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Simpson Strong-Tie Co., Inc.
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Att: Tim Kaucher, P.E.
(800)999-5099

RESEARCH REPORT: RR 25917
(CSI # 05 05 23)

BASED UPON ICC EVALUATION
SERVICE REPORT NO. ESR-3006

REEVALUATION DUE
DATE: August 1, 2012
Issued Date: August 1, 2011
Code: 2011 LABC

GENERAL APPROVAL – Simpson Strong-Tie® Quik Drive® X Series Self Drilling Tapping Screws.

DETAILS

The above products/assemblies are approved when in compliance with the description, use, identification and findings of Report No. ESR-3006, issued August 1, 2010, of the ICC Evaluation Service, Incorporated. The Report in its entirety, is attached and made part of this general approval.

The approval is subject to the following conditions:

1. The use of the nominal strength values contained in this evaluation report, for the design of cold-formed steel diaphragms, is outside the scope of this report.
2. Fasteners are to be installed in accordance with the manufacturer's published installation instructions and this report. If there is a conflict between the manufacturer's published installation instructions and this report, this report governs.
3. Calculations demonstrating that the applied loads are less than the allowable loads or factored loads described in this report shall be submitted to the plan check engineer at the time of permit application. The calculations shall be prepared by a Civil or Structural Engineer registered in the State of California.

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Simpson Strong-Tie Co., Inc.

Re: Simpson Strong-Tie® Quik Drive® X Series Self Drilling Tapping Screws.

4. The allowable loads are not to be increased when the fasteners are used to resist wind or seismic forces.
5. Connections subject to combined tension and shear loading shall be designed in accordance with Section E4.5 of the AISI-S100.
6. Drawings verifying compliance with this report and the 2011 City of Los Angeles Building Code must be submitted to the plan check engineer. The drawings shall be prepared by a Civil or Structural Engineer registered in the State of California.
7. Fastener packaging is imprinted with Simpson Strong-Tie® Logo and Quik Drive® Brand name and contact information. Also, included are types of fastener, fastener description, head style, size, length, quantity, country of origin.

DISCUSSION

The report is in compliance with the 2011 City of Los Angeles Building Code.

The approval is based on calculations and tests in accordance with the ICC-ES Criteria for Tapping Screw Fasteners (AC118).

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revision to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

WILLIAM STUTSMAN, Chief
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5C2/ AISI-S100-2007 Section E4

Attachment: ICC ES Report No. ESR-3006 (4 Pages)

ICC-ES Evaluation Report**ESR-3006**

Issued August 1, 2010

This report is subject to re-examination in one year.www.icc-es.org | (800) 423-6587 | (562) 699-0543 A Subsidiary of the International Code Council®**DIVISION: 05 00 00—METALS****Section: 05 05 23—Metal Fastenings****REPORT HOLDER:****SIMPSON STRONG-TIE CO., INC.**
5956 WEST LAS POSITAS BOULEVARD
PLEASANTON, CALIFORNIA 94588
(925) 560-9000
www.strongtie.com**EVALUATION SUBJECT:****SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SELF-
DRILLING TAPPING SCREWS****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2009 *International Building Code*® (2009 IBC)
- 2009 *International Residential Code*® (IRC)
- 2006 *International Building Code*® (2006 IBC)

Property evaluated:

Structural

2.0 USES

The Simpson Strong-Tie® Quik Drive® X Series self-drilling tapping 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 33 mils (0.083 mm) to 1/2 inch (12.7 mm).

3.0 DESCRIPTION**3.1 General:**

The Simpson Strong-Tie® Quik Drive® X Series screws, illustrated in Figure 1 of this report, are No. 12-24 self-drilling tapping screws complying with performance requirements of ASTM C 1513. The screws have a nominal shank diameter of 0.216 inch (5.49 mm) and have nominally 0.415-inch (10.5 mm) hex washer heads. Screw lengths are 7/8 inch, 1 1/4 inches, and 1 1/2 inches (22.23, 31.75, and 38.1 mm). Table 1 of this report provides screw designations, sizes, and descriptions of point styles. The screws are supplied in boxes of individual screws, or in collated plastic strips.

3.2 Materials:

3.2.1 Quik Drive Tapping Screws: The screws described in this report are case hardened after being

manufactured from carbon steel conforming to ASTM A 510, Grade 1022, and are coated with proprietary zinc coating.

