ICC-ES Evaluation Report

ESR-4208

Reissued May 2024

This report also contains:

- LABC Supplement

Subject to renewal May 2025

DIVISION: 05 00 00—METALS **Section: 05 05 23—Metal Fastenings** **DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES** **Section: 06 05 23—Wood, Plastic, and Composite Fastenings**	**REPORT HOLDER:** **SIMPSON STRONG-TIE COMPANY INC.**	**EVALUATION SUBJECT:** **SIMPSON STRONG-TIE® STRONG-DRIVE® PPHD AND CBSDQ SELF-DRILLING TAPPING SCREWS**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 *International Building Code®* (IBC)
- 2021, 2018, 2015 and 2012 *International Residential Code* (IRC)

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see ESR-4208 LABC and LARC Supplement.

Property evaluated:

Structural

2.0 USES

The Simpson Strong-Tie® Strong-Drive® PPHD and CBSDQ self-drilling tapping screws are used to attach wood structural panels to cold-formed steel, as prescribed in the code, and as specified in engineered designs.

3.0 DESCRIPTION

3.1 General:

The Simpson Strong-Tie® Strong-Drive® PPHD and CBSDQ self-drilling tapping screws, illustrated in Figure 1, are case hardened after being manufactured from carbon steel conforming to ASTM A510, Grade 1018 to 1024, and complying 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 Strong-Drive® PPHD Screws: The Simpson Strong-Tie® Strong-Drive® PPHD screws are #8-17TPI, #10-16TPI and #12-14TPI self-drilling tapping screws. The screws 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 PPHD 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., 4K).

3.1.2 Strong-Drive® CBSDQ Screws: The Simpson Strong-Tie® Strong-Drive® CBSDQ screws are #8-18TPI and #10-16TPI self-drilling tapping screws and are available with a proprietary Quik Guard® coating. The model numbers of Quik Guard® coated screws have "Q" in the designation. The CBSDQ screws are available in collated strips.

3.2 Framing Steel:

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 and 2012 IBC). Base steel thickness must comply with Section B7.1 of AISI S100 (Section A2.4 of AISI S100 for the 2015 and 2012 IBC), and this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Screw length selection must be based on the thickness of the fastened building materials plus the minimum required protrusion past the back of the supporting cold-formed steel. See Table 1 for the required protrusion lengths.

The screw point style must be selected on the basis of the drilling capacity, which is shown in Table 1. The tabulated drilling capacity refers to the thickness of the supporting cold-formed steel member. The screws can self-drill through wood structural panels up to $^{23}/_{32}$ inch (18.3 mm) thick.

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 Attachment of Sheathing to Steel: The PPHD and CBSDQ screws are may be used where minimum #8 screws complying with ASTM C1513 are prescribed in the IRC Sections R505.2.5, R603.2.5 and R804.2.5 for attachment of wood sheathing panels to cold-formed steel.

4.1.3 Prescriptive Use in Shear Walls and Diaphragms: The PPHD and CBSDQ screws may be used in shear walls and diaphragms consisting of wood structural panels fastened to cold-formed steel framing, where ASTM C1513 screws of the same size are prescribed in the code. Under the 2021 IBC, refer to Sections B5.2.2.3.3 and B5.4.2 of AISI S240 and Sections E1 and F2 of AISI S400, which are referenced in 2021 IBC Section 2211. Under the 2018 IBC, refer to Sections B5.2.2.3.3 and B5.4 of AISI S240 and Sections E1 and F2 of AISI S400, which are referenced in 2018 IBC Section 2211. Under the 2015 and 2012 IBC, refer to Sections C2.2.2 and D2.2 of AISI S213, which is referenced in Section 2211 of the 2015 and 2012 IBC.

4.1.4 Engineered Design: For use in engineered designs, the available fastener strengths are shown in Table 2 and the available pull-out strengths in common thicknesses of cold-formed steel are shown in Table 3. These values are intended to aid the designer in meeting the requirements of IBC Section 1604.2.

Determination of the suitability of a particular screw for the specific application is the responsibility of the registered design professional and is outside the scope of this report.

The registered design professional is responsible for determining the available strengths for the connection, considering all applicable limit states such as pull-over or pull-through, tilting and bearing, etc., and for considering serviceability issues, such as fastener slip.

The registered design professional is responsible for determining the required spacing, edge distance and end distance for the fasteners. For the supporting cold-formed steel base material, screws must be spaced a minimum of 3 times the nominal diameter of the screw and must be located not less than 1.5 times the diameter of the screw from any end or edge of the cold-formed steel base material. For the wood structural panels, the edge and end distances must be a minimum of $^{3}/_{8}$ inch (9.5 mm) and the screws must be spaced a minimum of 2 inches (51 mm) on center.

4.2 Installation:

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

The screws 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 protrude past the supporting cold-formed steel as required by Table 1.

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, the more restrictive requirements govern.

5.2 The screws have only been evaluated for fastener strength, compliance with ASTM C1513, quality control, and pull-out strength. Evaluation of other applicable limit states for connections of building materials to the cold-formed steel base material is outside the scope of this report.

