Attached are page(s) from the 2014 Hilti North American Product Tech Guide. For complete details on this product, including data development, product specifications, general suitability, installation, corrosion, and spacing and edge distance guidelines, please refer to the Technical Guide, or contact Hilti.

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KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

3.3.6.1 Product description

Hilti KWIK HUS-EZ (KH-EZ) anchors are comprised of a body with hex washer head. The anchor is manufactured from carbon steel and is heat treated. It has a minimum 0.0003 inch (8 µm) zinc coating in accordance with DIN EN ISO 4042. The KWIK HUS-EZ (KH-EZ) system is available in a variety of lengths with diameters of 1/4-, 3/8-, 1/2-, 5/8- and 3/4-in. The hex head is larger than the diameter of the anchor and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the concrete on the sides of the hole and interlock with the base material during installation. Applicable base materials include normal-weight concrete, structural lightweight concrete, lightweight concrete over metal deck, and grout-filled concrete masonry.

Guide specifications

Screw anchors shall be KWIK HUS-EZ as supplied by Hilti, Inc. Anchors shall be manufactured from heat treated carbon steel material, zinc plated to a minimum thickness of 8 µm. Anchor head shall display name of manufacturer, product name, diameter and length. Anchors shall be installed using a drill bit of same nominal diameter as anchor.

Product features

- Suitable for seismic and nonseismic loads.
- Quick and easy to install.
- Length and diameter identification clearly stamped on head facilitates quality control and inspection after installation.
- Through fixture installation improves productivity and accurate installation.
- Thread design enables quality setting and exceptional load values in wide variety of base material strengths.
- Anchor is fully removable
- Anchor size is same as drill bit size and uses standard diameter drill bits.
- Suitable for reduced edge distances and spacing.

3.3.6.2 Material specifications

Hilti KWIK HUS-EZ anchors are manufactured from carbon steel. The anchors are bright zinc plated to a minimum thickness of 8 µm.

3.3.6.3 Technical data

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318 Appendix D. For a detailed explanation of the Hilti Simplified Design Method, refer to section 3.1.7. Data tables from ESR-3027 are not contained in this section, but can be found on www.icc-es.org or at www.us.hilti.com.

Listings/Approvals

ICC-ES (International Code Council)
ESR-3027
Cracked and Uncracked Concrete
ESR-3056
Grout-filled concrete masonry
City of Los Angeles
Research Report No. 25897

Independent code evaluation

IBC® / IRC® 2012
IBC® / IRC® 2009
IBC® / IRC® 2006
IBC® / IRC® 2003

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

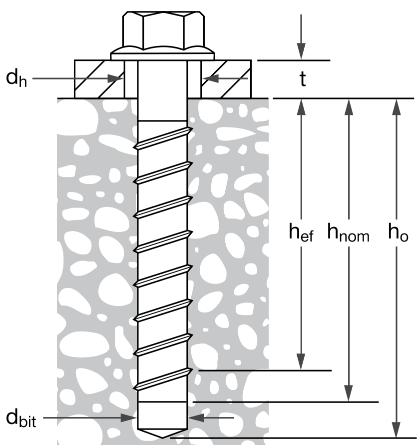
Table 1 - KWIK HUS-EZ specifications[1]

Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Nominal bit diameter	d_{bit}		1/4		3/8			1/2			5/8		3/4	
Minimum nominal embedment	h_{nom}	in.	1-5/8	2-1/2	1-5/8	2-1/2	3-1/4	2-1/4	3	4-1/4	3-1/4	5	4	6-1/4
Minimum effective embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum hole depth	h_o	in.	2	2-7/8	1-7/8	2-3/4	3-1/2	2-5/8	3-3/8	4-5/8	3-5/8	5-3/8	4-4/8	6-5/8
Fixture hole diameter	d_h	in.	3/8		1/2			5/8			3/4		7/8	
Anchor Length = h_{nom} + t	ℓ		See ordering information											
Installation torque	T_{inst}	ft-lb	18		19	40		45			85		115	
		(Nm)	(24)		(26)	(54)		(61)			(115)		(155)	
Maximum impact wrench torque rating[2]	$T_{impact,max}$	ft-lb	114	137	114	450		137	450		450		450	
		(Nm)	(154)	(185)	(154)	(608)		(185)	(608)		(608)		(608)	
Wrench size		in.	7/16		9/16			3/4			15/16		1-1/8	

1 T_{inst} is the maximum installation torque that may be applied with a torque wrench.

2 Because of variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over torquing can damage the anchor and/or reduce its holding capacity.

Figure 1 - KWIK HUS-EZ specifications



KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 2 - Hilti KWIK HUS-EZ design strength with concrete / pullout failure in uncracked concrete[1,2,3,4]

Nominal anchor diameter	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 6000 psi lb (kN)	f'_c = 2500 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 6000 psi lb (kN)
1/4	1-5/8 (41)	585 (2.6)	620 (2.8)	675 (3.0)	765 (3.4)	1,075 (4.8)	1,180 (5.2)	1,360 (6.0)	1,670 (7.4)
	2-1/2 (64)	1,525 (6.8)	1,670 (7.4)	1,930 (8.6)	2,365 (10.5)	2,235 (9.9)	2,450 (10.9)	2,825 (12.6)	3,460 (15.4)
3/8	1-5/8 (41)	910 (4.0)	1,000 (4.4)	1,155 (5.1)	1,415 (6.3)	980 (4.4)	1,075 (4.8)	1,245 (5.5)	1,520 (6.8)
	2-1/2 (64)	1,980 (8.8)	2,165 (9.6)	2,505 (11.1)	3,065 (13.6)	2,130 (9.5)	2,335 (10.4)	2,695 (12.0)	3,300 (14.7)
	3-1/4 (83)	3,085 (13.7)	3,375 (15.0)	3,900 (17.3)	4,775 (21.2)	6,640 (29.5)	7,275 (32.4)	8,400 (37.4)	10,290 (45.8)
1/2	2-1/4 (57)	1,645 (7.3)	1,800 (8.0)	2,080 (9.3)	2,550 (11.3)	1,770 (7.9)	1,940 (8.6)	2,240 (10.0)	2,745 (12.2)
	3 (76)	2,785 (12.4)	3,050 (13.6)	3,525 (15.7)	4,315 (19.2)	3,000 (13.3)	3,285 (14.6)	3,795 (16.9)	4,645 (20.7)
	4-1/4 (108)	5,070 (22.6)	5,555 (24.7)	6,415 (28.5)	7,855 (34.9)	10,920 (48.6)	11,965 (53.2)	13,815 (61.5)	16,920 (75.3)
5/8	3-1/4 (83)	3,240 (14.4)	3,550 (15.8)	4,100 (18.2)	5,025 (22.4)	3,490 (15.5)	3,825 (17.0)	4,415 (19.6)	5,410 (24.1)
	5 (127)	6,705 (29.8)	7,345 (32.7)	8,485 (37.7)	10,390 (46.2)	14,445 (64.3)	15,825 (70.4)	18,270 (81.3)	22,380 (99.6)
3/4	4 (102)	4,380 (19.5)	4,795 (21.3)	5,540 (24.6)	6,785 (30.2)	9,430 (41.9)	10,330 (45.9)	11,930 (53.1)	14,610 (65.0)
	6-1/4 (159)	9,345 (41.6)	10,235 (45.5)	11,820 (52.6)	14,475 (64.4)	20,125 (89.5)	22,045 (98.1)	25,455 (113.2)	31,175 (138.7)

