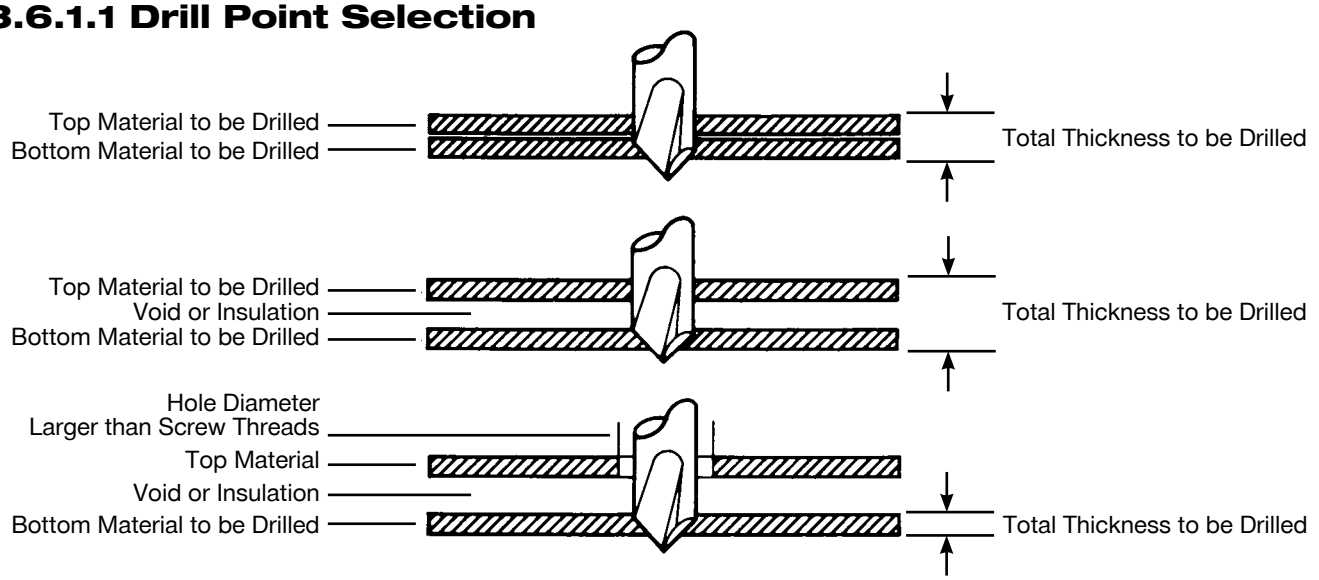
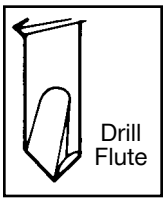
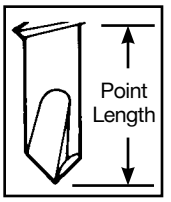
3.6.1 Self-Drilling Screw Fastener Selection and Design

3.6.1.1 Drill Point Selection

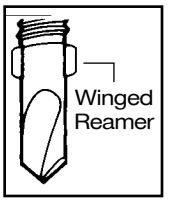




Drill Flute
The length of the drill flute determines the metal thickness that can be drilled. The flute itself provides a channel for chip removal during drilling action. If it becomes completely embedded in material, drill chips will be trapped in the flute and cutting action will cease. This will cause the point to burn up or break.



Point Length
The unthreaded section from the point to the first thread should be long enough to assure the drilling action is complete before the first thread engages the drilled metal. Screw threads advance at a rate of up to ten times faster than the drill flute can remove metal. All drilling therefore should be complete before threads begin to form.



Drilling Through Wood to Metal
If your application calls for drilling through wood over 1/2" thick, a clearance hole is required. Select a fastener with breakaway wings for this type of job. The wings will ream a clearance hole and break-off when they contact metal surface (minimum metal thickness 0.06") to be drilled.

Drilling Capacity – Material Thickness Recommendations (Steel to Steel)

Thickness of material to be drilled (in.)	#2 Point		#3 Point				#4 Point		#5 Point
0.500									0.500
0.400									
0.300									
0.200					0.210	0.220	0.250	0.250	0.250
0.100	0.100	0.110	0.140	0.175			0.175	0.175	
0.035			0.100	0.110	0.110	0.110			
Screw Diameter	#6, #8	#10	#8	#10	#12	#14	#12	#14	#12

Note: Meets or exceeds ASTM C1513. Shaded areas represent total thickness of all steel including any void spaces between layers.

Self-Drilling Screw Fastener Selection and Design 3.6.1

3.6.1.2 Thread Selection

Metal Gauge

Gauge	Aluminum Metal Sheet (Approx. Thickness in decimal parts of an inch)	
8	0.1285	0.1644
9	0.1144	0.1495
10	0.1019	0.1345
11	0.0907	0.1196
12	0.0808	0.1046
13	0.0720	0.0897
14	0.0641	0.0747
15	0.0571	0.0673
16	0.0508	0.0598
17	0.0493	0.0538
18	0.0403	0.0474
19	0.0359	0.0418
20	0.0320	0.0358
21	0.0285	0.0329
22	0.0253	0.0295
23	0.0226	0.0269
24	0.0201	0.0239
25	0.0179	0.0209
26	0.0159	0.0179
27	0.0142	0.0164
28	0.0126	0.0149

Fraction to Decimal

Fraction (in.)	Decimal Equivalent (in.)
1/64	0.015
1/32	0.031
3/64	0.046
1/16	0.062
5/64	0.078
3/32	0.093
7/64	0.109
1/8	0.125
9/64	0.140
5/32	0.156
11/64	0.171
3/16	0.187
13/64	0.203
7/32	0.218
15/64	0.234
1/4	0.250

Screw Diameter

Number	Decimal Equivalent (in.)
#6	0.1380
#7	0.1510
#8	0.1640
#10	0.1900
#12	0.2160
1/4	0.2500
5/16	0.3125

The importance of IBC compliant screws.

