ICC EVALUATION SERVICE®

ICC-ES Evaluation Report

ESR-3528

Reissued July 2021

This report is subject to renewal July 2022.

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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

DIVISION: 09 00 00—FINISHES
Section: 09 22 16.23—Fasteners

REPORT HOLDER:

INTERCORP DBA OF U.S. NITTO

EVALUATION SUBJECT:

STRONG-POINT® SCREWS

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

Properties evaluated:

Structural

2.0 USES

Strong-Point® screws are used to connect cold-formed steel members together and to connect gypsum wallboard, wood or other building materials to cold-formed steel framing (CFS). The screws are used in engineered connections of CFS and connections prescribed in the code for CFS framing and for sheathing to steel connections.

3.0 DESCRIPTION

3.1 General:

The Strong-Point® screws are self-drilling tapping screws that are manufactured from carbon steel conforming to ASTM A510, Grade 1018 or 1022, and are case-hardened. The screws have an electroplated zinc coating or phosphate coating, complying with the minimum corrosion-resistance requirements of ASTM F1941. Table 1 provides screw descriptions, including sizes, head styles, point styles, drilling capacities and finishes for the screws. Screws are supplied in boxes of individual screws. See Figures 1 through 5 for depictions of the screws described in Section 3.2.

3.2 Strong-Point® Self-drilling Tapping Screws:

3.2.1 D###: The #6 and #8 D### self-drilling screws comply with ASTM C954. The screws are fully threaded, coarse threaded screws with a Phillips Bugle Head (PBH) and a phosphate or zinc coating. See Figure 1.

3.2.2 H####: The #12 H#### self-drilling screws comply with ASTM C1513. The #10 and #14 H#### screws comply with the material and performance requirements of ASTM C1513. The H#### screws are fully threaded, coarse threaded screws with a Hex Washer Head (HWH) and an electroplated zinc coating. See Figure 2.

3.2.3 H5 and H5#: The #12 H5 and H5# self-drilling screws comply with ASTM C1513. The screws are fully threaded, fine threaded screws with a Hex Washer Head (HWH) and an electroplated zinc coating. See Figure 3.

3.2.4 M##Z and M###Z: The #8 M##Z and #12 M###Z screws comply with ASTM C1513. The #10 M###Z screws comply with the material and performance requirements of ASTM C1513. The screws also comply with ASTM C954. The screws are fully threaded, coarse threaded screws with a Phillips Modified Truss Head (PMTH) and an electroplated zinc coating. See Figure 4.

3.2.5 PC# and PC##: The #10 PC# and PC## screws comply with the material and performance requirements of ASTM C1513. The screws are fully threaded, coarse threaded screws with a Phillips Pancake Head (PPH) and an electroplated zinc coating. See Figure 5.

3.3 Connected Steel Members:

Connected steel member material must comply with Section A2 of AISI S100 and must have the minimum tensile strength, F_u, and minimum design thickness shown in the Tables 2 through 4.

4.0 DESIGN AND INSTALLATION

4.1 Design:

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

When tested for corrosion resistance in accordance with ASTM B117, the screws 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:

4.1.2.1 D#### Screws: The D### screws described in Section 3.2.1 are recognized for use in fastening gypsum board materials to CFS framing 0.033 inch to 0.112 inch (0.8 to 2.8 mm) thick, in accordance with IBC Section 2506 and IRC Section R702.3.6. They are also recognized for use in attaching gypsum board sheathing to CFS framing as prescribed in Section C2.2.3 of AISI S213, which is referenced in 2012 IBC Section 2211.6 (2009 IBC Section 2210.6; Section C2.2.3 of AISI—Lateral, referenced in 2006 IBC Section 2210.5).

4.1.2.2 H####, H5 and H5# Screws: The #12 H#### and #12 H5 and H5# screws described in Sections 3.2.2 and 3.2.3, respectively, are recognized for use where self-drilling ASTM C1513 screws of the same size and head style are prescribed in the IRC and in AISI Standards referenced in IBC Section 2210.

