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ICC-ES Evaluation Report

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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:

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EVALUATION SUBJECT:

HILTI SELF-DRILLING AND SELF-PIERCING 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)

* ■ ~~2013 *Abu Dhabi International Building Code* (ADIBC)~~†

†~~The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.~~

Property evaluated:

Structural

2.0 USES

The Hilti Self-drilling and Self-piercing Screws are used to connect cold-formed steel members together and to connect gypsum wall board, wood or other building materials to cold-formed steel. The screws are used in engineered connections of cold-formed steel and connections prescribed by the code for cold-formed steel framing and for sheathing to steel connections.

3.0 DESCRIPTION

3.1 General:

The Hilti Self-drilling and Self-piercing Screws are tapping screws, case-hardened from carbon steel conforming to ASTM A510, Grades 1018 to 1022. Table 1 provides screw designations, sizes and descriptions of head styles, point styles, drilling/piercing ranges, length of load bearing area and coatings. Screws are supplied in boxes of individual screws, or in collated plastic strips. See Figures 1 through 11 for depictions of the screws described in Sections 3.2 through 3.12, respectively.

3.2 HWH and HHWH Self-drilling Screws:

The #8, #10, #12 and $^1/_4$-inch HWH and HHWH self-drilling screws comply with ASTM C1513 and SAE J78 and have Hex Washer or High Hex Washer head styles. The $^1/_4$-inch HWH screws have a larger diameter than #14 screws complying with ASME B18.6.4, and may be used where #14 self-drilling tapping screws are specified. The screws have an electroplated zinc coating or a proprietary coating, as indicated in Table 1A.

3.3 HWH Self-piercing Screws:

The #8 and #10 HWH self-piercing screws comply with ASTM C1513 and have a Hex Washer head style. The screws have an electroplated zinc coating or a proprietary coating, as indicated in Table 1A.

3.4 PPH Self-drilling Screws:

The #8 and #10 PPH self-drilling screws comply with ASTM C1513 and SAE J78 and have a Phillips Pan head style. The screws have an electroplated zinc coating as indicated in Table 1A.

3.5 PPFH SD Framer Self-drilling Screws:

The #7 PPFH SD Framer self-drilling screws comply with the material and performance requirements of ASTM C1513. The dimensions of the screws comply with the manufacturer's quality documentation. The screws have a Phillips Pan Framing head style and have an electroplated zinc coating or a proprietary phosphated coating, as indicated in Table 1A.

3.6 PBH SD Self-drilling Drywall Screws:

The #6 PBH SD and #8 PBH SD self-drilling screws comply with ASTM C954. The screws have a Phillips Bugle head style and have an electroplated zinc coating, a proprietary duplex coating or a proprietary phosphated coating, as indicated in Table 1B.

* Deleted by City of Los Angeles

3.7 PBH S Self-piercing Drywall Screws:

The #6 PBH S self-piercing screws comply with ASTM C1002, Type S. The screws have a Phillips Bugle head style and have an electroplated zinc coating or a proprietary phosphated coating, as indicated in Table 1B.

3.8 PWH SD CMT BD Self-drilling Drywall Screws:

The #8 PWH SD CMT BD self-drilling screws comply with ASTM C954. The screws have a Phillips Wafer head style and have a proprietary coating as indicated in Table 1B.

3.9 PTH SD Framer Self-drilling Screws:

The #10 PTH self-drilling screws have a Phillips Truss head style and, except for the number of threads per inch, comply with ASTM C1513. The screws have an electroplated zinc coating as indicated in Table 1A.

3.10 PPCH SD Framer Self-drilling Screws:

The #10 PPCH SD Framer self-drilling screws comply with ASTM C1513. The screws have a Phillips Pancake head style and an electroplated zinc coating as indicated in Table 1A.

3.11 TPCH SD Framer Self-drilling Screws:

The #12 TPCH SD Framer self-drilling screws comply with ASTM C1513. The screws have a Torx Pancake head style and an electroplated zinc coating as indicated in Table 1A.

3.12 PFTH SD Framer Self-drilling Screws:

The #10 PFTH SD Framer self-drilling screws comply with ASTM C1513. The screws have a Phillips Flat Truss head style and an electroplated zinc coating as indicated in Table 1A.

3.13 Cold-formed Steel:

Cold-formed steel material must comply with Section A2 of AISI S100.

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 length of load bearing area (see Figure 12) and drilling/piercing 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:

4.1.2.1 Hilti HWH & HHWH, PPH, PTH SD Framer, PPCH SD Framer, TPCH SD Framer and PFTH SD Framer Screws (Sections 3.2, 3.3, 3.4, 3.9, 3.10, 3.11 and 3.12 respectively): These screws are recognized for use where ASTM C1513 screws of the same size and type (self-drilling and/or self-piercing) are prescribed in the IRC * and in the AISI Standards referenced in ~~2015 and~~ 2012 IBC Section 2211 (2009 and 2006 IBC Section 2210).