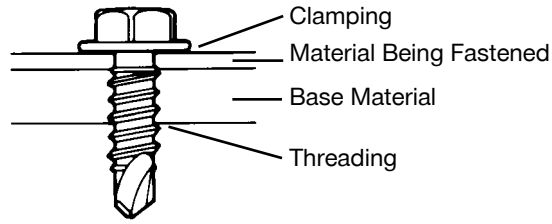
ICC-ES ESR-2196 provides IBC recognition of Hilti's Self-Drilling Screw Fasteners. This recognition was based on a comprehensive and rigorous independent evaluation of Hilti's Self-Drilling Screw Fasteners to the latest IBC code requirements in ICC-ES AC118 Acceptance Criteria for Self-Tapping Screw Fasteners, as well as the AISI S904 and AISI S905 test standards.

AC118 provides the IBC code recognition and quality assurance for screw fasteners. ICC-ES ESR-2196 recognizes many types of Hilti screws for the most common applications including CFS connections, gypsum to CFS, etc. Specifically, ESR-2196 covers the HWH, HHWH, PPH, PPFH, PBH, PWH, PTH, PPCH, TPCH and PFTH head style Hilti screws.

To ensure IBC compliance of screws on your next project, reference ESR-2196.

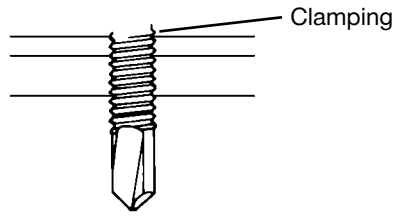
Thread Length

Always choose a fastener with sufficient threads to fully engage in the base metal. For attachments to 1/4" base steel, a self-drilling screw should have at least 1/4" of threads. It is helpful, but not critical, that the threads also engage in the material being fastened. The head of the fastener provides the bearing force for the material being fastened, while the threads provide the clamping force in the base material.

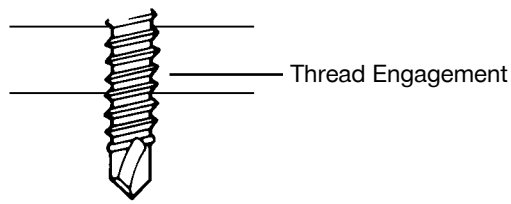


Thread Pitch

The thickness of material being fastened and diameter of the screw determine the type of thread pitch to be used. In general, the thinner the fastened materials, the fewer the number of threads. The thicker the material, the greater the number of threads. This principle is due to two primary methods of thread engagement/holding power: **Clamping** and **Threading**. In light gauge metal, the materials are actually being clamped together by the upper and lower threads.



Thinner base material requires a coarser thread pitch to assure proper clamping. The thicker the material, the finer the threads must be. In very thick metal (3/8" to 1/2" thick), a fine thread is advisable. This will allow the thread to tap into the base material with less installation torque than a coarse thread.



3.6.1 Self-Drilling Screw Fastener Selection and Design

3.6.1.3 Head Style Selection

HWH (HHWH)
(High) Hex Washer Head : Washer face provides a bearing surface for the driving sockets.

PPH (PPFH)
Phillips Pan (Framing) Head: Conventional head for general applications and provides low profile fastening.

PFH
Phillips Flat Head: Used primarily in wood to countersink and seat flush without splintering the wood.

PWH
Phillips Wafer Head: Large head provides the bearing surface necessary to seat flush in soft materials.

PBH
Phillips Bugle Head: Used primarily for fastening drywall, plywood or insulation board to steel studs.

PTH (MPTH)
(Modified) Phillips Truss Head: Large head and low profile provides surface area needed to attach wire lath to metal stud.

PPCH
Phillips Pancake Conventional Head: Head for general applications and provides low and flat profile.

PFTH
Phillips Flat Truss Head: Lowest profile head available for attaching metal to metal.

PFHUC
Pancake Framing Head Undercut: Used for countersinking where a full head taper would cause stand-off of the screw.

SHWH
Slotted Hex Washer Head: Hex washer head with slot in center to provide additional drive connection.

3.6.1.4 Sealing Criteria

Sealing washer screws offer weather resistant fastenings where moisture or condensation is a factor. The washer helps seal the hole to help prevent moisture from dripping into the fastener threads from the fastened material side, reducing corrosive build-up. As added protection against corrosion, all sealing washer screws come standard with Kwik-Cote coating. The torque control or depth gauge of the electric screwdrivers help ensure that the optimal seal is applied (Reference Section 3.6.1.7).

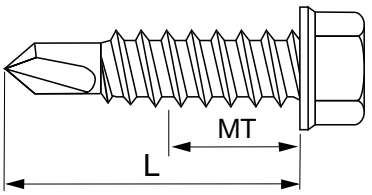
3.6.1.5 Length Selection

Length of the screw (L)

Depending on the screwhead, there are two different ways to measure the overall length of a screw.

For HWH/HHWH, PPH, PTH, PFTH, SHWH and PPCH screws, the overall length is measured from the bottom of the washer under the head to the point of the screw.

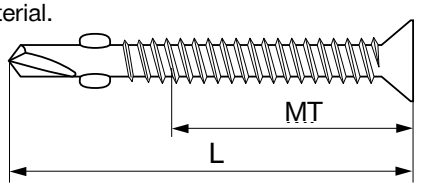
For PWH, PFH, PBH and PFHUC screws, the overall length is measured from the top of the head to the point of the screw.



Maximum Total Thickness (MT)

The maximum total thickness (MT) for all screws is the length of the threads reduced by the first three threads (protruding past the back-side of the base material). See drawings above and below.

The maximum total thickness (MT) describes the maximum thickness of all attachments to be fastened plus the base material.