5.3 Design of the connection of attached building material to the cold-formed steel base material, taking into account the properties of the attached building material, must comply with the applicable requirements of the IBC, and be justified to the satisfaction of the code official.

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

6.0 EVIDENCE SUBMITTED

Data in accordance with the Acceptance Criteria for Self-drilling Tapping Screws Used to Attach Miscellaneous Building Materials to Steel Base Material (AC500), dated October 2017 (editorially revised January 2021).

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4208) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label. [Electronic labeling is the ICC-ES web address (www.icc-es.org); specific URL related to the report; or the ICC-ES machine-readable code placed on the aforementioned items.]

7.2 In addition, 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-4208).

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

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

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

MODEL NO.		DESIGNATION (Size - TPI)	NOMINAL SCREW DIAMETER (inch)	NOMINAL SCREW LENGTH (inches)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER[2] (inch)	POINT (number)	DRILLING CAPACITY (inch)	MINIMUM REQUIRED PROTRUSION LENGTH (inch)	COATING
Collated Strip	Bulk									
PPHDQ11516S0817	PPHDQ11516B-4K	#8-17	0.164	$1^{15}/_{16}$	F/T25	0.323	5	0.100	0.903	Proprietary Quik Guard®
PPHDQ134S1016	PPHDQ134B1016-4K	#10-16	0.186	$1^{3}/_{4}$	F/T25	0.333	5	0.175	0.958	
PPHDQ134S1214	PPHDQ134B1214-4K	#12-14	0.212	$1^{3}/_{4}$	F/T25	0.460	5	0.210	0.984	
PPHD11516S0817	PPHD11516B-4K	#8-17	0.164	$1^{15}/_{16}$	F/T25	0.323	5	0.100	0.903	Yellow Zinc
PPHD134S1016	PPHD134B1016-4K	#10-16	0.186	$1^{3}/_{4}$	F/T25	0.333	5	0.175	0.958	
PPHD3S1016	-	#10-16	0.186	3	F/T25	0.333	5	0.175	0.958	
CBSDQ158S	-	#8-18	0.164	$1^{5}/_{8}$	F/SQ2	0.330	2	0.100	0.482	Proprietary Quik Guard®
CBSDQ214S	-	#10-16	0.190	$2^{1}/_{4}$	F/SQ2	0.330	2	0.100	0.543	

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

[1]Head Style: F/SQ2 = Flat head with #2 Square Drive recess, F/T25 Flat head with T25 Drive recess.
[2]Meets minimum head diameter requirement for screws used in shear walls and diaphragms constructed in accordance with AISI S240 and/or AISI S400, as applicable (AISI S213 for the 2015 and 2012 IBC).

TABLE 2—SIMPSON STRONG-TIE® PPHD AND CBSDQ SCREW STRENGTH[1,2] (lbf)

MODEL NO.		SCREW DESIGNATION	NOMINAL STRENGTH		ASD STRENGTH		LRFD STRENGTH	
Collated Strip	Bulk		Shear: P_{ss}	Tension: P_{ts}	Shear: P_{ss}/Ω	Tension: P_{ts}/Ω	Shear: ΦP_{ss}	Tension: ΦP_{ts}
PPHDQ11516S0817	PPHDQ11516B-4K	#8-17	1265	2075	420	690	630	1035
PPHDQ134S1016	PPHDQ134B1016-4K	#10-16	1265	2675	420	890	630	1335
PPHDQ134S1214	PPHDQ134B1214-4K	#12-14	2380	3880	795	1295	1190	1940
PPHD11516S0817	PPHD11516B-4K	#8-17	1265	2075	420	690	630	1035
PPHD134S1016	PPHD134B1016-4K	#10-16	1265	2675	420	890	630	1335
PPHD3S1016	-	#10-16	1265	2675	420	890	630	1335
CBSDQ158S	-	#8-18	1745	2500	580	835	870	1250
CBSDQ214S	-	#10-16	2205	3295	735	1100	1105	1650

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, $\Omega = 3.0$, and a resistance factor, $\Phi = 0.5$, respectively.
[2]P_{ss} and P_{ts} are nominal shear strength and nominal tension strength for the screw itself, respectively, and are the average (ultimate) values of all tests.

