TECHNICAL SUPPLEMENT

Kwik-X Dual Action Anchor

January, 2026

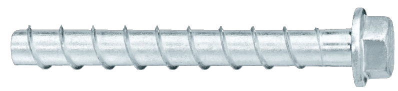
Kwik-X Dual Action Anchor System

KWIK-X Dual Action Anchor consisting of KHC Capsule and KH-EZ / KH-EZ CRC / KH-EZ SS316 screw anchors

Features and Benefits

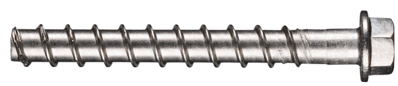
- Combines the high performance of adhesive anchors with the speed and simplicity of screw anchors
- Evaluated by ICC Evaluation Services for cracked concrete and seismic service
- No hole cleaning required for carbon steel anchors – helping save time and eliminating the need for accessories like air compressors and brushes
- OSHA Table 1926.1153 Table 1 compliant installation when installed with Hilti vacuum and DRS system or Hilti SafeSet™ hollow drill bit technology
- Suitable for real jobsite conditions – including water saturated concrete and low installation temperatures
- Screw is fully removable and reusable in the same borehole (one time remove and reuse only, not covered in ESR-5065)
- Immediate loading possible

Hilti KHC Kwik-X capsule

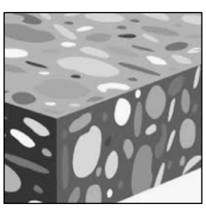


Hilti KH-EZ screw anchor

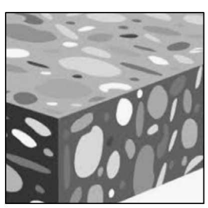
Hilti KH-EZ CRC screw anchor (Mechanically Galvanized)



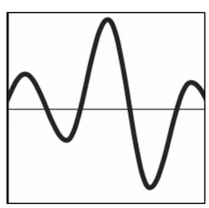
Hilti KH-EZ SS316 screw anchor



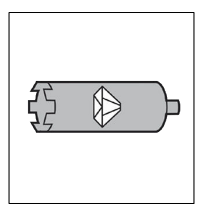
Uncracked concrete



Cracked concrete



Seismic design categories A-F



Diamond core drilling permitted (except for 3/8" Kwik-X SS316 anchors)

Hollow drill bit

PROFIS Engineering Design Software

Approvals / Listings

ICC-ES (International Code Council)	ESR-5065 in concrete per ACI 318 Ch. 17 / ACI 355.4 / ICC-ES AC308
NSF/ANSI Std 61	Certification for use in potable water
City of Los Angeles	LABC Supplement (within ESR-5065)
Florida Building Code	FBC Supplement (within ESR-5065) w/ HVHZ
U.S. Green Building Council	LEED® Credit 4.1-Low Emitting Materials

Design Data in Concrete per ACI 318

ACI 318 Chapter 17 Design

The load tables in this section were developed using the Strength Design parameters and variables of ESR-5065 and the equations within ACI 318 Chapter 17. For more information on ACI 318 Ch. 17 design and the Hilti Simplified Design Tables, refer to sections 3.1.6 and 3.1.8 of the North American Product Technical Guide, Volume 2: Anchor Fastening Technical Guide, Edition 22 (PTG Ed. 22). Data tables from ESR-5065 are not contained in this section but can be found at www.icc-es.org or at www.hilti.com.

Figure 1. Hilti Kwik-X Dual Action Carbon Steel Anchor Installation Conditions

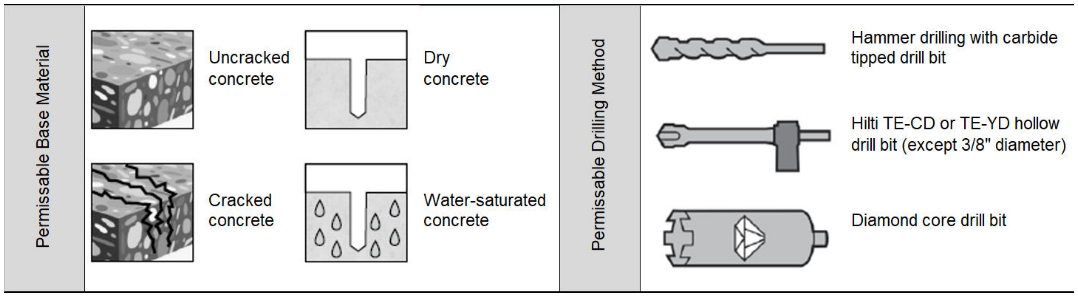


Table 1. Hilti Kwik-X Dual Action with KH-EZ and KH-EZ CRC Screw Anchors Installation Specifications

Design information		Symbol	Units	KH-EZ / KH-EZ CRC anchor diameter (in.)							
				3/8		1/2		5/8		3/4	
Drill hole diameter		d_o	in.	3/8		1/2		5/8		3/4	
Minimum fixture hole diameter		d_f	in.	1/2		5/8		3/4		7/8	
Nominal embedment[1]		h_{nom}	in. (mm)	2-1/2 – 3 (64 – 76)	3 – 4-1/2 (76 – 114)	3 – 4-1/4 (76 – 108)	4-1/4 – 5-1/2 (108 - 140)	3-1/4 – 4-1/2 (83 – 114)	4-1/2 - 6 (114 – 152)	4 – 4-1/2 (102 – 114)	4-1/2 – 7-1/4 (114 – 184)
KHC capsule size		-	-	3/8" Small	3/8" Large	1/2" Small	1/2" Large	5/8" Small	5/8" Large	3/4" Small	3/4" Large
Drilled hole depth[2]	Hole condition 1	h_1	in. (mm)	h_{nom} + 5/8 (h_{nom} + 16)		h_{nom} + 3/4 (h_{nom} + 19)		h_{nom} + 1-5/8 (h_{nom} + 41)		h_{nom} + 1-7/8 (h_{nom} + 48)	
	Hole condition 2	h_2	in. (mm)	h_{nom} + 3/8 (h_{nom} + 10)		h_{nom} + 3/8 (h_{nom} + 10)		h_{nom} + 3/8 (h_{nom} + 10)		h_{nom} + 3/8 (h_{nom} + 10)	
Minimum anchor spacing		s_{min}	in. (mm)	3 (76)		3 (76)		4 (102)		4 (102)	
Minimum edge distance		c_{min}	in. (mm)	1-1/2 (38)		1-3/4 (44)		1-3/4 (44)		1-3/4 (44)	
Minimum concrete thickness		h_{min}	in. (mm)	h_1 + 1-1/4 (h_1 + 32)		h_1 + 1-1/4 (h_1 + 32)		h_1 + 1-1/4 (h_1 + 32)		h_1 + 1-1/2 (h_1 + 38)	

[1]Nominal embedment (h_{nom}) = effective embedment (h_{ef}).
[2]See Figure 2 for description of drilled hole conditions.

