCREWS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Simpson Strong-Tie® Strong-Drive® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws, described in ICC-ES evaluation report ESR-3006, 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® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws, described in Sections 2.0 through 7.0 of evaluation report ESR-3006, comply with the LABC Chapter 22, 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® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-3006.
- The design, installation, conditions of use and identification of the Simpson Strong-Tie® Strong-Drive® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws are in accordance with the 2021 *International Building Code®* (2021 IBC) provisions noted in the evaluation report ESR-3006.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, 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 2024.

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® STRONG-DRIVE® X METAL, FPHSD FRAMING-TO-CFS, AND SHOULDERED SELF-DRILLING TAPPING SCREWS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Simpson Strong-Tie Strong-Drive® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws, described in ICC-ES evaluation report ESR-3006, 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® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-3006, comply 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 the ICC-ES evaluation report ESR-3006 for the 2021 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or *Florida Building Code—Residential,* as applicable.

Use of the Simpson Strong-Tie® Strong-Drive® X Metal, FPHSD Framing-to-CFS, and Shouldered Self-Drilling Tapping Screws has 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*.

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 2024.