4.1.2.3 M##Z Screws: The #8 M##Z and #10 and #12 M###Z screws described in Section 3.2.4 are recognized for use in attaching metal plaster bases (lath) to CFS where screws complying with ASTM C954 are prescribed in the code.

4.1.3 Engineered Design: The #10, #12 and #14 H####; #12 H5 and H5#; #8 M##Z and #10 and #12 M###Z; and #10 PC# and PC## screws described in Sections 3.2.2 through 3.2.5, respectively, are recognized for use in engineered connections of cold-formed steel light-framed construction. Design of connections must comply with Section E4 of AISI S100 (AISI-NAS for 2006 IBC), using the available fastener tension and shear strengths for screws shown in Table 5, and the connection capacities shown in Tables 2 through 4. For connections subject to tension, the least of the allowable pull-out, pullover, and fastener tension strength of screws found in Tables 2, 3 and 5 must be used for design. For connections subject to shear, the lesser of the connection shear and fastener shear strength found in Tables 4 and 5, respectively, must be used for design. Connections subject to combined tension and shear loading must be designed in accordance with Section E4.5 of AISI S100.

The values in Tables 2 through 4 are based on a minimum spacing between the centers of fasteners of three times the diameter of the screw, and a minimum distance from the center of the fastener to the edge of any connected part of 1.5 times the diameter of the screw. Minimum edge distance when connecting cold-formed framing members must be three times the diameter of the screw in accordance with Section D1.5 of AISI S200 (AISI-General for 2006 IBC). 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 connections shear strength determined in accordance with Section E4.3.2 of Appendix A of AISI S100 (AISI-NAS under the 2006 IBC) must be considered. Connected members must be checked for rupture in accordance with Section E5 of AISI S100.

4.2 Installation:

Installation of the Strong-Point® self-drilling tapping screws must be in accordance with 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 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 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 Strong-Point® 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 Fasteners 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 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 must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is located.

5.4 Connected members must be checked for rupture in accordance with Section E5 of AISI S100.

5.5 The use of the screws in steel deck diaphragms is outside the scope of this 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 2012.

7.0 IDENTIFICATION

7.1 The Strong-Point® screws are marked with an S and a P on the top surface of the screw heads, as shown in Figures 1 through 5. Packages of Strong-Point® screws are labeled with the report holder's name (Intercorp), product number, nominal screw size, nominal screw length, point type, finish and the evaluation report number (ESR-3528).

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

INTERCORP DBA OF U.S. NITTO
641 NORTH POPLAR
ORANGE, CALIFORNIA 92868
(714) 744-2622
www.intercorpusa.com

