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ESR-3006

Reissued 08/2017
This report is subject to renewal 08/2018.

DIVISION: 05 00 00—METALS
SECTION: 05 05 23—METAL FASTENINGS

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY INC.

5956 WEST LAS POSITAS BOULEVARD
PLEASANTON, CALIFORNIA 94588

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® X, FPHSD AND PPSD SELF-DRILLING TAPPING SCREWS

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

REPORT HOLDER:

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

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® X, FPHSD AND PPSD SELF-DRILLING TAPPING SCREWS

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

Property evaluated:

Structural

2.0 USES

The Simpson Strong-Tie® Self-Drilling X Metal Screws and the Strong-Drive® FPHSD Framing-to-Cold-Formed-Steel 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 connections prescribed in the code.

The Simpson Strong-Tie® Strong-Drive® PPSD Sheathing-to-Cold-Formed-Steel Screws are used in cold-formed steel shear walls and diaphragms prescribed in the code.

3.0 DESCRIPTION

3.1 General:

The Simpson Strong-Tie® Self-Drilling X Metal Screws, Strong-Drive® FPHSD Framing-to-Cold-Formed-Steel Screws and Strong-Drive® PPSD Sheathing-to-Cold-Formed-Steel Screws, illustrated in Figure 1, 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, load-bearing length and coating descriptions.

3.1.1 Self-Drilling 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 Strong-Drive® FPHSD Framing-to-Cold-Formed Steel Screws: The FPHSD Framing-to-Cold-Formed-Steel 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 Strong-Drive® PPSD Sheathing-to-Cold-Formed-Steel Screws: The PPSD Sheathing-to-Cold-Formed-Steel Screws are #8-18TPI and #10-16TPI self-drilling tapping screws and are available with a proprietary Quik Guard® coating or a yellow zinc coating. The model numbers of Quik Guard® coated screws have a "Q" in the designation, while those coated with yellow zinc do not. The PPSD 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.

3.2 Framing Steel:

Cold-formed framing steel must comply with one of the ASTM specifications noted in Section A2.1 of the AISI North American Specification for Design of Cold-Formed Steel Structural Members (AISI S100). Base steel thickness must comply with Section A2.4 of AISI S100, and this report.

For the design values listed in Tables 3, 4, 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.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Screw thread length and point style must be selected on the basis of thickness of the fastened material and thickness of the supporting steel, respectively, based on the load-bearing length and drilling capacity given in Table 1.

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.

4.1.2 Prescriptive Design: The X, FPHSD and PPSD screws are recognized for use where ASTM C1513 screws of the same size and head style are prescribed in the IRC and in the AISI Standards referenced in 2015 and 2012 IBC Section 2211 (2009 and 2006 IBC Section 2210).

4.1.3 Engineered Design: The X and FPHSD screws are recognized 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 Tables 3, 4, 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, 4, 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 3 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.

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 three 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 2 times the fastener diameter, the connection shear strength values in Table 3 must be reduced by 20 percent (Refer to Section D1.5 of AISI S200).

For screws used in applications other than framing connections, the minimum spacing between the fasteners must be three 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 and 2006 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 E6 of AISI S100-12 for the 2015 IBC (Section E5 of AISI S100-07/S2-10 for the 2012 IBC; Section E5 of AISI S100-07 for the 2009 IBC).

4.2 Installation:

Installation of the Simpson Strong-Tie® self-drilling tapping screws must be in accordance with AISI S100, 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 AISI S100, 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 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.

5.4 The use of the screws in engineered steel deck diaphragms has not been evaluated and is outside the scope of this evaluation report. Diaphragms constructed using the screws must comply with AISI S213 (AISI—Lateral) or must be recognized in a current ICC-ES evaluation report.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Tapping Screw Fasteners (AC118), dated February 2016.

7.0 IDENTIFICATION

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. 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).

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

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.)	LOAD BEARING LENGTH[2] (in.)	COATING
Collated Strip	Bulk									
X Screws										
XQ1S1016	XQ1B1016-4K	#10-16	0.190	1	HW	0.415	3	0.175	0.539	Proprietary Quik Guard®
XQ1S1214	XQ1B1214-3.5K	#12-14	0.216	1	HW	0.415	3	0.210	0.472	
XQ78S1224	XQ78B1224-3K	#12-24	0.216	7/8	HW	0.415	4	0.250	0.387	
XQ114S1224	XQ114B1224-2.5K	#12-24	0.216	1 1/4	HW	0.415	5	0.500	0.519	
XQ112S1224	XQ112B1224-2K	#12-24	0.216	1 1/2	HW	0.415	5	0.500	0.767	
-	X34B1016-5K	#10-16	0.190	3/4	HW	0.415	3	0.175	0.301	Blue-bright Zinc
X1S1016	X1B1016-4K	#10-16	0.190	1	HW	0.415	3	0.175	0.539	
X1S1214	X1B1214-3.5K	#12-14	0.216	1	HW	0.415	3	0.210	0.472	
X114S1224	X114B1224-2.5K	#12-24	0.216	1 1/4	HW	0.415	5	0.500	0.519	
FPHSD Screws										
FPHSD34S1016	FPHSD34B1016, FPHSD34B1016-5K	#10-16	0.190	3/4	FP/SQ	0.365	3	0.175	0.305	Blue-bright Zinc
FPHSD34S1214	FPHSD34B1214, FPHSD34B1214-5K	#12-14	0.216	3/4	FP/SQ	0.365	3	0.210	0.281	
PPSD Screws										
PPSDQ11516S0818	PPSDQ11516B-4K	#8-18	0.164	1 15/16	F/SQ	0.323	2	0.100	1.055	Proprietary Quik Guard®
PPSDQ134S1016	PPSDQ134B1016-4K	#10-16	0.190	1 3/4	F/SQ	0.333	3	0.175	0.811	
PPSDQ3S1016	PPSDQ3B1016-2K	#10-16	0.190	3	F/SQ	0.333	3	0.175	1.291	
PPSD11516S0818	PPSD11516B-4K	#8-18	0.164	1 15/16	F/SQ	0.323	2	0.100	1.055	Yellow Zinc
PPSD134S1016	PPSD134B1016-4K	#10-16	0.190	1 3/4	F/SQ	0.333	3	0.175	0.811	
PPSD3S1016	PPSD3B1016-2K	#10-16	0.190	3	F/SQ	0.333	3	0.175	1.291	