3.2.2 Framing Steel: Cold-formed framing steel must comply with one of the ASTM specifications 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 be of ASTM A 653, SS designation, Grade 33, for steel members with a designation thickness of 33 mils and 43 mils (0.083 and 1.09 mm); ASTM A 653, SS designation, Grade 50, Type I, for steel members with a designation thickness of 54 mils to 97 mils (1.37 and 2.46 mm); ASTM A 1011, CS designation, Type B, for steel members with thicknesses of 1/8 inch and 3/16 inch (3.2 and 4.8 mm); and ASTM A 36 for steel members with the thicknesses of 1/4 inch and 1/2 inch (6.04 and 12.7 mm). See Tables 3, 4, and 5 for base steel thicknesses.

4.0 DESIGN AND INSTALLATION**4.1 Design:**

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 3.2.2 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. Connections subject to combined shear and pull-over loading must be designed in accordance with Section E4.5 of AISI-S100.

The shear strength values in Table 3 are based on a minimum spacing between the centers of fasteners of three times the diameter of the screws and a minimum distance of 1.5 times the diameter of the screw from the center of any screw to the edge of any connected part. For edge distances less than 1.5 times the diameter of the screw, the allowable shear connection strength must be evaluated in accordance with Section E4.3.2 of Appendix A of AISI-S100.

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, in accordance with the manufacturer's published installation instructions

4.2 Installation:

Installation of the Simpson Strong-Tie® Quik Drive® X Series 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 screw gun or drill with a maximum speed of 2,500 rpm using a $5/16$ -inch hex driver. 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® Quik Drive® X Series 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 The screws are limited to use in cold-formed steel, cold-formed steel to hot-rolled and hot-rolled to hot-rolled connections.

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 rust-inhibitive (corrosion-resistant) coating on the screws must be suitable for the intended use, as determined by the registered design professional.

5.6 The use of the screws in steel deck diaphragms has not been evaluated and is outside the scope of this evaluation report. Diaphragms constructed using the screws 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 June 2010; and with the same document dated November 2009.

7.0 IDENTIFICATION

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



FIGURE 1—SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SELF-DRILLING TAPPING SCREW

TABLE 1—SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SELF-DRILLING TAPPING SCREW

MODEL NO.	DESIGNATION	NOMINAL DIAMETER (in.)	NOMINAL SCREW LENGTH (in.)	HEAD STYLE	POINT (number)	NOMINAL POINT LENGTH (in.)
XQ78S1224	#12-24	0.216	⁷ / ₈	Hex Washer	4	0.37
XQ114S1224	#12-24	0.216	1 ¹ / ₄	Hex Washer	5	0.61
XQ112S1224	#12-24	0.216	1 ¹ / ₂	Hex Washer	5	0.61

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

TABLE 2—SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SCREW STRENGTH (lbs)^{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} *Φ	Tension: P _{ts} *Φ
XQ78S1224	#12 x ⁷ / ₈ "	2,800	4,260	935	1,420	1,400	2,130
XQ114S1224	#12 x 1 ¹ / ₄ "						
XQ112S1224	#12 x 1 ¹ / ₂ "						

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

¹The tabulated ASD allowable strength and LRFD design strength values are based on a safety factor of Ω = 3 and a resistance factor of Φ = 0.5, respectively.

²For tension connections, the lesser of tension fastener strength of screws and the allowable pull-over and pull-out capacities found in Tables 2, 4, and 5, respectively, must be used for design.

³For shear connections, the lesser of shear fastener strength of screws and the connection shear strength found in Tables 2 and 3, respectively, must be used for design.

⁴P_{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 determined by independent laboratory testing.

TABLE 3—SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SCREW TWO MEMBER JOINT CONNECTION SHEAR LIMITED BY TILTING AND BEARING (lbs)^{1,2,3}

MODEL NO.	SIZE	NOMINAL DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS (mil/in.)						
			33 ^{4,5}	43 ^{4,5}	54 ^{4,5}	68 ^{4,5}	97 ^{4,5}	¹ / ₈ "	¹ / ₄ " ⁶
NOMINAL STRENGTH, R_n									
XQ78S1224	#12 x ⁷ / ₈ "	0.216	550	920	1,455	1,675	2,675	2,675	2,675
XQ114S1224	#12 x 1 ¹ / ₄ "								
XQ112S1224	#12 x 1 ¹ / ₂ "								
ALLOWABLE STRENGTH (ASD), R_n/Ω									
XQ78S1224	#12 x ⁷ / ₈ "	0.216	230	350	640	740	935	935	935
XQ114S1224	#12 x 1 ¹ / ₄ "								
XQ112S1224	#12 x 1 ¹ / ₂ "								
DESIGN STRENGTH (LRFD), R_n*Φ									
XQ78S1224	#12 x ⁷ / ₈ "	0.216	365	560	1,025	1,175	1,355	1,355	1,355
XQ114S1224	#12 x 1 ¹ / ₄ "								
XQ112S1224	#12 x 1 ¹ / ₂ "								

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

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

²For shear connection, the lesser of the allowable shear fastener strength and the allowable shear capacity found in Tables 2 and 3, respectively, must be used for design.

