

DESCRIPTION

The UCAN Hammer Cap is a new type of adhesive capsule for threaded rod and rebar dowelling that combines all the inherent safety and reliability of the capsule system with much easier and faster installation procedures. Thorough mixing of the components is accomplished by simply driving the dowel or rod directly through the capsule. Since no rotation of the rod is required during installation, rods of any shape may be installed.

FEATURES

- Stress free fastening
- Premeasured components in a sealed glass capsule
- High load capacity
- Suitable for reinforcing bars of any configuration
- Simple installation by hammering action only
- No angular-cut or pointed end required, installs with straight cut rebar and threaded rod
- Excellent resistance to vibration

TYPICAL APPLICATIONS

- Rebar and threaded rod dowelling
- Close spacing and edge distance applications
- Structural rehabilitation applications
- Replacement of damaged or incorrectly positioned cast-in anchors

LIMITATIONS

Not recommended for uncured concrete (less than 7 days of curing).

MATERIAL SPECIFICATIONS

Hammer cap capsule

- Quartz aggregate, hardener and resin

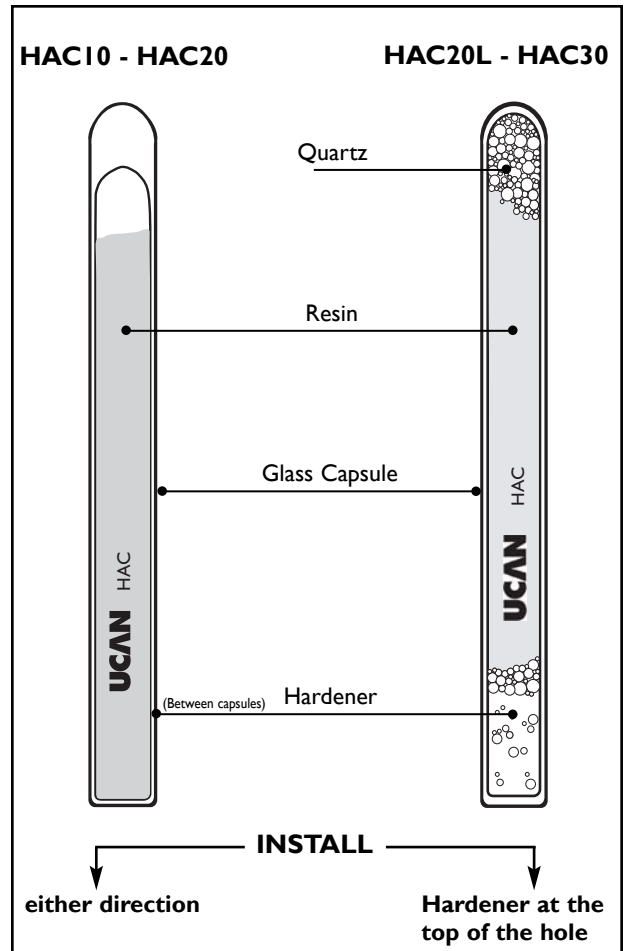
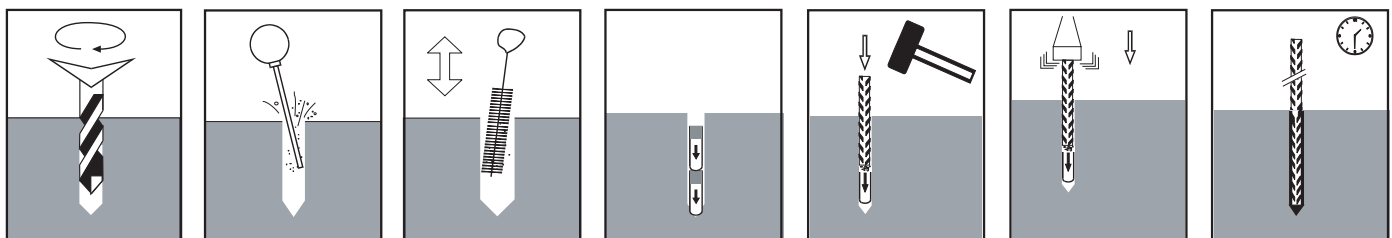
Reinforcing bar

- Conforms with CAN/CSA - G30.18-M92 (Supplied by others)