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

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

[2]See Figure 2 for a depiction of the load-bearing length.

TABLE 2—SIMPSON STRONG-TIE® X AND FPHSD SCREW STRENGTH (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: $P_{ss}*\Phi$	Tension: $P_{ts}*\Phi$
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

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

[1]The tabulated ASD allowable strength and LRFD design strength values are based on a safety factor of $\Omega = 3$ 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, 4, 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 3, 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 3—SIMPSON STRONG-TIE® X AND FPHSD SCREWS - CONNECTION SHEAR STRENGTH OF TWO-MEMBER JOINTS LIMITED BY TILTING AND BEARING (lbf)[1,2,3,4,6]

MODEL NO.	SIZE	NOMINAL SHANK DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS (mil/in.)							
			27[5]	33[5]	43[5]	54[5]	68[5]	97[5]	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), $R_n*\Phi$										
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 Fy =33 ksi and a minimum tensile strength of Fu = 45 ksi for 27-mil to 43-mil thicknesses, a minimum yield strength of Fy=50 ksi and a minimum tensile strength of Fu=65 ksi for 54 mil to 97 mil thickness, and a minimum yield strength of Fy = 36 ksi and a minimum tensile strength of Fu = 58 ksi for 1/8-inch and thicker.
[5]Design thickness must be the minimum base steel thickness divided by 0.95. Design thicknesses for steel sheets are: 27 mils = 0.0283”, 33 mils = 0.0346″, 43 mils = 0.0451″, 54 mils = 0.0566″, 68 mils=0.0713″, 97 mils=0.1017″.
[6]See Section 4.1.3 for spacing and edge distance requirements.

TABLE 4—SIMPSON STRONG-TIE® X 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, 4]					
			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), $R_n*\Phi$								
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, 4 and 5, respectively, must be used for design.
[3]Values are based on steel members with a minimum yield strength of Fy=33 ksi and a minimum tensile strength of Fu=45 ksi for 27 mil to 43 mil thickness, and a minimum yield strength of Fy=50 ksi and a minimum tensile strength of Fu=65 ksi for 54 mil to 97 mil thickness.
[4]Design thickness must be the minimum base steel thickness divided by 0.95. Design thicknesses for the steel sheets are: 27 mils= 0.02383", 33 mils=0.0346", 43 mils=0.0451", 54 mils=0.0566", 68 mils=0.0713″, 97 mils=0.1017″.

TABLE 5—SIMPSON STRONG-TIE® X AND FPHSD 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/in.)[3, 4]								
			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	-	-	-
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	-	-	-
DESIGN STRENGTH (LRFD), R_n*Φ											
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"										2,160
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	-	-	-

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, 4 and 5, respectively, must be used for design.
[3]Values are based on steel members with a minimum yield strength of Fy = 33 ksi and a minimum tensile strength of Fu =45 ksi for 27 mil to 43 mil thickness, a minimum yield strength of Fy = 50 ksi and a minimum tensile strength of Fu = 65 ksi for 54 mil to 97 mil thickness, and a minimum yield strength of Fy = 36 ksi and a minimum tensile strength of Fu = 58 ksi for 1/8″ and thicker.
Design thickness must be the minimum base steel thickness divided by 0.95. Design thicknesses for the steel sheets are: 27 mils= 0.02383", 33 mils = 0.0346″, 43 mils = 0.0451″, 54 mils = 0.0566″, 68 mils = 0.0713″, 97 mils = 0.1017″.

Example of X Metal Screw

Example of FPHSD Framing-to-Cold-Formed Steel Screw

Example of PPSD Sheathing-to-Cold-Formed Steel Screw

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

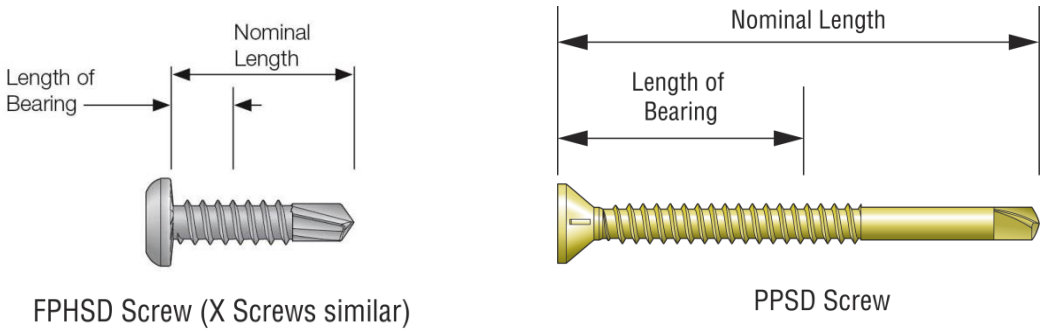

FIGURE 2—FASTENER LENGTH AND LOAD BEARING LENGTH