SCREW ANCHORS DESIGNED FOR IMPROVED CORROSION PROTECTION

Supplement to Hilti North American Product Technical Guide Volume 2: Anchor Fastening Technical Guide, Edition 19

3/8" diameter anchor data for CIP and CMU is bubbled for convenience

*CIP See Pages 2,3,4,6

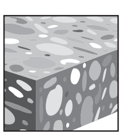
*Grout-filled CMU See Pages 11,12

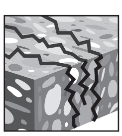
KWIK HUS-EZ SS316 SCREW ANCHOR

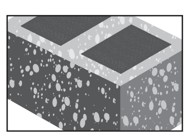
PRODUCT DESCRIPTION

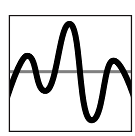
KWIK HUS EZ SS316 STAINLESS STEEL SCREW ANCHOR

Anchor System		Features and Benefits
	Stainless Steel KH-EZ SS316 1/4" - 1/2"	• OSHA Table 1926.1153 Table 1 complaint installation when installed with Hilti vacuum and DRS system or Hilti SafeSet hollow drill bit technology • Easy installation using impact tool • Product and length identification marks helps facilitate quality control after installation • Through fixture installation improves productivity and more accurate installation. • Full stainless steel 316 screw with carbide cutting elements to help enable quality setting and exceptional load values in a wide variety of base materials. • Anchor is fully removable. • Anchor diameter is same as drill bit diameter. No special diameter bit required. • Suitable for reduced edge distances and spacing. • Corrosion resistant coating allows for use in outdoor corrosive environments. • Installation process allows for adjustability.


Uncracked concrete


Cracked concrete


Grout-filled concrete masonry


Seismic Design Categories A-F

SAFESET
SafeSet™ System with Hollow Drill Bit

PROFIS software Anchor
Profis Anchor design software

Approvals/Listings	
ICC-ES (International Code Council)	ESR-3027 in concrete per ACI 318-14 Ch. 17 / ACI 355.2/ ICC-ES AC193 ESR-3056 in grout-filled CMU per ICC-ES AC106
City of Los Angeles	City of Los Angeles 2017 LABC Supplement (within ESR-3027 and ESR-3056)
Florida Building Code	2017 FBC w/ HVHZ (within ESR-3027 and ESR-3056)

INSTALLATION PARAMETERS

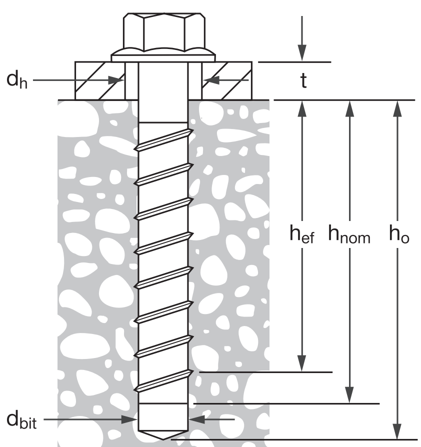
Table 1 - Hilti KH-EZ SS316 specifications

Setting information	Symbol	Units	Nominal anchor diameter							
			1/4		3/8			1/2		
Head style			Hex head		Hex head			Hex head		
Nominal bit diameter	d_{bit}	in.	1/4		3/8			1/2		
Minimum nominal embedment	h_{nom}	in.	1-5/8	2-1/2	2	2-1/2	3-1/4	2-1/4	3	4-1/4
Minimum effective embedment	h_{ef}	in.	1.19	1.93	1.49	1.92	2.55	1.56	2.20	3.26
Minimum hole depth	h_o	in.	2	2-7/8	2-1/4	2-3/4	3-1/2	2-5/8	3-3/8	4-5/8
Minimum Fixture hole diameter	d_h	in.	3/8		1/2			5/8		
Anchor Length = h_{nom} + t	ℓ		See ordering information							
Maximum impact wrench torque rating concrete[1]	$T_{impact,max}$	ft-lb (Nm)	100 (136)		157 (213)			332 (450)		
Maximum impact wrench torque rating masonry[1,2]	$T_{impact,max}$	ft-lb (Nm)	66 (89)		100 (136)			157 (213)		
Wrench size		in.	7/16		9/16			3/4		

1 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.

2 For more information on KWIK HUS-EZ SS316 installed in masonry, see ESR-3056 and Design Information for Masonry in this document.

Figure 1 -Hilti KWIK HUS-EZ SS316 specifications



DESIGN INFORMATION IN CONCRETE PER ACI 318

ACI 318-14 Chapter 17 design

The load values contained in this document are Hilti Simplified Design Tables. The load tables in this section were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8 of the North American Product Technical Guide, Volume 2: Anchor Fastening Technical Guide, Edition 19 (PTG Ed. 19). Data tables from ESR-3027 are not contained in this document, but can be found at www.icc-es.org or at www.hilti.com.