4.1.2.2 Hilti PBH SD and PWH SD CMT BD Screws (Sections 3.6 and 3.8, respectively): These screws are recognized for use in fastening gypsum board to cold-formed steel framing 0.033 inch to 0.112 inch (0.8 to 2.8 mm) thick, in accordance with IBC Section 2506 and * ~~2015 IRC Section R702.3.5.1~~ (2012 and 2009 IRC Section R702.3.6). They are also recognized for use in attaching gypsum board sheathing to cold-formed steel framing as prescribed in Section C2.2.3 of AISI S213, which is referenced in ~~2015 and~~ 2012 IBC Section 2211.6 (2009 * IBC Section 2210.6; Section C2.2.3 of AISI—Lateral, referenced in 2006 IBC Section 2210.5).

4.1.2.3 Hilti PBH S Screws (Section 3.7): These screws are recognized for use in fastening gypsum board to cold-formed steel framing less than 0.033 inch (0.8 mm) thick, in accordance with IBC Section 2506 and ~~2015 IRC Section R702.3.5.1~~ * (2012 and 2009 IRC Section R702.3.6).

4.1.3 Engineered Design: The Hilti HWH, HHWH, PPH, PPFH SD Framer, PTH SD Framer, PPCH SD Framer, TPCH SD Framer and PFTH SD Framer self-drilling screws described in Sections 3.2, 3.4, 3.5, 3.9, 3.10, 3.11 and 3.12, respectively, and the HWH self-piercing screws described in Section 3.3, are recognized for use in engineered connections of cold-formed steel light-framed construction.

For the self-drilling screws, design of the connections must comply with Section E4 of AISI S100 (AISI – NAS under the 2006 IBC), using the nominal and allowable fastener tension and shear strengths for the screws, shown in Table 5. Allowable connection strengths for use in Allowable Strength Design (ASD) for pull-out, pull-over, and shear (bearing) capacity for common sheet steel thicknesses are provided in Tables 2, 3 and 4, respectively, based upon calculations in accordance with AISI S100 (AISI – NAS under the 2006 IBC).

For the self-piercing screws, design of connections must comply with Section E4 of AISI S100 (AISI – NAS under the 2006 IBC), using the nominal and allowable fastener tension and shear strengths for the screws, shown in Table 5. Allowable connection strengths for use in Allowable Strength Design (ASD) for pull-over capacity for common sheet steel thicknesses are provided in Table 3, based upon calculations in accordance with AISI S100 (AISI – NAS under the 2006 IBC). Allowable connection strengths for use in Allowable Strength Design (ASD) for pull-out and shear (bearing) capacity for common sheet steel thicknesses are provided in Tables 2 and 4, respectively, based upon results of testing in accordance with AISI S905.

Instructions on how to calculate connection design strengths for use in Load and Resistance Factor Design (LRFD) are found in the footnotes of Tables 2, 3 and 4. For connections subject to tension, the least of the allowable pull-out, pullover, and tension fastener strength of screws found in Tables 2, 3, and 5, respectively, must be used for design. For connections subject to shear, the lesser of the allowable shear (bearing) and fastener 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 S100-12. The nominal strengths used in the combined loading equations must be the lesser of those shown in this report and those calculated in accordance with Section E4.5.1 or E4.5.2 of AISI S100-12, as applicable.

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 Tables 4A and 4B 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. 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.

* * Under the ~~2015~~ IBC, connected members must be checked for rupture in accordance with ~~Section E6 of AISI S100-12~~ (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 Hilti Self-drilling and Self-piercing 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 Hilti Self-drilling and Self-piercing 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. If there is a conflict between the manufacturer's published installation instructions and this report, this report governs.

5.2 The allowable loads specified in Section 4.1 are not to be increased when the fasteners are used to resist wind or seismic forces.

5.3 The utilization 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. Diaphragms constructed using the Hilti self-drilling or self-piercing screws must be recognized in a current ICC-ES evaluation report based upon the ICC-ES Acceptance Criteria for Steel Deck Roof and Floor Systems (AC43).

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.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Tapping Screw Fasteners (AC118), dated April 2015 (editorially revised October 2015).

7.0 IDENTIFICATION

Hilti Self-drilling and Self-piercing Screws are marked with an "H" on the top of the heads, as shown in Figures 1 through 11. Packages of Hilti Self-drilling and Self-piercing Screws are labeled with the report holder's name (Hilti, Inc.), the fastener type and size, and the evaluation report number (ESR-2196).

TABLE 1A—HILTI SELF-DRILLING AND SELF-PIERCING STEEL-TO-STEEL SCREWS (ASTM C1513)