TABLE 1—INTERCORP SELF-DRILLING SCREWS

PRODUCT NUMBER	DESIGNATION[1] (Nominal size-tpi)	BASIC/ NOMINAL SCREW DIAMETER (inch)	NOMINAL SCREW LENGTH (inches)	HEAD STYLE[2]	NOMINAL HEAD DIAMETER (inch)	POINT TYPE	DRILLING CAPACITY (inch)		LENGTH OF LOAD BEARING AREA[3] (inches)	COATING[4]
							Min.	Max.		
D610	#6-20	0.138	1.000	PBH	0.321	2	0.030	0.090	0.625	Phosphate or zinc
D611			1.125						0.750	
D614			1.250						0.875	
D615			1.625						1.25	
D617			1.875						1.50	
D823	#8-18	0.164	2.375	PBH	0.321	2	0.030	0.100	2.00	Phosphate or zinc
D825			2.625						2.25	
D830			3.000						2.63	
H1012	#10-16	0.190	0.750	HWH	0.399	3	0.035	0.176	0.325	Zinc
H1016			1.000						0.575	
H1020			1.250						8.25	
H1024			1.500						1.08	
H1032			2.000						1.58	
H1040			2.500						2.08	
H1048			3.000						2.58	
H1212	#12-14	0.216	0.750	HWH	0.415	3	0.035	0.210	0.300	Zinc
H1216			1.000						0.550	
H1220			1.250						0.800	
H1224			1.500						1.05	
H1232			2.000						1.55	
H1240			2.500						2.00	
H1248			3.000						2.45	
H1264			4.000						3.45	
H1412	#14-14	0.250	0.750	HWH	0.500	3	0.060	0.220	0.200	Zinc
H1416			1.000						0.450	
H1420			1.250						0.700	
H1424			1.500						0.950	
H1432			2.000						1.55	
H1440			2.500						2.00	
H1448			3.000						2.45	
H1464			4.000						3.45	
H1472			4.500						3.95	
H1480			5.000						4.45	
H1496			6.000						5.45	
H5	#12-24	0.216	1.250	HWH	0.415	5	0.125	0.500	0.585	Zinc
H52			1.500						0.835	
H53			2.000						1.34	
H54			3.000						2.34	
M82Z	#8-18	0.164	0.500	PMTH	0.437	2	0.030	0.100	0.125	Zinc
M83Z			0.750						0.375	
M84Z			1.000						0.625	
M85Z			1.250						0.875	
M87Z			1.625						1.25	
M88Z			1.875						1.50	
M92Z			2.500						2.13	
M95Z			3.000						2.63	
M106Z	#10-16	0.190	0.750	PMTH	0.437	3	0.035	0.176	0.325	Zinc
M126Z	#12-14	0.216	0.750	PMTH	0.437	3	0.035	0.210	0.300	Zinc
PC5	#10-16	0.190	0.625	PPH	0.411	3	0.035	0.176	0.200	Zinc
PC8			1.000						0.575	
PC12			1.500						1.08	

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

Table 1 Notes:

[1] tpi = threads per inch

[2]Head styles: PBH = Phillips Bugle Head; HWH = Hex Washer Head; PMTH = Phillips Modified Truss Head; PPH = Phillips Pancake Head.

[3]Length of Load Bearing Area provided by manufacturer which excludes the length of the drill point and the length of three full threads. See Figures 1 through 5.

[4]Zinc = Electroplated zinc in accordance with the manufacturer's specifications; Phosphate = Gray Phosphate in accordance with the manufacturer's specifications.

TABLE 2—PULL-OUT STRENGTH FOR SCREWS USED IN ENGINEERED STEEL-TO-STEEL CONNECTIONS[1] (lbf)

DESIGNATION	HEAD STYLE	NOMINAL SCREW DIAMETER (inch)	MINIMUM TENSILE STRENGTH AND DESIGN THICKNESS OF STEEL MEMBER NOT IN CONTACT WITH THE SCREW HEAD [3]								
			F_u = 45 ksi			F_u = 65 ksi			F_u = 58 ksi		
			0.030 inch	0.036 inch	0.048 inch	0.060 inch	0.075 inch	0.090 inch	0.125 inch	0.188 inch	0.250 inch
ALLOWABLE STRENGTH (ASD)											
#8-18	PMTH	0.164	27	79	110	189	299	-	-	-	-
#10-16	HWH PMTH PPH	0.190	-	87	121	193	299	424	-	-	-
#12-14	HWH PMTH	0.216	-	-	-	234	312	446	601	1103	-
#12-24	HWH	0.216	-	-	-	-	-	-	-	1265	1355
#14-14	HWH	0.250	-	-	-	-	325	457	658	1282	-
DESIGN STRENGTH (LRFD)											
#8-18	PMTH	0.164	44	126	177	303	479	-	-	-	-
#10-16	HWH PMTH PPH	0.190	-	140	193	309	479	679	-	-	-
#12-14	HWH PMTH	0.216	-	-	-	374	507	724	961	1764	-
#12-24	HWH	0.216	-	-	-	-	-	-	-	2037	2168
#14-14	HWH	0.250	-	-	-	-	519	731	1052	2050	-

For **SI:** 1 inch = 25.4 mm, 1 lb = 4.4 N, 1 ksi = 6.895 MPa.

[1]For tension connections, the least of the pull-out capacity, pull-over capacity, and tension fastener strength of screws found in Tables 2, 3 and 5, respectively, must be used for design.