Table 2 - Hilti KH-EZ SS316 design strength based on concrete failure modes in uncracked concrete per ACI 318-14 Ch. 17[1,2,3,4]

Nominal anchor diameter in.	Effective Embed. in. (mm)"	Nominal embed. in. (mm)"	Tension - ϕN_n				Shear - ϕV_n			
			f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
1/4	1.19 (30)	1 5/8 (41)	855 (3.8)	940 (4.2)	1,085 (4.8)	1,325 (5.9)	1,090 (4.8)	1,195 (5.3)	1,380 (6.1)	1,690 (7.5)
	1.93 (49)	2 1/2 (64)	1,450 (6.4)	1,585 (7.1)	1,830 (8.1)	2,245 (10.0)	2,250 (10.0)	2,465 (11.0)	2,850 (12.7)	3,490 (15.5)
3/8	1.49 (38)	2 (51)	1,595 (7.1)	1,750 (7.8)	2,020 (9.0)	2,470 (11.0)	1,720 (7.7)	1,885 (8.4)	2,175 (9.7)	2,665 (11.9)
	1.92 (49)	2 1/2 (64)	2,335 (10.4)	2,555 (11.4)	2,955 (13.1)	3,615 (16.1)	2,515 (11.2)	2,755 (12.3)	3,180 (14.1)	3,895 (17.3)
	2.55 (65)	3 1/4 (83)	3,575 (15.9)	3,915 (17.4)	4,520 (20.1)	5,535 (24.6)	7,695 (34.2)	8,430 (37.5)	9,735 (43.3)	11,925 (53.0)
1/2	1.56 (40)	2 1/4 (57)	1,445 (6.4)	1,585 (7.1)	1,830 (8.1)	2,240 (10.0)	1,840 (8.2)	2,015 (9.0)	2,330 (10.4)	2,850 (12.7)
	2.20 (56)	3 (76)	2,425 (10.8)	2,655 (11.8)	3,065 (13.6)	3,755 (16.7)	3,085 (13.7)	3,380 (15.0)	3,900 (17.3)	4,775 (21.2)
	3.26 (83)	4 1/4 (108)	4,370 (19.4)	4,790 (21.3)	5,530 (24.6)	6,770 (30.1)	11,125 (49.5)	12,185 (54.2)	14,070 (62.6)	17,235 (76.7)

Table 3 - Hilti KH-EZ SS316 design strength based on concrete failure modes in cracked concrete per ACI 318-14 Ch.17 [1,2,3,4,5]

Nominal anchor diameter in.	Effective Embed. in. (mm)"	Nominal embed. in. (mm)"	Tension - ϕN_n				Shear - ϕV_n			
			f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.4 MPa) lb (kN)
1/4	1.19 (30)	1 5/8 (41)	315 (1.4)	320 (1.4)	335 (1.5)	355 (1.6)	770 (3.4)	845 (3.8)	975 (4.3)	1,195 (5.3)
	1.93 (49)	2 1/2 (64)	495 (2.2)	530 (2.4)	585 (2.6)	670 (3.0)	1,595 (7.1)	1,750 (7.8)	2,020 (9.0)	2,470 (11.0)
3/8	1.49 (38)	2 (51)	980 (4.4)	1,075 (4.8)	1,240 (5.5)	1,520 (6.8)	1,080 (4.8)	1,185 (5.3)	1,370 (6.1)	1,675 (7.5)
	1.92 (49)	2 1/2 (64)	1,440 (6.4)	1,575 (7.0)	1,820 (8.1)	2,230 (9.9)	1,585 (7.1)	1,735 (7.7)	2,000 (8.9)	2,450 (10.9)
	2.55 (65)	3 1/4 (83)	2,250 (10.0)	2,465 (11.0)	2,845 (12.7)	3,485 (15.5)	4,845 (21.6)	5,310 (23.6)	6,130 (27.3)	7,505 (33.4)
1/2	1.56 (40)	2 1/4 (57)	1,125 (5.0)	1,235 (5.5)	1,425 (6.3)	1,745 (7.8)	1,430 (6.4)	1,570 (7.0)	1,810 (8.1)	2,220 (9.9)
	2.20 (56)	3 (76)	1,885 (8.4)	2,065 (9.2)	2,385 (10.6)	2,920 (13.0)	2,400 (10.7)	2,625 (11.7)	3,035 (13.5)	3,715 (16.5)
	3.26 (83)	4 1/4 (108)	3,400 (15.1)	3,725 (16.6)	4,300 (19.1)	5,265 (23.4)	8,655 (38.5)	9,480 (42.2)	10,945 (48.7)	13,405 (59.6)

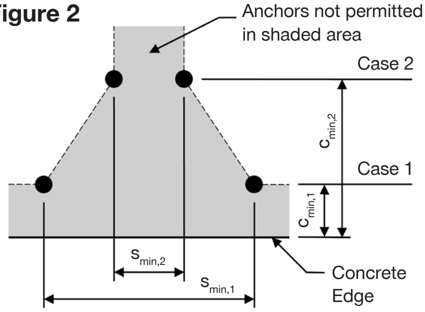
1 See PTG Ed. 19 Section 3.1.8 to convert design strength value to ASD value.
2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
3 Apply spacing, edge distance, and concrete thickness factors in Tables 6 through 11 as necessary. Compare to the steel values 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_α as follows: For sand-lightweight, λ_α = 0.68. For all-lightweight, λ_α = 0.60.
5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.51
All other sizes - $\alpha_{N,seis}$ = 0.75
No reduction needed for seismic shear. See PTG Ed. 19 Section 3.1.8 for additional information on seismic applications.

