

ICC-ES Evaluation Report

ESR-3223

Reissued November 2024

This report also contains:

- City of LA Supplement


Subject to renewal November 2026

- CA Supplement

- FL Supplement

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<p>DIVISION: 05 00 00—METALS</p> <p>Section: 05 05 23—Metal Fastenings</p>	<p>REPORT HOLDER:</p> <p>ITW BUILDEX</p>	<p>EVALUATION SUBJECT:</p> <p>ITW BUILDEX TEKS SELECT™ SELF-DRILLING STRUCTURAL FASTENERS</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, and 2012 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015, and 2012 [International Residential Code® \(IRC\)](#)

Property evaluated:

- Structural

2.0 USES

The ITW Buildex Tek Select™ Structural Fasteners are used in engineered steel-to-steel connections. The fasteners may be used under the IRC when an engineered design is submitted for review in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

ITW Buildex Tek Select™ Structural Fasteners are proprietary self-drilling tapping screws which have a dual heat treatment and are coated with a corrosion preventive coating identified as Climaseal ACR™. The drill point and lead threads of the screws are heat-treated to a relatively high hardness to facilitate drilling and thread forming. The balance of the fastener is treated to a lower hardness complying with the hardness limits for SAE J 429 Grade 5 screws and the hardness limits for ASTM A449-10 Type 1 screws. The threaded portion of the screw with the lower hardness is considered the load-bearing area, used to transfer loads between connected elements. [Table 1](#) provides screw descriptions (size, tpi, length), nominal diameters, head style, head diameters, point style, drilling capacities and length of load-bearing area.

3.2 Material:

The screws are formed from steel wire complying with the manufacturer's specifications. The drilling point and lead threads are heat-treated to a minimum through-hardness of 55 HRC. The remainder of the screw is heat-treated to a through-hardness of 30 to 34 HRC.

3.3 Cold-formed Steel:

Cold-formed steel material must comply with one of the ASTM specifications listed in Section A3.1 of AISI S100 (Section A2.1 of AISI S100 for the 2015 and 2012 IBC) and have the minimum specified tensile strengths shown in the tables in this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Selection of screw length must be based on the thickness of the fastened steel members plus the minimum required protrusion past the back of the supporting steel. Point selection must be based on the drilling capacity of the screw. See [Table 1](#) for minimum required protrusion lengths and drilling capacities.

When tested for corrosion resistance in accordance with ASTM B117, the screws meet 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 Engineered Design: ITW Buildex TEKS Select™ Structural Fasteners may be used in engineered connections of cold-formed steel construction. Design of the connections must comply with Section J4 of AISI S100 (Section E4 of AISI S100 for the 2015 and 2012 IBC), using the fastener strengths and connection strengths tabulated in this report. Nominal and allowable fastener tension and shear strengths for the screws are shown in [Table 4](#). Allowable connection capacities for use in Allowable Strength Design (ASD), for pull-out, pull-over, and shear (bearing), are provided in [Tables 2, 3](#) and [5](#), respectively, based upon laboratory testing. Instructions on how to determine connection design capacities for use in Load and Resistance Factor Design (LRFD) are found in the footnotes of [Tables 2, 3](#) and [5](#). The connection strength values are applicable to connections where the connected steel elements are in direct contact with one another.

For connections subject to tension, the least of the allowable pull-out capacity, pull-over capacity, and fastener tension strength found in [Tables 2, 3](#), and [4](#), respectively, must be used for design. For connections subject to shear, the lesser of the allowable fastener shear strength and the allowable shear (bearing) capacity found in [Tables 4](#) and [5](#), respectively, must be used for design. Design provisions for tapping screw connections subjected to combined shear and tension loading are outside the scope of this report. Connected members must be checked for rupture in accordance with Section J6 of AISI S100 (Section E6 of AISI S100 for the 2015 IBC, Section E5 of AISI S100-07/S2-10 for the 2012 IBC).