Self-Drilling Screw Fastener Selection and Design 3.6.1

3.6.1.6 Corrosion Resistance Guidelines

Self-Drilling Screw Fastener Selection Guidelines[1,2,3,6,7]

Environment	Low **Indoor - Dry:** no moisture exposure		Medium **Indoor and Exterior - Dry:** minimal moisture exposure		High **Indoor and Exterior - Wet:** Heavy industrial or coastal areas with high prolonged moisture levels but no direct exposure to chlorides, and average temperatures below 86 °F (30 °C).	
Connection Type	Untreated Lumber-to-steel, steel-to-steel, gypsum-to-steel applications	Pressure-Treated[4] or Fire-Retardant Lumber-to-steel; aluminum-to-steel; dissimilar metals	Untreated Lumber-to-steel, steel-to-steel, gypsum-to-steel applications; cement board-to-steel	Pressure-Treated[4] or Fire-Retardant Lumber-to-steel; aluminum-to-steel; dissimilar metals	Untreated Lumber-to-steel, steel-to-steel, gypsum-to-steel applications	Pressure-Treated[4] or Fire-Retardant Lumber-to-steel; aluminum-to-steel; dissimilar metals
Screw Fastener Descriptions	Hardened Carbon Steel fasteners with electro-galvanized (min. 5 - 13 microns), black phosphate coatings	Carbon Steel, two-step heat treated fasteners with Kwik-Cote coating	Hardened Carbon Steel fasteners with Kwik-Cote coating	Carbon Steel, two-step heat treated fasteners with Kwik-Cote coating	300 series[5] stainless steel fastener	
Screw Fastener Designation	Hilti Zinc Plated Screws	Hilti Kwik-Flex	Hilti Self-Drilling Screws with Kwik-Cote or Kwik-Seal Designation	Hilti Kwik-Flex	Hilti Bi-Metal Kwik-Flex	
Product Technical Guide Section	Section 3.6.2 or 3.6.3	Section 3.6.4	Section 3.6.2	Section 3.6.4	Section 3.6.5	

1 If the moisture content of Pressure-Treated Lumber is high (> 18%) or unknown, stainless steel fasteners are recommended. Select appropriate stainless steel grade for your application.

2 Guidelines based on fastener coating / material resistance to environmental corrosion (commonly called rusting) and fastener hardening process / resistance to hydrogen assisted stress corrosion cracking (HASCC). Evaluate site conditions which may affect these guidelines, such as: corrosive agents other than those listed; expected service life; other (non-environmental) types of corrosion, etc.

3 In highly corrosive environments (such as direct exposure to chlorides with average temperatures above 86 °F (30 °C)) it is generally recommended that a Highly Corrosive Resistant (HCR) fastener be used. Contact Hilti Technical Support at 877-749-6337 for more information.

4 Pressure treated lumber refers to lumber such as SBX/DOT, Zinc borated ACQ, CA-B, CBA-A treated lumber.

5 Most 400 series stainless steels, such as 410 stainless steel, 410 super-passivated stainless steel and 400 modified stainless steel are generally considered susceptible to HASCC. Moreover, these grades of stainless steel are 18/0 – they contain chromium but no nickel which reduces corrosion resistance significantly when compared to 18/8 grades (302, 304) or 18/8/2 grade (316).

6 The decision as to which fastener optimally meets the demands of a specific application is ultimately the judgment of the Engineer of Record or other responsible person for the project.

7 Reference Section 2.3.3.1 for more information on corrosion resistance.

3.6.1 Self-Drilling Screw Fastener Selection and Design

3.6.1.7 Hilti Screw Fastener Installation Instructions*

It is essential that proper rpm, setting depth and torque be utilized when installing Hilti screws.

Install self-drilling screws perpendicular to the work surface. The self-drilling feature of the screw will drill a hole completely through the base material before tapping the threads. Do not apply excessive pressure. Too much pressure will slow the speed of the screwdriver, increasing the installation time and possibly leading to drill tip failure. The variable speed motors of Hilti screwdrivers enable the operator to start the screw in a precise position and drive it at the speed best suited for the application. Below, two recommended tools are discussed in detail. The tables below provide additional suggested tools as well as common socket and bit sizes.

Common Socket and Bit Sizes

Screw Size	Magnetic Nut Setter Size	Phillips Bit Size
#8	1/4"	2
#10	5/16"	2
#12	5/16"	3
1/4"	3/8"	3

The Hilti SD 2500 siding edition features a 2,500 rpm motor for fastening self-drilling screws in steel up to 1/4" (6 mm) thick. There is a depth gauge on the front of the tool for correct depth setting of screws.

The Hilti ST 1800 heavy duty torque adjustable screwdriver features a 1,800 rpm for fastening self-drilling screws in steel up 1/2" (12 mm) thick. There is a depth gauge on the front of the tool for correct depth setting of screws. There is also an 18 position adjustable torque clutch for correct torque release setting of screws. By avoiding overdriving, proper torque adjustment will deliver consistent fastening quality.

The ST 1800 may also be operated with the SDT 5 for a stand-up decking system to fasten steel deck.

Please reference the table on torque considerations below for more information on proper installation of Hilti screw fasteners.

* These are abbreviated instructions which may vary by application. **ALWAYS** review/follow the instructions accompanying the product.

Torque Considerations for Screw Fastening Applications[3]

	Soft joint applications	Hard joint applications
Applications	These include, but are not limited to, typical applications involving interior drywall fastening, exterior sheathing, metal framing, HVAC duct and plywood to metal.	These include, but are not limited to, typical applications involving metal decking (both frame and sidelap), metal siding (both frame and sidelap), exterior façade and window glazing as well as any application where stripping of the base material may occur. Any application involving sealing washers requires a depth gauge or torque clutch to help ensure that an optimal seal is achieved.
Considerations[1]	These applications may not require a corded or cordless screwdriver that features either an adjustable torque clutch or a properly adjusted depth gauge. This is because the applications are considered non-structural and/or possess sufficient redundancy in fastening points that any impact of over-driving may be sufficiently mitigated.	These applications must utilize a corded or cordless screwdriver that features either an adjustable torque clutch or a properly adjusted depth gauge in order to ensure consistent fastening and achieve published connection capacities. This is because the applications are considered structural elements of the design. Over-driving may cause connection failures or fastener failures that possibly compromise the integrity of the connection.
Suggested Tools[2]	Corded: SD 2500, SD 4500, ST 1800, SD 2500 Siding Edition, SI 100 Cordless: SF/H 14, SF/H 18, SD 4500-A, SID 144, SIW 144	Corded: SD 2500, SD 4500, ST 1800, SD 2500 Siding Edition Cordless: SF/H 14, SF/H 18, SD 4500-A Do not use impact drivers.