Table 3 - Hilti KWIK HUS-EZ design strength with concrete / pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter	Nominal embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 6000 psi lb (kN)	f'_c = 2500 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 6000 psi lb (kN)
1/4	1-5/8 (41)	300 (1.3)	315 (1.4)	345 (1.5)	390 (1.7)	765 (3.4)	835 (3.7)	965 (4.3)	1,180 (5.2)
	2-1/2 (64)	760 (3.4)	830 (3.7)	960 (4.3)	1,175 (5.2)	1,585 (7.1)	1,735 (7.7)	2,000 (8.9)	2,450 (10.9)
3/8	1-5/8 (41)	475 (2.1)	520 (2.3)	600 (2.7)	730 (3.2)	695 (3.1)	760 (3.4)	880 (3.9)	1,080 (4.8)
	2-1/2 (64)	1,400 (6.2)	1,535 (6.8)	1,775 (7.9)	2,170 (9.7)	1,510 (6.7)	1,655 (7.4)	1,910 (8.5)	2,340 (10.4)
	3-1/4 (83)	2,185 (9.7)	2,390 (10.6)	2,765 (12.3)	3,385 (15.1)	4,705 (20.9)	5,155 (22.9)	5,950 (26.5)	7,285 (32.4)
1/2	2-1/4 (57)	1,035 (4.6)	1,135 (5.0)	1,310 (5.8)	1,605 (7.1)	1,115 (5.0)	1,220 (5.4)	1,410 (6.3)	1,725 (7.7)
	3 (76)	1,755 (7.8)	1,920 (8.5)	2,220 (9.9)	2,715 (12.1)	1,890 (8.4)	2,070 (9.2)	2,390 (10.6)	2,925 (13.0)
	4-1/4 (108)	3,190 (14.2)	3,495 (15.5)	4,040 (18.0)	4,945 (22.0)	6,875 (30.6)	7,530 (33.5)	8,695 (38.7)	10,650 (47.4)
5/8	3-1/4 (83)	2,040 (9.1)	2,235 (9.9)	2,580 (11.5)	3,165 (14.1)	2,200 (9.8)	2,410 (10.7)	2,780 (12.4)	3,405 (15.1)
	5 (127)	4,225 (18.8)	4,625 (20.6)	5,340 (23.8)	6,540 (29.1)	9,095 (40.5)	9,965 (44.3)	11,505 (51.2)	14,090 (62.7)
3/4	4 (102)	2,755 (12.3)	3,020 (13.4)	3,485 (15.5)	4,270 (19.0)	5,940 (26.4)	6,505 (28.9)	7,510 (33.4)	9,200 (40.9)
	6-1/4 (159)	5,885 (26.2)	6,445 (28.7)	7,440 (33.1)	9,115 (40.5)	12,670 (56.4)	13,880 (61.7)	16,030 (71.3)	19,630 (87.3)

1 See section 3.1.7.3 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Apply spacing, edge distance, and concrete thickness factors in table 6 to 15 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design
4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60
5 Tabular values are for static loads only. For seismic loads, multiply cracked concrete tabular values by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - α_{seis} = 0.60
All other sizes - α_{seis} = 0.75
See section 3.1.7.4 for additional information on seismic applications.

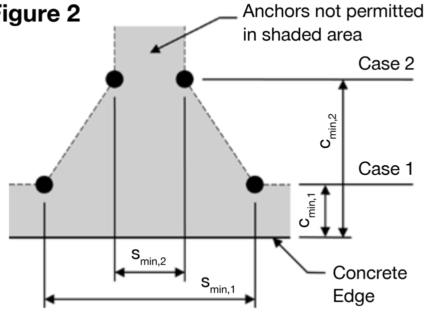
3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 4 - Steel design strength for Hilti KWIK HUS-EZ anchors[1,2]

Nominal anchor diameter	Nominal embedment in. (mm)			Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic shear[5] ϕV_{sa} lb (kN)
1/4	1-5/8 (41)		2-1/2 (64)	3,945 (17.5)	930 (4.1)	835 (3.7)
3/8	1-5/8 (41)			5,980 (26.6)	2,200 (9.8)	2,200 (9.8)
3/8	2-1/2 (64)		3-1/4 (83)	6,720 (29.9)	3,110 (13.8)	1,865 (8.3)
1/2	2-1/4 (57)	3 (76)	4-1/4 (108)	11,780 (52.4)	5,545 (24.7)	3,330 (14.8)
5/8	3-1/4 (83)		5 (127)	15,735 (70.0)	6,735 (30.0)	4,040 (18.0)
3/4	4 (102)		6-1/4 (159)	20,810 (92.6)	9,995 (44.5)	6,935 (30.8)

1 See section 3.1.7.3 to convert design strength value to ASD value.
2 KWIK HUS-EZ anchors are to be considered brittle steel elements.
3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318 Appendix D.
4 Shear values determined by static shear tests with $\phi V_{sa} < \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318 Appendix D.
5 Seismic shear values determined by seismic shear tests with $\phi V_{sa} \leq \phi\, 0.60 A_{se,V} f_{uta}$ as noted in ACI 318 Appendix D. See section 3.1.7.4 for additional information on seismic applications.

Figure 2



For a specific edge distance, the permitted spacing is calculated as follows:

$$s \geq s_{min,2} + \frac{(s_{min,1} - s_{min,2})}{(c_{min,1} - c_{min,2})}\,(c - c_{min,2})$$

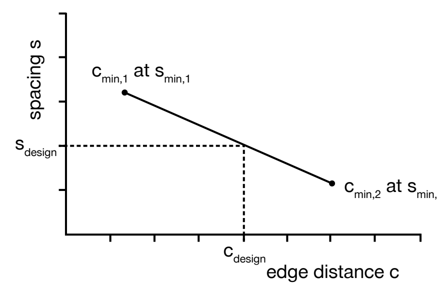


Table 5 - KWIK HUS-EZ installation parameters

Setting information	Symbol	Units	Nominal anchor diameter											
			1/4		3/8			1/2			5/8		3/4	
Effective minimum embedment	h_{ef}	in.	1.18	1.92	1.11	1.86	2.50	1.50	2.16	3.22	2.39	3.88	2.92	4.84
Minimum member thickness	h_{min}	in.	3-1/4	4.125	3-1/4	4	4-7/8	4-1/2	4 3/4	6-3/4	5	7	6	8-1/8
Case 1	$c_{min,1}$	in.	2	2.78	2.63	2.92	3.75	2.75	3.75	5.25	3.63	5.81	4.41	7.28
Case 1	for $s_{min,1} \geq$	in.	1.50		2.25			3						
Case 2	$c_{min,2}$	in.	1.50					1.75						
Case 2	for $s_{min,2} \geq$	in.	3								4			

1 Linear interpolation is permitted to establish an edge distance and spacing combination between Case 1 and Case 2. Linear interpolation for a specific edge .distance c, where $c_{min,1} < c < c_{min,2}$ will determine the permissible spacings.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 6 - Load adjustment factors for 1/4-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

1/4-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2 (38)	0.71	0.63	0.78	0.65	0.59	0.56	0.40	0.21	0.78	0.42	n/a	n/a
	2 (51)	0.78	0.67	1.00	0.77	0.62	0.58	0.61	0.33	1.00	0.65	n/a	n/a
	2-1/2 (64)	0.85	0.72		0.90	0.65	0.60	0.86	0.46		0.90	n/a	n/a
	3 (76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
	3-1/4 (83)	0.96	0.78			0.70	0.63		0.68			0.88	n/a
	3-1/2 (89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
	4 (102)	1.00	0.85			0.74	0.66		0.92			0.98	n/a
	4-1/8 (105)		0.86			0.75	0.66		0.97			1.00	0.81
	4-1/2 (114)		0.89			0.77	0.68		1.00				0.84
	5 (127)		0.93			0.80	0.70						0.89
	5-1/2 (140)		0.98			0.83	0.72						0.93
	6 (152)		1.00			0.86	0.74						0.97
	7 (178)					0.92	0.78						1.00
	8 (203)					0.98	0.82						
	9 (229)					1.00	0.86						
	10 (254)						0.89						
	11 (279)						0.93						
	12 (305)						0.97						
	14 (356)						1.00						

