

ICC-ES Evaluation Report**ESR-1976**

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DIVISION: 05 00 00—METALS**Section: 05 05 23—Metal Fastenings****REPORT HOLDER:****ITW BUILDEX**
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ITASCA, ILLINOIS 60143
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www.itwbuildex.com**EVALUATION SUBJECT:****ITW BUILDEX TEKS® SELF-DRILLING FASTENERS****1.0 EVALUATION SCOPE****Compliance with the following codes:**

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

Property evaluated:

Structural

2.0 USES

The ITW Buildex TEKS® Self-drilling Fasteners described in this report are used in engineered or code-prescribed connections of cold-formed steel framing and of sheet steel sheathing to cold-formed steel framing.

3.0 DESCRIPTION**3.1 General:**

ITW Buildex TEKS® Self-drilling Fasteners are self-drilling tapping screws complying with the material, process, and performance requirements of ASTM C 1513. The screws have either a hex washer head (HWH), an HWH with serrations, a Phillips® (Type II) pan head, or a Phillips® oval head. The screws' threads comply with ASME B18.6.4, and the screws' drill points and flutes are proprietary and are designated as TEKS/1, TEKS/2, TEKS/3, TEKS/4, TEKS/4.5, and TEKS/5. The screws have nominal sizes of No. 10 [0.190 inch (4.83 mm)], No. 12 [0.216 inch (5.49 mm)], and 1/4 inch [0.250 inch (6.35 mm)], and lengths from 1/2 inch to 8 inches (12.70 mm to 203.20 mm). See Figures 1 through 4 for depictions of the screws. Table 1 provides screw descriptions and sizes, as well as head styles, point styles, drilling capacity ranges, and coatings.

3.2 Material:

ITW Buildex TEKS® Self-drilling Fasteners are case-hardened from carbon steel conforming to ASTM A 510, Grade 1018 to 1022, and are heat-treated and case-

hardened to give them a hard outer surface necessary to cut internal threads in the joint material. Screws are coated with corrosion preventive coating identified as Climaseal®, or are plated with electrodeposited zinc (E-Zinc) complying with the minimum corrosion resistance requirements of ASTM F 1941.

3.3 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, in accordance with the manufacturer's published installation instructions.

4.1.2 Prescriptive Design: ITW Buildex TEKS Self-drilling Fasteners described in Section 3.2 are recognized for use where ASTM C 1513 screws of the same size are prescribed in AISI standards referenced in IBC Section 2210.

4.1.3 Engineered Design: ITW Buildex TEKS® Self-drilling Fasteners are recognized for use in engineered connections of cold-formed steel construction. Design of the connection must comply with Section E4 of AISI S100, using the nominal and allowable fastener tension and shear strength for the screws, shown in Table 5. Allowable connection strength for use in Allowable Strength Design (ASD) for pull-out, pullover, 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. Instructions on how to calculate connection design strengths for use in Load Resistance Factor Design (LRFD) are found in the footnotes of these tables. For connections subject to tension, the least of the allowable pullout, pullover, and fastener tension strength found in Tables 2, 3 and 5, respectively, must be used for design. For connections subject to shear, the lesser of the fastener shear strength and allowable 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 AISI S100.

The values in Tables 2, 3, and 4 are based on a minimum spacing between the center of fasteners of three times the diameter of the screws, and a minimum distance from the center of a fastener to the edge of any connected part of 1.5 times the diameter of the screws. 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 must be considered.

4.2 Installation:

Installation of ITW Buildex TEKS® Self-drilling Fasteners 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 screw driving tool. The installation speed for 1/4-inch TEKS/3, 1/4-inch TEKS/5, and #12 TEKS/5 screws should not exceed 1,800 rpm; the installation speed for all other screws should 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 ITW Buildex TEKS® Self-drilling Fasteners 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 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.

5.3 The allowable load values (ASD) specified in Section 4.1 for screws or for screw connections are not permitted to be increased for short-duration loads, such as wind or earthquake loads.

5.4 The rust-inhibitive (corrosion-resistant) coating on the screws must be suitable for the intended use. The screw fasteners are limited to dry, interior applications unless determined otherwise by the registered design professional.

5.5 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 October 2010 (AC118 dated November 2009 for IBC 2006).

7.0 IDENTIFICATION

ITW Buildex TEKS® Self-drilling Fastener heads are marked with “BX” as shown in Figures 1 through 4. Each box of fasteners has a label bearing the company name (ITW Buildex), fastener description (model, point type, diameter and length), lot number, and the evaluation report number (ESR-1976).