Under the 2021 IBC, for screws used in framing connections, in order for the screws to be considered fully effective, the minimum spacing between the fasteners must be 3 times the nominal screw diameter and the minimum edge distance must be 1.5 times the nominal screw diameter. Under the 2018, 2015 and 2012 IBC, 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 3 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 less than 3 times the nominal screw diameter, but at least 2 times the nominal screw diameter, the connection shear strength values in [Table 4](#) must be reduced by 20 percent [Refer to Section B1.5.1.3 of AISI S240 (Section D1.5 of AISI S200 for the 2015 and 2012 IBC).

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.

4.2 Installation:

Installation of ITW Buildex Teks Select™ Structural 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 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 Select™ Structural 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** The 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 connection capacities 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 connection capacities contained in this evaluation report, for the design of cold-formed steel diaphragms, is outside the scope of this report.
- 5.4 Evaluation of screws subjected to cyclic or fatigue loading is outside the scope of this report. Applicable Seismic Design Categories must be determined in accordance with the code for the entire assembly constructed with the screws.
- 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.
- 5.6 The screws are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Tapping Screw Fasteners Used in Steel-to-Steel Connections \(AC118\)](#), dated January 2018 (editorially revised December 2020).

7.0 IDENTIFICATION

- 7.1 The heads of the ITW Buildex Teks Select™ Structural Fasteners are marked with “ \overline{BX} ” as shown in [Figure 1](#). Each box of the fasteners has a label bearing the company name (ITW Buildex), product name, part number, size, lot number and the evaluation report number (ESR-3223).
- 7.2 The report holder’s contact information is the following:

ITW BUILDEX
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GLENVIEW, ILLINOIS 60025
(800) 848-5611
www.itwbuildex.com
techsupport@itwccna.com

TABLE 1—ITW BUILDEX TEKS SELECT™ STRUCTURAL FASTENERS

DESCRIPTION (nom. size-tpi x length)	NOMINAL DIAMETER (in.)	HEAD STYLE ¹	HEAD DIAMETER (in.)	DRILL POINT	DRILLING CAPACITY ² (in.)		LENGTH OF LOAD-BEARING AREA ³ (inch)	MINIMUM REQUIRED PROTRUSION ⁴ (inch)
					Min.	Max.		
#10-16x ³ / ₄ "	0.190	HWH	0.400	Tek/3	0.036	0.150	0.343	0.408
#12-14x ⁷ / ₈ "	0.216	HWH	0.415	Tek/3	0.036	0.187	0.346	0.529
#12-14x1"	0.216	HWH	0.415	Tek/3	0.036	0.187	0.456	0.544
#12-14x1"	0.216	UPFH	0.418	Tek/3	0.036	0.187	0.457	0.544
#12-14x1 ¹ / ₂ "	0.216	HWH	0.415	Tek/3	0.036	0.187	0.956	0.544
#12-14x2"	0.216	HWH	0.415	Tek/3	0.036	0.187	1.456	0.544
¹ / ₄ -14x1"	0.250	HWH	0.510	Tek/3	0.036	0.210	0.435	0.565
¹ / ₄ -14x1 ¹ / ₂ "	0.250	HWH	0.510	Tek/3	0.036	0.210	0.935	0.565
¹ / ₄ -20x1 ¹ / ₈ "	0.250	HWH	0.510	Tek/4	0.210	0.312	0.490	0.635
¹ / ₄ -20x1 ¹ / ₂ "	0.250	HWH	0.510	Tek/4	0.210	0.312	0.830	0.670
¹ / ₄ -20x2"	0.250	HWH	0.510	Tek/4	0.210	0.312	1.315	0.685
¹ / ₄ -20x2 ¹ / ₂ "	0.250	HWH	0.510	Tek/4	0.210	0.312	1.830	0.670

For SI: 1 inch = 25.4 mm.

¹Head styles: HWH = hex washer head; UPFH = undercut Phillips flat head.

²Drilling capacity refers to the minimum and maximum total allowable thicknesses of steel the fastener is designed to drill through.

³The load-bearing area is the threaded portion of the screw that is heat-treated to HRC 30-34. See Sections 3.0 and 4.2 and [Figures 1](#) and [2](#) for further clarification.