Figure 2. Drilled hole conditions for Kwik-X Dual Action Anchors

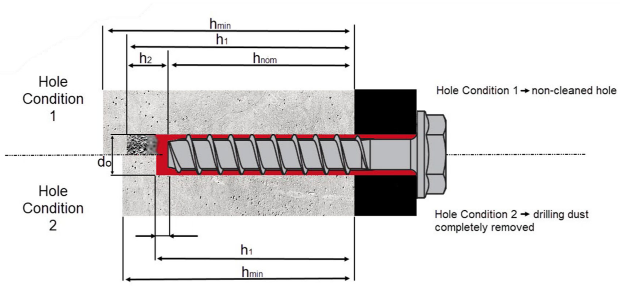


Table 2. Hilti Kwik-X Dual Action Anchor Carbon Steel design strength with concrete / bond failure in uncracked concrete[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)	f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)
3/8	2-1/2 (64)	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)
	3-1/4 (83)	4,570 (20.3)	5,005 (22.3)	5,780 (25.7)	6,510 (29.0)	9,845 (43.8)	10,785 (48.0)	12,450 (55.4)	14,025 (62.4)
	4-1/2 (114)	7,445 (33.1)	7,960 (35.4)	8,380 (37.3)	9,015 (40.1)	16,035 (71.3)	17,140 (76.2)	18,055 (80.3)	19,420 (86.3)
1/2	3 (76)	4,055 (18.0)	4,440 (19.8)	5,125 (22.8)	6,280 (27.9)	8,730 (38.8)	9,565 (42.5)	11,040 (49.1)	13,525 (60.2)
	4-1/4 (108)	6,835 (30.4)	7,485 (33.3)	8,645 (38.5)	10,585 (47.1)	14,720 (65.5)	16,125 (71.7)	18,620 (82.8)	22,805 (101.4)
	5-1/2 (140)	10,060 (44.7)	11,020 (49.0)	12,725 (56.6)	13,970 (62.2)	21,670 (96.4)	23,740 (105.6)	27,410 (121.9)	30,090 (134.0)
5/8	3-1/4 (83)	4,570 (20.3)	5,005 (22.3)	5,780 (25.7)	7,080 (31.5)	9,845 (43.8)	10,785 (48.0)	12,450 (55.4)	15,250 (67.8)
	4 (102)	6,240 (27.8)	6,835 (30.4)	7,895 (35.1)	9,665 (43.0)	13,440 (59.8)	14,725 (65.5)	17,000 (75.6)	20,820 (92.6)
	5 (127)	8,720 (38.8)	9,555 (42.5)	11,030 (49.1)	13,510 (60.1)	18,785 (83.6)	20,575 (91.5)	23,760 (105.7)	29,100 (129.4)
	6 (152)	11,465 (51.0)	12,560 (55.9)	14,500 (64.5)	17,760 (79.0)	24,690 (109.8)	27,045 (120.3)	31,230 (138.9)	38,250 (170.1)
3/4	4 (102)	6,240 (27.8)	6,835 (30.4)	7,895 (35.1)	9,665 (43.0)	13,440 (59.8)	14,725 (65.5)	17,000 (75.6)	20,820 (92.6)
	5 (127)	8,720 (38.8)	9,555 (42.5)	11,030 (49.1)	13,510 (60.1)	18,785 (83.6)	20,575 (91.5)	23,760 (105.7)	29,100 (129.4)
	6-1/4 (159)	12,190 (54.2)	13,350 (59.4)	15,415 (68.6)	18,880 (84.0)	26,250 (116.8)	28,755 (127.9)	33,205 (147.7)	40,665 (180.9)
	7-1/4 (184)	15,225 (67.7)	16,680 (74.2)	19,260 (85.7)	23,590 (104.9)	32,795 (145.9)	35,925 (159.8)	41,485 (184.5)	50,805 (226.0)

[1] See PTG Ed. 22 Section 3.1.8 to convert design strength value to ASD value.

[2] Linear interpolation between embedment depths and concrete compressive strengths are not permitted.

[3] Compare tabular values to the steel values in Table 4. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.

[4] Data is for max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

[5] Tabular values are for dry and water saturated concrete conditions.

[6] Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.

[7] Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.

[8] Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.