Table 4 - Steel design strength for Hilti KH-EZ SS316 anchors[1,2]

Anchor diameter in. (mm)	Nominal embedment depth in. (mm)			Tensile [3] ϕN_{sa} lb (kN)	Shear [4] ϕV_{sa} lb (kN)	Seismic shear [5] $\phi V_{sa,eq}$ lb (kN)
1/4 (6.4)	1-5/8 (41)	2-1/2 (64)		4,535 (20.2)	1,190 (5.3)	780 (3.5)
3/8 (9.5)	2 (51)	2-1/2 (64)	3-1/4 (83)	9,850 (43.8)	2,835 (12.6)	2,835 (12.6)
1/2 (12.7)	2-1/4 (57)	3 (76)	4-1/4 (108)	15,525 (69.1)	3,115 (13.9)	3,115 (13.9)

1 See PTG Ed. 19 Section 3.1.8 to convert design strength value to ASD value.
2 Hilti KH-EZ SS316 screw anchors are to be considered ductile steel elements.
3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318 Chapter 17.
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 Chapter 17.
5 Seismic shear values determined by seismic shear tests with $\phi_{Vsa} \leq \phi\ 0.60\ A_{se,V}\ f_{uta}$ as noted in ACI 318 Chapter 17. See PTG Ed. 19 Section 3.1.8 for additional information on seismic applications.

Figure 2



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

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

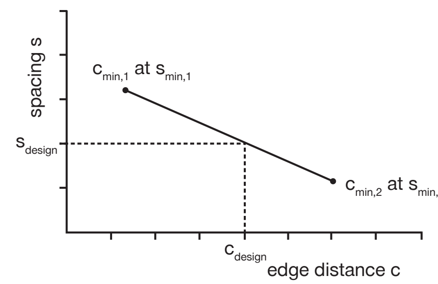


Table 5 - Hilti KH-EZ SS316 specifications[1]

Setting information	Symbol	Units	Nominal anchor diameter							
			1/4		3/8			1/2		
Effective minimum embedment	h_{ef}	in.	1.18	1.92	1.11	1.54	2.50	1.50	2.16	3.22
Minimum member thickness	h_{min}	in.	3-1/4	4-1/8	3-1/4	3-2/3	4-7/8	4-1/2	4-3/4	6-3/4
Case 1	$c_{min,1}$	in.	2		3			1.75		
	for $s_{min,1} \geq$	in.	1.5		2.25			3		
Case 2	$c_{min,2}$	in.	1.5		1.5			1.75		
	for $s_{min,2} \geq$	in.	3		3			3		

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.

Table 6 - Load adjustment factors for 1/4-in. diameter KH-EZ SS316 in uncracked concrete[1,2]

1/4-in. KH-EZ SS316 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)	0.710	0.630	0.329	0.244	0.553	0.532	0.177	0.086	0.329	0.171	n/a	n/a
2	(51)	0.780	0.673	0.420	0.288	0.570	0.543	0.272	0.132	0.420	0.264	n/a	n/a
2-7/8	(73)	0.903	0.748	0.604	0.373	0.601	0.562	0.469	0.227	0.604	0.373	n/a	n/a
3	(76)	0.920	0.759	0.630	0.389	0.605	0.565	0.500	0.242	0.630	0.389	n/a	n/a
3-1/4	(83)	0.955	0.781	0.683	0.421	0.614	0.570	0.564	0.273	0.683	0.421	0.675	n/a
4	(102)	1.000	0.845	0.840	0.518	0.640	0.586	0.770	0.373	0.840	0.518	0.748	n/a
4-1/8	(105)		0.856	0.867	0.534	0.644	0.589	0.807	0.391	0.867	0.534	0.760	0.597
5	(127)		0.932	1.000	0.648	0.675	0.608	1.000	0.521	1.000	0.648	0.837	0.657
6	(152)		1.000		0.777	0.710	0.630		0.685		0.777	0.917	0.720
8	(203)				1.000	0.780	0.673		1.000		1.000	1.000	0.831
10	(254)					0.850	0.716						0.929
12	(305)					0.920	0.759						1.000
> 14	(356)					0.990	0.802						

Table 7 - Load adjustment factors for 1/4-in. diameter KH-EZ SS316 in cracked concrete[1,2]

1/4-in. KH-EZ SS316 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)	0.710	0.630	0.876	0.649	0.590	0.559	0.398	0.212	0.796	0.425	n/a	n/a
2	(51)	0.780	0.673	1.000	0.767	0.620	0.579	0.613	0.327	1.000	0.654	n/a	n/a
2-7/8	(73)	0.903	0.748		0.994	0.673	0.614	1.000	0.563		0.994	n/a	n/a
3	(76)	0.920	0.759		1.000	0.680	0.619		0.600		1.000	n/a	n/a
3-1/4	(83)	0.955	0.781			0.695	0.629		0.677			0.884	n/a
4	(102)	1.000	0.845			0.741	0.658		0.924			0.981	n/a
4-1/8	(105)		0.856			0.748	0.663		0.968			0.996	0.808
5	(127)		0.932			0.801	0.698		1.000			1.000	0.889
6	(152)		1.000			0.861	0.737						0.974
8	(203)					0.981	0.816						1.000
10	(254)					1.000	0.895						
12	(305)						0.974						
> 14	(356)						1.000						

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 Engineering software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

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.

(shaded cell) 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 document to calculate permissable edge distance, spacing and concrete thickness combinations.

