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RESEARCH REPORT: RR 25915
(CSI #050523)

Expires: July 1, 2018
Issued Date: July 1, 2016
Code: 2014 LABC

GENERAL APPROVAL – Renewal - ITW Buildex Teks Select™ Self-drilling Structural Fasteners for Cold Formed Steel and Aluminum Connections.

DETAILS

ITW Buildex Teks Select™ Structural Fasteners are proprietary self-drilling tapping steel screws, which have a dual heat treatment and are coated with corrosion preventive coating identified as Climaseal ACR™. The drill point and the lead threads of screws are heat treated to a high hardness for drilling and thread forming. The balance of the fastener shank is the load-bearing area of the fastener and is treated to a lower hardness complying with Grade 5 of SAE J 429 and ASTM A449. Table 1 provides screw designations, sizes, descriptions of point styles, drilling capacity, and load bearing area. The No.10, No.12, and ¼ inch diameter fasteners have hex washer heads (HWH), and are available in various lengths. No. 12 fastener is also available in one inch with Undercut Phillips Flat Head (UPFH).

Installation of ITW Buildex Teks Select™ screws must be in accordance with the manufacturer's published installation instructions and this report. The screws must be installed perpendicular to the work surface using a screw driving tool. The installation speed for ¼ inch 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 metal with a minimum of three threads protruding past the back side of the supporting metal. To insure proper performance, only the load-bearing area being given in Table 1 can be engaged in the material being fastened.

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ITW BUILDEX

RE: ITW Buildex Tek Select™ Self-drilling Structural Fasteners for Cold Formed Steel and Aluminum Connections

The approval is subject to the following conditions:

1. For connections subject to tension, the least of the allowable pullout, pullover, and fastener tension strength found in Table 2, 3 and 4, respectively, must be used for design. For connections subject to shear, the lesser of the fastener shear strength and allowable shear (bearing) found in Table 4 and 5, respectively, must be used for design.
2. The minimum spacing and edge distance for fasteners shall comply with Table 6 shown on the attached sheet. For steel connections, the minimum spacing distance is three times the diameter of the screw, and the minimum edge distance is 1.5 times the diameter of the screws. For aluminum connections, the minimum spacing distance is four times the nominal diameter of the screw, and the minimum edge distance is two times the nominal diameter of the screws.
3. Calculations demonstrating the applied loads are less than the allowable loads prepared by a California licensed civil or structural engineer or architect must be submitted to the structural plan check section.
4. The allowable loads shall not be increased for wind or seismic forces.
5. Calculations shall be in accordance with the Cold Formed Steel Design Manual, AISI S100-2007/S2-10. Calculations shall consider all loading conditions acting on the connected assembly. Connections with combined shear and tension shall be checked using the equations given by AISI S100, Section E4.5.
6. Steel members shall have a minimum ultimate tensile strength of 58 ksi. Aluminum 6063-T52 and 6063-T6 shall have a minimum ultimate tensile strength of 22 ksi and 30 ksi respectively.
7. The nominal strength values contained in this report are not approved for the design of structural diaphragms used to resist wind , seismic and other in-plane lateral loads
8. The screws are identified with “BX” logo on top of the fastener head. Each box of fasteners has a label bearing the company name (ITW Buildex), fastener type, part number, lot number, and fastener description as shown in Figure 1.

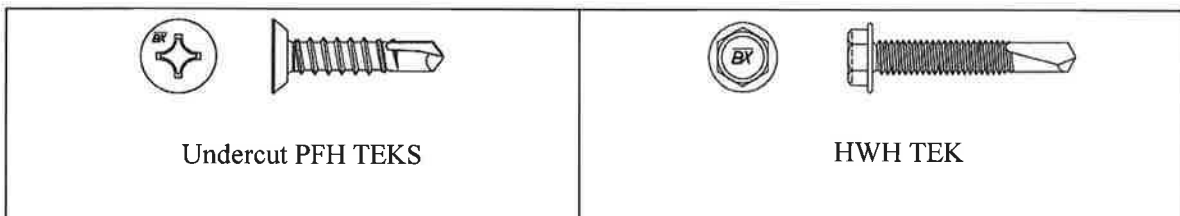


Figure 1 - ITW Buildex Tek Select™ Self-drilling Structural Fasteners.

ITW BUILDEX

RE: ITW Buildex Teks Select™ Self-drilling Structural Fasteners for Cold Formed Steel and Aluminum Connections

DICUSSION

The report is in compliance with the 2014 Los Angeles City Building Code.

The clerical modification is to update the contact address and phone number.