Table 3. Hilti Kwik-X Dual Action Carbon Steel Anchor design strength with concrete / bond failure in cracked concrete[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)	f'c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)
3/8	2-1/2 (64)	2,000 (8.9)	2,050 (9.1)	2,135 (9.5)	2,260 (10.1)	4,310 (19.2)	4,420 (19.7)	4,600 (20.5)	4,870 (21.7)
	3-1/4 (83)	3,235 (14.4)	3,545 (15.8)	4,095 (18.2)	5,015 (22.3)	6,970 (31.0)	7,640 (34.0)	8,820 (39.2)	10,800 (48.0)
	4-1/2 (114)	5,275 (23.5)	5,780 (25.7)	6,670 (29.7)	7,790 (34.7)	11,360 (50.5)	12,445 (55.4)	14,370 (63.9)	16,780 (74.7)
1/2	3 (76)	2,870 (12.8)	3,145 (14.0)	3,630 (16.1)	4,450 (19.8)	6,185 (27.5)	6,775 (30.1)	7,820 (34.8)	9,580 (42.6)
	4-1/4 (108)	4,840 (21.5)	5,305 (23.6)	6,125 (27.2)	7,500 (33.4)	10,425 (46.4)	11,420 (50.8)	13,190 (58.7)	16,150 (71.8)
	5-1/2 (140)	7,125 (31.7)	7,805 (34.7)	9,015 (40.1)	11,040 (49.1)	15,350 (68.3)	16,815 (74.8)	19,415 (86.4)	23,780 (105.8)
5/8	3-1/4 (83)	3,235 (14.4)	3,545 (15.8)	4,095 (18.2)	5,015 (22.3)	6,970 (31.0)	7,640 (34.0)	8,820 (39.2)	10,800 (48.0)
	4 (102)	4,420 (19.7)	4,840 (21.5)	5,590 (24.9)	6,845 (30.4)	9,520 (42.3)	10,430 (46.4)	12,040 (53.6)	14,750 (65.6)
	5 (127)	6,175 (27.5)	6,765 (30.1)	7,815 (34.8)	9,570 (42.6)	13,305 (59.2)	14,575 (64.8)	16,830 (74.9)	20,610 (91.7)
	6 (152)	8,120 (36.1)	8,895 (39.6)	10,270 (45.7)	12,580 (56.0)	17,490 (77.8)	19,160 (85.2)	22,120 (98.4)	27,095 (120.5)
3/4	4 (102)	4,420 (19.7)	4,840 (21.5)	5,590 (24.9)	6,845 (30.4)	9,520 (42.3)	10,430 (46.4)	12,040 (53.6)	14,750 (65.6)
	5 (127)	6,175 (27.5)	6,765 (30.1)	7,815 (34.8)	9,570 (42.6)	13,305 (59.2)	14,575 (64.8)	16,830 (74.9)	20,610 (91.7)
	6-1/4 (159)	8,635 (38.4)	9,455 (42.1)	10,920 (48.6)	13,375 (59.5)	18,595 (82.7)	20,370 (90.6)	23,520 (104.6)	28,805 (128.1)
	7-1/4 (184)	10,785 (48.0)	11,815 (52.6)	13,645 (60.7)	16,710 (74.3)	23,230 (103.3)	25,445 (113.2)	29,385 (130.7)	35,990 (160.1)

[1]See PTG Ed. 22 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]Compare tabular values to the steel values in Table 4. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.

[4]Data is for max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

[5]Tabular values are for dry and water saturated concrete conditions.

[6]Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.

[7]Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.

[8]Tabular values are for static loads only. Seismic design in not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tubular values in tension and shear by α_{seis} = 0.75. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

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

Nominal anchor diameter in.	Tensile[3] ϕN_{sa} lb (kN)	Shear[4] ϕV_{sa} lb (kN)	Seismic Shear[5] ϕV_{sa} lb (kN)
3/8	6,720 (29.9)	3,110 (13.8)	1,865 (8.3)
1/2	11,780 (52.4)	5,545 (24.7)	3,330 (14.8)
5/8	15,735 (70.0)	6,735 (30.0)	4,040 (18.0)
3/4	20,810 (92.6)	9,995 (44.5)	6,935 (30.8)

[1]See PTG Ed. 22 Section 3.1.8 to convert design strength value to ASD value.

[2]Hilti KH-EZ / KH-EZ CRC anchors are to be considered brittle 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 $\phi V_{sa} < \phi\, 0.60\, A_{se,V} f_{uta}$ as noted in ACI 318 Chapter 17. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

Figure 3. Hilti Kwik-X Dual Action SS316 Anchor installation conditions

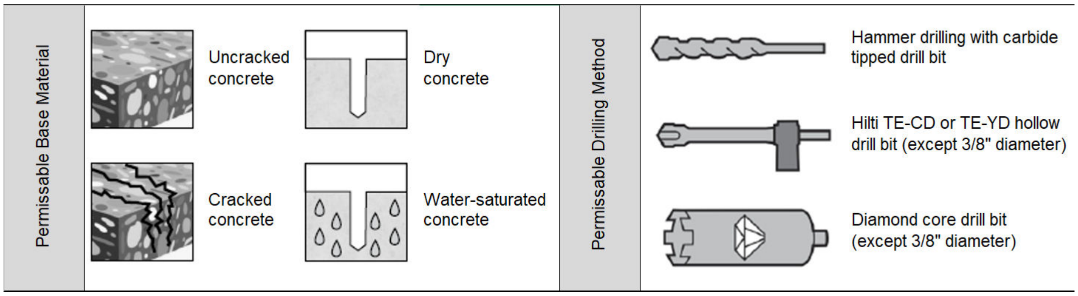


Table 5. Hilti Kwik-X Dual Action SS316 anchor installation specifications

Design information		Symbol	Units	Nominal anchor diameter (in.)		
				3/8		1/2
Drill hole diameter		d_o	in.	3/8		1/2
Minimum fixture hole diameter		d_f	in.	1/2		5/8
Nominal embedment[1]		h_{nom}	in (mm)	2-1/2 – 3 (64 – 76)	3 – 3-1/4 (76 – 83)	3 – 4-1/4 (76 – 108)
KHC Capsule size		-	-	3/8" Small	3/8" Large	1/2" Small
Drilled hole depth[2]	Hole condition 1	h_1	in. (mm)	N/A		N/A
	Hole condition 2	h_1	in. (mm)	h_{nom} + 3/8 (h_{nom}+ 10)		h_{nom} + 3/8 (h_{nom}+ 10)
Minimum anchor spacing		s_{min}	in. (mm)	3 (76)		3 (76)
Minimum edge distance		c_{min}	in. (mm)	1-1/2 (38)		1-3/4 (44)
Minimum concrete thickness		h_{min}	in. (mm)	h_1 + 1-1/4 (h_1 + 32)		h_1 + 1-1/4 (h_1 + 32)

[1]Nominal embedment (h_{nom}) = effective embedment (h_{ef}).
[2]See Figure 2 for description of drilled hole conditions.

Table 6. Steel Design Strength for Hilti KH-EZ SS316 Anchors[1,2,3]

Anchor Diameter in.	Tensile[4] ϕN_{sa} lb (kN)	Shear[5] ϕV_{sa} lb (kN)	Seismic Shear[6] ϕV_{sa} lb (kN)
3/8	9,820 (43.7)	2,830 (12.6)	2,830 (12.6)
1/2	15,490 (68.9)	3,115 (13.9)	3,115 (13.9)

[1]See PTG Ed. 22 Section 3.1.8 to convert design strength value to ASD value.
[2]Hilti KH-EZ SS316 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 $\phi V_{sa} < \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318 Chapter 17.
[6]See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