DESIGNATION	DESCRIPTION (Size - TPI)	NOMINAL DIAMETER (inch)	NOMINAL SCREW LENGTH[4] (inch)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER	DRILL POINT (Number)	DRILLING/ PIERCING CAPACITY (inch)		LENGTH OF LOAD BEARING AREA[4] (inch)	COATING[2]
							Min.	Max.		
S-MD 10-16 X 5/8 HWH #3	#10-16	0.190	5/8	HWH	0.399	3	0.110	0.175	0.187	Zinc-2
S-MD 10-16 X 3/4 HWH #3	#10-16	0.190	3/4	HWH	0.399	3	0.110	0.175	0.375	Zinc-2
S-MD 10-16 X 3/4 HHWH #3	#10-16	0.190	3/4	HHWH	0.399	3	0.110	0.175	0.375	Zinc-2
S-MD 10-16 X 1 HWH #3	#10-16	0.190	1	HWH	0.399	3	0.110	0.175	0.625	Zinc-2
S-MD 10-16 X 1 1/4 HWH #3	#10-16	0.190	1 1/4	HWH	0.399	3	0.110	0.175	0.875	Zinc-2
S-MD 10-16 X 1 1/2 HWH #3	#10-16	0.190	1 1/2	HWH	0.399	3	0.110	0.175	1.125	Zinc-2
S-MD 12-14 X 3/4 HWH #3	#12-14	0.216	3/4	HWH	0.415	3	0.110	0.210	0.313	Zinc-2
S-MD 12-14 X 1 HWH #3	#12-14	0.216	1	HWH	0.415	3	0.110	0.210	0.562	Zinc-2
S-MD 12-14 X 1 1/2 HWH #3	#12-14	0.216	1 1/2	HWH	0.415	3	0.110	0.210	1.062	Zinc-2
S-MD 12-14 X 2 HWH #3	#12-14	0.216	2	HWH	0.415	3	0.110	0.210	1.562	Zinc-2
S-MD 1/4-14 X 3/4 HHWH #3	1/4-14	0.250	3/4	HHWH	0.500	3	0.110	0.220	0.313	Zinc-2
S-MD 1/4-14 X 1 HHWH #3	1/4-14	0.250	1	HHWH	0.500	3	0.110	0.220	0.562	Zinc-2
S-MD 1/4-14 X 1 1/2 HHWH #3	1/4-14	0.250	1 1/2	HHWH	0.500	3	0.110	0.220	1.062	Zinc-2
S-MD 1/4-14 X 2 HHWH #3	1/4-14	0.250	2	HHWH	0.500	3	0.110	0.220	1.562	Zinc-2
S-MD 10-16 X 5/8 PPH #3	#10-16	0.190	5/8	PPH	0.364	3	0.110	0.175	0.313	Zinc-2
S-MD 10-16 X 3/4 PPH #3	#10-16	0.190	3/4	PPH	0.364	3	0.110	0.175	0.375	Zinc-2
S-MD 10-16 X 1 PPH #3	#10-16	0.190	1	PPH	0.364	3	0.110	0.175	0.500	Zinc-2
S-MD 12-24 X 7/8 HWH #4	#12-24	0.216	7/8	HWH	0.415	4	0.175	0.250	0.375	Zinc-2
S-MD 12-24 X 1 1/4 HWH #4	#12-24	0.216	1 1/4	HWH	0.415	4	0.175	0.250	0.625	Zinc-2

