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Legacy report on the 1997 Uniform Building Code™

DIVISION: 05—METALS
Section: 05090—Metal Fastenings

DRIL-FLEX AND KWIK-FLEX SELF-DRILLING STRUCTURAL FASTENERS

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CONSTRUCTION PRODUCTS DIVISION
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HILTI, INC.
5400 SOUTH 122ND EAST AVENUE
TULSA, OKLAHOMA 74146

1.0 SUBJECT

Dril-Flex and Kwik-Flex Self-Drilling Structural Fasteners.

2.0 DESCRIPTION

2.1 General:

Dril-Flex Structural Fasteners, by Elco Construction Products, and Kwik-Flex Self-Drilling Fasteners, by Hilti, Inc., used for connections to metal members, are steel screws and are identical in design and manufacture except for the product identification. The steel screws have a dual heat treatment and coating consisting of electroplated zinc. The fasteners are available as tapping metal screws for installation in predrilled holes, and as self-drilling/tapping metal screws. The lead threads of both screw types and the drill point of the self-drilling/tapping fasteners are heat-treated to a high hardness for thread forming and drilling. The balance of the fastener shank is the load-bearing area of the fastener and is treated to a lower hardness complying with SAE J429 Grade 5.

The No. 10, 12, 1/4- and 5/16-inch-diameter (4.7, 5.3, 6.4 and 7.9 mm) fasteners have hex washer heads, and are available in various lengths.

2.2 Installation:

2.2.1 Self-tapping Fasteners: Self-tapping fasteners must be installed in predrilled holes having the appropriate diameter specified in Table 1. The fasteners must be installed with a screw gun with a depth-sensitive or torque-limiting nose piece. Installed fasteners shall protrude through the attached members, with the high-hardness lead threads beyond the attached members.

2.2.2 Self-drilling/Self-tapping Fasteners: Self-drilling/self-tapping fasteners are installed without predrilling holes in the receiving member of the connection. The drilling function of the fastener must be completed prior to the lead threads of the fastener engaging the metal. This is accomplished by predrilling a clearance hole in the component being fastened to the attached member. Clearance holes shall be 13/64, 15/64, 17/64 and 21/64 inch (5.2, 5.9, 6.7 and 8.3 mm) in diameter for No. 10 gage diameter, No. 12 gage diameter, 1/4-inch-diameter and 5/16-inch-diameter (4.7, 5.3, 6.4 and 7.9 mm) 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. Installed fasteners must protrude through the attached members, with the high-hardness drill point and lead threads extending beyond the attached members.

2.3 Allowable Loads:

Allowable loads for the fasteners are as shown in Tables 1 and 2. The allowable values are for a single shear connection consisting of two members, with the material type and thickness of each member noted in the table. Minimum fastener spacing and edge distances must comply with Table 3.

2.4 Identification:

Fastener heads are marked with the Elco Textron logo within a raised circle. Each box of fasteners has a label bearing the company name (Textron Fastening Systems or Hilti, Inc.), fastener type, evaluation report number (ER-4780) and description (including load bearing area). See Figure 1.

3.0 EVIDENCE SUBMITTED

Data in compliance with the ICC-ES Interim Criteria for Tapping Screw Fasteners (AC118), dated July 1996.

4.0 FINDINGS

That the Dril-Flex and Kwik-Flex Self-Drilling Structural Fasteners described in this report comply with the 1997 Uniform Building Code™, subject to the following conditions:

- 4.1 Fasteners are installed in accordance with the manufacturer's instructions and this report.
4.2 Allowable pullout values comply with Table 1.
4.3 Allowable shear values comply with Table 2.

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4.4 Minimum spacing, edge distance and end distances comply with Table 3.

4.5 The capacity of the connections must be investigated in accordance with accepted design criteria for fastener bearing on connecting members and for fastener pull-through.

4.6 Calculations demonstrating that the applied loads are less than the allowable values are submitted to the building official for approval.

This report is subject to re-examination in two years.