Table 7. Hilti Kwik-X Dual Action SS316 anchor design strength with concrete / bond failure in uncracked concrete[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 Mpa) lb (kN)	f'_c = 3000 psi (20.7 Mpa) lb (kN)	f'_c = 4000 psi (27.6 Mpa) lb (kN)	f'_c = 6000 psi (41.4 Mpa) lb (kN)	f'_c = 2500 psi (17.2 Mpa) lb (kN)	f'_c = 3000 psi (20.7 Mpa) lb (kN)	f'_c = 4000 psi (27.6 Mpa) lb (kN)	f'_c = 6000 psi (41.4 Mpa) lb (kN)
3/8	2-1/2 (64)	3,085 (13.7)	3,375 (15.0)	3,900 (17.3)	4,725 (21.0)	6,640 (29.5)	7,275 (32.4)	8,400 (37.4)	10,180 (45.3)
	3-1/4 (83)	4,405 (19.6)	4,720 (21.0)	5,265 (23.4)	6,145 (27.3)	9,490 (42.2)	10,170 (45.2)	11,345 (50.5)	13,235 (58.9)
1/2[9]	3 (76)	4,055 (18.0)	4,440 (19.8)	5,125 (22.8)	6,280 (27.9)	8,730 (38.8)	9,565 (42.5)	11,040 (49.1)	13,525 (60.2)
	4-1/4 (108)	5,925 (26.4)	6,490 (28.9)	7,490 (33.3)	9,175 (40.8)	12,760 (56.8)	13,975 (62.2)	16,135 (71.8)	19,765 (87.9)

Table 8. Hilti Kwik-X Dual Action SS316 anchor design strength with concrete / bond failure in cracked concrete[1,2,3,4,5,6,7,8,9]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 Mpa) lb (kN)	f'_c = 3000 psi (20.7 Mpa) lb (kN)	f'_c = 4000 psi (27.6 Mpa) lb (kN)	f'_c = 6000 psi (41.4 Mpa) lb (kN)	f'_c = 2500 psi (17.2 Mpa) lb (kN)	f'_c = 3000 psi (20.7 Mpa) lb (kN)	f'_c = 4000 psi (27.6 Mpa) lb (kN)	f'_c = 6000 psi (41.4 Mpa) lb (kN)
3/8	2-1/2 (64)	1,665 (7.4)	1,760 (7.8)	1,925 (8.6)	2,185 (9.7)	3,585 (15.9)	3,795 (16.9)	4,150 (18.5)	4,705 (20.9)
	3-1/4 (83)	3,200 (14.2)	3,385 (15.1)	3,700 (16.5)	4,195 (18.7)	6,890 (30.6)	7,290 (32.4)	7,970 (35.5)	9,035 (40.2)
1/2[9]	3 (76)	2,870 (12.8)	3,145 (14.0)	3,630 (16.1)	4,450 (19.8)	6,185 (27.5)	6,775 (30.1)	7,820 (34.8)	9,580 (42.6)
	4-1/4 (108)	4,840 (21.5)	5,305 (23.6)	6,125 (27.2)	7,500 (33.4)	10,425 (46.4)	11,420 (50.8)	13,190 (58.7)	16,150 (71.8)

1 See PTG Ed. 22 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 Compare tabular values to the steel values in Table 6. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.

4 Data is for temperature range A: Max. short term temperature = 130°F (54°C), max. long term temperature = 110°F (43°C). For temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C) multiply above values by 0.98. Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

5 Tabular values are for dry and water saturated concrete conditions.

6 Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.

7 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by la as follows:

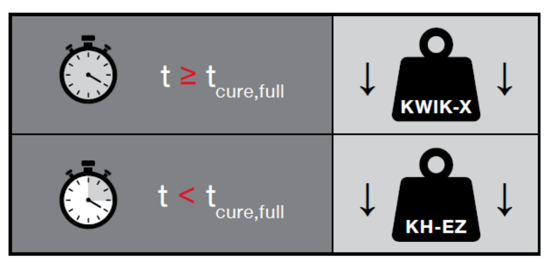
8 For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.

9 Tabular values are for static loads only. Seismic design in not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tubular values in tension and shear by a_{seis} = 0.75. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

The Kwik-X Dual Action Anchor system will provide greater load capacities with greater flexibility. This includes immediate loading in a vast range of temperatures. The amount of load capacity immediately available after installation of the Kwik-X Dual Action Anchor system will vary depending on the concrete temperature at the time of installation. As shown in Figure 3 below, in the very cold spectrum of temperatures the immediate load capacity available will be that of the Hilti KH-EZ / KH-EZ CRC KH-EZ SS316 screw anchor until the full cure time has elapsed. For the load capacity of the Hilti KH-EZ / KH-EZ CRC / KH-EZ SS316 screw anchor please refer to ESR-3027 or Section 3.3.6 or 3.3.7 of PTG Ed. 22.

Figure 4. Cure time and immediate load allowance

°C	°F	°C	°F	$t_{cure,full}$
-28 ... -10	-18 ... 14	5 ... 40	41 ... 104	24 h
-10 ... 5	14 ... 41	5 ... 40	41 ... 104	30 min
5 ... 40	41 ... 104	5 ... 40	41 ... 104	0.5 min



Design Data in Concrete per CSA A23.3

CSA A23.3 Annex D Design

This section contains the Limit State Design tables with un-factored characteristic loads and pre-calculated factored resistance tables based on the published loads in ICC Evaluation Services ESR-5065 and testing per ACI 355.4.

For a detailed explanation of the tables developed in accordance with CSA A23.3 Annex D, refer to Sections 3.1.7 and 3.1.8 of the 2022 PTG Ed. 22. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.ca.

Table 9. Hilti Kwik-X Dual Action Carbon Steel Anchor design information in hammer drilled and/or core drilled holes in accordance with CSA A23.3 Annex D[1]