DESIGNATION	DESCRIPTION (Size - TPI)	NOMINAL DIAMETER (inch)	NOMINAL SCREW LENGTH[4] (inch)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER	DRILL POINT (Number)	DRILLING/ PIERCING CAPACITY (inch)		LENGTH OF LOAD BEARING AREA[4] (inch)	COATING[2]
							Min.	Max.		
S-MD 12-24 X 1 1/4 HWH #5	#12-24	0.216	1 1/4	HWH	0.415	5	0.250	0.500	0.437	Zinc-2
S-MD 10-16 X 5/8 HWH #3 Kwik-Cote	#10-16	0.190	5/8	HWH	0.399	3	0.110	0.175	0.187	Kwik-Cote
S-MD 10-16 X 3/4 HWH #3 Kwik-Cote	#10-16	0.190	3/4	HWH	0.399	3	0.110	0.175	0.375	Kwik-Cote
S-MD 10-16 X 3/4 HHWH #3 Kwik-Cote	#10-16	0.190	3/4	HHWH	0.399	3	0.110	0.175	0.375	Kwik-Cote
S-MD 10-16 X 1 HWH #3 Kwik-Cote	#10-16	0.190	1	HWH	0.399	3	0.110	0.175	0.625	Kwik-Cote
S-MD 12-14 X 3/4 HWH #3 Kwik-Cote	#12-14	0.216	3/4	HWH	0.415	3	0.110	0.210	0.313	Kwik-Cote
S-MD 12-14 X 1 HWH #3 Kwik-Cote	#12-14	0.216	1	HWH	0.415	3	0.110	0.210	0.562	Kwik-Cote
S-MD 12-14 X 1 1/4 HWH #3 Kwik-Cote	#12-14	0.216	1 1/4	HWH	0.415	3	0.110	0.210	0.813	Kwik-Cote
S-MD 12-14 X 1 1/2 HWH #3 Kwik-Cote	#12-14	0.216	1 1/2	HWH	0.415	3	0.110	0.210	1.062	Kwik-Cote
S-MD 12-14 X 2 HWH #3 Kwik-Cote	#12-14	0.216	2	HWH	0.415	3	0.110	0.210	1.562	Kwik-Cote
S-MD 12-24 X 1 1/4 HWH #5 Kwik Cote	#12-24	0.216	1 1/4	HWH	0.415	5	0.250	0.500	0.437	Kwik-Cote
S-MD 12-24 X 1 1/4 HWH #5 Kwik Cote with Bonded Washer	#12-24	0.216	1 1/4	HWH	0.415	5	0.250	0.500	0.313	Kwik-Cote
S-MD 12-24 X 2 HWH #5 Kwik Cote	#12-24	0.216	2	HWH	0.415	5	0.250	0.500	1.187	Kwik-Cote
S-MD 12-24 X 3 HWH #5 Kwik Cote	#12-24	0.216	3	HWH	0.415	5	0.250	0.500	2.187	Kwik-Cote
S-MD 10-16 X 3/4 M HHWH3 Collated	#10-16	0.190	3/4	HHWH	0.399	3	0.110	0.175	0.375	Zinc-2
S-MD 10-16 X 3/4 HHWH3 KC M Collated	#10-16	0.190	3/4	HHWH	0.399	3	0.110	0.175	0.375	Kwik-Cote
S-MD 12-24 X 7/8 M HWH4 Collated	#12-24	0.216	7/8	HWH	0.399	4	0.175	0.250	0.375	Zinc-2
S-MD 10-16 X 7/8 HHWH Pilot Point	#10-16	0.190	7/8	HHWH	0.399	1	0.028	0.120	0.188	Zinc-2
S-MD 12-14 X 1 HHWH Pilot Point	#12-14	0.216	1	HHWH	0.415	1	0.028	0.120	0.375	Zinc-2
S-SLC 02 M HWH	#12-14	0.216	1	HWH	0.415	1	0.028	0.120	0.375	Zinc-2
S-MD 1/4-14 X 7/8 HWH Pilot Point Kwik Seal	1/4-14	0.250	7/8	HWH	0.415	1	0.028	0.140	0.313	Kwik-Cote
S-MD 8-18 X 1/2 HWH #2	#8-18	0.164	1/2	HWH	0.335	2	0.035	0.100	0.125	Zinc-2
S-MD 8-18 X 3/4 HWH #2	#8-18	0.164	3/4	HWH	0.335	2	0.035	0.100	0.375	Zinc-2
S-MD 8-18 X 1/2 PPH #2	#8-18	0.164	1/2	PPH	0.311	2	0.035	0.100	0.125	Zinc-2
S-MD 8-18 X 3/4 PPH #2	#8-18	0.164	3/4	PPH	0.311	2	0.035	0.100	0.375	Zinc-2
S-MD 10-16 X 1/2 HWH #2	#10-16	0.190	1/2	HWH	0.399	2	0.035	0.110	0.188	Zinc-2
S-MD 10-16 X 3/4 HWH #2	#10-16	0.190	3/4	HWH	0.399	2	0.035	0.110	0.313	Zinc-2
S-MD 10-16 X 1 HWH #2	#10-16	0.190	1	HWH	0.399	2	0.035	0.110	0.500	Zinc-2
S-MD 12-14 x 3/4 HWH #3 Kwik Seal	#12-14	0.216	3/4	HWH	0.415	3	0.110	0.210	0.125	Kwik-Cote
S-MD 12-14 x 1 HWH #3 Kwik Seal	#12-14	0.216	1	HWH	0.415	3	0.110	0.210	0.375	Kwik-Cote
S-MD 12-14 X 1 1/4 HWH #3 Kwik Seal	#12-14	0.216	1 1/4	HWH	0.415	3	0.110	0.210	0.625	Kwik-Cote
S-MD 12-14 X 1 1/2 HWH #3 Kwik Seal	#12-14	0.216	1 1/2	HWH	0.415	3	0.110	0.210	0.875	Kwik-Cote
S-MD 12-14 X 2 HWH #3 Kwik Seal	#12-14	0.216	2	HWH	0.415	3	0.110	0.210	1.375	Kwik-Cote
S-MD 1/4-14 X 3/4 HWH #3 Kwik Seal	1/4-14	0.250	3/4	HWH	0.500	3	0.110	0.220	0.125	Kwik-Cote
S-MD 1/4-14 x 1 HWH #3 Kwik Seal	1/4-14	0.250	1	HWH	0.500	3	0.110	0.220	0.375	Kwik-Cote
S-MD 1/4-14 X 1 1/2 HWH #3 Kwik Seal	1/4-14	0.250	1 1/2	HWH	0.500	3	0.110	0.220	0.875	Kwik-Cote
7 X 7/16 PPFH SD Framer	#7-18	0.151	7/16	PPFH	0.303	2	0.035	0.100	0.063	BP
7 X 7/16 PPFH SD Framer Zinc	#7-18	0.151	7/16	PPFH	0.303	2	0.035	0.100	0.063	Zinc-2
S-DD 10-18 X 3/4 PTH #3	#10-18	0.190	3/4	PTH	0.433	3	0.110	0.175	0.375	Zinc-2
S-DD 10-16 X 5/8 PPCH #3	#10-16	0.190	5/8	PPCH	0.409	3	0.110	0.175	0.313	Zinc-2
S-DD 10-12 X 3/4 PFTH #3	#10-12	0.190	3/4	PFTH	0.364	3	0.110	0.175	0.375	Zinc-2
S-DD 12-14 X 1 TPCH #3	#12-14	0.216	1	TPCH	0.409	3	0.110	0.210	0.500	Zinc-2
S-MS 8-18 X 1/2 HWH	#8-18S	0.164	1/2	HWH	0.315	Self-piercing	0.015	0.072	0.072	Zinc-2
S-MS 10-12 X 3/4 HWH	#10-12S	0.190	3/4	HWH	0.399	Self-piercing	0.018	0.096	0.100	Zinc-2

