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This report is subject to re-examination in one year.

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DIVISION: 05—METALS
Section: 05090—Metal Fastenings

REPORT HOLDER:

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EVALUATION SUBJECT:

HILTI KWIK-PRO SELF-DRILLING SCREWS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 1997 *Uniform Building Code*™ (UBC)

Property evaluated:

Structural

2.0 USES

The Hilti Kwik-Pro Self-drilling Screws are used to connect cold-formed steel members to cold-formed steel members.

3.0 DESCRIPTION

The Hilti Kwik-Pro Self-drilling Screws are self-drilling tapping screws complying with ASTM C 1513, and are case-hardened from carbon steel conforming to ASTM A 510, Grade 1022. The screws have a hex washer head and have an electroplated zinc coating complying with ASTM F 1941, or a proprietary coating. Table 1 provides screw designations, sizes and descriptions of point styles. Screws are supplied in boxes of individual screws, or in collated plastic strips.

4.0 DESIGN AND INSTALLATION

4.1 Design:

Allowable fastener loads using Allowable Stress Design (ASD) for pull-out, pull-over, and shear (bearing) capacity are provided in Tables 2, 3 and 5, respectively. Instructions on how to calculate Load Resistance Factor Design (LRFD) capacities are found in the footnotes of these tables. Table 4 presents the nominal and allowable fastener tension and shear strengths for the screws. 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 4, respectively, must be used for design. For connections subject to shear, the lesser of the allowable shear fastener strength and shear (bearing) 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 the AISI – NAS.

The values in the tables 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 a fastener to the edge of any connected part as follows:

1. In jurisdictions adopting the IBC: 1.5 times the diameter of the screw. When the distance to the end of the connected part is parallel to the line of the applied force, the allowable shear fastener strength determined in accordance with Section E4.3.2 of Appendix A of the AISI – NAS must be considered.
2. In jurisdictions adopting the UBC: three times the diameter of the screw. If the connection is subjected to shear force in one direction only, the minimum edge distance must be 1.5 times the diameter of the screw in the direction perpendicular to the force.

Screw thread length and point style are to 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 Hilti Kwik-Pro Self-drilling Screws must be in accordance with the manufacturer's published installation instructions and this report. The manufacturer's published installation instructions are to 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 gun 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 Kwik-Pro Self-drilling 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 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.

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.

***Corrected May 2007**

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.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Tapping Screw Fasteners (AC118), dated December 2006.

7.0 IDENTIFICATION

Hilti Kwik-Pro Self-drilling Screws are marked with an “H” on the top of the heads, as shown in Figure 1. Packages of Hilti Self-drilling Screws are labeled with the report holder’s name (Hilti, Inc.), the fastener type and size, and the evaluation report number (ESR-2196).

TABLE 1—HILTI KWIK-PRO SELF-DRILLING TAPPING SCREWS

Description	Designation	Nominal Diameter (in.)	Nominal Screw Length (in.)	Head Style[1]	Point (Number)	Coating[2]
S-MD 10-16 X 5/8 HWH #3	#10-16	0.190	5/8	HWH	3	Zinc
S-MD 10-16 X 3/4 HWH #3	#10-16	0.190	3/4	HWH	3	Zinc
S-MD 10-16 X 3/4 HHWH #3	#10-16	0.190	3/4	HHWH	3	Zinc
S-MD 10-16 X 1 HWH #3	#10-16	0.190	1	HWH	3	Zinc
S-MD 10-16 X 1-1/4 HWH #3	#10-16	0.190	1-1/4	HWH	3	Zinc
S-MD 10-16 X 1/1/2 HWH #3	#10-16	0.190	1-1/2	HWH	3	Zinc
S-MD 12-14X3/4 HWH #3	#12-14	0.216	3/4	HWH	3	Zinc
S-MD 12-14 X 1 HWH #3	#12-14	0.216	1	HWH	3	Zinc
S-MD 12-14 X 1 1/2 HWH #3	#12-14	0.216	1-1/2	HWH	3	Zinc
S-MD 12-14 X 2 HWH #3	#12-14	0.216	2	HWH	3	Zinc
S-MD 1/4-14 X 3/4 HWH #3	1/4-14	0.250	3/4	HWH	3	Zinc
S-MD1/4-14 X 1 HWH #3	1/4-14	0.250	1	HWH	3	Zinc
S-MD 1/4-14 X 1-1/2 HWH #3	1/4-14	0.250	1-1/2	HWH	3	Zinc
S-MD 1/4-14 X 2 HWH #3	1/4-14	0.250	2	HWH	3	Zinc
S-MD 12-24 X 7/8 HWH #4	#12-24	0.216	7/8	HWH	4	Zinc
S-MD 12-24 X 1-1/4 HWH #4	#12-24	0.216	1-1/4	HWH	4	Zinc
S-MD 12-24 X 1-1/4 HWH #5	#12-24	0.216	1-1/4	HWH	5	Zinc
S-MD 12-24 X 1-1/4 HWH #5 Kwik Cote	#12-24	0.216	1-1/4	HWH	5	Kwik-Cote
S-MD 12-24 X 2 HWH #5 Kwik Cote	#12-24	0.216	2	HWH	5	Kwik-Cote
S-MD 12-24 X 3 HWH #5 Kwik Cote	#12-24	0.216	3	HWH	5	Kwik-Cote
S-MD 10-16 X 7/8 M HWH Collated	#10-16	0.190	7/8	HWH	1	Zinc
S-MD 12-14 X 1 M HWH Collated	#12-14	0.216	1	HWH	1	Zinc
S-MD 10-16 X 3/4 M HWH3 Collated	#10-16	0.190	3/4	HWH	3	Zinc
S-MD 12-24 X 7/8 M HWH4 Collated	#12-24	0.216	7/8	HWH	4	Zinc
S-MD 10-16 X 7/8 HWH Pilot Point	#10-16	0.190	7/8	HWH	1	Zinc
S-MD 12-14 X 1 HWH Stitch	#12-14	0.216	1	HWH	1	Zinc
S-MD 1/4-14 X 7/8 HWH Stitch Kwik Seal	1/4-14	0.250	7/8	HWH	1	Kwik-Cote
S-MD 8-18 X 1/2 HWH #2	#8-18	0.164	1/2	HWH	2	Zinc
S-MD 8-18 X 3/4 HWH #2	#8-18	0.164	3/4	HWH	2	Zinc
S-MD 10-16 X 1/2 HWH #2	#10-16	0.190	1/2	HWH	2	Zinc
S-MD 10-16 X 3/4 HWH #2	#10-16	0.190	3/4	HWH	2	Zinc
S-MD 10-16 X 1 HWH #2	#10-16	0.190	1	HWH	2	Zinc
S-MD 12-14 x 3/4 HWH #3 Kwik Seal	#12-14	0.216	3/4	HWH	3	Kwik-Cote
S-MD 12-14 x 1 HWH #3 Kwik Seal	#12-14	0.216	1	HWH	3	Kwik-Cote
S-MD 12-14 X 1-1/4 HWH #3 Kwik Seal	#12-14	0.216	1-1/4	HWH	3	Kwik-Cote
S-MD 12-14 X 1 -1/2 HWH #3 Kwik Seal	#12-14	0.216	1-1/2	HWH	3	Kwik-Cote
S-MD 12-14 X 2 HWH #3 Kwik Seal	#12-14	0.216	2	HWH	3	Kwik-Cote
S-MD 1/4-14 X 3/4 HWH #3 Kwik Seal	1/4-14	0.250	3/4	HWH	3	Kwik-Cote
S-MD 1/4-14 x 1 HWH #3 Kwik Seal	1/4-14	0.250	1	HWH	3	Kwik-Cote
S-MD 1/4-14 X 1-1/2 HWH #3 Kwik Seal	1/4-14	0.250	1-1/2	HWH	3	Kwik-Cote

