HCA COIL ANCHOR

Technical Supplement

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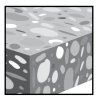
The following is a supplement to the North American Product Technical Guide Volume 2: Anchor Fastening Technical Guide, Edition 22 (PTG Ed. 22). Please refer to the publication in its entirety for complete details including data development, general suitability, installation, corrosion and spacing and eddistance guidelines.

PRODUCT DESCRIPTION

HCA Coil Anchors

Anchor System	Features and Benefits
HCA Coil Anchor 	• HCA hex bolt may be reused four times. A new coil is required for each reuse. • Bolt type anchor enables low profile fastenings. • Preassembled units allow quick production fastening. • Utilizes a disposable, low-cost expansion coil which minimizes reuse costs. • Heat treated Grade 5 specification, which provides high shear load capacity.  Uncracked concrete

MATERIAL SPECIFICATIONS

3/8-, 1/2-, 5/8- and 3/4-in. HCA meet the chemical requirements of AISI 1035 carbon steel and are heat treated for a minimum tensile strength of 120 ksi (830 MPa).
Coil is manufactured from carbon steel.
Anchor and coil are zinc plated in accordance with ASTM B633, SC 1.

Figure 1. HCA Specifications

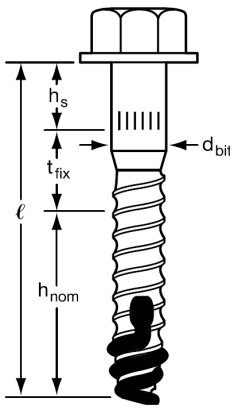


Table 1. Hilti HCA Coil Anchor Specification

Setting Information	Symbol	Units	Nominal Anchor Diameter			
			3/8	1/2	5/8	3/4
Nominal bit diameter	d_o	in.	3/8	1/2	5/8	3/4
Embedment mark[1]	h_s	in.	5/8	5/8	3/4	1
Anchor length minimum	ℓ	in.	2-1/4	3	3-1/2	4-1/2
Anchor length maximum	ℓ	in.	5	7	8	10
Fixture hole diameter	d_h	in.	7/16	9/16	11/16	13/16
Installation torque	T_{inst}	ft-lb	40	80	130	180
Minimum base material thickness	h	in.	the greater of 3 or 1.3 times h_{nom}			

[1]Maximum fixture thickness $t = \ell - (h_{nom} + h_s)$

Table 2. Hilti HCA allowable concrete and steel capacity (lb)[1]

Nominal anchor diameter in.	Nominal embedment in.	f'_c = 2,000 psi		f'_c = 4,000 psi		f'_c = 6,000 psi		Allowable steel strength[2]	
		Tension[3]	Shear	Tension[3]	Shear	Tension[3]	Shear	Tensile	Shear
3/8	1-1/2	650	850	920	1,205	990	1,475	4,375	2,255
	2	1,005	1,390	1,420	1,965	1,740	2,410		
1/2	2	1,005	1,515	1,420	2,145	1,740	2,410	7,775	4,005
	3	1,845	3,020	2,605	4,270	3,190	5,230		
5/8	2-3/8	1,300	2,175	1,835	3,075	2,250	3,765	12,150	6,260
	3-7/8	2,705	5,000	3,825	7,070	4,685	8,660		
3/4	3-1/4	2,080	3,915	2,940	5,540	3,600	6,780	17,495	9,010
	4-1/2	3,385	6,810	4,790	9,630	5,865	11,705		

[1]Allowable concrete capacities based on a safety factor of 4.
[2]Steel strength calculated using 0.33 f_{uta} $A_{nominal}$ for tension and 0.17 f_{uta} $A_{nominal}$ for shear.
[3]Reduce tension capacity by 20% for HCA Hex Head Bolts that are reused. Coils may not be reused.