Table 7 - Load adjustment factors for 1/4-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

1/4-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-1/2 (38)	0.71	0.63	0.88	0.65	0.59	0.56	0.40	0.21	0.80	0.43	n/a	n/a
	2 (51)	0.78	0.67	1.00	0.77	0.62	0.58	0.62	0.33	1.00	0.66	n/a	n/a
	2-1/2 (64)	0.85	0.72		0.90	0.65	0.60	0.87	0.46		0.90	n/a	n/a
	3 (76)	0.92	0.76		1.00	0.68	0.62	1.00	0.60		1.00	n/a	n/a
	3-1/4 (83)	0.96	0.78			0.70	0.63		0.68			0.89	n/a
	3-1/2 (89)	0.99	0.80			0.71	0.64		0.76			0.92	n/a
	4 (102)	1.00	0.85			0.74	0.66		0.93			0.98	n/a
	4-1/8 (105)		0.86			0.75	0.66		0.97			1.00	0.81
	4-1/2 (114)		0.89			0.77	0.68		1.00				0.85
	5 (127)		0.93			0.80	0.70						0.89
	5-1/2 (140)		0.98			0.83	0.72						0.93
	6 (152)		1.00			0.86	0.74						0.98
	7 (178)					0.92	0.78						1.00
	8 (203)					0.98	0.82						
	9 (229)					1.00	0.86						
	10 (254)						0.90						
	11 (279)						0.94						
	12 (305)						0.98						
	14 (356)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

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Table 8 - Load adjustment factors for 3/8-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

3/8-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4
	(mm)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)																			
1-1/2	(38)	n/a	n/a	n/a	0.58	0.63	0.57	n/a	n/a	n/a	0.49	0.25	0.08	0.58	0.50	0.17	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	0.76	0.75	0.66	n/a	n/a	n/a	0.75	0.38	0.13	0.76	0.75	0.26	n/a	n/a	n/a
2-1/4	(57)	0.84	0.70	0.65	0.86	0.81	0.70	0.65	0.60	0.55	0.90	0.46	0.16	0.90	0.81	0.31	n/a	n/a	n/a
2-1/2	(64)	0.88	0.72	0.67	0.95	0.88	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.88	0.37	n/a	n/a	n/a
3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
3-1/4	(83)	0.99	0.79	0.72			0.90	0.72	0.64	0.57		0.80	0.27			0.54	0.95	n/a	n/a
3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.89	0.30			0.61	0.98	n/a	n/a
4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.74	1.00	0.84	n/a
4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.88		0.89	n/a
4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.96		0.91	0.64
5	(127)		0.95	0.83				0.84	0.72	0.61			0.52			1.00		0.94	0.66
6	(152)		1.00	0.90				0.91	0.76	0.63			0.68					1.00	0.72
7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
9	(229)								0.90	0.69									0.88
10	(254)								0.94	0.71									0.93
11	(279)								0.98	0.74									0.97
12	(305)								1.00	0.76									1.00
14	(356)									0.80									
16	(406)									0.84									
18	(457)									0.89									
20	(508)									0.93									
24	(610)									1.00									

Table 9 - Load adjustment factors for 3/8-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

3/8-in. KH-EZ Cracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4	1-5/8	2-1/2	3-1/4
	(mm)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)	(41)	(64)	(83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)																			
1-1/2	(38)	n/a	n/a	n/a	0.92	0.66	0.57	n/a	n/a	n/a	0.49	0.25	0.09	0.92	0.50	0.17	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	1.00	0.79	0.66	n/a	n/a	n/a	0.76	0.39	0.13	1.00	0.77	0.26	n/a	n/a	n/a
2-1/4	(57)	0.84	0.70	0.65	1.00	0.85	0.70	0.66	0.60	0.55	0.90	0.46	0.16	1.00	0.85	0.31	n/a	n/a	n/a
2-1/2	(64)	0.88	0.72	0.67	1.00	0.92	0.75	0.67	0.61	0.55	1.00	0.54	0.18	1.00	0.92	0.37	n/a	n/a	n/a
3	(76)	0.95	0.77	0.70	1.00	1.00	0.85	0.71	0.63	0.56	1.00	0.71	0.24	1.00	1.00	0.48	n/a	n/a	n/a
3-1/4	(83)	0.99	0.79	0.72			0.90	0.73	0.64	0.57		0.80	0.27			0.55	0.95	n/a	n/a
3-1/2	(89)	1.00	0.81	0.73			0.95	0.74	0.65	0.58		0.90	0.31			0.61	0.98	n/a	n/a
4	(102)		0.86	0.77			1.00	0.78	0.68	0.59		1.00	0.37			0.75	1.00	0.84	n/a
4-1/2	(114)		0.90	0.80				0.81	0.70	0.60			0.44			0.89		0.89	n/a
4-3/4	(121)		0.93	0.82				0.83	0.71	0.60			0.48			0.97		0.92	0.64
5	(127)		0.95	0.83				0.85	0.72	0.61			0.52			1.00		0.94	0.66
6	(152)		1.00	0.90				0.92	0.77	0.63			0.69					1.00	0.72
7	(178)			0.97				0.98	0.81	0.65			0.86						0.78
8	(203)			1.00				1.00	0.85	0.67			1.00						0.83
9	(229)								0.90	0.69									0.88
10	(254)								0.94	0.72									0.93
11	(279)								0.99	0.74									0.97
12	(305)								1.00	0.76									1.00
14	(356)									0.80									
16	(406)									0.85									
18	(457)									0.89									
20	(508)									0.93									
24	(610)									1.00									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

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Table 10 - Load adjustment factors for 1/2-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

1/2-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4
	(mm)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm) 1-3/4	(44)	n/a	n/a	n/a	0.68	0.57	0.51	n/a	n/a	n/a	0.40	0.25	0.07	0.68	0.50	0.15	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	0.75	0.62	0.54	n/a	n/a	n/a	0.48	0.31	0.09	0.75	0.61	0.18	n/a	n/a	n/a
2-1/2	(64)	n/a	n/a	n/a	0.91	0.71	0.60	n/a	n/a	n/a	0.68	0.43	0.13	0.91	0.71	0.25	n/a	n/a	n/a
3	(76)	0.83	0.73	0.66	1.00	0.81	0.66	0.65	0.61	0.55	0.89	0.56	0.17	1.00	0.81	0.33	n/a	n/a	n/a
3-1/2	(89)	0.88	0.77	0.68		0.93	0.73	0.68	0.63	0.56	1.00	0.71	0.21		0.93	0.42	n/a	n/a	n/a
4	(102)	0.94	0.81	0.71		1.00	0.80	0.71	0.65	0.57		0.87	0.26		1.00	0.52	n/a	n/a	n/a
4-1/2	(114)	0.99	0.85	0.73			0.87	0.73	0.67	0.58		1.00	0.31			0.62	0.96	n/a	n/a
4-3/4	(121)	1.00	0.87	0.75			0.91	0.74	0.68	0.58			0.33			0.67	0.99	0.85	n/a
5	(127)		0.89	0.76			0.95	0.76	0.69	0.58			0.36			0.72	1.00	0.87	n/a
6	(152)		0.96	0.81			1.00	0.81	0.73	0.60			0.47			0.95		0.95	n/a
6-3/4	(171)		1.00	0.85				0.85	0.76	0.61			0.57			1.00		1.00	0.68
7	(178)			0.86				0.86	0.77	0.62			0.60						0.69
8	(203)			0.91				0.91	0.80	0.64			0.73						0.73
9	(229)			0.97				0.96	0.84	0.65			0.87						0.78
10	(254)			1.00				1.00	0.88	0.67			1.00						0.82
11	(279)								0.92	0.69									0.86
12	(305)								0.95	0.70									0.90
14	(356)								1.00	0.74									0.97
16	(406)									0.77									1.00
18	(457)									0.80									
20	(508)									0.84									
> 24	(610)									0.91									