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

[1]Head configuration abbreviations are as follows; HWH = Hex Washer Head. HHWH = High Hex Washer Head.
[2]For coating, Zinc = ASTM F 1941; Kwik-Cote = Proprietary coating.

TABLE 2—ALLOWABLE TENSILE PULL-OUT LOADS (P_{NOT}/Ω), pounds-force [1, 2, 3, 4, 5]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0								
Screw Designation	Nominal Diameter (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
#8-18	0.164	75	100	125	157	188	220	282
#10-16	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

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 4, respectively must be used for design.
[2]ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.
[3]The allowable pull-out 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 = 65 ksi steel, multiply values by 1.44.

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

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0									
Screw Designation	Washer Head Diameter (in.)	Design thickness of member in contact with the screw head (in.)							
		0.030	0.036	0.048	0.060	0.075	0.090	0.105	0.135
#8-18	0.335	225	271	363	453	567	680	790	1020
#10-16	0.399	268	323	430	540	673	807	943	1210
#12-14, #12-24	0.415	279	337	447	560	700	840	980	1260
1/4-14	0.500	336	407	540	677	843	1010	1180	1520

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 4, respectively must be used for design.
[2]ANSI/ASME standard screw head diameters were used in the calculations and are listed in the tables.
[3]The allowable pull-over 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 = 65 ksi steel, multiply values by 1.44.

TABLE 4—FASTENER STRENGTH OF SCREW

Screw Designation	Diameter (in.)	Allowable Fastener Strength[4]		Nominal Fastener Strength (tested)	
		Tension (P_{ts}/Ω)[1] (lb)	Shear (P_{ss}/Ω)[2,3] (lb)	Tension, P_{ts} (lb)	Shear, P_{ss} (lb)
#8-18	0.164	335	390	1000	1170
#10-16	0.190	455	405	1370	1215
#12-14	0.216	775	625	2325	1880
#12-24	0.216	1300	760	3900	2285
1/4-14	0.250	1525	815	4580	2440

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 4, respectively must be used for design.
[2]For shear connections, the lower of the allowable shear fastener strength and allowable shear (bearing) found in Tables 4 and 5, respectively must be used for design.
[3]See Section 4.1 for fastener spacing and end distance requirements.
[4]To calculate LRFD values, multiply the allowable fastener strengths by the ASD safety factor of 3.0 and multiply again by the LRFD Φ factor of 0.5.

TABLE 5—ALLOWABLE SHEAR (BEARING) CAPACITY OF COLD-FORMED STEEL, lb [1, 2, 3, 4, 5]

Steel F_u = 45 ksi Applied Factor of Safety, Ω = 3.0								
Screw Designation	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
#8	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	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	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 in.	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

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

[1]The lower of the allowable shear fastener strength and shear bearing found in Tables 4 and 5, respectively must be used for design.
[2]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 = 65 ksi steel, multiply values by 1.44.

FIGURE 1—HILTI HEX WASHER HEAD SELF-DRILLING SCREW