1 Whether an application requires a depth gauge or torque clutch is the judgment of the person responsible for the project. If conditions are unknown or in doubt, use a screwdriver that features either an adjustable torque clutch or a properly adjusted depth gauge.

2 All published screw fastening connection capacities were developed using corded or cordless screwdriver tools with adjustable torque clutches. Over-driving a screw fastener can cause a connection failure in lighter gauge and lower strength steel base materials (the threads tapping the base material are stripped by excessive torque) or a fastener failure in heavier gauge and higher strength steel base materials (the screw is damaged or sheared by excessive torque). This type of damage is not always visually detectable. Regardless of the tool or its torque setting, test fastenings should always be performed to verify the appropriate torque is being applied.

3 For additional information, contact Hilti Technical Services at 877-749-6337.

3.6.2.1 Product Description

Hilti self-drilling screws are designed to drill their own hole in steel base materials up to 1/2" thick. These screws are available in a variety of head styles, thread lengths and drill-flute lengths for screw diameters #6 through 1/4". Hilti self-drilling screws meet ASTM C1513, ASTM C954 and SAE J78 standards, as applicable.

Product Features:

- Hex head for metal-to-metal applications
- Flush head for wood-to-metal applications
- For metal from 0.035" to 0.500" thick
- Winged reamers for wood over 1/2" thick
- Stitch screws for light gauge metal-to-metal
- Sealing screws for water resistant fastenings

3.6.2.2 Material Specifications

Material	ASTM A510 Grade 1018-1022
Heat Treatment	Case hardened and tempered • Sizes 8, 10 and 12: 0.004" to 0.009" case depth • Size 1/4": 0.005" to 0.011" case depth
Plating	Refer to Section 3.6.2.5 for screw coating information.

Warning: Because of the potential for delayed hydrogen assisted stress corrosion cracking, many hardened steel fasteners are not recommended for use with dissimilar metals or chemically treated wood when moisture may be present or in corrosive environments. For further information, contact Hilti Technical Support at 1-877-749-6337.

Listings/Approvals

ICC-ES (International Code Council)
ESR-2196

COLA (City of Los Angeles)
RR 25678

ICC-ES ESR-2196, provides IBC recognition of Hilti's Self-Drilling Screw fasteners for most common applications (e.g. CFS connections, gypsum to CFS, etc.), including HWH, HHWH, PPH, PPFH, PBH, PWH, PTH, PPCH, TPCH and PFTH head style screws.

3.6.2.3 Technical Data

Ultimate Tensile Strengths – Pullout (Tension), lb (kN)[1,2,3,4,5,6,7]

Screw Designation	Nominal Diameter in.	Thickness of steel member not in contact with the screw head, ga (in.)					
		20 (0.036)	18 (0.048)	16 (0.060)	14 (0.075)	12 (0.105)	10 (0.135)
#6	0.138	190 (0.85)	250 (1.11)	320 (1.42)	395 (1.76)	555 (2.47)	715 (3.18)
#7	0.151	210 (0.93)	275 (1.22)	345 (1.53)	435 (1.93)	605 (2.69)	780 (3.47)
#8	0.164	225 (1.00)	300 (1.33)	375 (1.67)	470 (2.09)	660 (2.94)	845 (3.76)
#10	0.190	260 (1.16)	350 (1.56)	435 (1.93)	545 (2.42)	765 (3.40)	980 (4.36)
#12	0.216	295 (1.31)	395 (1.76)	495 (2.20)	620 (2.76)	870 (3.87)	1120 (4.98)
1/4 in.	0.250	345 (1.53)	460 (2.05)	575 (2.56)	715 (3.18)	1000 (4.45)	1290 (5.74)

1 The lower of the ultimate pullout, pullover, and tension fastener strength of screw should be used for design.
2 Load values based upon calculations done in accordance with Section E4 of the AISI S100.
3 AISI S100 recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.
4 ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.
5 The screw diameters in the table above are available in head styles of pan, hex washer, pancake, flat, wafer and bugle.
6 The load data in the table is based upon sheet steel with F_u = 45 ksi. For F_u = 55 ksi steel, multiply values by 1.22. For F_u = 65 ksi steel, multiply values by 1.44.
7 Refer to Section 3.6.2.5 to ensure drilling capacities.

3.6.2 Self-Drilling Screws

Ultimate Tensile Strengths – Pullover (Tension), lb (kN)[1,2,3,4,5,6,7]

Screw Designation	Washer or Head Diameter in.	Thickness of steel member in contact with the screw head, ga (in.)						
		22 (0.030)	20 (0.036)	18 (0.048)	16 (0.060)	14 (0.075)	12 (0.105)	10 (0.135)
Hex Washer Head (HWH)								
#8	0.335	675 (3.00)	815 (3.63)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)
#10	0.399	805 (3.58)	970 (4.31)	1290 (5.74)	1370 (6.09)	1370 (6.09)	1370 (6.09)	1370 (6.09)
#12-14	0.415	835 (3.71)	1010 (4.49)	1340 (5.96)	1680 (7.47)	2100 (9.34)	2325 (10.34)	2325 (10.34)
#12-24	0.415	835 (3.71)	1010 (4.49)	1340 (5.96)	1680 (7.47)	2100 (9.34)	2940 (13.08)	3780 (16.81)
1/4 in.	0.500	1010 (4.49)	1220 (5.43)	1620 (7.21)	2030 (9.03)	2530 (11.25)	3540 (13.75)	4560 (20.28)
Phillips Pan Head (PPH)								
#7	0.303	615 (2.74)	735 (3.27)	980 (4.36)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)
#8	0.311	630 (2.80)	755 (3.36)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)
#10	0.364	740 (3.29)	885 (3.94)	1180 (5.25)	1370 (6.09)	1370 (6.09)	1370 (6.09)	1370 (6.09)
Phillips Truss Head (PTH)								
#8	0.433	875 (3.89)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)	1000 (4.45)
#10	0.411	830 (3.69)	1000 (4.45)	1330 (5.92)	1390 (6.18)	1390 (6.18)	1390 (6.18)	1390 (6.18)
Phillips Pancake Head (PPCH)								
#10, #12	0.409	830 (3.69)	995 (4.43)	1325 (5.89)	1370 (6.09)	1370 (6.09)	1370 (6.09)	1370 (6.09)
Phillips Flat Truss Head (PFTH)								
#10	0.364	740 (3.29)	885 (3.94)	1180 (5.25)	1475 (6.56)	1840 (8.18)	2170 (9.65)	2170 (9.65)