TABLE 1B—HILTI SELF-DRILLING (ASTM C954) AND SELF-PIERCING (ASTM C1002) DRYWALL SCREWS

DESIGNATION	DESCRIPTION (Size - TPI)[3]	NOMINAL DIAMETER (inch)	NOMINAL SCREW LENGTH[4] (inch)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER	DRILL POINT (Number)	DRILLING / PIERCING CAPACITY (inch)		LENGTH OF LOAD BEARING AREA[4] (inch)	COATING[2]
							Min.	Max.		
6 X 1 PBH SD	#6-19	0.138	1	PBH	0.322	1	0.033	0.112	0.625	DGP
6 X 1 PBH SD	#6-20	0.138	1	PBH	0.322	1	0.033	0.112	0.625	DGP
6 X 1 PBH SD Zinc	#6-19	0.138	1	PBH	0.322	1	0.033	0.112	0.625	Zinc-2
6 X 1 PBH SD Zinc	#6-20	0.138	1	PBH	0.322	1	0.033	0.112	0.625	Zinc-2
6 X $1^1/_8$ PBH S	#6-9S	0.138	$1^1/_8$	PBH	0.322	Self-piercing	0.023	0.033	0.750	DGP
6 X $1^1/_8$ PBH S Collated	#6-9S	0.138	$1^1/_8$	PBH	0.322	Self-piercing	0.023	0.033	0.750	DGP
6 X $1^1/_8$ PBH SD	#6-19	0.138	$1^1/_8$	PBH	0.322	1	0.033	0.112	0.750	DGP
6 X $1^1/_8$ PBH SD	#6-20	0.138	$1^1/_8$	PBH	0.322	1	0.033	0.112	0.750	DGP
6 X $1^1/_8$ PBH SD Zinc	#6-19	0.138	$1^1/_8$	PBH	0.322	1	0.033	0.112	0.750	Zinc-2
6 X $1^1/_8$ PBH SD Zinc	#6-20	0.138	$1^1/_8$	PBH	0.322	1	0.033	0.112	0.750	Zinc-2
6 X $1^1/_8$ PBH SD Zinc Collated	#6-20	0.138	$1^1/_8$	PBH	0.322	1	0.033	0.088	0.750	Zinc-3
6 X $1^1/_4$ PBH S	#6-9S	0.138	$1^1/_4$	PBH	0.322	Self-piercing	0.023	0.033	0.875	DGP
6 X $1^1/_4$ PBH S Collated	#6-9S	0.138	$1^1/_4$	PBH	0.322	Self-piercing	0.023	0.033	0.875	DGP
6 X $1^1/_4$ PBH SD	#6-19	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	DGP
6 X $1^1/_4$ PBH SD	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	DGP
6 X $1^1/_4$ PBH SD Collated	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.088	0.875	DGP
6 X $1^1/_4$ PBH SD Zinc	#6-19	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	Zinc-2
6 X $1^1/_4$ PBH SD Zinc	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	Zinc-2
6 X $1^1/_4$ PBH SD Zinc Collated	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.088	0.875	Zinc-3
6 X $1^1/_4$ PBH SD CRC	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	CRC
6 X $1^1/_4$ PBH SD CRC Collated	#6-20	0.138	$1^1/_4$	PBH	0.322	1	0.033	0.112	0.875	CRC
6 X $1^5/_8$ PBH S	#6-9S	0.138	$1^5/_8$	PBH	0.322	Self-piercing	0.023	0.033	1.250	DGP
6 X $1^5/_8$ PBH S Collated	#6-9S	0.138	$1^5/_8$	PBH	0.322	Self-piercing	0.023	0.033	1.250	DGP
6 X $1^5/_8$ PBH SD	#6-19	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.112	1.250	DGP
6 X $1^5/_8$ PBH SD	#6-20	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.112	1.250	DGP
6 X $1^5/_8$ PBH SD Collated	#6-20	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.088	1.250	DGP
6 X $1^5/_8$ PBH SD Zinc	#6-19	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.112	1.250	Zinc-2
6 X $1^5/_8$ PBH SD Zinc	#6-20	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.112	1.250	Zinc-2
6 X $1^5/_8$ PBH SD Zinc Collated	#6-20	0.138	$1^5/_8$	PBH	0.322	1	0.033	0.088	1.250	Zinc-3
6 X $1^7/_8$ PBH SD	#6-19	0.138	$1^7/_8$	PBH	0.322	1	0.033	0.112	1.500	DGP
6 X $1^7/_8$ PBH SD	#6-20	0.138	$1^7/_8$	PBH	0.322	1	0.033	0.112	1.500	DGP
6 X $1^7/_8$ PBH SD Zinc	#6-19	0.138	$1^7/_8$	PBH	0.322	1	0.033	0.112	1.500	Zinc-2
6 X $1^7/_8$ PBH SD Zinc	#6-20	0.138	$1^7/_8$	PBH	0.322	1	0.033	0.112	1.500	Zinc-2
6 X $1^7/_8$ PBH SD CRC	#6-20	0.138	$1^7/_8$	PBH	0.322	1	0.033	0.112	1.500	CRC
6 X 2 PBH S	#6-9S	0.138	2	PBH	0.322	Self-piercing	0.023	0.033	1.625	DGP
6 X 2 PBH S Collated	#6-9S	0.138	2	PBH	0.322	Self-piercing	0.023	0.033	1.625	DGP
6 X 2 PBH SD Collated	#6-20	0.138	2	PBH	0.322	1	0.033	0.088	1.625	DGP
6 X 2 PBH SD Zinc	#6-20	0.138	2	PBH	0.322	1	0.033	0.088	1.625	Zinc-3
6 X 2 PBH SD Zinc Collated	#6-20	0.138	2	PBH	0.322	1	0.033	0.088	1.625	Zinc-3