Design Parameter		Symbol	Units	KH-EZ/KH-EZ CRC Anchor diameter (in.)					Ref A23.3
				3/8		1/2	5/8	3/4	
Nominal anchor diameter		d_a	mm	9.5		12.7	15.9	19.1	
Effective minimum embedment[2]		$h_{ef,min}$	mm	64	76	76	83	102	
Effective maximum embedment[2]		$h_{ef,max}$	mm	76	114	140	152	184	
Minimum concrete thickness[2]		h_{min}	mm	See Table1 and Figure 2 of this document					
Critical edge distance		c_{ac}	-	See ESR-5065, section 4.1.10					
Minimum edge distance		c_{min}	mm	38		44	44	44	
Minimum anchor spacing		s_{min}	mm	76		76	102	102	
Coeff. for factored concrete breakout resistance, uncracked concrete		$k_{c,uncr}$[3]	-	10					D.6.2.2
Coeff. for factored concrete breakout resistance, cracked concrete		$k_{c,cr}$[3]	-	7					D.6.2.2
Concrete material resistance factor		ϕ_c	-	0.65					8.4.2
Resistance modification factor fortension and shear, concrete failure modes, Condition B4		R_{conc}	-	100					D.5.3(c)
Minimum specified ultimate strength		f_{uta}	psi (N/mm^2)	120,300 (829)		112,540 (776)	90,180 (622)	81,600 (563)	
Effective tensile stress area		$A_{se,N}$	in^2 (mm^2)	0.086 (55.5)		0.161 (103.9)	0.268 (172.9)	0.392 (252.9)	
Steel embedment material resistance factor for reinforcement		ϕ_s	-	0.85					8.4.3
Resistance modification factor for tension, steel failure modes[4]		R	-	0.70					D.5.3
Resistance modification factor for shear, steel failure modes[4]		R	-	0.65					D.5.3
Factored steel resistance intension		N_{sar}	lb (kN)	6,150 (27.4)		10,780 (48.0)	14,405 (64.1)	19,050 (84.7)	D.6.1.2
Effective tensile stress area		V_{sar}	lb (kN)	2,865 (12.7)		5,110 (22.7)	6,200 (64.1)	9,205 (40.9)	D.7.1.2
Effective tensile stress area		$V_{sar,eq}$	lb (kN)	1,720 (7.7)		3,065 (13.6)	3,720 (16.5)	6,385 (28.4)	
Temperature Range[5]	Characteristic bond stress in cracked concrete[6]	τ_{cr}	psi (MPa)	1,045 (7.2)	2,000 (13.8)	1,900 (13.1)	1,800 (12.4)	1,700 (11.7)	D.6.5.2
	Characteristic bond stress in uncracked concrete[6]	τ_{uncr}	psi (MPa)	2,235 (15.4)		2,125 (14.7)	2,020 (13.9)	1,915 (13.2)	D.6.5.2
Reduction for seismic tension		$\alpha_{N.seis}$	-	1.00					
Permissible installation conditions	Resistance modification factor tension and shear, bond failure dry and water saturated concrete	Anchor category	-	1					D.5.3(c)
		$R_{dry,ws}$	-	1.00					

[1]Design information in this table is taken from ICC-ES ESR-5065 and converted for use with CSA A23.3 Annex D.

[2]See Table 1 and Figure 2 of this document.

[3]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.

[4]For use with the load combinations of CSA A23.3 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3 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.

[5]Temperature range A: Max. short term temperature = 130°F (54°C), max. long term temperature = 110°F (43°C). Temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

[6]Bond strength values corresponding to concrete compressive strength f'_c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'_c, between 2,500 psi (17.2 MPa) and 8,000 psi (55.2 MPa), the tabulated characteristic bond strength may be increased by a factor of $(f'_c/2,500)^n$ [for SI: $(f'_c / 17.2)^n$] where n is as follows: n = 0.38 and n= 0.50 for 3/8" and 1/2" respectively, in uncracked concrete, hammer drilling with carbide bit; n = 0.31 and n= 0.39 for 3/8" and 1/2" respectively, in cracked concrete, hammer drilling with carbide bit; n = 0.50 for 1/2" in uncracked and cracked concrete, diamond core bit drilling

Table 10. Hilti Kwik-X Dual Action Carbon Steel anchor factored resistance with concrete / bond failure in uncracked concrete[1,2,3,4,5,6,7,8,9]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - Nr				Shear - Vr			
		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)	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)
3/8	2-1/2 (64)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,675 (20.8)	6,615 (29.4)	7,395 (32.9)	8,100 (36.0)	9,355 (41.6)
	3-1/4 (83)	4,900 (21.8)	5,480 (24.4)	6,005 (26.7)	6,475 (28.8)	9,805 (43.6)	10,960 (48.8)	12,005 (53.4)	12,950 (57.6)
	4-1/2 (114)	7,910 (35.2)	8,235 (36.6)	8,510 (37.9)	8,965 (39.9)	15,825 (70.4)	16,475 (73.3)	17,025 (75.7)	17,930 (79.7)
1/2	3 (76)	4,345 (19.3)	4,860 (21.6)	5,325 (23.7)	6,145 (27.3)	8,695 (38.7)	9,720 (43.2)	10,650 (47.4)	12,295 (54.7)
	4-1/4 (108)	7,330 (32.6)	8,195 (36.5)	8,975 (39.9)	10,365 (46.1)	14,660 (65.2)	16,390 (72.9)	17,955 (79.9)	20,730 (92.2)
	5-1/2 (140)	10,790 (48.0)	12,065 (53.7)	13,190 (58.7)	13,890 (61.8)	21,580 (96.0)	24,130 (107.3)	26,375 (117.3)	27,780 (123.6)
5/8	3-1/4 (83)	4,900 (21.8)	5,480 (24.4)	6,005 (26.7)	6,930 (30.8)	9,805 (43.6)	10,960 (48.8)	12,005 (53.4)	13,865 (61.7)
	4 (102)	6,690 (29.8)	7,480 (33.3)	8,195 (36.5)	9,465 (42.1)	13,385 (59.5)	14,965 (66.6)	16,395 (72.9)	18,930 (84.2)
	5 (127)	9,355 (41.6)	10,455 (46.5)	11,455 (51.0)	13,225 (58.8)	18,705 (83.2)	20,915 (93.0)	22,910 (101.9)	26,455 (117.7)
	6 (152)	12,295 (54.7)	13,745 (61.1)	15,060 (67.0)	17,385 (77.3)	24,590 (109.4)	27,490 (122.3)	30,115 (134.0)	34,775 (154.7)
3/4	4 (102)	6,690 (29.8)	7,480 (33.3)	8,195 (36.5)	9,465 (42.1)	13,385 (59.5)	14,965 (66.6)	16,395 (72.9)	18,930 (84.2)
	5 (127)	9,355 (41.6)	10,455 (46.5)	11,455 (51.0)	13,225 (58.8)	18,705 (83.2)	20,915 (93.0)	22,910 (101.9)	26,455 (117.7)
	6-1/4 (159)	13,070 (58.1)	14,615 (65.0)	16,010 (71.2)	18,485 (82.2)	26,140 (116.3)	29,230 (130.0)	32,020 (142.4)	36,970 (164.5)
	7-1/4 (184)	16,330 (72.6)	18,260 (81.2)	20,000 (89.0)	23,095 (102.7)	32,660 (145.3)	36,515 (162.4)	40,000 (177.9)	46,190 (205.5)

1 See PTG Ed. 22 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 Compare tabular values to the steel values in Table 12. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.