3.3.6

Table 11 - Load adjustment factors for 1/2-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

1/2-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}			Edge distance factor in tension f_{RN}			Spacing factor in shear[3] f_{AV}			Edge distance in shear ⊥ toward edge f_{RV}			Edge distance in shear II to edge f_{RV}			Conc. thickness factor in shear[4] f_{HV}		
Embedment h_{nom}	in.	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4	2-1/4	3	4-1/4
	(mm)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)	(57)	(76)	(108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm) 1-3/4	(44)	n/a	n/a	n/a	0.82	0.66	0.55	n/a	n/a	n/a	0.45	0.28	0.08	0.82	0.57	0.17	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	0.90	0.72	0.58	n/a	n/a	n/a	0.55	0.35	0.10	0.90	0.70	0.21	n/a	n/a	n/a
2-1/2	(64)	n/a	n/a	n/a	1.00	0.83	0.65	n/a	n/a	n/a	0.77	0.49	0.14	1.00	0.83	0.29	n/a	n/a	n/a
3	(76)	0.83	0.73	0.66	1.00	0.94	0.72	0.67	0.62	0.56	1.00	0.64	0.19	1.00	0.94	0.38	n/a	n/a	n/a
3-1/2	(89)	0.88	0.77	0.68		1.00	0.79	0.70	0.64	0.56		0.80	0.24		1.00	0.48	n/a	n/a	n/a
4	(102)	0.94	0.81	0.71		1.00	0.87	0.72	0.66	0.57		0.98	0.29		1.00	0.59	n/a	n/a	n/a
4-1/2	(114)	0.99	0.85	0.73			0.95	0.75	0.69	0.58		1.00	0.35			0.70	1.00	n/a	n/a
4-3/4	(121)	1.00	0.87	0.75			0.99	0.77	0.70	0.59			0.38			0.76		0.88	n/a
5	(127)		0.89	0.76			1.00	0.78	0.71	0.59			0.41			0.82		0.91	n/a
6	(152)		0.96	0.81			1.00	0.84	0.75	0.61			0.54			1.00		0.99	n/a
6-3/4	(171)		1.00	0.85				0.88	0.78	0.62			0.64					1.00	0.70
7	(178)			0.86				0.89	0.79	0.63			0.68						0.72
8	(203)			0.91				0.95	0.83	0.65			0.83						0.77
9	(229)			0.97				1.00	0.87	0.67			0.99						0.81
10	(254)			1.00					0.91	0.68			1.00						0.86
11	(279)								0.95	0.70									0.90
12	(305)								0.99	0.72									0.94
14	(356)								1.00	0.76									1.00
16	(406)									0.79									
18	(457)									0.83									
20	(508)									0.87									
> 24	(610)									0.94									

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 12 - Load adjustment factors for 5/8-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

5/8-in. KH-EZ uncracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)		3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.62	0.51	n/a	n/a	0.24	0.06	0.47	0.13	n/a	n/a
	2	(51)	n/a	n/a	0.67	0.54	n/a	n/a	0.29	0.08	0.57	0.15	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.76	0.59	n/a	n/a	0.40	0.11	0.76	0.21	n/a	n/a
	3	(76)	0.71	0.63	0.86	0.65	0.61	0.55	0.53	0.14	0.86	0.28	n/a	n/a
	3-1/2	(89)	0.74	0.65	0.97	0.70	0.63	0.55	0.66	0.18	0.97	0.35	n/a	n/a
	4	(102)	0.78	0.67	1.00	0.76	0.65	0.56	0.81	0.22	1.00	0.43	n/a	n/a
	4-1/2	(114)	0.81	0.69		0.83	0.66	0.57	0.97	0.26		0.52	n/a	n/a
	5	(127)	0.85	0.71		0.89	0.68	0.58	1.00	0.30		0.60	0.85	n/a
	5-1/2	(140)	0.88	0.74		0.96	0.70	0.58		0.35		0.70	0.89	n/a
	6	(152)	0.92	0.76		1.00	0.72	0.59		0.40		0.80	0.93	n/a
	7	(178)	0.99	0.80			0.75	0.61		0.50		1.00	1.00	0.65
	8	(203)	1.00	0.84			0.79	0.62		0.61				0.69
	9	(229)		0.89			0.83	0.64		0.73				0.74
	10	(254)		0.93			0.86	0.65		0.86				0.78
	11	(279)		0.97			0.90	0.67		0.99				0.81
	12	(305)		1.00			0.94	0.68		1.00				0.85
	14	(356)					1.00	0.71						0.92
	16	(406)						0.74						0.98
	18	(457)						0.77						1.00
	20	(508)						0.80						
	24	(610)						0.86						
	> 30	(762)						0.95						

Table 13 - Load adjustment factors for 5/8-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

5/8-in. KH-EZ cracked concrete			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom}	in. (mm)		3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)	3-1/4 (83)	5 (127)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.63	0.51	n/a	n/a	0.27	0.07	0.53	0.14	n/a	n/a
	2	(51)	n/a	n/a	0.68	0.54	n/a	n/a	0.33	0.09	0.65	0.17	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.77	0.59	n/a	n/a	0.46	0.12	0.77	0.24	n/a	n/a
	3	(76)	0.71	0.63	0.87	0.65	0.62	0.55	0.60	0.16	0.87	0.32	n/a	n/a
	3-1/2	(89)	0.74	0.65	0.98	0.70	0.64	0.56	0.75	0.20	0.98	0.40	n/a	n/a
	4	(102)	0.78	0.67	1.00	0.76	0.66	0.57	0.92	0.25	1.00	0.49	n/a	n/a
	4-1/2	(114)	0.81	0.69		0.83	0.68	0.57	1.00	0.29		0.59	n/a	n/a
	5	(127)	0.85	0.71		0.89	0.70	0.58		0.34		0.69	0.89	n/a
	5-1/2	(140)	0.88	0.74		0.96	0.72	0.59		0.40		0.79	0.93	n/a
	6	(152)	0.92	0.76		1.00	0.74	0.60		0.45		0.90	0.97	n/a
	7	(178)	0.99	0.80			0.78	0.61		0.57		1.00	1.00	0.68
	8	(203)	1.00	0.84			0.82	0.63		0.69				0.72
	9	(229)		0.89			0.86	0.65		0.83				0.77
	10	(254)		0.93			0.89	0.66		0.97				0.81
	11	(279)		0.97			0.93	0.68		1.00				0.85
	12	(305)		1.00			0.97	0.70						0.89
	14	(356)					1.00	0.73						0.96
	16	(406)						0.76						1.00
	18	(457)						0.79						
	20	(508)						0.83						
	24	(610)						0.89						
	> 30	(762)						0.99						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

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Table 14 - Load adjustment factors for 3/4-in. diameter KWIK HUS-EZ in uncracked concrete[1,2]