The approval was based on the tests in accordance with ICC-ES Acceptance Criteria for Tapping Screw fasteners (AC118), dated November 2010.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

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Attachment: 3 pages. Table of Screw Description; Tables of Allowable Pullout, Pullover and Shear Service Loads; Table of Fastener Tensile and Shear Strength; and Minimum Spacing and Edge Distance.

TABLE 1 – ITW BUILDEX TEKS SELECT™ SCREWS

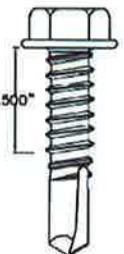
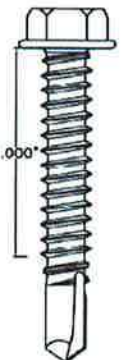
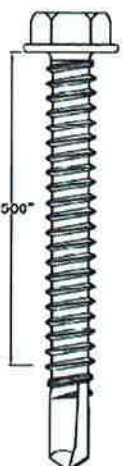
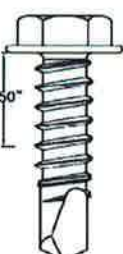
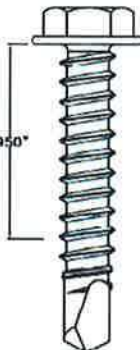
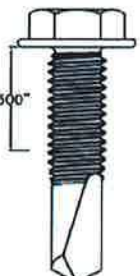
Description	10-16x3/4" HWH Tek/3	12-14x7/8" HWH Tek/3	12-14x1" HWH Tek/3	12-14x1-1/2" HWH Tek/3	12-14x2" HWH Tek/3	1/4-14 X 1" HWH Tek/3
Part No.	1076000	1112000	1080000	1114000	1117000	1119000
Drilling Capacity	0.150"	0.187"	0.187"	0.187"	0.187"	0.210"
Maximum Load Bearing Area Indicated by Arrows						
Description	1/4-14 X 1-1/2" HWH Tek/3	1/4-20x1-1/8" HWH Tek/4	1/4-20x1-1/2" HWH Tek/4	1/4-20x2" HWH Tek/4	1/4-20x2-1/2" HWH Tek/4	#12-14X1" Undercut PFH Tek/3
Part No.	1121000	1124000	1125000	1078000	1126000	1132000
Drilling Capacity	0.210"	0.210-0.312"	0.210-0.312"	0.210-0.312"	0.210-0.312"	0.187"
Maximum Load Bearing Area Indicated by Arrows						

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

Allowable Pullout Values (P/Q) on Cold Formed Steel and Aluminum; Q=3.0														
Screw Designation	Nominal Diameter (in.)	Steel Gauge/Thickness								Aluminum Thickness				
										6063-T52			6063-T6	
		18	16	14	12	1/8"	3/16"	1/4"	5/16"	1/8"	1/4"	3/8"	1/8"	1/4"
#10-16 HWH	0.190	140	182	211	388	404				250			377	
#12-14 HWH	0.216	138	186	230	481	496	809			278	680		434	864
#12-14 UPFH	0.216	140	218	252	473	507	837			274	642		418	812
1/4-14 HWH	0.250	170	224	274	431	582	971			283	732		403	997
1/4-20 HWH	0.250	157	231	282	427	571	1066	1422	1422	281	685	1118	396	949

- For tension connections, the lower of the allowable pull-out, pullover, and fastener tension strength found in Table 2, 3, and 4, respectively must be used for design.
- Nominal strengths are based on laboratory tests. Steel is compliance with AISI Manual of Cold-formed Steel Design, 2008 Edition, Part I: Dimension and Properties for Use with the 2007 North American Cold-Formed Steel Specification with minimum tensile strength 58 ksi. Aluminum is compliance with 2010 Aluminum Design Manual, Part I specification for Aluminum Structures; 6063-T52 with minimum tensile strength 22 ksi, or 6063-T6 with minimum tensile strength 30 ksi.
- 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.
- The base-metal thickness of 18 gauge steel is 0.048"; 16 gauge is 0.060"; 14 gauge is 0.075"; and 12 gauge is 0.105";

TABLE 3 – ALLOWABLE TENSILE PULL-OVER LOADS (P_{NOT}/Ω), pounds-force^{1, 2, 3, 4}

