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RESEARCH REPORT: RR 25095  
(CSI #03150)

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

**GENERAL APPROVAL** – Renewal-Elco Dril-Flex and Hilti Kwik-Flex Structural Fasteners for Cold-Formed Steel and Aluminum.

## DETAILS

Elco Dril-Flex and Kwik-Flex structural fasteners used for connecting cold-formed steel or aluminum members. The steel screws have a dual heat treatment and electroplated zinc coating. The fasteners are available as self-drilling/tapping metal screws without pre-drilling holes in the receiving member of the connection and as self-tapping metal screws for installation in pre-drilled holes.

The Elco Dril-Flex and Hilti Kwik-Flex structural fasteners are identical in design and manufacture except for product name identification.

The Self-drilling/tapping metal screws are installed without pre-drilling holes in the receiving member of the connection. The self-drilling function of the fastener is achieved by the lead threads of the fastener engaging the metal accomplishing a pre-drilled clearance hole in the component being connected to the receiving member. Clearance holes shall be 13/64, 15/64, 17/64, and 21/64-inch in diameter for No. 10-gage, No. 12-gage, 1/4-inch, and 5/16-inch diameter fasteners, respectively. Fasteners must be installed with a 1,800 to 2,500 rpm screw gun incorporating a depth sensitive or torque limiting nose piece. The installed fasteners must protrude through the attached members, with the high-hardness drill point and lead threads extending beyond the attached members.

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RE: Elco Drill-Flex and Hilti Kwik-Flex Structural Fasteners for Cold-Formed Steel and Aluminum.

Self Tapping fasteners must be installed in 0.290-inch diameter pre-drilled hole in connecting and receiving members for the 5/16-inch diameter fasteners. The fasteners must be installed with a screw gun with a depth-sensitive or torque limiting nose piece. The installed fasteners shall protrude through the attached members with the high-hardness lead threads extending beyond the attached members.

**The approval is subject to the following conditions:**

1. The applied tension and shear service (allowable strength design) loads shall not exceed the allowable nominal tension and shear strengths for fasteners as tabulated in Table 1 and Table 2 as shown on the attached sheet.
2. The minimum spacing and edge distance for fasteners shall comply with Table 3 shown on the attached sheet.
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. Calculations shall consider all loading conditions acting on the connected assembly. Connections with combined shear and tension shall be checked using the interaction equation;

$$(P_t / P_{ts}) + (P_s / P_{ss}) \leq 1.0,$$

Where,  
 $P_t$  = Applied Tension Service Load  
 $P_s$  = Applied Shear Service Load  
 $P_{ts}$  = Allowable Nominal Tension Service Load  
 $P_{ss}$  = Allowable Nominal Shear Service Load

7. Steel members shall have a minimum ultimate tensile strength of 58-ksi.
6. The nominal strength values contained in this report are not approved for the design of cold-formed steel diaphragms.
8. Fasteners are to be installed in accordance with the manufacturer's published installation instructions and this report.
9. The screws are identified with a raised circle around a "flag" logo on top of the fastener head.

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## **DICUSSION**

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

The approval was based on tests in accordance with ICC-ES Acceptance Criteria for Tapping Screw Fasteners (AC118), dated June 2008.

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: 1-page: Table of Allowable Tension and Shear Service Loads and Minimum Spacing and Edge Distance.

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TABLE 1 - ALLOWABLE NOMINAL TENSION STRENGTHS, P<sub>tr</sub>, FOR DRIL-FLEX AND KWIK-FLEX FASTENERS<sup>1</sup>

SCREW SIZE	SCREW TYPE	DRILL POINT TYPE	DRILL CAP. <sup>2</sup> (inch)	TENSION (pounds)												
				COLD-FORMED STEEL, GAGE <sup>3</sup> , OR THICKNESS (inch)										ALUMINUM 6063-T52, THICKNESS (inch)		
				18 Ga	16 Ga	14 Ga	12 Ga	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	1/8"	1/4"	3/8"
10-16	Self-drill	3	0.150	132	167	211	478	420	-	-	-	-	-	255	-	-
12-14		3	0.187	132	176	237	559	687	966	-	-	-	-	313	762	-
1/4-14		3	0.210	133	177	229	650	755	1306	-	-	-	-	334	808	-
1/4-20		4	0.375	-	172	216	555	718	1308	1060	1496	-	-	299	774	1085
5/16-18		3	0.210	-	-	-	778	952	-	-	-	-	-	373	973	1599
5/16-24		4	0.250	-	-	-	711	858	1209	1980	-	-	-	348	-	-
5/16-24	Self-tap <sup>4</sup>	-	-	-	-	-	634	777	1334	1609	2219	2852	2851	186	542	-