⁴The minimum required protrusion is the larger of the induction hardened zone or the length from tip to the third thread.

TABLE 2—ALLOWABLE TENSILE PULL-OUT LOADS (pounds-force)^{1,2,3,4,5}

SCREW DESIGNATION	NOMINAL DIAMETER (in.)	DESIGN THICKNESS OF STEEL SHEET NOT IN CONTACT WITH THE SCREW HEAD (inch)						
		0.048	0.060	0.075	0.105	¹ / ₈	³ / ₁₆	¹ / ₄
#10-16 HWH	0.190	139	181	211	388	404	—	—
#12-14 HWH	0.216	138	186	229	481	496	808	—
#12-14 UPFH	0.216	140	218	250	473	507	836	—
¹ / ₄ -14 HWH	0.250	169	224	273	431	582	971	—
¹ / ₄ -20 HWH	0.250	157	231	281	427	571	1065	1422

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 ksi = 6.89 MPa.

¹For tension connections, the lower of the allowable pull-out, pull-over, and fastener tension strength found in [Tables 2, 3, and 4](#), respectively, must be used for design.

²Nominal strengths are based on laboratory tests.

³Steel must comply with AISI S100 and have a minimum tensile strength of 58 ksi.

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

⁵The “—” symbol denotes pull-out not tested.

TABLE 3—ALLOWABLE TENSILE PULL-OVER LOADS (pounds-force)^{1,2,3,4,5}

SCREW DESIGNATION	NOMINAL DIAMETER (in.)	NOMINAL EFFECTIVE PULL-OVER DIAMETER (in.)	DESIGN THICKNESS OF STEEL SHEET IN CONTACT WITH SCREW HEAD (inch)				
			0.048	0.060	0.075	0.105	¹ / ₈
#10-16 HWH	0.190	0.400	557	641	714	—	—
#12-14 HWH	0.216	0.415	619	793	893	1092	—
#12-14 UPFH	0.216	0.418	489	620	712	—	—
¹ / ₄ -14 HWH	0.250	0.510	661	952	1069	1515	—
¹ / ₄ -20 HWH	0.250	0.510	667	910	1070	1568	—

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 ksi = 6.89 MPa.

¹For tension connections, the lower of the allowable pull-out, pull-over, and fastener tension strength found in [Tables 2, 3, and 4](#), respectively, must be used for design.

²Nominal strengths are based on laboratory tests.

³Steel must comply with AISI S100 and have a minimum tensile strength of 58 ksi.

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

⁵The “—” symbol denotes pull-over not tested.

TABLE 4—FASTENER STRENGTH (pounds-force)^{1,2,3,4}

SCREW DESIGNATION	NOMINAL FASTENER STRENGTH (TESTED)		ALLOWABLE FASTENER STRENGTH, $\Omega = 3$	
	Tensile, P_{ts}	Shear, P_{ss}	Tensile, P_{ts}/Ω	Shear, P_{ss}/Ω
#10-16 HWH	2598	1607	866	536
#12-14 HWH	3227	2091	1076	697
#12-14 UPFH	3118	1935	1039	645
1/4-14 HWH	4400	2727	1467	909
1/4-20 HWH	4490	2725	1497	908

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

¹For tension connections, the lower of the allowable pull-out, pull-over, and fastener tension strength found in Tables 2, 3, and 4, respectively, must be used for design.

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

³Nominal strengths are based on laboratory tests;

⁴To calculate LRFD values, multiply nominal values in the table by the LRFD resistance factor of 0.5.

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

SCREW DESIGNATION	NOMINAL DIAMETER (in.)	THICKNESS OF TOP SHEET – THICKNESS OF BOTTOM SHEET (inch-inch) ⁶						
		0.048-0.048	0.048-0.075	0.060-0.060	0.075-0.075	1/8 - 3/16	0.105 - 1/4	3/16 - 1/4
#10-16 HWH	0.190	331	583	475	–	–	–	–
#12-14 HWH	0.216	372	646	520	646	–	–	–
#12-14 UPFH	0.216	375	662	542	636	–	–	–
1/4-14 HWH	0.250	376	622	536	785	841	–	–
1/4-20 HWH	0.250	356	687	520	760	858	860	–

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 ksi = 6.89 MPa.