DESIGNATION	DESCRIPTION (Size - TPI)[3]	NOMINAL DIAMETER (inch)	NOMINAL SCREW LENGTH[4] (inch)	HEAD STYLE[1]	NOMINAL HEAD DIAMETER	DRILL POINT (Number)	DRILLING / PIERCING CAPACITY (inch)		LENGTH OF LOAD BEARING AREA[4] (inch)	COATING[2]
							Min.	Max.		
8 X $2^3/_8$ PBH SD	#8-18	0.164	$2^3/_8$	PBH	0.330	1	0.033	0.112	2.000	BP
8 X $2^3/_8$ PBH SD Zinc	#8-18	0.164	$2^3/_8$	PBH	0.330	1	0.033	0.112	2.000	Zinc-2
8 X $2^5/_8$ PBH SD	#8-18	0.164	$2^5/_8$	PBH	0.330	1	0.033	0.112	2.250	BP
8 X $2^5/_8$ PBH SD Zinc	#8-18	0.164	$2^5/_8$	PBH	0.330	1	0.033	0.112	2.250	Zinc-2
8 X 3 PBH SD	#8-18	0.164	3	PBH	0.330	1	0.033	0.112	2.625	BP
8 X 3 PBH SD Zinc	#8-18	0.164	3	PBH	0.330	1	0.033	0.112	2.625	Zinc-2
8 X $1^1/_4$ PWH SD CMT BD	#8-18	0.164	$1^1/_4$	PWH	0.421	1	0.033	0.112	0.875	Tufcoat
8 X $1^5/_8$ PWH SD CMT BD	#8-18	0.164	$1^5/_8$	PWH	0.421	1	0.330	0.112	1.250	Tufcoat

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

[1]Refer to Section 3.0 and Figures 1 through 11 for head configuration abbreviations.
[2]For coating abbreviations, BP = Black phosphated per EN ISO 3892; DGP = Dark Grey phosphate per EN ISO 3892; Zinc-2 = EN/ISO 4042 A3F; Zinc-3 = electroplated zinc coating, Cr3+ passivated; Kwik-Cote = Proprietary organic zinc coating; CRC = Proprietary Duplex Coating; Tufcoat = Tufcoat forest green similar to ISO 10683.
[3]An 'S' in the thread designation indicates a double thread. Listed thread pitch is for one thread only.
[4]Refer to Figure 12 for nominal screw length (L) and load bearing area (LBA) description.

TABLE 2—ALLOWABLE TENSILE PULL-OUT LOADS (P_{NOT}/Ω), pounds-force[1,2,3,4]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0												
Screw Description	Nominal Diameter (in.)	Design thickness of member not in contact with the screw head (in.)										
		0.015	0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.090	0.105	0.135
Self-drilling Screws for Steel-to-Steel Connections[5]												
#7-18	0.151	-	-	-	-	69	92	116	144	173	202	260
#8-18	0.164	-	-	-	-	75	100	125	157	188	220	282
#10-12 #10-16 #10-18	0.190	-	-	-	-	87	116	145	182	218	254	327
#12-14 #12-24	0.216	-	-	-	-	99	132	165	207	248	289	373
$^1/_4$-14	0.250	-	-	-	-	115	153	191	239	287	333	430
Self-piercing Screws for Steel-to-Steel Connections[6]												
#8-18S	0.164	37	49	68	86	109	-	-	-	-	-	-
#10-12S	0.190	44	53	77	102	117	150	-	-	-	-	-

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the lower of the allowable pull-out, pullover, and tension fastener strength of screw found in Tables 2, 3, and 5, respectively must be used for design.
[2]Unless otherwise noted, load values are based upon calculations in accordance with Section E4 of AISI S100. ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.
[3]The allowable pull-out capacity for intermediate member thicknesses can be determined by interpolating within the table.
[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.
[5]For $F_u \geq 65$ ksi steel, multiply values by 1.44.
[6]Load values are based on testing in accordance with AISI S905.

TABLE 3—ALLOWABLE TENSILE PULL-OVER LOADS (P_{NOV}/Ω), FOR HILTI ASTM C1513 SCREWS, pounds-force[1,2,3,4,5]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0												
Screw Description	Washer or Head Diameter (in.)	Design thickness of member in contact with the screw head (in.)										
		0.015	0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.090	0.105	0.135
Hex Washer Head (HWH) or High Hex Washer Head (HHWH)												
#8-18S	0.315	106	128	170								
#8-18	0.335	113	136	181	225	271	363	453	567	680	790	1020
#10-16 #10-12S	0.399	135	162	215	268	323	430	540	673	807	943	1210
#12-14 #12-24	0.415	140	168	224	279	337	447	560	700	840	980	1260
$^1/_4$-14	0.500	169	203	270	336	407	540	677	843	1010	1180	1520
Phillips Pan Head (PPH)												
#8-18	0.311	105	126	168	210	252	336	420	525	630	735	945
#10-16	0.364	123	147	197	246	295	393	491	614	737	860	1106
Phillips Truss Head (PTH)												
#10-18	0.433	146	175	234	292	351	468	585	731	877	1023	1315
Phillips Pan Framing Head (PPFH)												
#7-18	0.303	102	123	164	205	245	327	409	511	614	716	920
Phillips Pancake Head (PPCH)												
#10-16	0.409	138	166	221	276	331	442	552	690	828	966	1242
Torx Pancake Head (TPCH)												
#12-14	.0409	138	166	221	276	331	442	552	690	828	966	1242
Phillips Flat Truss Head (PFTH)												
#10-12	0.364	123	147	197	246	295	393	491	614	737	860	1106

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the lower of the allowable pull-out, pullover, and tension fastener strength of screw found in Tables 2, 3, and 5, respectively must be used for design.