3/4-in. KH-EZ uncracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom} in.	(mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)													
1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.10	0.05	0.19	0.10	n/a	n/a
2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.12	0.06	0.23	0.12	n/a	n/a
2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.16	0.08	0.33	0.17	n/a	n/a
3	(76)	0.67	0.60	0.76	0.58	0.56	0.54	0.21	0.11	0.43	0.22	n/a	n/a
3-1/2	(89)	0.70	0.62	0.84	0.62	0.57	0.55	0.27	0.14	0.54	0.28	n/a	n/a
4	(102)	0.73	0.64	0.93	0.67	0.58	0.55	0.33	0.17	0.66	0.34	n/a	n/a
4-1/2	(114)	0.76	0.65	1.00	0.72	0.59	0.56	0.39	0.20	0.79	0.41	n/a	n/a
5	(127)	0.79	0.67		0.76	0.60	0.56	0.46	0.24	0.92	0.48	n/a	n/a
5-1/2	(140)	0.81	0.69		0.81	0.61	0.57	0.53	0.28	1.00	0.55	n/a	n/a
6	(152)	0.84	0.71		0.86	0.62	0.58	0.61	0.31		0.63	0.69	n/a
7	(178)	0.90	0.74		0.97	0.64	0.59	0.77	0.40		0.79	0.75	n/a
8	(203)	0.96	0.78		1.00	0.66	0.60	0.94	0.48		0.97	0.80	n/a
8-1/8	(206)	0.96	0.78			0.66	0.60	0.96	0.50		0.99	0.80	0.65
9	(229)	1.00	0.81			0.68	0.62	1.00	0.58		1.00	0.85	0.68
10	(254)		0.84			0.70	0.63		0.68			0.89	0.72
11	(279)		0.88			0.72	0.64		0.78			0.94	0.75
12	(305)		0.91			0.74	0.65		0.89			0.98	0.79
14	(356)		0.98			0.78	0.68		1.00			1.00	0.85
16	(406)		1.00			0.82	0.71						0.91
18	(457)					0.86	0.73						0.96
20	(508)					0.90	0.76						1.00
24	(610)					0.98	0.81						
30	(762)					1.00	0.89						
> 36	(914)						0.96						

Table 15 - Load adjustment factors for 3/4-in. diameter KWIK HUS-EZ in cracked concrete[1,2]

3/4-in. KH-EZ cracked concrete		Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Embedment h_{nom} in.	(mm)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)	4 (102)	6-1/4 (159)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)													
1-3/4	(44)	n/a	n/a	0.57	0.48	n/a	n/a	0.11	0.06	0.22	0.11	n/a	n/a
2	(51)	n/a	n/a	0.61	0.50	n/a	n/a	0.13	0.07	0.27	0.14	n/a	n/a
2-1/2	(64)	n/a	n/a	0.68	0.54	n/a	n/a	0.19	0.10	0.37	0.19	n/a	n/a
3	(76)	0.67	0.60	0.76	0.58	0.57	0.54	0.24	0.13	0.49	0.25	n/a	n/a
3-1/2	(89)	0.70	0.62	0.85	0.63	0.58	0.55	0.31	0.16	0.61	0.32	n/a	n/a
4	(102)	0.73	0.64	0.93	0.67	0.59	0.56	0.38	0.19	0.75	0.39	n/a	n/a
4-1/2	(114)	0.76	0.65	1.00	0.72	0.60	0.56	0.45	0.23	0.90	0.46	n/a	n/a
5	(127)	0.79	0.67		0.77	0.61	0.57	0.52	0.27	1.00	0.54	n/a	n/a
5-1/2	(140)	0.81	0.69		0.81	0.62	0.58	0.60	0.31		0.63	n/a	n/a
6	(152)	0.84	0.71		0.87	0.63	0.58	0.69	0.36		0.71	0.72	n/a
7	(178)	0.90	0.74		0.97	0.65	0.60	0.87	0.45		0.90	0.78	n/a
8	(203)	0.96	0.78		1.00	0.67	0.61	1.00	0.55		1.00	0.83	n/a
8-1/8	(206)	0.96	0.78			0.68	0.61		0.56			0.84	0.67
9	(229)	1.00	0.81			0.70	0.63		0.66			0.88	0.71
10	(254)		0.84			0.72	0.64		0.77			0.93	0.75
11	(279)		0.88			0.74	0.65		0.89			0.98	0.78
12	(305)		0.91			0.76	0.67		1.00			1.00	0.82
14	(356)		0.98			0.80	0.70						0.89
16	(406)		1.00			0.85	0.72						0.95
18	(457)					0.89	0.75						1.00
20	(508)					0.93	0.78						
24	(610)					1.00	0.84						
30	(762)						0.92						
> 36	(914)						1.00						

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

If a reduction factor value is in a shaded cell, this indicates that this specific edge distance may not be permitted with a certain spacing (or vice versa). Check with table 5 and figure 2 of this section to calculate permissable edge distance, spacing and concrete thickness combinations.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 16 - Hilti KWIK HUS-EZ in the soffit of uncracked lightweight concrete over metal deck[1,2,3,4,5,6]

Nominal anchor diameter	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)
1/4	1-5/8 (41)	545 (2.4)	595 (2.6)	725 (3.2)	725 (3.2)	670 (3.0)	730 (3.2)	725 (3.2)	725 (3.2)
	2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	1,325 (5.9)	1,325 (5.9)	1,275 (5.7)	1,470 (6.5)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	845 (3.8)	975 (4.3)	905 (4.0)	905 (4.0)	970 (4.3)	1,120 (5.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,455 (6.5)	1,680 (7.5)	905 (4.0)	905 (4.0)	1,900 (8.5)	2,195 (9.8)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	2,550 (11.3)	2,945 (13.1)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	850 (3.8)	980 (4.4)	965 (4.3)	965 (4.3)	905 (4.0)	1,045 (4.6)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,990 (8.9)	2,300 (10.2)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,485 (15.5)	4,025 (17.9)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,715 (12.1)	3,135 (13.9)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	6,170 (27.4)	7,125 (31.7)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,715 (12.1)	3,135 (13.9)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

Table 17 - Hilti KWIK HUS-EZ in the soffit of cracked lightweight concrete over metal deck[1,2,3,4,5,6]

Nominal anchor diameter	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n[7]		Shear - ϕV_n[7,8]		Tension - ϕN_n[7]		Shear - ϕV_n[7,8]	
		f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)	f'_c = 3000 psi lb (kN)	f'_c = 4000 psi lb (kN)
1/4	1-5/8 (41)	280 (1.2)	305 (1.4)	725 (3.2)	725 (3.2)	340 (1.5)	370 (1.6)	725 (3.2)	725 (3.2)
	2-1/2 (64)	605 (2.7)	700 (3.1)	1,325 (5.9)	1,325 (5.9)	635 (2.8)	735 (3.3)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	525 (2.3)	605 (2.7)	905 (4.0)	905 (4.0)	770 (3.4)	890 (4.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,035 (4.6)	1,195 (5.3)	905 (4.0)	905 (4.0)	1,345 (6.0)	1,555 (6.9)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	1,805 (8.0)	2,085 (9.3)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	535 (2.4)	620 (2.8)	965 (4.3)	965 (4.3)	640 (2.8)	740 (3.3)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,255 (5.6)	1,450 (6.4)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	2,195 (9.8)	2,535 (11.3)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	1,710 (7.6)	1,975 (8.8)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	3,885 (17.3)	4,485 (20.0)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,710 (7.6)	1,975 (8.8)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