TABLE 1—ALLOWABLE PULLOUT VALUES FOR DRIL-FLEX AND KWIK-FLEX FASTENERS¹

SCREW TYPE	SCREW SIZE	DRILL POINT TYPE	DRILL CAP. ² (inch)	PULLOUT (pounds)												
				STEEL GAGE ³ OR THICKNESS (inch)										ALUM 6063-T5, THICKNESS (inch)		
				No. 18	No. 16	No. 14	No. 12	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$
Self-drill	10-16	3	0.150	158	200	254	638	677	-	-	-	-	-	306	-	-
	12-14	3	0.187	158	210	284	460	620	1159	-	-	-	-	210	914	-
	$\frac{1}{4}$ -14	3	0.187	159	212	274	480	740	1015	-	-	-	-	240	969	-
	$\frac{1}{4}$ -20	4	0.312		206	260	500	765	1045	1215	1275	-	-	230	700	1473
Self-tap	$\frac{5}{16}$ -24 ⁴	-	-	-	-	-	760	932	1729	1931	2662	3422	3421	308	802	-

For SI: 1 inch = 25.4 mm, 1 pound = 4.448 N.

¹Steel members shall conform to ASTM A 36. Aluminum members shall be 6063-T5 aluminum alloy.

²The maximum drill capacity is the maximum metal thickness the fastener can self-drill and self-tap.

³The base-metal thickness of No. 12 gage steel is 0.105 inch, of No. 14 gage steel is 0.075 inch, of No. 16 gage steel is 0.060 inch and of No. 18 gage steel is 0.048 inch.

⁴For self-tap fasteners, use 0.290-inch predrilled holes through members.

TABLE 2—ALLOWABLE SHEAR VALUES FOR DRIL-FLEX AND KWIK-FLEX FASTENERS¹

SCREW TYPE	SCREW SIZE	DRILL POINT TYPE	DRILL CAP. ² (inch)	SHEAR (pounds)									
				STEEL GAGE ³ OR THICKNESS (inch)						ALUM 6063-T5, THICKNESS (inch)			
				No. 18-18 Gage	No. 18-14 Gage	No. 16-16 Gage	No. 14-14 Gage	$\frac{1}{8}$ " - $\frac{3}{16}$ "	$\frac{3}{16}$ " - $\frac{1}{4}$ "	$\frac{1}{4}$ "-12 Gage	$\frac{1}{8}$ " - $\frac{1}{8}$ "	$\frac{1}{8}$ " - $\frac{1}{4}$ "	
Self-drill	10-16	3	.150	545	693	585						587	
	12-14	3	.187	526	847	662	727					335	475
	$\frac{1}{4}$ -14	3	.187	558	925	672	967	635				405	590
	$\frac{1}{4}$ -20	4	.312	540	835	633	980	670	715	660		395	570
	$\frac{5}{16}$ -24	4	.312					2194	2113	1904		740	1147
Self-tap	$\frac{5}{16}$ -24 ⁴	-	-					2182	2116			804	1170

For SI: 1 inch = 25.4 mm, 1 pound = 4.448 N.

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³The base-metal thickness of No. 12 gage steel is 0.105 inch, of No. 14 gage steel is 0.075 inch, of No. 16 gage steel is 0.060 inch and of No. 18 gage is 0.048 inch.

⁴For self-tap fasteners, use 0.290-inch predrilled holes through members.

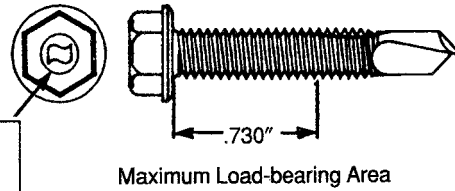
TABLE 3—MINIMUM FASTENER SPACING AND EDGE DISTANCES

FASTENER GAGE/DIAMETER	FASTENER MATERIAL	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)
No. 10	Steel	$\frac{5}{8}$	$\frac{9}{32}$
	Aluminum	$\frac{15}{32}$	$\frac{3}{8}$
No. 12	Steel	$\frac{11}{16}$	$\frac{3}{8}$
	Aluminum	$\frac{9}{16}$	$\frac{7}{16}$
$\frac{1}{4}$ inch	Steel	$\frac{3}{4}$	$\frac{3}{8}$
	Aluminum	$\frac{5}{8}$	$\frac{1}{2}$
$\frac{5}{16}$ inch	Steel	$\frac{15}{16}$	$\frac{15}{32}$
	Aluminum	$\frac{25}{32}$	$\frac{5}{8}$

For SI: 1 inch = 25.4 mm.

COMPANY NAME
(Elco Industries, Inc., or Hilti, Inc.)

$\frac{1}{4}$ -20 by $1\frac{1}{2}$ inch HWH No. 4
Drilling Capability .210 inch-.375 inch



Inspect by noting raised circle around "flag" logo on top of head.

Maximum Load-bearing Area

To insure proper performance, only the load-bearing area can be engaged in the material being fastened.

FIGURE 1—TYPICAL LABEL