[2]Load values are based upon calculations in accordance with Section E4 of AISI S100. ANSI/ASME standard screw head diameters were used in the calculations and are listed in the tables.

[3]The allowable pull-over capacity for intermediate member thicknesses can be determined by interpolating within the table.

[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.

[5]For $F_u \geq 65$ ksi steel, multiply values by 1.44.

TABLE 4A—ALLOWABLE SHEAR (BEARING) CAPACITY OF STEEL-TO-STEEL CONNECTIONS USING HILTI ASTM C1513 SELF-DRILLING SCREWS, pounds-force[1,2,3,4,5]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0									
Screw Description	**Nominal Diameter (in.)**	**Design thickness of member in contact with screw head, (in.)**	**Design thickness of member not in contact with the screw head (in.)**						
			0.036	**0.048**	**0.060**	**0.075**	**0.090**	**0.105**	**0.135**
#7-18	0.151	0.036	167	220	220	220	220	220	220
		0.048	167	257	294	294	294	294	294
		0.060	167	257	360	367	367	367	367
		0.075	167	257	360	459	459	459	459
		0.090	167	257	360	459	550	550	550
		0.105	167	257	360	459	550	642	642
		0.135	167	257	360	459	550	642	826
#8-18	0.164	0.036	174	239	239	239	239	239	239
		0.048	174	268	319	319	319	319	319
		0.060	174	268	373	400	400	400	400
		0.075	174	268	373	497	497	497	497
		0.090	174	268	373	497	597	597	597
		0.105	174	268	373	497	597	697	697
		0.135	174	268	373	497	597	697	897
#10-12 #10-16 #10-18	0.190	0.036	188	277	277	277	277	277	277
		0.048	188	289	370	370	370	370	370
		0.060	188	289	403	463	463	463	463
		0.075	188	289	403	563	577	577	577
		0.090	188	289	403	563	693	693	693
		0.105	188	289	403	563	693	807	807
		0.135	188	289	403	563	693	807	1040
#12-14 #12-24	0.216	0.036	200	309	315	315	315	315	315
		0.048	200	308	420	420	420	420	420
		0.060	200	308	430	523	523	523	523
		0.075	200	308	430	600	657	657	657
		0.090	200	308	430	600	787	787	787
		0.105	200	308	430	600	787	920	920
		0.135	200	308	430	600	787	920	1180
$^1/_4$-14	0.250	0.036	215	340	363	363	363	363	363
		0.048	215	331	467	487	487	487	487
		0.060	215	331	463	607	607	607	607
		0.075	215	331	463	647	760	760	760
		0.090	215	331	463	647	850	910	910
		0.105	215	331	463	647	850	1060	1060
		0.135	215	331	463	647	850	1060	1370

TABLE 4B—ALLOWABLE SHEAR (BEARING) CAPACITY OF STEEL-TO-STEEL CONNECTIONS USING HILTI ASTM C1513 SELF-PIERCING SCREWS, pounds-force[1,3,4,6]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0								
Screw Description	**Nominal Diameter (in.)**	**Design thickness of member in contact with screw head, (in.)**	**Design thickness of member not in contact with the screw head (in.)**					
			0.015	**0.018**	**0.024**	**0.030**	**0.036**	**0.048**
#8-18S	0.164	0.015	73	87	105	107	107	-
		0.018	79	90	113	113	113	-
		0.024	81	90	149	158	158	-
		0.030	82	117	149	186	186	-
		0.036	106	114	184	236	287	-
#10-12S	0.190	0.018	-	77	125	152	173	173
		0.024	-	77	137	191	220	253
		0.030	-	109	167	228	255	309
		0.036	-	121	167	228	298	373
		0.048	-	121	191	241	298	444

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 ksi = 6.89 MPa.

[1]The lower of the allowable shear (bearing) and the allowable fastener shear strength found in Tables 4 and 5, respectively must be used for design.

[2]Load values in Table 4A are based upon calculations in accordance with Section E4 of AISI S100. ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables

[3]The allowable bearing capacity for other member thicknesses can be determined by interpolating within the table.

[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.

[5]For $F_u \geq 65$ ksi steel, multiply values by 1.44.

[6]Load values in Table 4B are based on testing in accordance with AISI S905.