Allowable Pullover Values (P/Ω) on Cold Formed Steel and Aluminum; Ω=3.0												
Screw Designation	Nominal Diameter (in.)	Steel Gauge/Thickness						Aluminum Thickness				
								6063-T52			6063-T6	
		18	16	14	12	1/8"	3/16"	1/8"	1/4"	3/8"	1/8"	1/4"
#10-16 HWH	0.190	557	645	718	718	718		578			640	
#12-14 HWH	0.216	619	798	898	1092	1092	1092	586	827		783	885
#12-14 UPFH	0.216	489	624	716	716	716	716	561	818		750	818
1/4-14 HWH	0.250	661	958	1074	1514	1514	1514	722	1091		944	1183
1/4-20 HWH	0.250	667	916	1076	1568	1568	1568	688	1170	1190	922	1243

- For tension connections, the lower of the allowable pull-out, pullover, and fastener tension strength found in Table 2, 3, and 4, respectively must be used for design.
- Nominal strengths are based on laboratory tests. Steel is compliance with AISI Manual of Cold-formed Steel Design, 2008 Edition, Part I: Dimension and Properties for Use with the 2007 North American Cold-Formed Steel Specification with minimum tensile strength 58 ksi. Aluminum is compliance with 2010 Aluminum Design Manual, Part I specification for Aluminum Structures; 6063-T52 with minimum tensile strength 22 ksi, or 6063-T6 with minimum tensile strength 30 ksi.
- 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.
- The base-metal thickness of 18 gauge steel is 0.048"; 16 gauge is 0.060"; 14 gauge is 0.075"; and 12 gauge is 0.105";

TABLE 4 – FASTENER STRENGTH OF SCREWS, pound-force^{1, 2, 3, 4}

Fastener	Allowable Fastener Strength $\Omega=3$		Nominal Fastener Strength (Tested)	
	Tensile, P_{ts}/Ω (lb)	Shear, P_{ss}/Ω (lb)	Tensile, P_{ts} (lb)	Shear, P_{ss} (lb)
#10-16 HWH	866	536	2598	1607
#12-14 HWH	1076	697	3227	2091
#12-14 UPFH	1039	645	3118	1935
#14-14 HWH	1455	909	4365	2727
#14-20 HWH	1561	908	4683	2725

- For tension connections, the lower of the allowable pull-out, pullover, and fastener tension strength found in Table 2, 3, and 4, respectively must be used for design.
- Nominal strengths are based on laboratory tests;
- 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.
- The base-metal thickness of 18 gauge steel is 0.048"; 16 gauge is 0.060"; 14 gauge is 0.075"; and 12 gauge is 0.105";

TABLE 5 - ALLOWABLE SHEAR (BEARING) CAPACITY, pounds-force^{1, 2, 3, 4}

Allowable Shear Values (S/Ω) on Cold Formed Steel and Aluminum; Ω=3.0												
Screw Designation	Nominal Diameter (in.)	Steel Gauges/(Thickness)							Aluminum Thickness			
									6063-T52		6063-T6	
		18-18	18-14	16-16	14-14	1/8"-3/16"	12-1/4"	3/16"-1/4"	1/8"-1/8"	1/8"-1/4"	1/8"-1/8"	1/8"-1/4"
# 10-16 HWH	0.190	331	583	475					402		454	
# 12-14 HWH	0.216	372	646	520	646				456	728	566	603
# 12-14 UPFH	0.216	375	662	542	636				520	580	639	542
1/4-14 HWH	0.250	376	622	536	785	838			519	806	731	810
1/4-20 HWH	0.250	356	687	520	760	854	860	860	529	819	692	921

1. 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.
2. Nominal strengths are based on laboratory tests. Steel is compliance with AISI Manual of Cold-formed Steel Design, 2008 Edition, Part I: Dimension and Properties for Use with the 2007 North American Cold-Formed Steel Specification with minimum tensile strength 58 ksi. Aluminum is compliance with 2010 Aluminum Design Manual, Part I specification for Aluminum Structures; 6063-T52 with minimum tensile strength 22 ksi, or 6063-T6 with minimum tensile strength 30 ksi.
3. 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.
4. The base-metal thickness of 18 gauge steel is 0.048"; 16 gauge is 0.060"; 14 gauge is 0.075"; and 12 gauge is 0.105";

TABLE 6 - MINIMUM FASTENER SPACING AND EDGE DISTANCES

Screws Size	Screw Nominal Diameter (inch)	Fastened Material	Minimum Spacing (inch)	Minimum Edge Distance (inch)
No. 10	0.190	Steel	0.570	0.285
		Aluminum	0.760	0.380
No. 12	0.216	Steel	0.648	0.324
		Aluminum	0.864	0.432
1/4"	0.250	Steel	0.750	0.375
		Aluminum	1.000	0.500