TABLE 3—PULL-OVER STRENGTH FOR SCREWS USED IN ENGINEERED STEEL-TO-STEEL CONNECTIONS[1,2] (lbf)

DESIGNATION	HEAD STYLE	NOMINAL HEAD DIAMETER (inch)	MINIMUM TENSILE STRENGTH AND DESIGN THICKNESS OF STEEL MEMBER IN CONTACT WITH THE SCREW HEAD								
			F_u = 45 ksi			F_u = 65 ksi			F_u = 58 ksi		
			0.030 inch	0.036 inch	0.048 inch	0.060 inch	0.075 inch	0.090 inch	0.125 inch	0.188 inch	0.250 inch
ALLOWABLE STRENGTH (ASD)											
#8-18	PMTH	0.437	295	354	472	852	1065	-	-	-	-
#10-16	HWH	0.399	-	322	430	776	970	1164	-	-	-
#10-16	PMTH	0.437	-	354	472	852	1065	1278	-	-	-
#10-16	PPH	0.411	-	333	444	801	1002	1202	-	-	-
#12-14	HWH	0.415	-	-	-	809	1012	1214	1504	2263	-
#12-14	PMTH	0.437	-	-	-	852	1065	1278	1584	2383	-
#12-24	HWH	0.415	-	-	-	-	-	-	-	2263	3009
#14-14	HWH	0.500	-	-	-	-	1219	1463	1813	2726	-
DESIGN STRENGTH (LRFD)											
#8-18	PMTH	0.437	442	531	708	1278	1598	-	-	-	-
#10-16	HWH	0.399	-	484	645	1164	1455	1746	-	-	-
#10-16	PMTH	0.437	-	531	708	1278	1598	1917	-	-	-
#10-16	PPH	0.411	-	499	666	1202	1503	1803	-	-	-
#12-14	HWH	0.415	-	-	-	1214	1517	1821	2257	3394	-
#12-14	PMTH	0.437	-	-	-	1278	1598	1917	2376	3574	-
#12-24	HWH	0.415	-	-	-	-	-	-	-	3394	4513
#14-14	HWH	0.500	-	-	-	-	1828	2194	2719	4089	-

For **SI:** 1 inch = 25.4 mm, 1 lb = 4.4 N, 1 ksi = 6.895 MPa.

Table 3 Notes:
[1]For tension connections, the least of the pull-out capacity, pull-over capacity, and tension fastener strength of screws found in Tables 2, 3 and 5, respectively, must be used for design.
[2]The allowable pull-over capacity for other member thicknesses can be determined by interpolation within the table for the values that have the same steel tensile strength, F_u.

TABLE 4—CONNECTION SHEAR STRENGTH LIMITED BY TILTING AND BEARING FOR SCREWS USED IN ENGINEERED STEEL-TO-STEEL CONNECTIONS[1] (lbf)

DESIGNATION	HEAD STYLE	NOMINAL SCREW DIAMETER (inch)	MINIMUM TENSILE STRENGTH AND DESIGN THICKNESS OF STEEL MEMBER[2]								
			F_u = 45 ksi			F_u = 65 ksi			F_u = 58 ksi		
			0.030 inch	0.036 inch	0.048 inch	0.060 inch	0.075 inch	0.090 inch	0.125 inch	0.188 inch	0.250 inch
ALLOWABLE STRENGTH (ASD)											
#8-18	PMTH	0.164	136	141	318	-	-	-	-	-	-
#10-16	HWH PMTH PPH	0.190	-	153	318	579	673	-	-	-	-
#12-14	HWH PMTH	0.216	-	-	318	579	683	704	-	-	-
#12-24	HWH	0.216	-	-	-	-	-	-	653	914	917
#14-14	HWH	0.250	-	-	-	606	895	1018	-	-	-
DESIGN STRENGTH (LRFD)											
#8-18	PMTH	0.164	214	226	508	-	-	-	-	-	-
#10-16	HWH PMTH PPH	0.190	-	245	508	919	1070	-	-	-	-
#12-14	HWH PMTH	0.216	-	-	508	926	1092	1126	-	-	-
#12-24	HWH	0.216	-	-	-	-	-	-	1045	1463	1468
#14-14	HWH	0.250	-	-	-	969	1432	1629	-	-	-

For **SI:** 1 inch = 25.4 mm, 1 lb = 4.4 N, 1 ksi = 6.895 MPa.