4 Data is for max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C).

5 Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

6 Tabular values are for dry and water saturated concrete conditions.

7 Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.

8 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.

9 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.

Table 11. Hilti Kwik-X Dual Action Carbon Steel anchor factored resistance with concrete / bond failure in cracked concrete[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - N_r				Shear - V_r			
		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)	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)
3/8	2-1/2 (64)	2,045 (9.1)	2,110 (9.4)	2,160 (9.6)	2,250 (10.0)	4,085 (18.2)	4,215 (18.8)	4,325 (19.2)	4,505 (20.0)
	3-1/4 (83)	3,430 (15.3)	3,835 (17.1)	4,200 (18.7)	4,850 (21.6)	6,860 (30.5)	7,670 (34.1)	8,405 (37.4)	9,705 (43.2)
	4-1/2 (114)	5,590 (24.9)	6,250 (27.8)	6,845 (30.5)	7,755 (34.5)	11,180 (49.7)	12,500 (55.6)	13,695 (60.9)	15,510 (69.0)
1/2	3 (76)	3,045 (13.5)	3,400 (15.1)	3,725 (16.6)	4,305 (19.1)	6,085 (27.1)	6,805 (30.3)	7,455 (33.2)	8,605 (38.3)
	4-1/4 (108)	5,130 (22.8)	5,735 (25.5)	6,285 (28.0)	7,255 (32.3)	10,260 (45.6)	11,475 (51.0)	12,570 (55.9)	14,510 (64.6)
	5-1/2 (140)	7,555 (33.6)	8,445 (37.6)	9,250 (41.1)	10,680 (47.5)	15,105 (67.2)	16,890 (75.1)	18,500 (82.3)	21,365 (95.0)
5/8	3-1/4 (83)	3,430 (15.3)	3,835 (17.1)	4,200 (18.7)	4,850 (21.6)	6,860 (30.5)	7,670 (34.1)	8,405 (37.4)	9,705 (43.2)
	4 (102)	4,685 (20.8)	5,240 (23.3)	5,740 (25.5)	6,625 (29.5)	9,370 (41.7)	10,475 (46.6)	11,475 (51.0)	13,250 (58.9)
	5 (127)	6,545 (29.1)	7,320 (32.6)	8,020 (35.7)	9,260 (41.2)	13,095 (58.2)	14,640 (65.1)	16,035 (71.3)	18,520 (82.4)
	6 (152)	8,605 (38.3)	9,620 (42.8)	10,540 (46.9)	12,170 (54.1)	17,215 (76.6)	19,245 (85.6)	21,080 (93.8)	24,340 (108.3)
3/4	4 (102)	4,685 (20.8)	5,240 (23.3)	5,740 (25.5)	6,625 (29.5)	9,370 (41.7)	10,475 (46.6)	11,475 (51.0)	13,250 (58.9)
	5 (127)	6,545 (29.1)	7,320 (32.6)	8,020 (35.7)	9,260 (41.2)	13,095 (58.2)	14,640 (65.1)	16,035 (71.3)	18,520 (82.4)
	6-1/4 (159)	9,150 (40.7)	10,230 (45.5)	11,205 (49.8)	12,940 (57.6)	18,300 (81.4)	20,460 (91.0)	22,410 (99.7)	25,880 (115.1)
	7-1/4 (184)	11,430 (50.8)	12,780 (56.9)	14,000 (62.3)	16,165 (71.9)	22,865 (101.7)	25,560 (113.7)	28,000 (124.6)	32,335 (143.8)

[1] See PTG Ed. 22 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] Compare tabular values to the steel values in Table 12. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.

[4] Data is for max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

[5] Tabular values are for dry and water saturated concrete conditions.

[6] Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.

[7] Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.

[8] Tabular values are for static loads only. Seismic design in not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tubular values in tension and shear by a_{seis} = 0.75. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

Table 12. Steel resistance for Hilti KH-EZ / KH-EZ CRC carbon steel 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)
3/8	6,150 (27.4)	2,865 (12.7)	1,720 (7.7)
1/2	10,780 (48.0)	5,110 (22.7)	3,065 (13.6)
5/8	14,405 (64.1)	6,200 (27.6)	3,720 (16.5)
3/4	19,050 (84.7)	9,205 (40.9)	6,385 (28.4)

[1] See PTG Ed. 22 Section 3.1.8 to convert design strength value to ASD value.

[2] Hilti KH-EZ / KH-EZ CRC carbon steel screw anchors are to be considered brittle steel elements.

[3] Tensile $N_{sar} = A_{se,N}\ \phi s\ f_{uta}\ R$ as noted in CSA A23.3 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 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 Annex D. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

Table 13. Hilti Kwik-X Dual Action SS316 anchor design information in hammer drilled and/or core drilled holes in accordance with CSA A23.3 Annex D[1]