1. The lower of the ultimate pullout, pullover, and tension fastener strength of screw should be used for design.
2. Load values based upon calculations done in accordance with Section E4 of the AISI S100.
3. AISI S100 recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.
4. ANSI/ASME standard screw head diameters were used in the calculations and are listed in the tables.
5. Phillips Bugle Head (PBH) and Phillips Wafer Head (PWH) styles are not covered by this table because they are not intended for attachment of steel to steel.
6. The load data in the table is based upon sheet steel with F_u = 45 ksi. For F_u = 55 ksi steel, multiply values by 1.22. For F_u = 65 ksi steel, multiply values by 1.44.
7. Refer to Section 3.6.2.5 for drilling capacities.

Nominal Ultimate Fastener Strength of Screw

Screw Designation	Nominal Diameter (in.)	Nominal Fastener Strength			
		Tension, P_{ts} lb (kN)[1]		Shear, P_{ss} lb (kN)[2,3,4]	
#6-20	0.138	1000	(4.45)	890	(3.96)
#7-18	0.151	1000	(4.45)	890	(3.96)
#8-18	0.164	1000	(4.45)	1170	(5.20)
#10-12	0.190	2170	(9.65)	1645	(7.32)
#10-16	0.190	1370	(6.09)	1215	(5.40)
#10-18	0.190	1390	(6.18)	1645	(7.32)
#12-14	0.216	2325	(10.34)	1880	(8.36)
#12-24	0.216	3900	(17.35)	2285	(10.16)
1/4 in.	0.250	4580	(20.37)	2440	(10.85)

1 The lower of the ultimate pullout, pullover, and tension fastener strength of screw should be used for design. The Pullout and Pullover tables in this section have already been adjusted where screw strength governs.

2 The lower of the ultimate shear fastener strength and shear bearing should be used for design. The Shear Bearing table in this section has already been adjusted where screw strength governs.

3 AISI S100 recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.

4 When the distance to the end of the connected part is parallel to the line of the applied force the allowable shear fastener strength must be reduced for end distance, when necessary, in accordance with E4.3.2 of Appendix A of AISI S100.

Torsional Strength[1,2]

Size	Min. Torsional Strength in-lb (Nm)	
6-20	24	(2.7)
7-18	38	(4.3)
8-18	42	(4.8)
10-12	61	(6.9)
10-16	61	(6.9)
10-18	61	(6.9)
10-24	65	(7.3)
12-14	92	(10.4)
12-24	100	(11.3)
1/4-14	150	(17.0)
1/4-20	156	(17.6)

1 Based on screw only. Does not consider base material limitations.

2 Values in table are ultimate torsional strengths. To obtain maximum setting torque, multiply values in table by 0.66.

Ultimate Shear Strengths – Bearing (Shear), lb (kN)[1,2,3,4,5,6,7]

Screw Designation	Nominal Diameter in.	Thickness of steel member in contact with screw head ga (in.)	Thickness of steel member not in contact with the screw head, ga (in.)				
			20 (0.036)	**18** (0.048)	**16** (0.060)	**14** (0.075)	≥ **12** (0.105)
#7	0.151	**20** (0.036)	**500** (2.22)	**660** (2.94)	**660** (2.94)	**660** (2.94)	**660** (2.94)
		18 (0.048)	**500** (2.22)	**660** (2.94)	**880** (3.91)	**880** (3.91)	**880** (3.91)
		≥ **16** (0.060)	**500** (2.22)	**660** (2.94)	**890** (3.96)	**890** (3.96)	**890** (3.96)
#8	0.164	**20** (0.036)	**525** (2.34)	**715** (3.18)	**715** (3.18)	**715** (3.18)	**715** (3.18)
		18 (0.048)	**525** (2.34)	**805** (3.58)	**955** (4.25)	**955** (4.25)	**955** (4.25)
		≥ **16** (0.060)	**525** (2.34)	**805** (3.58)	**1120** (4.98)	**1170** (5.20)	**1170** (5.20)
#10-12	0.190	**20** (0.036)	**565** (2.51)	**830** (3.69)	**830** (3.69)	**830** (3.69)	**830** (3.69)
		18 (0.048)	**565** (2.51)	**865** (3.85)	**1110** (4.94)	**1110** (4.94)	**1110** (4.94)
		16 (0.060)	**565** (2.51)	**865** (3.85)	**1210** (5.38)	**1390** (6.18)	**1390** (6.18)
		≥ **14** (0.075)	**565** (2.51)	**865** (3.85)	**1210** (5.38)	**1645** (7.32)	**1645** (7.32)
#10-16	0.190	**20** (0.036)	**565** (2.51)	**830** (3.69)	**830** (3.69)	**830** (3.69)	**830** (3.69)
		18 (0.048)	**565** (2.51)	**865** (3.85)	**1110** (4.94)	**1110** (4.94)	**1110** (4.94)
		≥ **16** (0.060)	**565** (2.51)	**865** (3.85)	**1210** (5.38)	**1215** (5.40)	**1215** (5.40)
#10-18	0.190	**20** (0.036)	**565** (2.51)	**830** (3.69)	**830** (3.69)	**830** (3.69)	**830** (3.69)
		18 (0.048)	**565** (2.51)	**865** (3.85)	**1110** (4.94)	**1110** (4.94)	**1110** (4.94)
		16 (0.060)	**565** (2.51)	**865** (3.85)	**1210** (5.38)	**1390** (6.18)	**1390** (6.18)
		≥ **14** (0.075)	**565** (2.51)	**865** (3.85)	**1210** (5.38)	**1645** (7.32)	**1645** (7.32)
#12-14	0.216	**20** (0.036)	**600** (2.67)	**930** (4.14)	**945** (4.20)	**945** (4.20)	**945** (4.20)
		18 (0.048)	**600** (2.67)	**925** (4.11)	**1260** (5.60)	**1260** (5.60)	**1260** (5.60)
		16 (0.060)	**600** (2.67)	**925** (4.11)	**1290** (5.74)	**1570** (6.98)	**1570** (6.98)
		≥ **14** (0.075)	**600** (2.67)	**925** (4.11)	**1290** (5.74)	**1800** (8.00)	**1880** (8.36)
#12-24	0.216	**20** (0.036)	**600** (2.67)	**930** (4.14)	**945** (4.20)	**945** (4.20)	**945** (4.20)
		18 (0.048)	**600** (2.67)	**925** (4.11)	**1260** (5.60)	**1260** (5.60)	**1260** (5.60)
		16 (0.060)	**600** (2.67)	**925** (4.11)	**1290** (5.74)	**1570** (6.98)	**1570** (6.98)
		14 (0.075)	**600** (2.67)	**925** (4.11)	**1290** (5.74)	**1800** (8.00)	**1970** (8.76)
		≥ **12** (0.090)	**600** (2.67)	**925** (4.11)	**1290** (5.74)	**1800** (8.00)	**2285** (10.16)
1/4 in.	0.250	**20** (0.036)	**645** (2.87)	**1020** (4.54)	**1090** (4.85)	**1090** (4.85)	**1090** (4.85)
		18 (0.048)	**645** (2.87)	**995** (4.43)	**1400** (6.23)	**1460** (6.49)	**1460** (6.49)
		16 (0.060)	**645** (2.87)	**995** (4.43)	**1390** (6.18)	**1820** (8.10)	**1820** (8.10)
		14 (0.075)	**645** (2.87)	**995** (4.43)	**1390** (6.18)	**1940** (8.63)	**2280** (10.14)
		≥ **12** (0.090)	**645** (2.87)	**995** (4.43)	**1390** (6.18)	**1940** (8.63)	**2440** (10.85)