- Nominal strengths are based on laboratory tests, calculated in accordance with American Iron and Steel Institute Standard North American Specification for the Design of Cold-Formed Steel Structural Members, 2001 Edition, with 2004 Supplement.
- The drill capacity is the maximum metal thickness the fastener can self-drill and self-tap.
- The base-metal thickness of 18 Gage steel is 0.050"; 16 Gage is 0.060"; 14 Gage is 0.076"; and 12 Gage is 0.105".
- For self-tap fasteners, use 0.290" predrilled holes through members.

TABLE 2 - ALLOWABLE NOMINAL SHEAR STRENGTHS, P<sub>sv</sub>, FOR DRIL-FLEX AND KWIK-FLEX FASTENERS<sup>1</sup>

SCREW SIZE	SCREW TYPE	DRILL POINT TYPE	DRILL CAP. <sup>2</sup> (inch)	SHEAR (pounds)									
				COLD-FORMED STEEL, GAGE <sup>3</sup> , OR THICKNESS (inch)								ALUMINUM 6063-T52, THICKNESS (inch)	
				18 Ga - 18 Ga	18 Ga - 14 Ga	16 Ga - 16 Ga	14 Ga - 14 Ga	1/8" - 3/16"	3/16" - 1/4"	1/4" - 12 Ga	1/8" - 1/8"	1/8" - 1/4"	
10-16	Self-drill	3	0.150	454	547	487	-	-	-	-	-	489	-
12-14		3	0.187	438	706	552	605	-	-	-	-	599	828
1/4-14		3	0.210	465	771	560	806	867	-	-	-	665	961
1/4-20		4	0.375	398	695	527	817	938	937	902	-	669	975
5/16-18		3	0.210	503	767	604	1085	-	-	-	-	711	1003
5/16-24		4	0.250	-	-	-	-	1829	1761	1587	-	598	956
5/16-24	Self-tap <sup>4</sup>	-	-	-	-	-	-	1819	1763	-	670	975	

- Nominal strengths are based on laboratory tests, calculated in accordance with American Iron and Steel Institute Standard North American Specification for the Design of Cold-Formed Steel Structural Members, 2001 Edition, with 2004 Supplement.
- The drill capacity is the maximum metal thickness the fastener can self-drill and self-tap.
- The base-metal thickness of 18 Gage steel is 0.050"; 16 Gage is 0.060"; 14 Gage is 0.076"; and 12 Gage is 0.105".
- For self-tap fasteners, use 0.290" predrilled holes through members.

TABLE 3 - MINIMUM FASTENER SPACING AND EDGE DISTANCES

SCREW SIZE / DIAMETER	FASTENED MATERIAL	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)
No. 10	Steel	9/16"	3/8"
	Aluminum	15/32"	3/8"
No. 12	Steel	11/16"	3/8"
	Aluminum	9/16"	7/16"
1/4"	Steel	3/4"	3/8"
	Aluminum	5/8"	1/2"
5/16"	Steel	15/16"	15/32"
	Aluminum	25/32"	5/8"

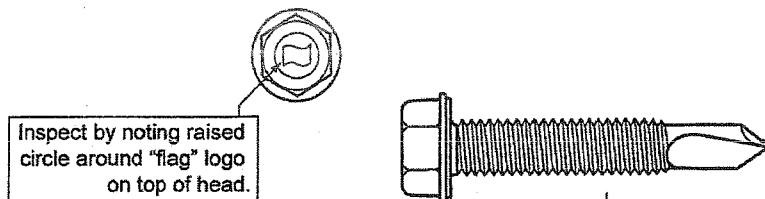


FIGURE 1 - TYPICAL LABEL