Design parameter		Symbol	Units	Nominal anchor diameter (in.)			Ref A23.3
				3/8		1/2	
Nominal anchor diameter		d_a	mm	9.5		12.7	
Effective minimum embedment[2]		$h_{ef,min}$	mm	64	76	76	
Effective maximum embedment[2]		$h_{ef,max}$	mm	76	83	108	
Min. concrete thickness[2]		h_{min}	mm	See Table 1 and Figure 2 of this document			
Critical edge distance		c_{ac}	-	See ESR-5065, section 4.1.10			
Minimum edge distance		c_{min}	mm	38		45	
Minimum anchor spacing		s_{min}	mm	76		76	
Coeff. for factored conc. breakout resistance, uncracked concrete		$k_{c,uncr}$[3]	-	10.0			D.6.2.2
Coeff. for factored conc. breakout resistance, cracked concrete		$k_{c,cr}$[3]	-	7.0			D.6.2.2
Concrete material resistance factor		ϕ_c	-	0.65			8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B[4]		R_{conc}	-	1.00			D.5.3 (c)
Minimum specified ultimate strength		f_{uta}	psi (N/mm^2)	139,300 (961)		120,100 (828)	
Effective tensile stress area		$A_{se,N}$	in^2 (mm^2)	0.094 (60.8)		0.172 (111.2)	
Steel embedment material resistance factor for reinforcement.		ϕ_s	-	0.85			8.4.3
Resistance modification factor for tension, steel failure modes[4]		R	-	0.80			D.5.3
Resistance modification factor for shear, steel failure mode[4]		R	-	0.75			D.5.3
Factored steel resistance in tension		N_{sar}	lb (kN)	8,905 (39.6)		14,045 (62.5)	D.6.1.2
Effective tensile stress area		V_{sar}	lb (kN)	2,775 (12.3)		3,055 (13.6)	D.7.1.2
Effective tensile stress area		$V_{sar,eq}$	lb (kN)	2,775 (12.3)		3,055 (13.6)	
Carbide Bit							
Temp. range A[5]	Characteristic bond stress in cracked concrete[6]	τ_{cr}	psi (MPa)	870 (6.0)	1,285 (8.9)	1,240 (8.6)	D.6.5.2
	Characteristic bond stress in uncracked concrete[6]	τ_{uncr}	psi (MPa)	1,770 (12.2)		1,365 (9.4)	D.6.5.2
Temp. range B[5]	Characteristic bond stress in cracked concrete[6]	τ_{cr}	psi (MPa)	850 (5.9)	1,255 (8.7)	1,215 (8.4)	D.6.5.2
	Characteristic bond stress in uncracked concrete[6]	τ_{uncr}	psi (MPa)	1,730 (11.9)		1,330 (9.2)	D.6.5.2
Reduction for seismic tension		$\alpha_{N,seis}$	-	1.00			
Diamond Core Drill Bit							
Temp. range A[5]	Characteristic bond stress in cracked concrete[6]	τ_{cr}	psi (MPa)	N/A		1,005 (6.9)	D.6.5.2
	Characteristic bond stress in uncracked concrete[6]	τ_{uncr}	psi (MPa)	N/A		1,295 (8.9)	D.6.5.2
Temp. range B[5]	Characteristic bond stress in cracked concrete[6]f	τ_{cr}	psi (MPa)	N/A		980 (6.8)	D.6.5.2
	Characteristic bond stress in uncracked concrete[6]	τ_{uncr}	psi (MPa)	N/A		1,265 (8.7)	D.6.5.2
Reduction for seismic tension		$\alpha_{N,seis}$	-	1.00			
Carbide Bit or Diamond Core Drill Bit							
Permissible installation conditions	Resistance modification factor tension & shear, bond failure dry and water saturated concrete	Anchor category	-	1			D.5.3 (c)
		$R_{dry,ws}$	-	1.00			

[1]Design information in this table is taken from ICC-ES ESR-5065 and converted for use with CSA A23.3 Annex D.

[2]See Table 1 and Figure 2 of this document.

[3]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.

[4]For use with the load combinations of CSA A23.3 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3 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.

[5]Temperature range A: Max. short term temperature = 130°F (54°C), max. long term temperature = 110°F (43°C). Temperature range B: Max. short term temperature = 176°F (80°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

[6]Bond strength values corresponding to concrete compressive strength f'_c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'_c, between 2,500 psi (17.2 MPa) and 8,000 psi (55.2 MPa), the tabulated characteristic bond strength may be increased by a factor of $(f'_c/2{,}500)^n$ [for SI: $(f'_c / 17.2)^n$] where n is as follows: n = 0.38 and n= 0.50 for 3/8" and 1/2" respectively, in uncracked concrete, hammer drilling with carbide bit; n = 0.31 and n= 0.39 for 3/8" and 1/2" respectively, in cracked concrete, hammer drilling with carbide bit; n = 0.50 for 1/2" in uncracked and cracked concrete, diamond core bit drilling

Table 14. Hilti Kwik-X SS316 Dual Action anchor factored resistance with concrete / bond failure in uncracked concrete[1,2,3,4,5,6,7,8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - N_r				Shear - V_r			
		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)	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)
3/8	2-1/2 (64)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,665 (20.8)	3,305 (14.7)	3,695 (16.4)	4,050 (18.0)	4,665 (20.8)
	3-1/4 (83)	4,660 (20.7)	5,075 (22.6)	5,440 (24.2)	6,065 (27.0)	9,325 (41.5)	10,150 (45.1)	10,875 (48.4)	12,135 (54.0)
1/2[9]	3 (76)	4,345 (19.3)	4,860 (21.6)	5,325 (23.7)	6,145 (27.3)	8,695 (38.7)	9,720 (43.2)	10,650 (47.4)	12,295 (54.7)
	4-1/4 (108)	6,380 (28.4)	7,135 (31.7)	7,815 (34.8)	9,025 (40.1)	12,760 (56.8)	14,270 (63.5)	15,630 (69.5)	18,050 (80.3)

1 See PTG Ed. 22 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 Compare tabular values to the steel values in Table 16. The lesser of the values is to be used for the design. Tables do not consider effects of edge distance, spacing, or concrete thickness. Use Hilti PROFIS Engineering design software for designs that require additional design considerations.
4 Data is for max. short term temperature = 130°F (54°C), max. long term temperature = 110°F (43°C). Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
5 Tabular values are for dry and water saturated concrete conditions.
6 Tabular values are for short term loads only. For sustained loads including overhead use, see PTG Ed. 22 Section 3.1.8.
7 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.51. For all-lightweight, λ_a = 0.45.
8 Tabular values are for static loads only. Seismic design in not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tubular values in tension and shear by α_{seis} = 0.75. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.
9 Tabular values are for holes drilled in concrete with carbide tipped hammer drill bit. For diamond core drilling with 1/2" diameter anchors only, multiply uncracked concrete tabular values by 0.95 and cracked concrete tabular values by 0.90.