1 The lower of the ultimate shear bearing and shear fastener strength of screw should be used for design.

2 Load values based upon calculations done in accordance with Section E4 of AISI S100.

3 AISI S100 recommends a safety factor of 3.0 be applied for allowable strength design, a Φ factor of 0.5 be applied for LRFD design or a Φ factor of 0.4 be applied for LSD design.

4 ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.

5 Load values in table are for Hex Washer Head (HWH and HHWH), Phillips Pan Head (PPH), Phillips Truss Head (PTH), Phillips Pancake Head (PPCH), and Phillips Flat Truss Head (PFTH) style screws. Phillips Bugle Head (PBH) and Phillips Wafer Head (PWH) styles are not covered by this table because they are not intended for attachment of steel to steel.

6 The load data in the table is based upon sheet steel with F_u = 45 ksi. For F_u = 55 ksi steel, multiply values by 1.22. For F_u = 65 ksi steel, multiply values by 1.44.

7 Refer to Section 3.6.2.5 to ensure drilling capacities.

3.6.2.4 Installation Instructions

For general discussion of Hilti screw fastener installation, reference Section 3.6.1.7.

For allowable diaphragm shear loads and stiffness values for steel roof or floor deck utilizing Hilti self-drilling screws as frame or sidelap fasteners, reference Section 3.5 and download Hilti's Profis DF software at www.us.hilti.com/decking (US), or www.hilti.ca (Canada).

To estimate the number of sidelap screws on a steel roof or floor deck project, reference Section 3.5.1.6.

Warning: Because of the potential for delayed hydrogen assisted stress corrosion cracking, many hardened steel fasteners are not recommended for use with dissimilar metals or chemically treated wood when moisture may be present or in corrosive environments. For further information, contact Hilti Technical Support at 1-877-749-6337.

3.6.2 Self-Drilling Screws

3.6.2.5 Ordering Information

Collated Self-Drilling Screws

Light/Medium Gauge Metal Applications (Sidelap)

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-SLC 01 M HWH Collated	5/8"	0.018"	0.095"	3/32"	0.100"	5/16"	Zinc-2	250
S-SLC 02 M HWH Collated	3/4"	0.028"	0.120"	3/8"	0.375"	5/16"	Zinc-1	250
S-MD 10-16 x 7/8 HWH Collated	3/8"	0.028"	0.120"	3/16"	0.188"	5/16"	Zinc-1	250

Medium/Heavy Gauge Metal Applications (Frame Fastener)

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-MD 10-16 x 3/4 HWH#3 Collated	1/2"	0.110"	0.175"	3/8"	0.375"	5/16"	Zinc-1	250
S-MD 12-24 x 7/8 HWH#4 Collated	1/2"	0.175"	0.312"	3/8"	0.375"	5/16"	Zinc-1	250

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; Zinc-2 = Cr3 + (Cr6 + free) 8-14 µm. For more information on corrosion resistance, reference Section 3.6.1.6.

PPH | HWH | #5 Point | Stitch | HWH Kwik-Seal | HWH with bonded washer | PFH with wings | PWH

Single Self-Drilling Screws

Sidelap (unsupported metal sheets)

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-MD 12-14x1 HHWH Stitch	3/4"	0.028"	0.120"	3/8"	0.375"	5/16"	Zinc-1	3000
S-MD 10-16x7/8 HHWH Pilot Point	3/8"	0.028"	0.120"	3/16"	0.188"	5/16"	Zinc-1	6000
S-MD 1/4-14x7/8 HWH Stitch Kwik-Seal	1/2"	0.028"	0.140"	5/16"	0.313"	5/16"	Kwik-Cote	2500

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; Kwik Cote = Proprietary Coating, Section 3.6.2.2 For more information on corrosion resistance, reference Section 3.6.1.6.

Light Gauge Applications: Steel to Steel

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-MD 8-18x1/2 HWH #2	1/4"	0.035"	0.100"	1/8"	0.125"	1/4"	Zinc-1	1000
S-MD 8-18x3/4 HWH #2	1/2"	0.035"	0.100"	3/8"	0.375"	1/4"	Zinc-1	1000
S-MD 8-18x1/2 PPH #2	1/4"	0.035"	0.100"	1/8"	0.125"	PHL #2	Zinc-1	1000
S-MD 10-16x1/2 HWH #2	5/16"	0.035"	0.110"	3/16"	0.188"	5/16"	Zinc-1	8500
S-MD 10-16x3/4 HWH #2	1/2"	0.035"	0.110"	5/16"	0.313"	5/16"	Zinc-1	6500
S-MD 10-16x1 HWH #2	3/4"	0.035"	0.110"	1/2"	0.500"	5/16"	Zinc-1	5000

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F For more information on corrosion resistance, reference Section 3.6.1.6.