1 See section 3.1.7.3 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 3 x h_{nom} (nominal embedment).
4 Tabular values are lightweight concrete and no additional reduction factor is needed.
5 No additional reduction factors for spacing or edge distance need to be applied.
6 Comparison to steel values in table 4 is not required. Values in tables 16 and 17 control.
7 Tabular values are for static loads only. For seismic loads, multiply cracked concrete tabular values by α_{seis} = 0.75. See section 3.1.7.4 for additional information on seismic applications.
8 For the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:
1/4-inch diameter - $\alpha_{v,seis}$ = 0.75
3/8-inch diameter - $\alpha_{v,seis}$ = 0.60
1/2-inch diameter - $\alpha_{v,seis}$ = 0.60
5/8-inch diameter - $\alpha_{v,seis}$ = 0.60
3/4-inch diameter - $\alpha_{v,seis}$ = 0.70

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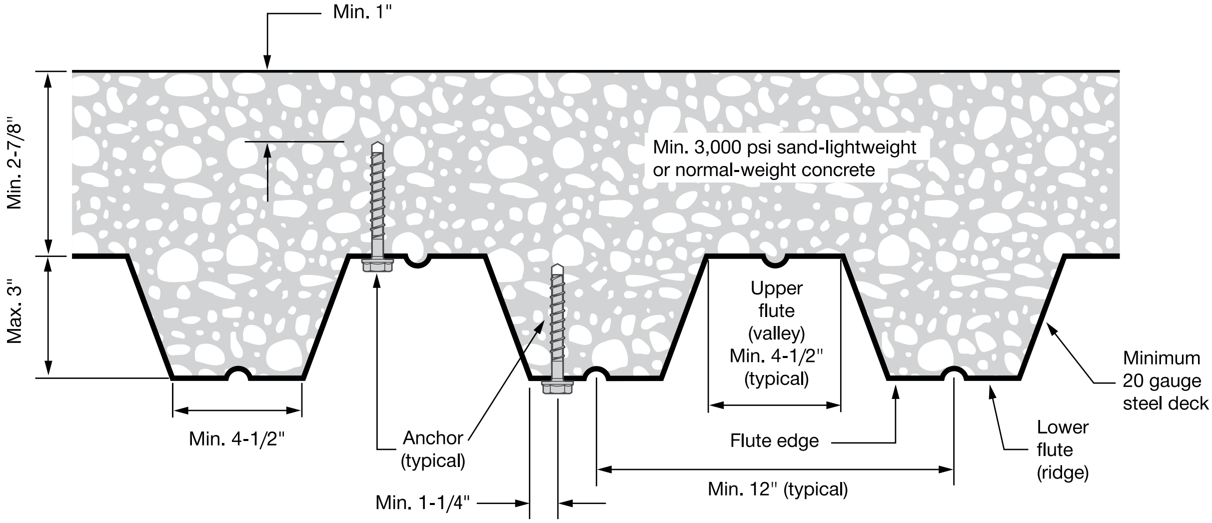
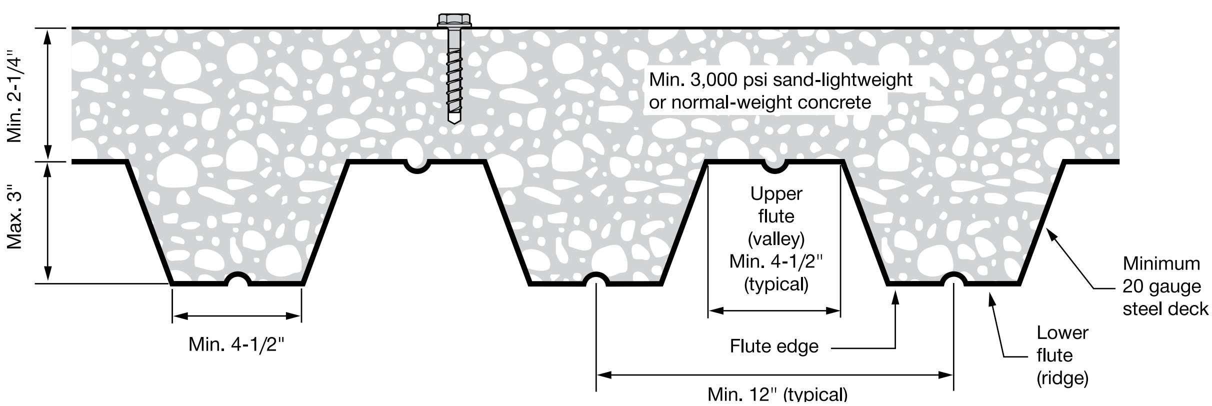
Figure 3 – Installation of KWIK HUS-EZ (KH-EZ) in soffit of concrete over steel deck floor and roof assemblies[1]



1 Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum concrete cover above the drilled hole is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

Figure 4 – Installation of KWIK HUS-EZ on the top of sand-lightweight concrete over metal floor and roof assemblies



3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 18 - Hilti KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2,3,4]

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
1/4 (6.4)	1-5/8 (41)	620 (2.8)	675 (3.0)	1,180 (5.2)	1,360 (6.0)
3/8 (9.5)	1-5/8 (41)	1,000 (4.4)	1,155 (5.1)	1,075 (4.8)	1,245 (5.5)

Table 19 - Hilti KWIK HUS-EZ in the top of ucracked concrete over metal deck[1,2,3,4]

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Tension - ϕN_n		Shear - ϕV_n	
		f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
1/4 (6.4)	1-5/8 (41)	315 (1.4)	345 (1.5)	835 (3.7)	965 (4.3)
3/8 (9.5)	1-5/8 (41)	520 (2.3)	600 (2.7)	760 (3.4)	880 (3.9)

1 See section 3.1.7.3 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values
in table 4. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λa as follows:
for sand-lightweight, λ_a = 0.68; for all-lightweight, λ_a = 0.60

5 Tabular values are for static loads only. For seismic loads, multiply cracked concrete tabular values by the following reduction factors:
1/4-inch diameter - α_{seis} = 0.60
3/8-inch diameter- α_{seis} = 0.75.
See section 3.1.7.4 for additional information on seismic applications.

KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor 3.3.6

Table 20 - Load adjustment factors for KWIK HUS-EZ in the top of uncracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a	in.	(mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}	in.	(mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.44	0.58	n/a	n/a	0.44	0.58	0.44	0.58	n/a	n/a
	2	(51)	n/a	n/a	0.50	0.67	n/a	n/a	0.50	0.67	0.50	0.67	n/a	n/a
	2-1/2	(64)	n/a	n/a	0.63	0.83	n/a	n/a	0.63	0.83	0.63	0.83	0.78	0.83
	3	(76)	0.92	0.95	0.75	1.00	0.68	0.71	0.75	1.00	0.75	1.00	0.85	0.91
	3-1/4	(83)	0.96	0.99	0.81		0.70	0.72	0.81		0.81			
	3-1/2	(89)	0.99	1.00	0.88		0.71	0.74	0.88		0.88			
	4	(102)	1.00		1.00		0.74	0.78	1.00		1.00			
	4-1/2	(114)					0.77	0.81						
	5	(127)					0.80	0.84						
	5-1/2	(140)					0.83	0.88						
	6	(152)					0.86	0.91						
	6-1/2	(165)					0.89	0.95						
	7	(178)					0.92	0.98						
	7-1/2	(191)					0.95	1.00						
	8	(203)					0.98							
	9	(229)					1.00							

3.3.6

Table 21 - Load adjustment factors for KWIK HUS-EZ in the top of cracked concrete over metal deck[1,2]