Table 8 - Load adjustment factors for 3/8-in. diameter KH-EZ SS316 in uncracked concrete[1,2]

3/8-in. KH-EZ SS316 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)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm) 1-1/2	(38)	0.668	0.630	0.598	0.282	0.244	0.213	0.542	0.533	0.525	0.126	0.086	0.056	0.253	0.173	0.113	n/a	n/a	n/a
2	(51)	0.724	0.674	0.631	0.344	0.289	0.245	0.556	0.543	0.533	0.194	0.133	0.087	0.344	0.266	0.174	n/a	n/a	n/a
2-1/4	(57)	0.752	0.695	0.647	0.378	0.312	0.261	0.563	0.549	0.537	0.232	0.159	0.104	0.378	0.312	0.207	n/a	n/a	n/a
3	(76)	0.836	0.760	0.696	0.503	0.391	0.313	0.584	0.565	0.549	0.357	0.244	0.160	0.503	0.391	0.313	n/a	n/a	n/a
3-1/2	(89)	0.891	0.804	0.729	0.587	0.456	0.350	0.598	0.576	0.557	0.450	0.308	0.201	0.587	0.456	0.350	0.626	n/a	n/a
3-3/4	(95)	0.919	0.826	0.745	0.629	0.488	0.369	0.605	0.581	0.561	0.499	0.341	0.223	0.629	0.488	0.369	0.648	n/a	n/a
4	(102)	0.947	0.847	0.761	0.671	0.521	0.392	0.612	0.587	0.565	0.550	0.376	0.246	0.671	0.521	0.392	0.669	0.589	n/a
4-3/4	(121)	1.000	0.912	0.810	0.797	0.618	0.466	0.633	0.603	0.578	0.711	0.486	0.318	0.797	0.618	0.466	0.729	0.642	0.557
5	(127)		0.934	0.827	0.839	0.651	0.490	0.640	0.609	0.582	0.768	0.525	0.343	0.839	0.651	0.490	0.748	0.659	0.572
6	(152)		1.000	0.892	1.000	0.781	0.588	0.668	0.630	0.598	1.000	0.691	0.451	1.000	0.781	0.588	0.819	0.722	0.626
8	(203)			1.000		1.000	0.784	0.724	0.674	0.631		1.000	0.695		1.000	0.784	0.946	0.833	0.723
10	(254)						0.980	0.780	0.717	0.663			0.971			0.980	1.000	0.932	0.808
12	(305)						1.000	0.836	0.760	0.696			1.000			1.000		1.000	0.886
14	(356)							0.891	0.804	0.729									0.957
16	(406)							0.947	0.847	0.761									1.000
18	(457)							1.000	0.891	0.794									
20	(508)								0.934	0.827									
> 24	(610)								1.000	0.892									

Table 9 - Load adjustment factors for 3/8-in. diameter KH-EZ SS316 in cracked concrete[1,2]

3/8-in. KH-EZ SS316 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)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)	2 (51)	2-1/2 (64)	3-1/4 (83)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm) 1-1/2	(38)	0.668	0.630	0.598	0.753	0.651	0.569	0.580	0.565	0.532	0.336	0.241	0.083	0.671	0.483	0.167	n/a	n/a	n/a
2	(51)	0.724	0.674	0.631	0.918	0.770	0.652	0.607	0.586	0.542	0.517	0.372	0.128	0.918	0.743	0.257	n/a	n/a	n/a
2-1/4	(57)	0.752	0.695	0.647	1.000	0.832	0.696	0.621	0.597	0.548	0.617	0.443	0.153	1.000	0.832	0.307	n/a	n/a	n/a
3	(76)	0.836	0.760	0.696		1.000	0.834	0.661	0.629	0.564	0.949	0.683	0.236		1.000	0.472	n/a	n/a	n/a
3-1/2	(89)	0.891	0.804	0.729			0.933	0.688	0.651	0.574	1.000	0.860	0.297			0.595	0.867	n/a	n/a
3-3/4	(95)	0.919	0.826	0.745			0.984	0.701	0.662	0.580		0.954	0.330			0.660	0.897	n/a	n/a
4	(102)	0.947	0.847	0.761			1.000	0.715	0.672	0.585		1.000	0.363			0.727	0.927	0.830	n/a
4-3/4	(121)	1.000	0.912	0.810				0.755	0.705	0.601			0.470			0.941	1.000	0.905	0.635
5	(127)		0.934	0.827				0.768	0.715	0.606			0.508			1.000		0.928	0.651
6	(152)		1.000	0.892				0.822	0.758	0.627			0.668					1.000	0.714
8	(203)			1.000				0.929	0.845	0.670			1.000						0.824
10	(254)							1.000	0.931	0.712									0.921
12	(305)								1.000	0.755									1.000
14	(356)									0.797									
16	(406)									0.840									
18	(457)									0.882									
20	(508)									0.924									
> 24	(610)									1.000									

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 Engineering software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

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.

(Shaded cell) 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 document to calculate permissable edge distance, spacing and concrete thickness combinations.

Table 10 - Load adjustment factors for 1/2-in. diameter KH-EZ SS316 in uncracked concrete[1,2]

1/2-in. KH-EZ SS316 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)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	n/a	0.303	0.247	0.357	n/a	n/a	n/a	0.149	0.089	0.073	0.297	0.177	0.147	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	0.333	0.266	0.378	n/a	n/a	n/a	0.181	0.108	0.090	0.333	0.217	0.179	n/a	n/a	n/a
3	(76)	0.821	0.727	0.653	0.481	0.348	0.465	0.580	0.557	0.550	0.333	0.199	0.165	0.481	0.348	0.330	n/a	n/a	n/a
4	(102)	0.927	0.803	0.704	0.641	0.455	0.560	0.607	0.576	0.567	0.513	0.306	0.254	0.641	0.455	0.508	n/a	n/a	n/a
4-1/2	(114)	0.981	0.841	0.730	0.721	0.511	0.611	0.620	0.585	0.575	0.612	0.366	0.303	0.721	0.511	0.606	0.693	n/a	n/a
4-3/4	(121)	1.000	0.860	0.743	0.761	0.540	0.637	0.627	0.590	0.579	0.664	0.397	0.328	0.761	0.540	0.637	0.712	0.600	n/a
5	(127)		0.879	0.756	0.801	0.568	0.667	0.634	0.595	0.584	0.717	0.428	0.355	0.801	0.568	0.667	0.731	0.615	n/a
6	(152)		0.955	0.807	0.962	0.682	0.800	0.660	0.614	0.600	0.943	0.563	0.466	0.962	0.682	0.800	0.801	0.674	n/a
6-3/4	(171)		1.000	0.845	1.000	0.767	0.900	0.680	0.628	0.613	1.000	0.672	0.556	1.000	0.767	0.900	0.849	0.715	0.672
8	(203)			0.909		0.909	1.000	0.714	0.652	0.634		0.867	0.718		0.909	1.000	0.925	0.778	0.731
10	(254)			1.000		1.000		0.767	0.689	0.667		1.000	1.000		1.000		1.000	0.870	0.817
12	(305)							0.821	0.727	0.700								0.953	0.895
16	(406)							0.927	0.803	0.767								1.000	1.000
20	(508)							1.000	0.879	0.834									
> 24	(610)								0.955	0.901									