Light / Medium Gauge Metal Applications

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-MD 10-16x5/8 HWH #3	5/16"	0.110"	0.175"	3/16"	0.187"	5/16"	Zinc-1	7500
S-MD 10-16x3/4 HWH #3	1/2"	0.110"	0.175"	3/8"	0.375"	5/16"	Zinc-1	6500
S-MD 10-16x3/4 HHWH #3	1/2"	0.110"	0.175"	3/8"	0.375"	5/16"	Zinc-1	6500
S-MD 10-16x1 HWH #3	3/4"	0.110"	0.175"	5/8"	0.625"	5/16"	Zinc-1	5000
S-MD 10-16x1 1/4 HWH #3	1"	0.110"	0.175"	7/8"	0.875"	5/16"	Zinc-1	4000
S-MD 10-16x1 1/2 HWH #3	1-1/4"	0.110"	0.175"	1-1/8"	1.125"	5/16"	Zinc-1	4000
S-MD 10-16x5/8 PPH #3	5/16"	0.110"	0.175"	5/16"	0.313"	PHL #2	Zinc-1	7500
S-MD 10-16x3/4 PPH #3	1/2"	0.110"	0.175"	3/8"	0.375"	PHL #2	Zinc-1	6500
S-DD 10-16x5/8 PPCH #3	1/2"	0.110"	0.175"	5/16"	0.313"	PHL #2	Zinc-1	7500
S-DD 10-12x3/4 PFTH #3	9/16"	0.110"	0.175"	3/8"	0.375"	PHL #2	Zinc-1	7500
S-DD 10-18x3/4 PTH #3	9/16"	0.110"	0.175"	3/8"	0.375"	PHL #2	Zinc-1	5000
S-MD 12-14x3/4 HWH #3	1/2"	0.110"	0.210"	5/16"	0.313"	5/16"	Zinc-1	5000
S-MD 12-14x1 HWH #3	3/4"	0.110"	0.210"	9/16"	0.562"	5/16"	Zinc-1	3000
S-MD 12-14x1 1/2 HWH #3	1-1/4"	0.110"	0.210"	1-1/16"	1.062"	5/16"	Zinc-1	2500
S-MD 12-14x2 HWH #3	1-5/8"	0.110"	0.210"	1-9/16"	1.562"	5/16"	Zinc-1	2000
S-DD 12-14x1 TPCH #3	11/16"	0.110"	0.210"	1/2"	0.500"	TX 25 HF	Zinc-2	7500
S-MD 1/4-14x3/4 HWH #3	1/2"	0.110"	0.220"	5/16"	0.313"	3/8"	Zinc-1	4000
S-MD 1/4-14x1 HWH #3	3/4"	0.110"	0.220"	9/16"	0.562"	3/8"	Zinc-1	3000
S-MD 1/4-14x1 1/2 HWH #3	1-1/4"	0.110"	0.220"	1-1/16"	1.062"	3/8"	Zinc-1	2000
S-MD 1/4-14x2 HWH #3	1-5/8"	0.110"	0.220"	1-9/16"	1.562"	3/8"	Zinc-1	1000
S-MD 12-14x3/4 HWH #3 Kwik-Seal	1/4"	0.110"	0.210"	1/8"	0.125"	5/16"	Kwik-Cote	3000
S-MD 12-14x1 HWH #3 Kwik-Seal	5/8"	0.110"	0.210"	3/8"	0.375"	5/16"	Kwik-Cote	2500
S-MD 12-14x1 1/4 HWH #3 Kwik-Seal	1"	0.110"	0.210"	5/8"	0.625"	5/16"	Kwik-Cote	2000
S-MD 12-14x1 1/2 HWH #3 Kwik-Seal	1-1/4"	0.110"	0.210"	7/8"	0.875"	5/16"	Kwik-Cote	2000
S-MD 12-14x2 HWH #3 Kwik-Seal	1-1/2"	0.110"	0.210"	1-3/8"	1.375"	5/16"	Kwik-Cote	1500
S-MD 1/4-14x1 HWH #3 Kwik-Seal	5/8"	0.110"	0.220"	3/8"	0.375"	3/8"	Kwik-Cote	2000
S-MD 1/4-14x1 1/2 HWH #3 Kwik-Seal	1"	0.110"	0.220"	7/8"	0.875"	3/8"	Kwik-Cote	1500

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; Zinc-2 = Cr3+ (Cr6+ free) 8-14 µm, Kwik-Cote = Proprietary Coating, Section 3.6.2.2. For more information on corrosion resistance, reference Section 3.6.1.6.

Warning: Because of the potential for delayed hydrogen assisted stress corrosion cracking, many hardened steel fasteners are not recommended for use with dissimilar metals or chemically treated wood when moisture may be present or in corrosive environments. For further information, contact Hilti Technical Support at 1-877-749-6337.

3.6.2 Self-Drilling Screws

Single Self-Drilling Screws – Heavy Gauge Metal Applications

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
S-MD 12-24x7/8 HWH #4	1/2"	0.175"	0.250"	3/8"	0.375"	5/16"	Zinc-1	4500
S-MD 12-24x1 1/4 HWH #4	3/4"	0.175"	0.250"	5/8"	0.625"	5/16"	Zinc-1	3500
S-MD 12-24x1 1/4 HWH #5	1/2"	0.250"	0.500"	7/16"	0.437"	5/16"	Zinc-1	4000
S-MD 12-24x1 1/4 HWH #5 Kwik-Cote	1/2"	0.250"	0.500"	5/16"	0.313"	5/16"	KwikCote	4000
S-MD 12-24x2 HWH #5 Kwik-Cote	1-1/4"	0.250"	0.500"	1-3/16"	1.187"	5/16"	KwikCote	2000
S-MD 12-24x3 HWH #5 Kwik-Cote	2-1/4"	0.250"	0.500"	2-3/16"	2.187"	5/16"	KwikCote	1000
S-MD 12-24x1 1/4 HWH #5 Kwik-Cote Bond Washer	1/2"	0.250"	0.500"	5/16"	0.313	5/16''	KwikCote	2500

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; Kwik Cote = Proprietary Coating, Section 3.6.2.2. For more information on corrosion resistance, reference Section 3.6.1.6.