³The tabulated shear values are limited by the thinner steel member in the connection. Steel thickness for both members must be in the range of 33 mils to ¹/₄" inch.

⁴Values are based on steel members with a minimum yield strength of F_y = 33 ksi and tensile strength of F_u = 45 ksi for 33-mil and 43-mil thicknesses, a minimum yield strength of F_y = 50 ksi and 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 F_u = 58 ksi for ¹/₈-inch and thicker.

⁵Minimum base steel thickness must comply with AISI S201 Table B2-1. Design thickness must be the minimum base steel thickness divided by 0.95. Design thickness for steel sheets is: 33 mils = 0.0346", 43 mils = 0.0451", 54 mils = 0.0566", 68 mils = 0.0713", 97 mils = 0.1017".

⁶Not applicable for XQ78S1224 screws.

TABLE 4—SIMPSON STRONG-TIE® QUIK DRIVE® X SERIES SCREW PULL-OVER STRENGTH IN TWO MEMBER JOINT CONNECTIONS (lbs)^{1,2}

MODEL NO.	SIZE	NOMINAL DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS IN CONTACT WITH THE SCREW HEAD (mil) ^{3,4}				
			33	43	54	68	97
NOMINAL STRENGTH, R_n							
XQ78S1224	#12 x 7/8"	0.216	875	985	1,770	1,930	3,400
XQ114S1224	#12 x 1 1/4"						
XQ112S1224	#12 x 1 1/2"						
ALLOWABLE STRENGTH (ASD), R_n/Ω							
XQ78S1224	#12 x 7/8"	0.216	290	400	720	790	1390
XQ114S1224	#12 x 1 1/4"						
XQ112S1224	#12 x 1 1/2"						
DESIGN STRENGTH (LRFD), R_n*Φ							
XQ78S1224	#12 x 7/8"	0.216	440	640	1,155	1,260	2,160
XQ114S1224	#12 x 1 1/4"						
XQ112S1224	#12 x 1 1/2"						

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

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

²For tension connection, the lesser of tension fastener strength of screws and the allowable pull-over and pull-out found by Tables 2, 4 and 5, respectively, must be used for design.

³Values are based on steel members with a minimum yield strength of F_y=33 ksi and tensile strength of F_u=45 ksi for 33 mil to 43 mil thickness, a minimum yield strength of F_y=50 ksi and F_u=65 ksi for 54 mil to 97 mil thickness.

⁴Minimum base steel thickness must comply with AISI S201 Table B2-1. Design thickness must be the minimum base steel thickness divided by 0.95. Design thickness for the steel sheets is: 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® QUIK DRIVE® X SERIES SCREW PULL-OUT STRENGTH IN TWO MEMBER JOINT CONNECTIONS, lbs^{1,2}

MODEL NO.	SIZE	NOMINAL DIA. (in.)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS NOT IN CONTACT WITH THE SCREW HEAD (mil/in.) ^{3,4}							
			33	43	54	68	97	3/16"	1/4"	1/2" ⁵
NOMINAL STRENGTH, R_n										
XQ78S1224	#12 x 7/8"	0.216	205	280	505	640	1,130	1,990	3,370	4,260
XQ114S1224	#12 x 1 1/4"									
XQ112S1224	#12 x 1 1/2"									
ALLOWABLE STRENGTH (ASD), R_n/Ω										
XQ78S1224	#12 x 7/8"	0.216	80	115	200	260	460	730	1,375	1,420
XQ114S1224	#12 x 1 1/4"									
XQ112S1224	#12 x 1 1/2"									
DESIGN STRENGTH (LRFD), R_n*Φ										
XQ78S1224	#12 x 7/8"	0.216	125	185	320	415	735	1,170	2,135	2,160
XQ114S1224	#12 x 1 1/4"									
XQ112S1224	#12 x 1 1/2"									

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

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

²For tension connection, the lesser of tension fastener strength of screws and the allowable pull-over and pull-out found in Tables 2, 4 and 5, respectively, must be used for design.

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

⁴Minimum base steel thickness must comply with AISI S201 Table B2-1. Design thickness must be the minimum base steel thickness divided by 0.95. Design thickness for the steel sheets is: 33 mils = 0.0346", 43 mils = 0.0451", 54 mils = 0.0566", 68 mils = 0.0713", 97 mils = 0.1017".

⁵Not applicable for XQ78S1224 screws.