Table 3. Hilti HCA ultimate concrete and steel capacity (lb)

Nominal anchor diameter in.	Nominal embedment in.	f'_c = 2,000 psi		f'_c = 4,000 psi		f'_c = 6,000 psi		Allowable steel strength[1,2]	
		Tension[2]	Shear	Tension[2]	Shear	Tension[2]	Shear	Tensile	Shear
3/8	1-1/2	2,610	3,410	3,690	4,825	4,515	5,910	13,255	7,950
	2	4,015	5,565	5,675	7,865	6,950	9,635		
1/2	2	4,015	6,065	5,675	8,575	6,950	10,505	23,560	14,135
	3	7,375	12,080	10,430	17,085	12,770	20,930		
5/8	2-3/8	5,195	8,700	7,345	12,305	9,000	15,070	36,815	22,090
	3-7/8	10,825	19,995	15,305	28,275	18,745	34,630		
3/4	3-1/4	8,315	15,660	11,760	22,150	14,400	27,125	53,015	31,810
	4-1/2	13,545	27,235	19,160	38,515	23,465	47,170		

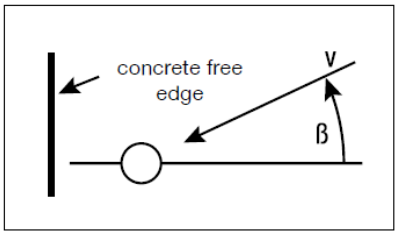
[1]Steel strength calculated using f_{uta} $A_{nominal}$ for tension and 0.6 f_{uta} $A_{nominal}$ for shear.
[2]Reduce tension capacity by 20% for HCA Hex Head Bolts that are reused. Coils may not be reused.

Table 4. Hilti HCA edge distance and anchor spacing guidelines[1,2]

Load Direction		Critical	Minimum	Influence Factor[3]
Spacing	Tension	3.0 h_{nom}	1.0 h_{nom}	f_{AN}= 0.70
	Shear	2.0 h_{nom}	1.0 h_{nom}	f_{AV}= 0.70
Edge Distance	Tension	1.5 h_{nom}	0.8 h_{nom}	f_{RN}= 0.75
	Shear ⊥ toward edge[4]	2.5 h_{nom}	1.0 h_{nom}	f_{RV1}= 0.25
	Shear II or ⊥ away from edge[4]	2.5 h_{nom}	1.0 h_{nom}	f_{RV2}= 0.50

[1]For edge and spacing distances between critical and minimum spacing/edge distances, use linear interpolation.
[2]Influence factors are cumulative.
[3]Influence factor at minimum spacing/edge distance. Influence factor at critical equals 1.0,
[4]For shear loads in between perpendicular toward edge and parallel with edge, use the following equation, $f_{RVß}$ = 0.25 / (cos ß + 0.5 sin ß) for 55° ≤ ß < 90°. For 0° ≤ ß < 55°, use influence factor for shear perpendicular toward edge. See Figure 2.

Figure 2. Oblique shear load towards edge



Combined shear and tension loading

$$\left(\frac{N_d}{N_{rec}}\right) + \left(\frac{V_d}{V_{rec}}\right) \leq 1.0$$

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

Table 5. HCA HEX Head[1,2]

Description	Bit dia.	Fixture thickness at minimum embedment	Box / qty
HCA 3/8 X 2-1/4	3/8	1/8	100
HCA 3/8 X 3	3/8	7/8	100
HCA 3/8 X 5	3/8	2-7/8	50
HCA 1/2 X 3	1/2	3/8	50
HCA 1/2 X 4	1/2	1-3/8	25
HCA 1/2 X 5-1/2	1/2	2-7/8	25
HCA 1/2 X 7	1/2	4-3/8	25
HCA 5/8 X 3-1/2	5/8	3/8	25
HCA 5/8 X 5	5/8	1-7/8	25
HCA 5/8 X 8	5/8	4-7/8	20
HCA 3/4 X 4-1/2	3/4	1/4	20
HCA 3/4 X 6	3/4	1-3/4	10
HCA 3/4 X 7	3/4	2-3/4	12
HCA 3/4 X 10	3/4	5-3/4	10

[1]All dimensions in inches.
[2]HCA Hex Head Bolts may be reused four (4) times.

Table 6. HCT Replacement Coil[1,2]

Description	Box qty.
HCT 3/8	100
HCT 1/2	100
HCT 5/8	100
HCT 3/4	50

[1]All dimensions in inches.
[2]HCT Replacement Coils may not be reused.

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The data contained in this literature was current as of the date of publication. Updates and changes may be made based on later testing. If verification is needed that the data is still current, please contact the Hilti Technical Support Specialists at 1-800-879-8000. All published load values contained in this literature represent the results of testing by Hilti or test organizations. Local base materials were used. Because of variations in materials, on-site testing is necessary to determine performance at any specific site. Printed in the United States.