Threaded rods

- ASTM A 307 Grade 2 (UTS = 60,000 psi)
- ASTM A 193 Grade B7 (UTS = 125,000 psi)

INSTALLATION



HAMMER CAPSULE ADHESIVE ANCHOR

■ CAPSULE SPECIFICATIONS

Capsule Data			
Part Number	Capsule		
	Diameter	Length	Volume
	inch	inch	cu. inch
HAC 10	7/16	3-1/4	0.33
HAC12	1/2	4	0.50
HAC16	11/16	5	1.21
HAC20	27/32	4-3/4	1.88
HAC20L	27/32	6-3/4	2.32
HAC24	15/16	8-1/4	3.99
HAC30	1-5/16	10-7/16	11.66

Mechanical Properties (Cured Resin)

Bond Strength (in concrete)	7.3 MPa
Compressive Strength	160 MPa
Bending Strength	110 MPa
Tensile Strength	50 MPa

■ CURING TIMES

Temperature	Dry Hole Installation	Damp Hole Installation
Over 20° C (over 68 F)	10 minutes	30 minutes
10° - 20° C (50 - 68° F)	20 minutes	1 hour
0° - 10° C (32 - 50° F)	1 hour	3 hours
-5° - 0° C (23-32° F)	5 hours	n/a

Resistance against Chemicals

The resin compound in the chemical anchors is resistant to many chemicals. The tests were carried out in accordance with the ASTM C 581-87. For complete listing, see Appendix, 8.1 (Resistance to Chemicals) or please contact UCAN Technical Department.

INSTALLATION SPECIFICATIONS

Threaded Rod Dowelling					
Rod Size	Drilled Hole Diameter	Embedment Depth	Max. Installation Torque	Adhesive Required per inch Embedment	# of Hammer Caps Required
inch	inch	inch	ft. lbs	cu. inch/inch	
3/8	7/16	3-1/2	20	0.081	1 x HAC10
		7			2 x HAC10
1/2	9/16	4	30	0.110	1 x HAC12
		8			2 x HAC12
5/8	3/4	5	70	0.227	1 x HAC16
		10			2 x HAC16
3/4	7/8	5	150	0.284	1 x HAC20
		10-3/4			2 x HAC20
	1	6-3/4			1 x HAC20L
		13			2 x HAC20L
7/8	1	6-1/2	170	0.336	1 x HAC20L
		13			2 x HAC20L
1	1-1/8	8	210	0.418	1 x HAC24
		16			2 x HAC24
1-1/4	1-1/2	13	380	0.818	1 x HAC30
		26			2 x HAC30

NOTE:

- It is possible to combine capsules of different size in the hole to meet varied installation conditions (i.e. hole size and embedment). Contact UCAN to select the right capsule mix.
- To calculate the adhesive mortar volume required for a specific embedment, multiply the adhesive mortar volume listed above by the embedment required. Select the combination of capsules using the capsule volume chart. When selecting a combination of capsules, check the overall capsule length to be sure that it does not exceed the embedment depth and that the capsule diameter is smaller than the drilled hole size.

HAMMER CAPSULE ADHESIVE ANCHOR

Rebar Dowelling					
Metric Rebar	Drilled Hole Diameter	Approx. Overall Rebar Diameter	Adhesive Required per inch Embedment	Embedment	# of Hammer Caps Required
	inch	inch	cu. inch/inch	inch	
10M	9/16	1/2	0.115	4	1 x HAC12
				8	2 x HAC12
15M	3/4	11/16	0.167	5	1 x HAC16
				10	2 x HAC16
20M	61/64	13/16	0.261	5	1 x HAC20
				7-1/4	1 x HAC20L
25M	1-1/4	1-1/16	0.540	14-1/2	2 x HAC20L
				8	1 x HAC24
				16	2 x HAC24
30M	1-1/2	1-5/16	0.782	14	1 x HAC30
				28	2 x HAC30
35M	1-3/4	1-1/2	0.814	14	1 x HAC30
				28	2 x HAC30

NOTE:

- Variation in rebar diameter and pattern may alter the capsule type and quantity required, as noted above. If necessary, capsules of different sizes may be mixed, hole diameter may be different than marked on the capsules.
- Before inserting the glass capsule, check the viscosity of the resin. At room temperature, resin should run easily inside the capsule.
- Always have the arrow pointing towards the bottom of the hole when inserting capsule(s) into the hole.
- Mark embedment depth on the rod / rebar, prior to insertion, and hammer it in until the mark is flush with the concrete surface.
- Capsule(s) must be fully inserted in the hole to ensure correct mixing. It is possible to use a mix of different sized capsules in the hole to meet varied installation conditions. Please consult the UCAN Technical Department for proper procedures and feasibility.
- Reinforcing bar data is in compliance with CAN/CSA - G30.18-M92 and RSIC design guidelines.

NOTE:

Apply Safety Factor to ensure the working load per anchor does not exceed 1/4 of the tabulated ultimate load, under static loading conditions.

DESIGN DATA

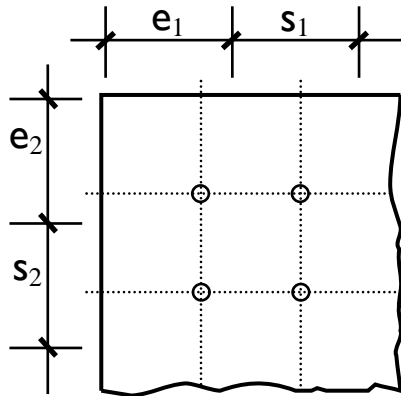
Average Ultimate Tension Loads for installations Using Threaded Rods in 4,500 psi (31 MPa) Concrete

Rod Size	Drilled Hole		Hammer Cap required	Average Ultimate Tension Loads in min. 31 MPa Concrete					
	Dia.	Embedment		A307 Threaded Rod		A325 Threaded Rod		304 SS Threaded Rod	
	inch	inch		lbs	kN	lbs	kN	lbs	kN
3/8	7/16	3-1/2	1 x HAC10	4,650	20.68	5,083	22.61	5,083	22.61
		7	2 x HAC10	4,650	20.68	9,300	41.37	6,588	29.30
1/2	9/16	4	1 x HAC12	8,514	37.87	11,900	52.93	11,900	52.93
		8	2 x HAC12	8,514	37.87	17,028	75.74	10,643	47.34
5/8	3/4	5	1 x HAC16	13,560	60.32	14,524	64.61	14,524	64.61
		10	2 x HAC16	13,560	60.32	27,120	120.06	19,210	85.45
3/4	7/8	5	1 x HAC20	18,636	82.90	18,636	82.90	18,636	87.90
		6-3/4	1 x HAC20L	20,040	89.14	22,875	101.75	22,875	101.75
		13	2 x HAC20L	20,040	89.14	40,080	178.28	28,390	126.28
7/8	1	6-1/2	1 x HAC20L	23,238	103.37	23,238	103.37	23,238	103.37
		13	2 x HAC20L	27,720	123.30	50,349	223.96	39,270	174.68
1	1-1/8	8	1 x HAC24	34,854	155.04	34,854	155.04	34,854	155.04
		16	2 x HAC24	36,360	161.74	72,720	323.48	51,510	229.13
1-1/4	1-1/2	13	1 x HAC30	58,140	258.62	69,230	307.95	69,230	307.95
		26	2 x HAC30	58,140	258.62	116,280	517.24	82,365	366.38

Average Ultimate Shear Loads for installations Using Threaded Rods in 4,350 psi (30 MPa) Concrete

Rod Size	Drilled Hole		Hammer Cap required	Average Ultimate Shear Loads in min. 30 MPa Concrete					
	Dia.	Min. Embedment		A307 Threaded Rod		A325 Threaded Rod		304 SS Threaded Rod	
	inch	inch		lbs	kN	lbs	kN	lbs	kN
3/8	7/16	3-1/2	1 x HAC10	2,790	12.41	5,580	24.82	3,953	17.58
1/2	9/16	4	1 x HAC12	5,108	22.72	10,217	45.45	7,237	32.19
5/8	3/4	5	1 x HAC16	8,136	36.19	16,272	72.38	11,526	51.27
3/4	7/8	5	1 x HAC20	12,024	53.49	24,048	106.97	17,034	75.77
7/8	1	6-1/2	1 x HAC20L	16,632	73.98	33,264	147.96	23,562	104.81
1	1-1/8	8	1 x HAC24	21,816	97.04	43,632	194.08	30,906	137.48
1-1/4	1-1/2	13	1 x HAC30	34,884	155.17	69,768	310.34	49,416	219.81