Table 11 - Load adjustment factors for 1/2-in. diameter KH-EZ SS316 in cracked concrete[1,2]

1/2-in. KH-EZ SS316 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)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)	2-1/4 (57)	3 (76)	4-1/4 (108)
Spacing (s)/edge distance (c_a)/concrete thickness (h) - in. (mm): 1-3/4	(44)	n/a	n/a	n/a	0.808	0.657	0.548	n/a	n/a	n/a	0.352	0.225	0.067	0.703	0.450	0.135	n/a	n/a	n/a
2	(51)	n/a	n/a	n/a	0.887	0.708	0.580	n/a	n/a	n/a	0.430	0.275	0.082	0.859	0.550	0.165	n/a	n/a	n/a
3	(76)	0.821	0.727	0.653	1.000	0.929	0.713	0.642	0.606	0.547	0.789	0.505	0.151	1.000	0.929	0.303	n/a	n/a	n/a
4	(102)	0.927	0.803	0.704		1.000	0.859	0.690	0.641	0.563	1.000	0.777	0.233		1.000	0.466	n/a	n/a	n/a
4-1/2	(114)	0.981	0.841	0.730			0.937	0.714	0.658	0.571		0.927	0.278		1.000	0.556	0.924	n/a	n/a
4-3/4	(121)	1.000	0.860	0.743			0.977	0.725	0.667	0.575		1.000	0.302		1.000	0.603	0.949	0.818	n/a
5	(127)		0.879	0.756			1.000	0.737	0.676	0.579			0.326			0.651	0.974	0.839	n/a
6	(152)		0.955	0.807				0.785	0.711	0.595			0.428			0.856	1.000	0.919	n/a
6-3/4	(171)		1.000	0.845				0.820	0.738	0.607			0.511			1.000		0.975	0.653
8	(203)			0.909				0.880	0.782	0.626			0.659					1.000	0.711
10	(254)			1.000				0.974	0.852	0.658			0.921						0.794
12	(305)							1.000	0.923	0.689			1.000						0.870
16	(406)								1.000	0.752									1.000
20	(508)									0.816									
> 24	(610)									0.879									

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 Engineering software or perform anchor calculation using design equations from ACI 318-14 Chapter 17.

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 document to calculate permissable edge distance, spacing and concrete thickness combinations.

DESIGN INFORMATION IN CONCRETE PER CSA A23.3

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-3027. These tables are followed by factored resistance tables. The factored resistance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-14 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to PTG Ed. 19 Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.com.

Table 12 - Steel resistance for Hilti KH-EZ SS316 screw anchor[1,2]

Nominal anchor diameter in.	Tensile[3] N_{sar} lb (kN)	Shear[4] V_{sar} lb (kN)	Seismic shear[5] $V_{sar,eq}$ lb (kN)
1/4	3,595 (16.0)	1,010 (4.5)	665 (3.0)
3/8	7,810 (34.7)	2,405 (10.7)	2,405 (10.7)
1/2	12,315 (54.8)	2,645 (11.8)	2,645 (11.8)

1 See PTG Ed. 19 section 3.1.8 to convert design strength value to ASD value.
2 Hilti KWIK HUS-EZ SS316 stainless steel screw anchors are to be considered ductile steel elements.
3 Tensile $N_{sar} = A_{se,N}\ \phi_s\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.
4 Shear determined by static shear tests with $V_{sar} < 0.6\ A_{se,V}\ \phi_s\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D.
5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} \leq 0.60\ A_{se,V}\ \phi_s\ f_{uta}\ R$ as noted in CSA A23.3-14 Annex D. See PTG Ed. 19 section 3.1.8 for additional information on seismic applications.

Table 13 - KH-EZ SS316 design information in accordance with CSA A23.3-14 Annex D[1]