Table 15. Hilti Kwik-X SS316 Dual Action anchor factored resistance with concrete / bond failure in cracked concrete[1, 2, 3, 4, 5, 6, 7, 8]

Nominal anchor diameter in.	Effective embedment in. (mm)	Tension - N_r				Shear - V_r			
		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)	f'_u = 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)
3/8	2-1/2 (64)	1,745 (7.8)	1,870 (8.3)	1,980 (8.8)	2,165 (9.6)	1,745 (7.8)	1,870 (8.3)	1,980 (8.8)	2,165 (9.6)
	3-1/4 (83)	3,350 (14.9)	3,590 (16.0)	3,800 (16.9)	4,150 (18.5)	6,700 (29.8)	7,180 (31.9)	7,595 (33.8)	8,305 (36.9)
1/2 9	3 (76)	3,045 (13.5)	3,400 (15.1)	3,725 (16.6)	4,305 (19.1)	6,085 (27.1)	6,805 (30.3)	7,455 (33.2)	8,605 (38.3)
	4-1/4 (108)	5,130 (22.82)	5,735 (25.52)	6,285 (27.95)	7,255 (32.28)	10,260 (45.64)	11,475 (51.03)	12,570 (55.90)	14,510 (64.55)

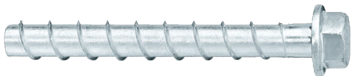
Table 16. Steel resistance for Hilti Kwik-X SS316 screw anchor[1,2]

Nominal anchor diameter in.	Tensile[3] N_{sar} lb (kN)	Shear[4] V_{sar} lb (kN)	Seismic Shear[5] $V_{sar,eq}$ lb (kN)
3/8	7,855 (34.9)	2,450 (10.9)	2,450 (10.9)
1/2	14,045 (62.5)	3,055 (13.6)	3,055 (13.6)

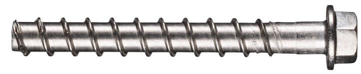
1 See PTG Ed. 22 Section 3.1.8 to convert design strength value to ASD value.
2 Hilti KH-EZ carbon steel screw anchors are to be considered brittle steel elements.
3 Tensile $N_{sar} = A_{se,N}$ ϕs f_{uta} R as noted in CSA A23.3 Annex D.
4 Shear determined by static shear tests with V_{sar} < 0.6 $A_{se,v}$ ϕs f_{uta} R as noted in CSA A23.3 Annex D.
5 Seismic shear values determined by seismic shear tests with $V_{sar,eq}$ < 0.60 $A_{se,V}$ ϕs f_{uta} R as noted in CSA A23.3 Annex D. See PTG Ed. 22 Section 3.1.8 for additional information on seismic applications.

Product Portfolio

Hilti KHC Kwik-X Capsule


Hilti KH-EZ Screw Anchor


Hilti KH-EZ CRC Screw Anchor


Hilti KH-EZ SS316 Screw Anchor

Kwik-X Dual Action Anchor

Description	Hole diameter in.	Minimum Embedment	Maximum Embedment	Qty / Box
KHC Kwik-X Capsule 3/8" SMALL	3/8"	2-1/2	3	50
KHC Kwik-X Capsule 3/8" LARGE	3/8"	3	4-1/2	50
KHC Kwik-X Capsule 1/2" SMALL	1/2"	3	4-1/4	25
KHC Kwik-X Capsule 1/2" LARGE	1/2"	4-1/4	5-1/2	25
KHC Kwik-X Capsule 5/8" SMALL	5/8"	3-1/4	4-1/2	24
KHC Kwik-X Capsule 5/8" LARGE	5/8"	4-1/2	6	24
KHC Kwik-X Capsule 3/4" SMALL	3/4"	4	4-1/2	24
KHC Kwik-X Capsule 3/4" LARGE	3/4"	4-1/2	7-1/4	24

KH-EZ Screw Anchor

Description	Hole diameter in.	Minimum Embedment	Maximum Embedment	Qty / Box
KH-EZ 3/8"x3"	3/8"	2-1/2	3	50
KH-EZ 3/8"x3 1/2"	3/8"	2-1/2	3-1/2	50
KH-EZ 3/8"x4"	3/8"	2 -/2	4	50
KH-EZ 3/8"x5"	3/8"	2-1/2	5	30
KH-EZ 1/2"x3 1/2"	1/2"	3	3-1/4	25
KH-EZ 1/2"x4"	1/2"	3	4	25
KH-EZ 1/2"x4 1/2"	1/2"	3	4 1/2	25
KH-EZ 1/2"x5"	1/2"	3	5	25
KH-EZ 1/2"x6"	1/2"	3	6	25
KH-EZ 5/8"x3 1/2"	1/2"	3	3-1/2	15
KH-EZ 5/8"x4"	5/8"	3-1/4	4	15
KH-EZ 5/8"x5 1/2"	5/8"	3-1/4	5-1/2	15
KH-EZ 5/8"x6 1/2"	5/8"	3-1/4	6-1/2	15
KH-EZ 5/8"x8"	5/8"	3-1/4	8	15
KH-EZ 3/4"x4 1/2"	3/4"	4	4-1/2	10
KH-EZ 3/4"x5 1/2"	3/4"	4	5-1/2	10
KH-EZ 3/4"x7"	3/4"	4	7	10
KH-EZ 3/4"x8"	3/4"	4	8	10
KH-EZ 3/4"x9"	3/4"	4	9	10

KH-EZ CRC Screw Anchor

Description	Hole diameter in.	Minimum Embedment	Maximum Embedment	Qty / Box
KH-EZ CRC 3/8"x3"	3/8"	2-1/2	3	50
KH-EZ CRC 3/8"x4"	3/8"	2-1/2	4	50
KH-EZ CRC 3/8"x5"	3/8"	2-1/2	5	30
KH-EZ CRC 1/2"x4"	1/2"	3	4	25
KH-EZ CRC 1/2"x5"	1/2"	3	5	25
KH-EZ CRC 1/2"x6"	1/2"	3	6	25
KH-EZ CRC 5/8"x5 1/2"	5/8"	3-1/4	5-1/2	15
KH-EZ CRC 5/8"x6 1/2"	5/8"	3-1/4	6-1/2	15
KH-EZ CRC 5/8"x8"	5/8"	3-1/4	8	15
KH-EZ CRC 3/4"x5 1/2"	3/4"	4	5-1/2	10
KH-EZ CRC 3/4"x7"	3/4"	4	7	10
KH-EZ CRC 3/4"x9"	3/4"	4	9	10

KH-EZ SS316 Screw Anchor

Description	Hole Diameter	Minimum Embedment	Maximum Embedment	Qty / Box
KH-EZ SS316 3/8"x3"	3/8"	2 1/2	3	25
KH-EZ SS316 3/8"x4"	3/8"	2 1/2	4	25
KH-EZ SS316 3/8"x5"	3/8"	2 1/2	5	25
KH-EZ SS316 1/2"x4"	1/2"	3	4	12
KH-EZ SS316 1/2"x5"	1/2"	3	5	12

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