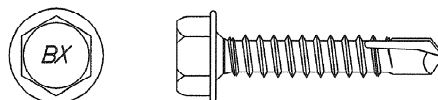


FIGURE 1—HEX WASHER HEAD (HWH)

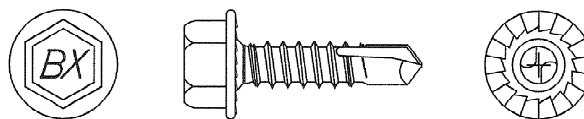


FIGURE 2—HWH WITH SERRATIONS

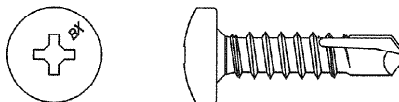


FIGURE 3—PHILLIPS PAN HEAD



FIGURE 4—PHILLIPS OVAL HEAD

TABLE 1—TEKS® SELF-DRILLING TAPPING SCREWS¹

DESCRIPTION (nom. size-tpi x length)	HEAD STYLE	DRILL POINT	DRILLING CAPACITY ³ (in.)		COATING
			Min.	Max.	
10-16 x $\frac{3}{4}$ "	HWH	TEKS/1	0.018	0.095	Climaseal
12-14 x $\frac{3}{4}$ "	HWH	TEKS/1	0.018	0.095	Climaseal
$\frac{1}{4}$ -14 x $\frac{7}{8}$ "	HWH	TEKS/1	0.018	0.095	Climaseal
10-16 x $\frac{1}{2}$ "	Pan	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{5}{8}$ "	Pan	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{3}{4}$ "	Pan	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{3}{4}$ "	Oval	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{1}{2}$ "	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{5}{8}$ "	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{3}{4}$ "	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x 1"	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x 1"	Oval	TEKS/3	0.036	0.175	Climaseal
10-16 x 1"	Pan	TEKS/3	0.036	0.175	Climaseal
10-16 x 1- $\frac{1}{4}$ "	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x 1- $\frac{1}{4}$ "	Oval	TEKS/3	0.036	0.175	Climaseal
10-16 x 1- $\frac{1}{2}$ "	HWH	TEKS/3	0.036	0.175	Climaseal
10-16 x $\frac{3}{4}$ "	HWH ²	TEKS/3	0.036	0.175	E-Zinc
12-14 x $\frac{3}{4}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
12-14 x 1"	HWH	TEKS/3	0.036	0.210	Climaseal
12-14 x 1- $\frac{1}{4}$ "	HWH	TEKS/2	0.036	0.210	Climaseal
12-14 x 1- $\frac{1}{2}$ "	HWH	TEKS/2	0.036	0.210	Climaseal
12-14 x 2"	HWH	TEKS/3	0.036	0.210	Climaseal
12-14 x 2- $\frac{1}{2}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
12-14 x 3"	HWH	TEKS/3	0.036	0.210	Climaseal
12-14 x 4"	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x $\frac{3}{4}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 1"	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 1- $\frac{1}{4}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 1- $\frac{1}{2}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 2"	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 2- $\frac{1}{2}$ "	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 3"	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 4"	HWH	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x $\frac{3}{4}$ "	HWH ²	TEKS/3	0.036	0.210	Climaseal
$\frac{1}{4}$ -14 x 1"	HWH ²	TEKS/3	0.036	0.210	Climaseal
12-24 x $\frac{7}{8}$ "	HWH	TEKS/4	0.125	0.250	Climaseal
12-24 x 1- $\frac{1}{4}$ "	HWH	TEKS/4.5	0.125	0.375	Climaseal
12-24 x 1- $\frac{1}{4}$ "	HWH	TEKS/5	0.125	0.500	Climaseal
12-24 x 1- $\frac{1}{2}$ "	HWH	TEKS/5	0.125	0.500	Climaseal
12-24 x 2"	HWH	TEKS/5	0.125	0.500	Climaseal
$\frac{1}{4}$ -28 x 3"	HWH	TEKS/5	0.125	0.500	Climaseal
$\frac{1}{4}$ -28 x 4"	HWH	TEKS/5	0.125	0.500	Climaseal
$\frac{1}{4}$ -28 x 5"	HWH	TEKS/5	0.125	0.500	Climaseal
$\frac{1}{4}$ -28 x 6"	HWH	TEKS/5	0.125	0.500	Climaseal
$\frac{1}{4}$ -28 x 8"	HWH	TEKS/5	0.125	0.500	Climaseal

For SI: 1 inch = 25.4 mm.

¹ Screw dimensions comply with ASME B18.6.4 (nom. size = nominal screw size, tip = threads per inch, length = inches).

² HWH with serrations.

³ Drilling capacity refers to the minimum and maximum total allowable thicknesses of material the fastener is designed to drill through, including any space between the layers.

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, $\Omega=3.0$												
Screw Designation	Nominal Diameter (in.)	Design Thickness of Member Not in Contact with the Screw Head (in)										
		0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.105	0.125	0.187	0.250
10-16	0.190	44	58	73	87	116	145	182	254	303	⁶	⁶
12-14, 12-24	0.216	50	66	83	99	132	165	207	289	344	515	689
¹ / ₄ -14, ¹ / ₄ -28	0.250	57	77	96	115	153	191	239	335	398	596	797

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

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

²ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.

³The allowable pull-out capacity for other member thickness can be determined by interpolating within the table.

⁴To 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.

⁵For $F_u = 58$ ksi, multiply values by 1.29; for $F_u = 65$ ksi, multiply values by 1.44.

⁶Outside drilling capacity limits.