Design parameter	Symbol	Units	Nominal anchor diameter 1/4		3/8			1/2			Ref A23.3-04
Nominal anchor diameter	d_a	in. (mm)	0.25 (6.4)		0.375 (9.5)			0.5 (12.7)			
Effective embedment [2]	h_{ef}	in. (mm)	1.19 (30)	1.93 (49)	1.49 (38)	1.92 (49)	2.55 (65)	1.56 (40)	2.20 (56)	3.26 (83)	
Min. nominal embedment [2]	h_{nom}	in. (mm)	1-5/8 (41)	2-1/2 (64)	2 (51)	2-1/2 (64)	3-1/4 (83)	2-1/4 (57)	3 (76)	4-1/4 (108)	
Min. concrete thickness	h_{min}	in. (mm)	3-1/4 (83)	4 1/8 (105)	3-1/2 (89)	4 (102)	4 3/4 (121)	4 1/2 (114)	4 3/4 (121)	6 3/4 (171)	
Critical edge distance	c_{ac}	in. (mm)	4.76 (121)	7.72 (196)	5.96 (151)	7.68 (195)	10.20 (259)	6.24 (158)	8.80 (224)	7.50 (191)	
Minimum spacing at critical edge distance	$s_{min,cac}$	in. (mm)	1.5 (38)		2.25 (57)			3 (76)			
Minimum edge distance	c_{min}	in. (mm)	1.5 (38)					1.75 (44)			
Minimum spacing at minimum edge distance	for s >	in. (mm)	3 (76)								
Min. hole depth in concrete	h_0	in. (mm)	2 (51)	2-7/8 (73)	2-1/4 (57)	2-3/4 (70)	3-1/2 (89)	2-5/8 (67)	3-3/8 (86)	4-5/8 (117)	
Min. specified ultimate strength	f_{uta}	psi (N/mm2)	153,000 (1055)		139,300 (961)			120,100 (828)			
Effective tensile stress area	$A_{se,N}$	in2 (mm2)	0.040 (25.8)		0.094 (60.6)			0.172 (111.0)			
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85								8.4.3
Resistance modification factor for tension, steel failure modes [3]	R	-	0.70								D.5.3
Resistance modification factor for shear, steel failure modes [3]	R	-	0.65								
Factored steel resistance in tension	N_{sar}	lb (kN)	3,595 (16.0)		7,810 (34.7)			12,315 (54.8)			D.6.1.2
Factored steel resistance in shear	V_{sar}	lb (kN)	1,010 (4.5)		2,405 (10.7)			2,645 (11.8)			D.7.1.2
Factored steel resistance in shear, seismic	$V_{sar,eq}$	lb (kN)	665 (3.0)		2,405 (10.7)			2,645 (11.8)			
Coeff. for factored conc. breakout resistance, uncracked concrete	$k_{c,uncr}$	-	10.0		11.3						
Coeff. for factored conc. breakout resistance, cracked concrete	$k_{c,cr}$	-	7.1					8.8			
Modification factor for anchor resistance, tension, uncracked conc. [4]	$\psi_{c,N}$	-	1.0								D.6.2.6
Anchor category	-	-	2	3	1			2			
Concrete material resistance factor	ϕ_c	-	0.65								8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B [5]	R	-	0.85	0.75	1.00			0.85			
Factored pullout resistance in 20 MPa uncracked concrete [6]	$N_{pr,uncr}$	lb (kN)	NA								D.6.3.2
Factored pullout resistance in 20 MPa cracked concrete [6]	$N_{pr,cr}$	lb (kN)	340 (1.5)	580 (2.6)	1,060 (4.7)	1,555 (6.9)	NA				D.6.3.2
Factored seismic pullout resistance in 20 MPa cracked concrete [6]	$N_{pr,eq}$	lb (kN)	225 (1.0)	580 (2.6)	1,060 (4.7)	1,555 (6.9)	NA				D.6.3.2

1 Design information in this table is taken from ICC-ES ESR-3027, dated July 2020, tables 2 and 4, and converted for use with CSA A23.3-14 Annex D.
2 See figure 1 of this document.
3 The KWIK HUS-EZ SS316 is considered a ductile steel element as defined by CSA A23.3-14 Annex D section D.2.
4 For all design cases, $\psi_{c,N}$ = 1.0. The appropriate coefficient for breakout resistance for cracked concrete ($k_{c,cr}$) or uncracked concrete ($k_{c,uncr}$) must be used.
5 For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.
6 For all design cases, $\psi_{c,P}$ = 1.0. NA (not applicable) denotes that this value does not control for design. See section 4.1.4 of ESR-3027 for additional information.

Table 14 - Hilti KH-EZ SS316 screw anchor factored resistance with concrete / pullout failure in uncracked concrete[1,2,3,4]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.19 (30)	1-5/8 (41)	925 (4.1)	1,030 (4.6)	1,130 (5.0)	1,305 (5.8)	925 (4.1)	1,030 (4.6)	1,130 (5.0)	1,305 (5.8)
	1.93 (49)	2-1/2 (64)	1,680 (7.5)	1,880 (8.4)	2,060 (9.2)	2,380 (10.6)	1,680 (7.5)	1,880 (8.4)	2,060 (9.2)	2,380 (10.6)
3/8	1.49 (38)	2 (51)	1,710 (7.6)	1,915 (8.5)	2,095 (9.3)	2,420 (10.8)	1,710 (7.6)	1,915 (8.5)	2,095 (9.3)	2,420 (10.8)
	1.92 (49)	2-1/2 (64)	2,505 (11.1)	2,800 (12.5)	3,065 (13.6)	3,540 (15.8)	2,505 (11.1)	2,800 (12.5)	3,065 (13.6)	3,540 (15.8)
	2.55 (65)	3-1/4 (83)	3,830 (17.0)	4,285 (19.1)	4,695 (20.9)	5,420 (24.1)	3,830 (17.0)	4,285 (19.1)	4,695 (20.9)	5,420 (24.1)
1/2	1.56 (40)	2-1/4 (57)	1,560 (6.9)	1,745 (7.8)	1,910 (8.5)	2,205 (9.8)	1,560 (6.9)	1,745 (7.8)	1,910 (8.5)	2,205 (9.8)
	2.20 (56)	3 (76)	2,610 (11.6)	2,920 (13.0)	3,195 (14.2)	3,690 (16.4)	2,610 (11.6)	2,920 (13.0)	3,195 (14.2)	3,690 (16.4)
	3.26 (83)	4-1/4 (108)	4,710 (20.9)	5,265 (23.4)	5,765 (25.7)	6,660 (29.6)	9,415 (41.9)	10,530 (46.8)	11,535 (51.3)	13,320 (59.2)