1/4-in. and 3/8-in. KH-EZ uncracked concrete over metal deck			Spacing factor in tension f_{AN}		Edge distance factor in tension f_{RN}		Spacing factor in shear[3] f_{AV}		Edge distance in shear ⊥ toward edge f_{RV}		Edge distance in shear II to edge f_{RV}		Conc. thickness factor in shear[4] f_{HV}	
Anchor diameter d_a	in.	(mm)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)	1/4 (6.4)	3/8 (9.5)
Nominal embed. h_{nom}	in.	(mm)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)	1-5/8 (41)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm)	1-3/4	(44)	n/a	n/a	0.99	1.00	n/a	n/a	0.51	0.62	0.99	1.00	n/a	n/a
	2	(51)	n/a	n/a	1.00		n/a	n/a	0.62	0.76	1.00		n/a	n/a
	2-1/2	(64)	n/a	n/a			n/a	n/a	0.87	1.00			0.78	0.83
	3	(76)	0.92	0.95			0.68	0.71	1.00				0.85	0.91
	3-1/4	(83)	0.96	0.99			0.70	0.73						
	3-1/2	(89)	0.99	1.00			0.71	0.74						
	4	(102)	1.00				0.74	0.78						
	4-1/2	(114)					0.77	0.81						
	5	(127)					0.80	0.85						
	5-1/2	(140)					0.83	0.88						
	6	(152)					0.86	0.92						
	6-1/2	(165)					0.89	0.95						
	7	(178)					0.92	0.98						
	7-1/2	(191)					0.95	1.00						
	8	(203)					0.98							
	9	(229)					1.00							

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI 318 Appendix D.

3 Spacing factor reduction in shear, f_{AV}, assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV}, assumes an influence of a nearby edge. If no edge exists, then f_{HV} = 1.0.

- For concrete thickness greater than or equal to 3-1/4-inches, the anchor can be designed using either table 2 or table 3 of this section.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor

Table 22 – Allowable tension loads for KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter	Embedment in.[6]	Loads @ c_{cr} and s_{cr}	Spacing			Edge distance
			Critical - s_{cr} in.[7]	Minimum - S_{min} in.[7]	Load reduction factor at s_{min} [8]	Critical - c_{cr} in.[9]
1/4	1 5/8[10]	530	4	2	0.70	4
	2 1/2[11]	910		4	1.00	
3/8	1 5/8[11]	535	4	2	0.70	4
	2 1/2	895	6	4	0.80	
	3 1/4	1,210				
1/2	2 1/4	710	4	2	0.60	4
	3	1,110	8	4		
	4 1/4	1,515				
5/8	3 1/4	1,155	10	4	0.60	4
	5	1,735				
3/4	4	1,680	12	4	0.60	4
	6 1/4	2,035				

Table 23 – Allowable shear loads for KWIK HUS-EZ installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter	Embedment in.[6]	Load at c_{cr} and s_{cr}	Spacing			Edge distance			
								Load reduction factor at c_{min}	
			Critical - S_{cr} in.[7]	Minimum - S_{min} in.[7]	Load reduction factor at S_{min} [8]	Critical - c_{cr} in.[9]	Minimum - c_{min} in.[9]	Load direction perpendicular to edge	Load direction parallel to edge
1/4	1 5/8	675	4	4	1.00	4	4	1.00	1.00
	2 1/2	840						1.00	1.00
3/8	1 5/8	1,140	6	4	0.94	6	4	0.61	1.00
	2 1/2	1,165						0.70	1.00
	3 1/4	1,190						0.70	1.00
1/2	2 1/4	1,845	8	4	0.88	8	4	0.50	1.00
	3	2,055						0.45	0.94
	4 1/4	2,745						0.40	0.89
5/8	3 1/4	3,040	10	4	0.36	10	4	0.36	0.82
	5	3,485						0.34	0.92
3/4	4	3,040	10	4	0.36	10	4	0.36	0.82
	6 1/4	3,485						0.34	0.92

1 All values are for anchors installed in fully grouted masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight.

2 Anchors may not be installed within one inch in any direction of a vertical joint.

3 Linear interpolation of load values between minimum spacing s_{min} and critical spacing s_{cr} and between minimum edge distance c_{min} and critical edge distance c_{cr} is permitted.

4 For combined loading: For 1/4-in. - $\frac{T_{applied}}{T_{allowable}} + \frac{V_{applied}}{V_{allowable}} \leq 1$ For 3/8- through 3/4-in. - $\left(\frac{T_{applied}}{T_{allowable}}\right)^{5/3} + \left(\frac{V_{applied}}{V_{allowable}}\right)^{5/3} \leq 1$

5 See figure 5 for anchor locations.

6 Embedment depth is measured from the outside face of the concrete masonry embedment.

7 Critical spacing s_{cr} is the anchor spacing where full load values may be used. The minimum spacing s_{min} is the minimum spacing for which values are available and installation is recommended. Spacing is measured from the center of one anchor to the center of the adjacent anchor.

8 Load reduction factors are multiplicative, both spacing and edge distance load reduction factors must be considered. Load values for anchors installed at less than c_{cr} or s_{cr} must be multiplied by the appropriate load reduction factor based on actual edge distance (c) or spacing (s).

9 The critical edge distance c_{cr} is the edge distance where full load values may be used. The minimum edge distance c_{min} is the minimum edge distance for which values are available and installation is recommended. For tension, c_{cr} equals c_{min}. Edge distance is measured from the center of the anchor to the closest edge.

10 Load values must be reduced by 21% for installations within 1 1/4 inches of the bed joint.

11 Load values must be reduced by 13% for installations within 1 1/4 inches of the bed joint.

Table 24 – KWIK HUS-EZ allowable loads installed in top of grout-filled concrete masonry walls or horizontal members of wall openings[1,2,3]

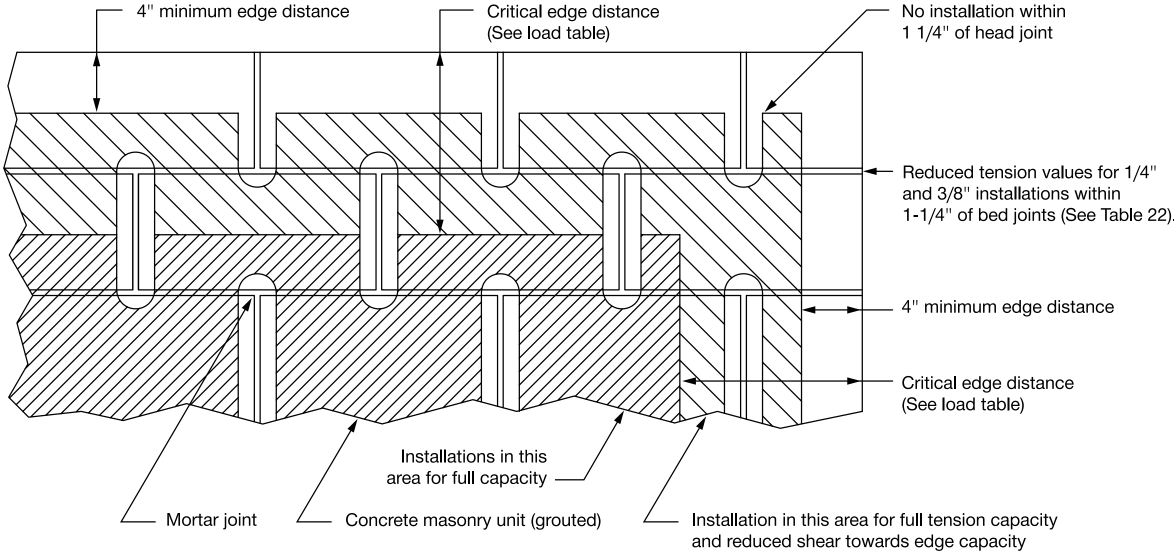
Nominal anchor diameter	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb Load direction Parallel to edge of masonry wall	Shear lb Load direction Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	205	180	135
		3 3/4			205	275	275
	2 1/2	1 1/2			355	345	155
		3 3/4			390	415	330
3/8	1 5/8	1 1/2	6	6	245	345	175
		3 3/4			245	345	435
	3 1/4	1 1/2			465	490	200
		3 3/4			540	800	625
1/2	2 1/4	1 3/4	8	8	390	460	200
		3 3/4			610	525	500
	4 1/4	1 3/4			540	885	245
		3 3/4			750	1275	550
5/8	5	1 3/4	10	10	975	930	245
		3 3/4			975	2190	630
3/4	6 1/4	3 3/4	12	12	975	2430	630