TABLE 3—SIMPSON STRONG-TIE® PPHD AND CBSDQ SCREW PULL-OUT STRENGTH[1] (lbf)

MODEL NO.	SCREW SIZE	NOMINAL SCREW DIAMETER (inch)	MINIMUM BASE STEEL THICKNESS OF STEEL MEMBERS NOT IN CONTACT WITH THE SCREW HEAD (mil)[2]					
			27	33	43	54	68	97
NOMINAL STRENGTH, R_n								
PPHDQ11516S0817 / PPHDQ11516B-4K	#8 x 1 15/16	0.164	155	225	335	485	'-	'-
PPHDQ134B1016 / PPHDQ134B1016-4K	#10 x 1 3/4	0.186	155	225	340	505	765	1,075
PPHDQ134S1214 / PPHDQ134B1214-4K	#12 x 1 3/4	0.212	170	235	350	515	825	1,170
PPHD11516S0817 / PPHD11516B-4K	#8 x 1 15/16	0.164	155	225	335	485	-	'-
PPHD134S1016 / PPHD134B1016-4K	#10 x 1 3/4	0.186	155	225	340	505	765	1,075
PPHD3S1016	#10 x 3	0.186	155	225	340	505	765	1,075
CBSDQ158S	#8 x 1 5/8"	0.164	-	-	300	460	-	-
CBSDQ214S	#10 x 2 1/4"	0.190	-	-	445	665	-	-
ASD STRENGTH, R_n/Ω								
PPHDQ11516S0817 / PPHDQ11516B-4K	#8 x 1 15/16	0.164	60	85	135	195	-	-
PPHDQ134B1016 / PPHDQ134B1016-4K	#10 x 1 3/4	0.186	60	85	140	205	310	440
PPHDQ134S1214 / PPHDQ134B1214-4K	#12 x 1 3/4	0.212	65	85	140	210	335	475
PPHD11516S0817 / PPHD11516B-4K	#8 x 1 15/16	0.164	60	85	135	195	-	-
PPHD134S1016 / PPHD134B1016-4K	#10 x 1 3/4	0.186	60	85	140	205	310	440
PPHD3S1016	#10 x 3	0.186	60	85	140	205	310	440
CBSDQ158S	#8 x 1 5/8"	0.164	-	-	105	175	-	-
CBSDQ214S	#10 x 2 1/4"	0.190	-	-	155	255	-	-
LRFD STRENGTH, ΦR_n								
PPHDQ11516S0817 / PPHDQ11516B-4K	#8 x 1 15/16	0.164	100	140	220	315	-	-
PPHDQ134B1016 / PPHDQ134B1016-4K	#10 x 1 3/4	0.186	100	140	220	330	500	700
PPHDQ134S1214 / PPHDQ134B1214-4K	#12 x 1 3/4	0.212	105	140	225	335	540	760
PPHD11516S0817 / PPHD11516B-4K	#8 x 1 15/16	0.164	100	140	220	315	-	-
PPHD134S1016 / PPHD134B1016-4K	#10 x 1 3/4	0.186	100	140	220	330	500	700
PPHD3S1016	#10 x 3	0.186	100	140	220	330	500	700
CBSDQ158S	#8 x 1 5/8"	0.164	-	-	170	280	-	-
CBSDQ214S	#10 x 2 1/4"	0.190	-	-	250	410	-	-

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 test results, in accordance with AISI S100.

[2]Values are based on steel members with a minimum yield strength, F_y = 33 ksi and a minimum tensile strength, F_u = 45 ksi for thickness of 27 mil to 43 mil, and a minimum yield strength, F_y = 50 ksi and a minimum tensile strength, F_u = 65 ksi for 54 mil to 97 mil.

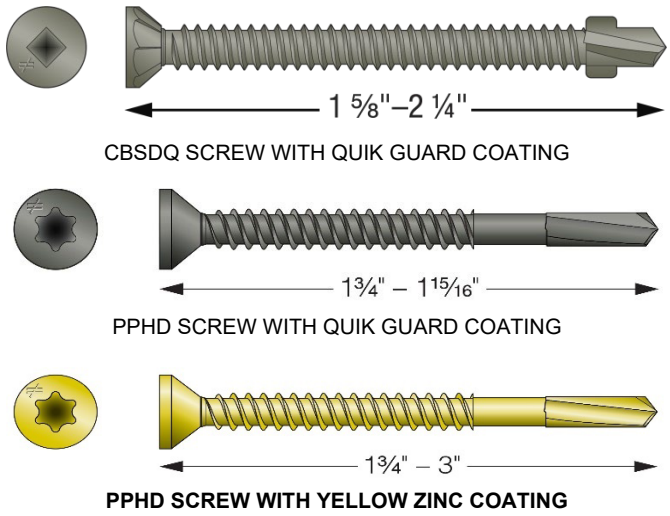

FIGURE 1—SIMPSON STRONG-TIE® PPHD AND CBSDQ SELF-DRILLING TAPPING SCREWS

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

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

REPORT HOLDER:

SIMPSON STRONG-TIE® COMPANY INC.

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® STRONG-DRIVE® PPHD AND CBSDQ 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® PPHD and CBSDQ self-drilling tapping screws, described in ICC-ES evaluation report ESR-4208, 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® PPHD and CBSDQ self-drilling tapping screws, described in Sections 2.0 through 7.0 of the evaluation report ESR-4208, comply with the LABC Chapters 22, and the LARC Sections R505, R603, R804, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Simpson Strong-Tie® Strong-Drive® PPHD and CBSDQ 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-4208.
- The design, installation, conditions of use and identification are in accordance with the 2021 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-4208.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineering design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued May 2024.