Table 15 - Hilti KH-EZ SS316 screw anchor factored resistance with concrete / pullout failure in cracked concrete[1,2,3,4,5]

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4	1.19 (30)	1-5/8 (41)	330 (1.5)	350 (1.6)	370 (1.7)	405 (1.8)	655 (2.9)	735 (3.3)	805 (3.6)	925 (4.1)
	1.93 (49)	2-1/2 (64)	770 (3.4)	860 (3.8)	945 (4.2)	1,090 (4.8)	1,195 (5.3)	1,335 (5.9)	1,465 (6.5)	1,690 (7.5)
3/8	1.49 (38)	2 (51)	1,055 (4.7)	1,180 (5.3)	1,295 (5.8)	1,495 (6.7)	1,080 (4.8)	1,210 (5.4)	1,325 (5.9)	1,530 (6.8)
	1.92 (49)	2-1/2 (64)	1,550 (6.9)	1,735 (7.7)	1,900 (8.5)	2,195 (9.8)	1,580 (7.0)	1,765 (7.9)	1,935 (8.6)	2,235 (9.9)
	2.55 (65)	3-1/4 (83)	2,420 (10.8)	2,705 (12.0)	2,960 (13.2)	3,420 (15.2)	2,420 (10.8)	2,705 (12.0)	2,960 (13.2)	3,420 (15.2)
1/2	1.56 (40)	2-1/4 (57)	1,220 (5.4)	1,365 (6.1)	1,495 (6.6)	1,725 (7.7)	1,220 (5.4)	1,365 (6.1)	1,495 (6.6)	1,725 (7.7)
	2.20 (56)	3 (76)	2,040 (9.1)	2,285 (10.2)	2,500 (11.1)	2,890 (12.8)	2,040 (9.1)	2,285 (10.2)	2,500 (11.1)	2,890 (12.8)
	3.26 (83)	4-1/4 (108)	3,685 (16.4)	4,120 (18.3)	4,510 (20.1)	5,210 (23.2)	7,365 (32.8)	8,235 (36.6)	9,020 (40.1)	10,420 (46.3)

1 See PTG Ed. 19 section 3.1.8 to convert factored resistance 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 6 to 11 as necessary. Compare to the steel values in table 12. The lesser of the values is to be used for the design.
4 Tablular 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. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:
1/4-in diameter by 1-5/8-in nominal embedment depth - $\alpha_{N,seis}$ = 0.51 All other sizes - $\alpha_{N,seis}$ = 0.75
No reduction needed for seismic shear. See PTG Ed. 19 section 3.1.8 for additional information on seismic applications.

DESIGN INFORMATION IN MASONRY

Table 16 – Allowable tension loads for Hilti KH-EZ SS316 installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Loads @ c_{cr} and s_{cr}	Spacing Critical - s_{cr} in.[7]	Spacing Minimum - s_{min} in.[7]	Spacing Load reduction factor at s_{min}[8]	Edge distance Critical - c_{cr} Minimum - c_{min} in.[9]
1/4	1-5/8	530	4	2	0.70	4
	2-1/2	910		4	1.00	
3/8	1-5/8	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 17 – Allowable shear loads for Hilti KH-EZ SS316 installed in grout-filled masonry walls (lb)[1,2,3,4,5]

Nominal anchor diameter in.	Embedment in.[6]	Load at c_{cr} and s_{cr}	Spacing Critical - s_{cr} in.[7]	Spacing Minimum - s_{min} in.[7]	Spacing Load reduction factor at s_{min}[8]	Edge distance Critical - c_{cr} in.[9]	Edge distance Minimum - c_{min} in.[9]	Load reduction factor at c_{min} perpendicular to edge	Load reduction factor at c_{min} 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: $\left(\frac{T_{applied}}{T_{allowable}}\right) + \left(\frac{V_{applied}}{V_{allowable}}\right) \leq 1$

5 See figure 5 of this document 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.

Table 18 – Hilti KH-EZ SS316 allowable loads installed in top-of-grout-filled concrete masonry walls or horizontal members of wall openings[1,2,3]

Nominal anchor diameter in.	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	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	345
	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 19 – Hilti KH-EZ SS316 allowable loads installed in end-of-wall or vertical members of wall openings[1,2]

Nominal anchor diameter in.	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	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 1-1/4" in any direction of a head 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.