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, $\Omega=3.0$													
Screw Designation	Nominal Diameter (in.)	Washer Diameter (in.)	Design Thickness of Member in Contact with the Screw Head (in)										
			0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.105	0.125	0.187	0.250
Hex Washer Head (HWH)													
10-16	0.190	0.400	162	216	270	324	432	540	675	945	1125	⁶	⁶
12-14, 12-24	0.216	0.415	168	224	280	336	448	560	700	980	1167	1746	2334
¹ / ₄ -14, ¹ / ₄ -28	0.250	0.500	203	270	338	405	540	675	844	1181	1406	2104	2813
HWH with Serrations													
10-16	0.190	0.435	176	235	294	352	470	587	734	1028	1223	⁶	⁶
¹ / ₄ -14	0.250	0.610	203	270	338	405	540	675	844	1181	1406	2104	⁶
Phillips Pan Head													
10-16	0.190	0.365	148	197	246	296	394	493	616	862	1027	⁶	⁶
Phillips Oval Head													
10-16	0.190	0.365	148	197	246	296	394	493	616	862	1027	⁶	⁶

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

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

²ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.

³The allowable pull-over capacity for other member thickness can be determined by interpolating within the table.

⁴To 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.

⁵For $F_u = 58$ ksi, multiply values by 1.29; for $F_u = 65$ ksi, multiply values by 1.44.

⁶Outside drilling capacity limits.

TABLE 4—ALLOWABLE SHEAR (BEARING) CAPACITY (P_{NS}/Ω), pounds-force^{1, 2, 3, 4, 5}

Steel $F_u = 45$ ksi, Applied Factor of Safety, $\Omega=3.0$													
Screw Designation	Nominal Diameter (in.)	Design Thickness of Member Not in Contact with the Screw Head (in)	Design Thickness of Member in Contact with the Screw Head (in)										
			0.018	0.024	0.030	0.036	0.048	0.060	0.075	0.105	0.125	0.187	0.250
10-16	0.190	0.018	66	66	66	66	66	66	66	66	66	66	
		0.024	102	102	102	102	102	102	102	102	102	102	
		0.030	111	143	143	143	143	143	143	143	143	143	
		0.036	120	152	185	188	188	188	188	188	188	188	
		0.048	139	168	199	228	289	289	289	289	289	289	
		0.060	139	185	213	239	327	404	404	404	404	404	
		0.075	139	185	231	251	337	427	564	564	564	564	
		0.105	139	185	231	277	356	436	570	808	808	808	
12-14 12-24	0.216	0.018	71	71	71	71	71	71	71	71	71	71	71
		0.024	109	109	109	109	109	109	109	109	109	109	109
		0.030	125	152	152	152	152	152	152	152	152	152	152
		0.036	136	170	205	200	200	200	200	200	200	200	200
		0.048	157	190	223	253	308	308	308	308	308	308	308
		0.060	157	210	240	266	362	430	430	430	430	430	430
		0.075	157	210	262	282	375	468	601	601	601	601	601
		0.105	157	210	262	315	402	483	624	919	919	919	919
		0.125	157	210	262	315	420	494	629	919	1094	1094	1094
		0.187	157	210	262	315	420	525	642	919	1094	1636	1636
1/4-14 1/4-28	0.250	0.018	76	76	76	76	76	76	76	76	76	76	76
		0.024	117	117	117	117	117	117	117	117	117	117	117
		0.030	142	164	164	164	164	164	164	164	164	164	164
		0.036	156	193	215	215	215	215	215	215	215	215	215
		0.048	182	218	253	283	331	331	331	331	331	331	331
		0.060	182	243	276	300	406	463	463	463	463	463	463
		0.075	182	243	304	322	424	521	647	647	647	647	647
		0.105	182	243	304	365	461	544	694	1063	1063	1063	1063
		0.125	182	243	304	365	486	560	703	1063	1266	1266	1266
		0.187	182	243	304	365	486	608	731	1063	1266	1893	1893
0.250	182	243	304	365	486	608	759	1063	1266	1893	2531		

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

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

²ANSI/ASME standard screw diameters were used in the calculations and are listed in the tables.

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

⁴To 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.

⁵For $F_u = 58$ ksi, multiply values by 1.29; for $F_u = 65$ ksi, multiply values by 1.44.

TABLE 5—FASTENER STRENGTH OF SCREWS^{1, 2, 3, 4, 5}

SCREW DESIGNATION	DIAMETER (in.)	ALLOWABLE FASTENER STRENGTH		NOMINAL FASTENER STRENGTH	
		Tensile, P_{ts}/Ω (lb)	Shear, P_{ss}/Ω (lb)	Tensile, P_{ts} (lb)	Shear, P_{ss} (lb)
10-16	0.190	885	573	2654	1718
12-14	0.216	1184	724	3551	2171
12-24	0.216	1583	885	4750	2654
1/4-14	0.250	1605	990	4816	2970
1/4-28	0.250	1922	1308	5767	3925

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

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

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

³See Section 4.1 for fastener spacing and end distance requirements.

⁴Nominal strengths are based on laboratory tests;

⁵To calculate LRFD values, multiply nominal strength values by the LRFD Φ factor of 0.5.