Single Self-Drilling Screws – Heavy Gauge Metal Applications

Description	Thread Length	Drilling Capacity Min	Drilling Capacity Max	Maximum Total Thickness (MT)[1]		Recess	Coating[2]	Box Qty
Wood Drill Screws								
Decking Screws (Plywood to Framing)								
S-WD 8-18x1 5/16 PFH #3	1/2"	0.050"	0.140"	1/2"	0.500"	PHL #2	BP	6000
S-WD 8-18x1 15/16 PFH #3	5/8"	0.050"	0.140"	3/4"	0.750"	PHL #2	BP	4000
S-WD 10-24x1 PWH #3	3/4"	0.050"	0.175"	5/8"	0.625"	PHL #2	Zinc-1	6000
S-WD 10-24x1 1/4 PWH #3	1"	0.050"	0.175"	7/8"	0.875"	PHL #2	Zinc-1	5000
S-WD 10-24x1 1/2PWH #3	1-1/4"	0.050"	0.175"	1-1/8"	1.125"	PHL #2	Zinc-1	3500
Winged Reamer Wood Drill Screws								
S-WW 10-24x1 7/16 PWH #3 wings	1"	0.050"	0.175"	3/4"	0.750"	PHL #2	Zinc-1	4000
S-WW 12-24x2 PFH #4 wings	1-3/8"	0.050"	0.232"	1-1/4"	1.250"	PHL #2	Zinc-1	2000
S-WW 12-24x2 1/2 PFH #4 wings	2"	0.050"	0.232"	1-3/4"	1.750"	PHL #2	Zinc-1	1500
S-WW 14-20x2 3/4 PFH #4 wings	2-1/4"	0.050"	0.250"	2"	2.000"	PHL #2	Zinc-1	1000

1 Refer to Figure in Section 3.6.1.5.

2 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; BP = Black Phosphate. For more information on corrosion resistance, reference Section 3.6.1.6.

Warning: Because of the potential for delayed hydrogen assisted stress corrosion cracking, many hardened steel fasteners are not recommended for use with dissimilar metals or chemically treated wood when moisture may be present or in corrosive environments. For further information, contact Hilti Technical Support at 1-877-749-6337.

Self-Drilling Screws 3.6.2

Drywall Applications (Drywall to steel, framing and lathing screws)

Description	Coating[1]	Box Qty	Application
6 x 1 PBH SD	DGP	10,000	Fastening Drywall, plywood, insulation, etc. to metal studs from 14 ga to 20 ga
6 x 1 PBH SD Zinc	Zinc-1	10,000	
6 x 1-1/8 PBH SD	DGP	10,000	
6 x 1-1/8 PBH SD Zinc	Zinc-1	10,000	
6 x 1-1/4 PBH SD	DGP	8,000	
6 x 1-1/4 PBH SD Zinc	Zinc-1	8,000	
6 x 1-5/8 PBH SD	DGP	5,000	
6 x 1-5/8 PBH SD Zinc	Zinc-1	5,000	
6 x 1-7/8 PBH SD	DGP	4,000	
6 x 1-7/8 PBH SD Zinc	Zinc-1	4,000	
8 x 2-3/8 PBH SD	BP	2,500	
8 x 2-3/8 PBH SD Zinc	Zinc-1	2,500	
8 x 2-5/8 PBH SD	BP	1,600	
8 x 2-5/8 PBH SD Zinc	Zinc-1	1,600	
8 x 3 PBH SD	BP	1,400	
8 x 3 PBH SD Zinc	Zinc-1	1,400	
7 x 7/16 PPFH SD Framer	BP	10,000	Fastening stud to track from 14 ga to 20 ga
7 x 7/16 PPFH SD Framer Zinc	Zinc-1	10,000	
8 x 1/2 PPH SD Framer Zinc	Zinc-1	10,000	
10 x 5/8 PPCH SD Framer	Zinc-1	7,500	
10 x 3/4 PFTH SD Framer Zinc	Zinc-1	7,500	
10 x 3/4 PTH SD Framer Zinc	Zinc-1	5,000	
8 x 1/2 PTH SD Lathing Zinc	Zinc-1	10,000	Fastening wire lath to 14 ga to 20 ga
8 x 3/4 PTH SD Lathing Zinc	Zinc-1	10,000	
8 x 1 PTH SD Lathing Zinc	Zinc-1	8,000	
8 x 1-1/4 PTH SD Lathing Zinc	Zinc-1	8,000	
6 x 1-5/8 SFH SD	DGP	5,000	Fastening wood trim and base to 14 ga to 20 ga studs
6 x 2-1/4 SFH SD Zinc	Zinc-1	3,000	

1 For coating abbreviations, Zinc-1 = EN/ISO 4042 A3F; BP = Black Phosphate; DGP = Dark Grey Phosphate. For more information on corrosion resistance, reference Section 3.6.1.6.

The importance of IBC compliant screws.

ICC-ES ESR-2196 provides IBC recognition of Hilti's Self-Drilling Screw Fasteners. This recognition was based on a comprehensive and rigorous independent evaluation of Hilti's Self-Drilling Screw Fasteners to the latest IBC code requirements in ICC-ES AC118 Acceptance Criteria for Self-Tapping Screw Fasteners, as well as the AISI S904 and AISI S905 test standards.

AC118 provides the IBC code recognition and quality assurance for screw fasteners. ICC-ES ESR-2196 recognizes many types of Hilti screws for the most common applications including CFS connections, gypsum to CFS, etc. Specifically, ESR-2196 covers the HWH, HHWH, PPH, PPFH, PBH, PWH, PTH, PPCH, TPCH and PFTH head style Hilti screws.

To ensure IBC compliance of screws on your next project, reference ESR-2196.