[1]For shear connections, the least of the shear connection capacity and fastener shear strength of screws found in Tables 4 and 5, respectively, must be used for design.
[2]Thickness of thinner steel member in the connection.

TABLE 5—FASTENER STRENGTH FOR SCREWS USED IN ENGINEERED STEEL-TO-STEEL CONNECTIONS[1,2] (lbf)

DESIGNATION	HEAD STYLE	NOMINAL SCREW DIAMETER	NOMINAL STRENGTH		ALLOWABLE STRENGTH DESIGN (ASD)		LOAD AND RESISTANCE FACTOR DESIGN (LRFD)	
			Shear	Tension	Shear	Tension	Shear	Tension
#10-16	HWH	0.190	1934	3102	645	1034	967	1551
#12-14		0.216	2089	4129	696	1376	1045	2065
#12-24		0.216	2546	4156	849	1385	1273	2078
#14-14		0.250	3288	4307	1096	1436	1644	2154
#8-18	PMTH	0.164	1523	2051	508	684	762	1026
#10-16		0.190	1934	3102	645	1034	967	1551
#12-14		0.216	2089	4129	696	1376	1045	2065
#10-16	PPH	0.190	1934	3102	645	1034	967	1551

For **SI:** 1 lbf = 4.4 N

[1]For tension connections, the least of the pull-out capacity, pull-over capacity, and fastener tension strength of screws found in Tables 2, 3 and 5, respectively, must be used for design.
[2]For shear connections, the lesser of the connection shear capacity and the fastener shear strength found in Tables 4 and 5, respectively, must be used for design.

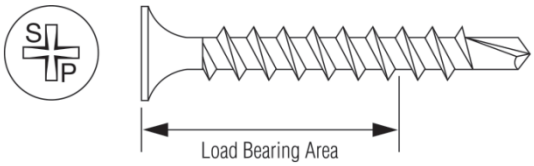

FIGURE 1—D### SCREW

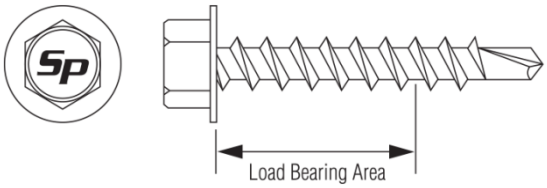

FIGURE 2—H#### SCREW

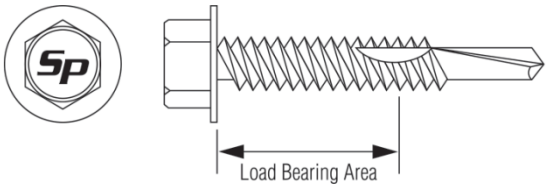

FIGURE 3—H5 AND H5# SCREW

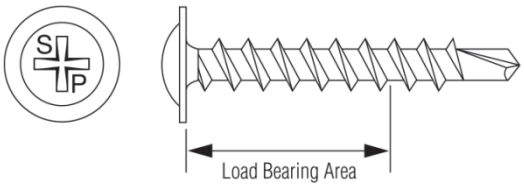

FIGURE 4—M##Z AND M###Z SCREW

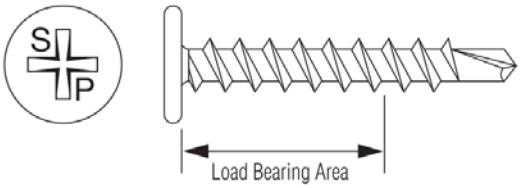

FIGURE 5—PC# AND PC## SCREW