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

²Nominal strengths are based on laboratory tests.

³Steel must comply with AISI S100 and have a minimum tensile strength of 58 ksi.

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

⁵The “–” symbol denotes shear capacity not tested.

⁶The top sheet is in contact with the fastener head, while the bottom sheet is not.

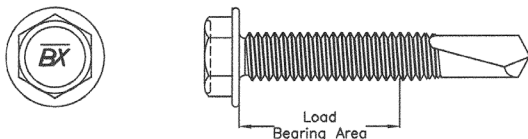


FIGURE 1—TEKS SELECT HEX WASHER HEAD (HWH) FASTENER

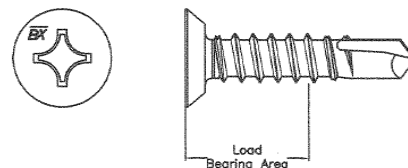


FIGURE 2—TEKS SELECT UNDERCUT PHILLIPS FLAT HEAD (UPFH) FASTENER

DIVISION: 05 00 00—METALS

Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

ITW BUILDEX

EVALUATION SUBJECT:

ITW BUILDEX TEKS SELECT™ SELF-DRILLING STRUCTURAL FASTENERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the ITW Buildex Tek Select™ Structural Fasteners, described in ICC-ES evaluation report [ESR-3223](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* ([LABC](#))
- 2020 *City of Los Angeles Residential Code* ([LARC](#))

2.0 CONCLUSIONS

The ITW Buildex Tek Select™ Structural Fasteners, described in Sections 2.0 through 7.0 of evaluation report [ESR-3223](#), comply with the LABC Chapter 22, and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The ITW Buildex Tek Select™ Structural Fasteners described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-3223](#).
- The design, installation, conditions of use and identification of the ITW Buildex Tek Select™ Structural Fasteners are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-3223](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued November 2024.

DIVISION: 05 00 00—METALS

Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

ITW BUILDEX

EVALUATION SUBJECT:

ITW BUILDEX TEKS SELECT™ SELF-DRILLING STRUCTURAL FASTENERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that ITW BUILDEX TEKS Select™ Self-Drilling Structural Fasteners, described in ICC-ES evaluation report ESR-3223, have also been evaluated for compliance with the code(s) noted below.

Applicable code edition(s):

- 2022 and 2019 *California Building Code* (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 and 2019 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The ITW BUILDEX TEKS Select™ Self-Drilling Structural Fasteners, described in Sections 2.0 through 7.0 of the evaluation report ESR-3223, comply with CBC Chapter 22, provided the design and installation are in accordance with the 2021 and 2018 *International Building Code*® (IBC) provisions, respectively, noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 22, as applicable.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The ITW BUILDEX TEKS Select™ Self-Drilling Structural Fasteners, described in Sections 2.0 through 7.0 of the evaluation report ESR-3223, comply with CRC Chapter 3, provided the design and installation are in accordance with the 2021 and 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued November 2024.

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

ITW BUILDEX

EVALUATION SUBJECT:

ITW BUILDEX TEKS SELECT™ SELF-DRILLING STRUCTURAL FASTENERS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the ITW Buildex Tek Select™ Structural Fasteners, described in ICC-ES evaluation report ESR-3223, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2020 Florida Building Code—Building
- 2020 Florida Building Code—Residential

2.0 CONCLUSIONS

The ITW Buildex Tek Select™ Structural Fasteners, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-3223, comply with the *Florida Building Code—Building* and *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-3223 for the 2018 *International Building Code*® meet the requirements of the *Florida Building Code—Building* or *Florida Building Code—Residential*, as applicable.

Use of the ITW Buildex Tek Select™ Structural Fasteners for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated and is outside the scope of this supplement report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued November 2024.