TABLE 5—FASTENER STRENGTH OF SCREW

SCREW DESCRIPTION	**DIAMETER (in.)**	**NOMINAL FASTENER STRENGTH DETERMINED BY TESTING**		**ALLOWABLE FASTENER STRENGTH[4]**	
		Tension, P_{ts} (lbf)	**Shear, P_{ss} (lbf)**	**Tension (P_{ts}/Ω)[1] (lbf)**	**Shear (P_{ss}/Ω)[2,3] (lbf)**
#7-18 PPFH	0.151	1000	890	335	295
#8-18 HWH, PPH	0.164	1000	1170	335	390
#8-18S HWH	0.164	1915	1570	640	525
#10-12 PFTH	0.190	2170	1645	720	550
#10-12S HWH	0.190	1915	1905	640	635
#10-16 HWH, HHWH, PPH, PPCH	0.190	1370	1215	455	405
#10-18 PTH	0.190	1390	1845	465	615
#12-14 HWH, TPCH	0.216	2325	1880	775	625
#12-24 HWH	0.216	3900	2285	1300	760
$^1/_4$-14 HWH	0.250	4580	2440	1525	815

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the lower of the allowable pull-out, pullover, and tension fastener strength of screw found in Tables 2, 3, and 5, respectively must be used for design.

[2]For shear connections, the lower of the allowable shear (bearing) and the allowable fastener shear strength found in Tables 4 and 5, respectively must be used for design.

[3]See Section 4.1.3 for fastener spacing and end distance requirements.

[4]To calculate LRFD values, multiply the nominal fastener strengths by the LRFD Φ factor of 0.5.

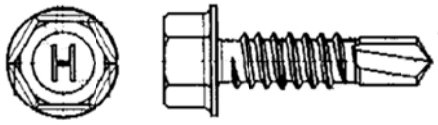

FIGURE 1—HEX WASHER HEAD (HWH) AND HIGH HEX WASHER HEAD (HHWH) SELF-DRILLING SCREW

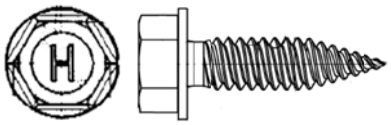

FIGURE 2—HEX WASHER HEAD (HWH) SELF-PIERCING SCREW

FIGURE 3—PHILLIPS PAN HEAD (PPH) SELF-DRILLING SCREW

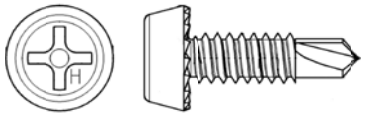

FIGURE 4—PHILLIPS PAN FRAMING HEAD (PPFH) SD FRAMER SELF-DRILLING SCREW

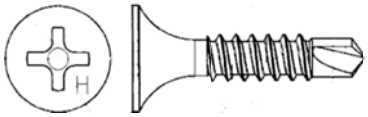

FIGURE 5—PHILLIPS BUGLE HEAD (PBH) SD SELF-DRILLING DRYWALL SCREW

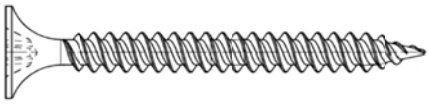

FIGURE 6—PHILLIPS BUGLE HEAD (PBH) S SELF-PIERCING DRYWALL SCREW

FIGURE 7—PHILLIPS WAFER HEAD (PWH) SD CMT BD SELF-DRILLING DRYWALL SCREW

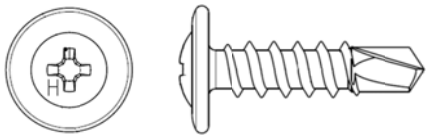

FIGURE 8—PHILLIPS TRUSS HEAD (PTH) SD FRAMER SELF-DRILLING SCREW

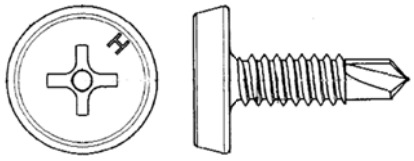

FIGURE 9—PHILLIPS PANCAKE HEAD (PPCH) SD FRAMER SELF-DRILLING SCREW

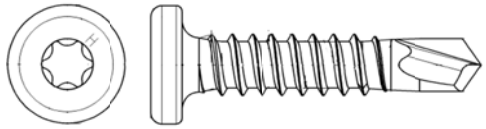

FIGURE 10—TORX PANCAKE HEAD (TPCH) SD FRAMER SELF-DRILLING SCREW

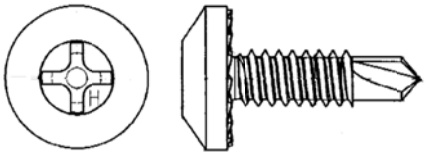

FIGURE 11—PHILLIPS FLAT TRUSS HEAD (PFTH) SD FRAMER SELF-DRILLING SCREW

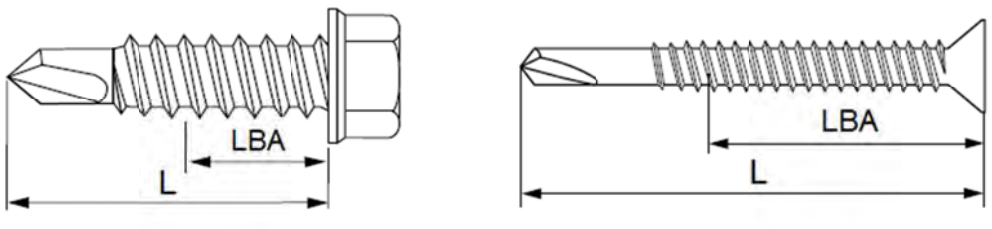

FIGURE 12—DESCRIPTION OF NOMINAL SCREW LENGTH (L) AND LOAD BEARING AREA (LBA)