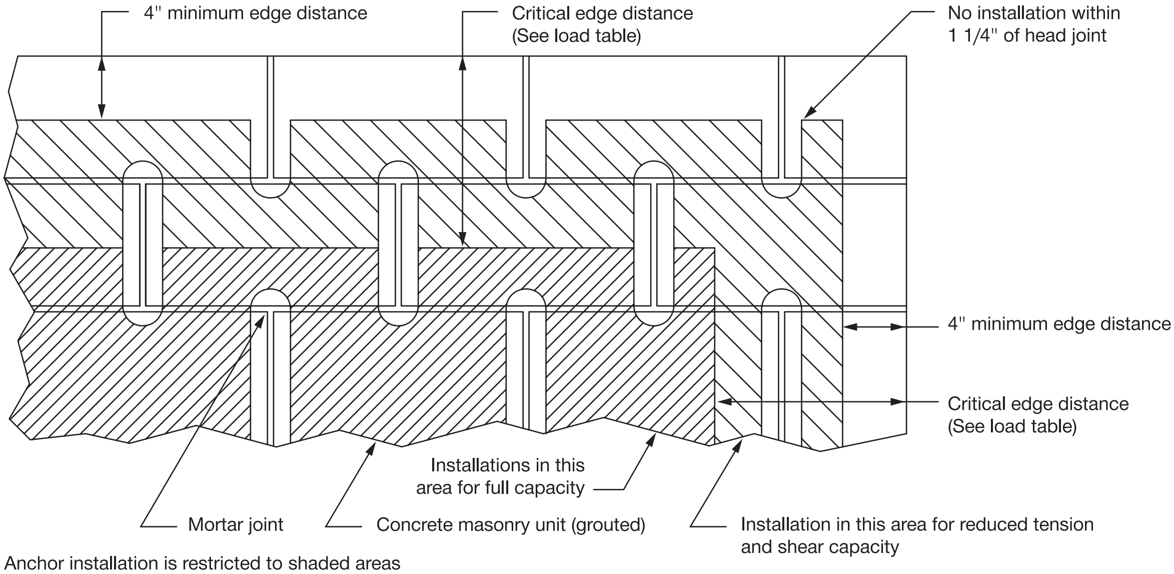


Figure 5 – Acceptable locations (shaded areas) for Hilti KH-EZ SS316 anchors in grout-filled concrete masonry

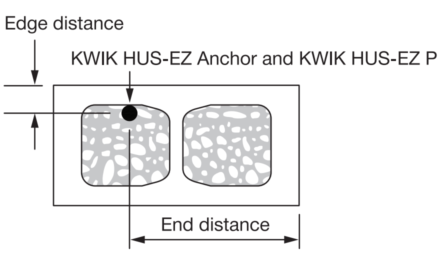


Figure 6 – Edge and end distances for the Hilti KH-EZ SS316 anchor installed in the top of CMU masonry wall construction

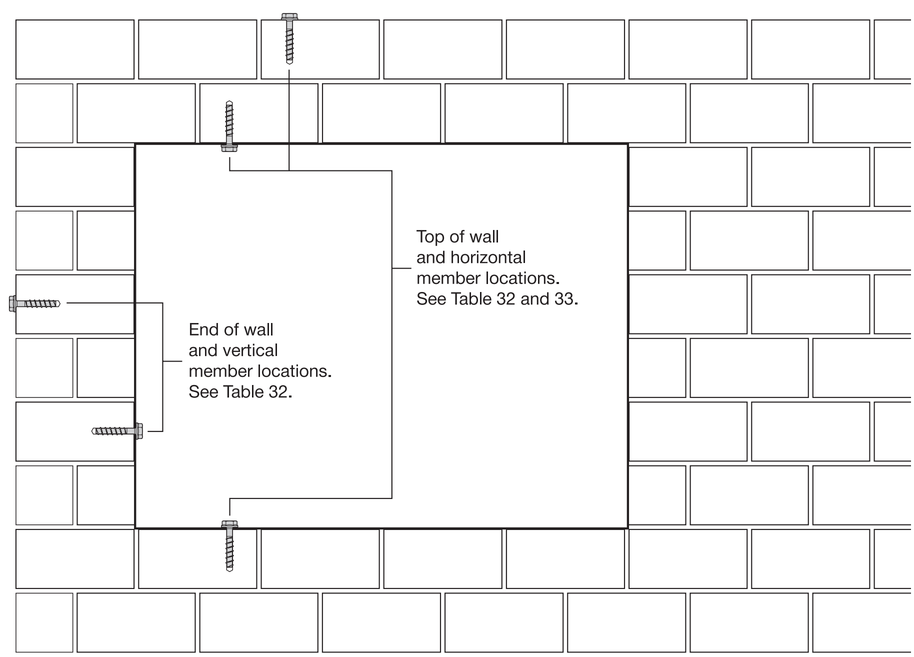


Figure 7 – Anchor locations in end of wall or wall opening applications

INSTALLATION INSTRUCTIONS

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at **www.hilti.com**. 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.

ORDERING INFORMATION

Order Information

Description	Hole Diameter	Total Length	Screw Anchor Head Height (in)	Screw Anchor Head Width (in)	Minimum Embedment Depth	Qty (pcs) / Box
KH-EZ SS316 1/4''x2''	1/4''	2	0.24	0.44	1 5/8	100
KH-EZ SS316 1/4''x2 1/2''	1/4''	2 1/2	0.24	0.44	1 5/8	100
KH-EZ SS316 1/4''x3''	1/4''	3	0.24	0.44	1 5/8	100
KH-EZ SS316 3/8''x2 1/2''	3/8''	2 1/2	0.35	0.56	2	50
KH-EZ SS316 3/8''x3''	3/8''	3	0.35	0.56	2	50
KH-EZ SS316 3/8''x4''	3/8''	4	0.35	0.56	2 1/2	50
KH-EZ SS316 3/8''x5''	3/8''	5	0.35	0.56	2 1/2	50
KH-EZ SS316 1/2''x3''	1/2''	3	0.48	0.75	2 1/4	25
KH-EZ SS316 1/2''x4''	1/2''	4	0.48	0.75	3	25
KH-EZ SS316 1/2''x5''	1/2''	5	0.48	0.75	3	25
KH-EZ SS316 1/2''x6''	1/2''	6	0.48	0.75	3	25

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