Table 25 – KWIK HUS-EZ allowable loads installed in end of wall or vertical members of wall openings[1,2,3]

Nominal anchor diameter	Minimum embedment depth in.	Edge distance[4] in.	Critical spacing[5] in.	Minimum end distance[6] in.	Tension lb	Shear lb Load direction Parallel to edge of masonry wall	Shear lb Load direction Perpendicular to edge of masonry wall
1/4	1 5/8	1 1/2	4	4	360	525	205
		3 3/4			380	595	585
	2 1/2	1 1/2			590	610	225
		3 3/4			755	635	585
3/8	1 5/8	1 1/2	6	6	355	725	215
		3 3/4			465	1010	825
	3 1/4	1 1/2			565	875	240
		3 3/4			1020	1195	1050
1/2	2 1/4	1 3/4	8	8	500	855	260
		3 3/4			525	1100	1050
	4 1/4	1 3/4			650	925	280
		3 3/4			1150	1240	1050
5/8	5	3 3/4	10	10	1605	2215	1050
3/4	6 1/4	3 3/4	12	12	1865	2550	1050

1 All values are for anchors installed in fully grouted concrete masonry with minimum masonry prism strength of 1,500 psi. Concrete masonry units may be lightweight, medium-weight or normal-weight conforming to ASTM C90. Allowable loads are calculated using safety factor of 5.
2 See figure 6 and 7 for allowable anchor installation locations on the top of grout-filled concrete masonry walls. Anchors may not be installed within one inch of a vertical joint. See figure 7 for anchor installation locations in end-of-wall and vertical members of wall openings.
3 Anchors may not be installed within one inch in any direction of a vertical joint.
4 For load values at edge distances between listed values linear interpolation is permitted.
5 Critical spacing equals minimum spacing.
6 Minimum end distance applicable to top-of-wall and end-of-wall and does not apply for wall openings such as windows.

3.3.6 KWIK HUS-EZ (KH-EZ) Carbon Steel Screw Anchor



Anchor installation is restricted to non-shaded areas

Figure 5 – Acceptable locations (shaded areas) for Hilti KWIK HUS-EZ anchors in grout-filled concrete masonry

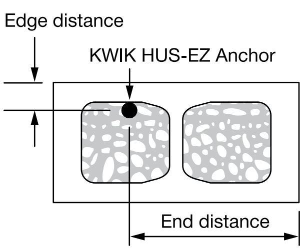


Figure 6 – Edge and end distances for the KWIK HUS-EZ anchor installed in the top of CMU masonry wall construction

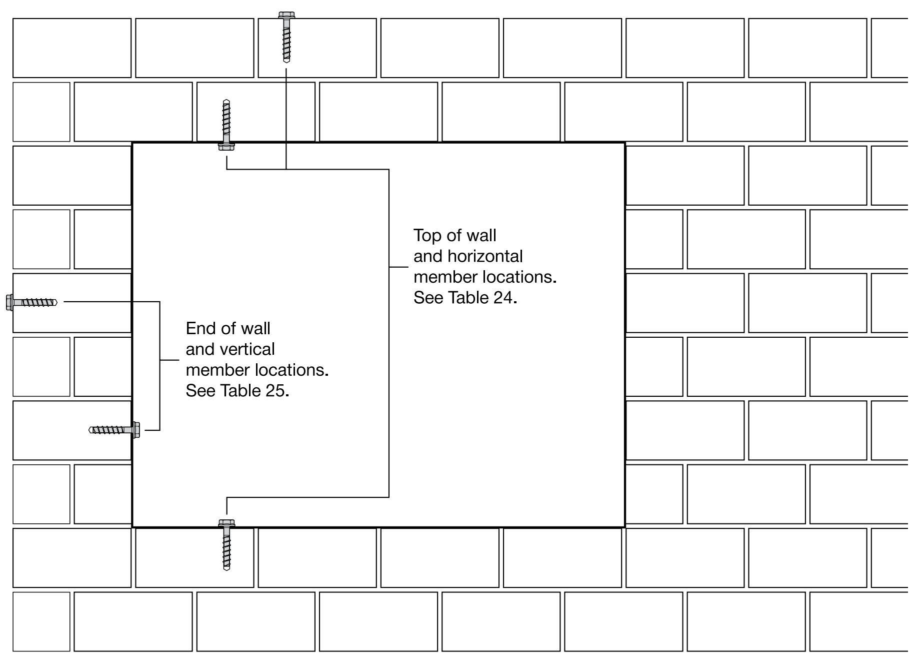


Figure 7 – Anchor locations in end of wall or wall opening applications

3.3.6.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.us.hilti.com (US) and www.hilti.ca (Canada). Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

3.3.6.5 Ordering information[1]

Description	Hole Diameter	Total Length without Anchor Head	Minimum Embedment Depth	Qty (pcs) / Box
KH-EZ 1/4x1-7/8	1/4	1-7/8	1-5/8	100
KH-EZ 1/4x2-5/8	1/4	2-5/8	2-1/2	100
KH-EZ 1/4x3	1/4	3	2-1/2	100
KH-EZ 1/4x3-1/2	1/4	3-1/2	2-1/2	100
KH-EZ 1/4x4	1/4	4	2-1/2	100
KH-EZ 3/8x1-7/8	3/8	1-7/8	1-5/8	50
KH-EZ 3/8x2-1/8	3/8	2-1/8	1-5/8	50
KH-EZ 3/8x3	3/8	3	2-1/2	50
KH-EZ 3/8x3-1/2	3/8	3-1/2	2-1/2	50
KH-EZ 3/8x4	3/8	4	3-1/4	50
KH-EZ 3/8x5	3/8	5	3-1/4	30
KH-EZ 1/2x2-1/2	1/2	2-1/2	2-1/4	30
KH-EZ 1/2x3	1/2	3	2-1/4	30
KH-EZ 1/2x3-1/2	1/2	3-1/2	3	25
KH-EZ 1/2x4	1/2	4	3	25
KH-EZ 1/2x4-1/2	1/2	4-1/2	4 1/4	25
KH-EZ 1/2x5	1/2	5	4 1/4	25
KH-EZ 1/2x6	1/2	6	4-1/4	25
KH-EZ 5/8x3-1/2	5/8	3-1/2	3-1/4	15
KH-EZ 5/8x4	5/8	4	3-1/4	15
KH-EZ 5/8x5-1/2	5/8	5-1/2	3-1/4	15
KH-EZ 5/8x6-1/2	5/8	6-1/2	3-1/4	15
KH-EZ 5/8x8	5/8	8	3-1/4	15
KH-EZ 3/4x4-1/2	3/4	4-1/2	4	10
KH-EZ 3/4x5-1/2	3/4	5-1/2	4	10
KH-EZ 3/4x7	3/4	7	4	10
KH-EZ 3/4x8	3/4	8	4	10
KH-EZ 3/4x9	3/4	9	4	10

1 All dimensions in inches

Notes