Load Reduction Factors for Anchor Groups with Reduced Spacing and Edge Distances



$(e_{min} = 0.5 \times e) < e < 1.0 \times h$		Reduction factor (f_e)
Recommended	1.0 x h	1.00
Minimum	0.5 x h	0.70
Reduced	Actual distance(s)	$0.6 \times e/h + 0.4$

$(s_{min} = 0.5 \times s) < s < 1.5 \times h$		Reduction factor (f_s)
Recommended	1.5 x h	1.00
Minimum	0.5 x h	0.70
Reduced	Actual distance(s)	$0.3 \times s/h + 0.55$

- h - embedment depth
- e - actual edge distance (e_1 ; e_2 ; etc.)
- s - actual center to center spacing (s_1 ; s_2 ; etc.)

The ultimate strength of a uniformly loaded anchor group is n (number of anchors in the group) times the strength of the most influenced anchor calculated as:

$$F_{(red)} = \{f_{s1} \times f_{s1} \times f_{s(n)} \times f_{e1} \times f_{e2} \times f_{e(n)}\} \times F_{Ultimate}$$

Average Ultimate Tension Loads for installations Using Metric Reinforcing Bars in 4,500 psi (31 MPa) Concrete

Metric Rebar	Drilled Hole		Hammer Cap required	Average Ultimate Tension Loads in min. 4,500 psi (31 MPa) Concrete					
	Dia.	Embedment		300 MPa		400 MPa		500 MPa	
				lbs	kN	lbs	kN	lbs	kN
10M	9/16	4	1 x HAC12	8,714	38.76	8,714	38.76	8,714	38.76
		8	2 x HAC12	9,105	40.50	12,140	54.00	15,175	67.50
15M	3/4	5	1 x HAC16	14,524	64.61	14,524	64.61	14,524	64.61
		10	2 x HAC16	18,210	81.00	24,280	108.00	29,048	129.21
20M	61/64	5	1 x HAC20	Grade 300R bars are normally available in sizes 10M and 15M	22,148	98.52	22,148	98.52	
		7-1/4	1 x HAC20L		25,840	114.94	25,840	114.94	
		14-1/2	2 x HAC20L		36,419	162.00	45,524	202.50	
25M	1-1/4	8	1 x HAC24		38,730	172.28	38,730	172.28	
		16	2 x HAC24		60,698	270.00	75,873	337.50	
30M	1-1/2	14	1 x HAC30		81,333	361.79	81,333	361.79	
		28	2 x HAC30		84,978	378.00	106,223	472.50	
35M	1-3/4	14	1 x HAC30		88,111	391.94	88,111	391.94	
		28	2 x HAC30		121,397	540.00	151,746	675.00	

■ SPECIFICATION

The following sample specification clause is arranged for inclusion in any one of a variety of master specification sections utilizing the Construction Specifications Canada (CSC) format. Brackets [...] indicate alternatives, data required, or the need to fill in information by the specifier.

ANCHORS (FASTENERS)

[*Grade, size and length*] Reinforcing Bar Dowels (Threaded Rods) shall be installed into [*diameter*] hole with **UCAN Hammer Cap Capsules**, supplied by UCAN Fastening Products. The hole depth shall be [*xx mm*] and must contain [*quantity*] HAC [*size*] sealed glass capsules [*diameter and length*].

Installation:

Anchor holes shall be drilled with a drill bit conforming to ANSI B94.12-77 Standards. The mixing of the Hammer Cap adhesive capsule components shall be accomplished by driving the straight cut reinforcing bar (threaded rod) into the capsule without rotation by hand with a hammer or mechanically by using a percussion hammer and power driver head. The installation shall follow the manufacturer's instructions.

Materials:

The UCAN Hammer Cap adhesive Capsule shall be a two part capsule containing the resin and the hardener and shall bear the manufacturer name, size.

Reinforcing Bars shall conform to CAN / CSA -G30.18 - M92 Standards.

Threaded rods shall be manufactured from [*Grade X, ASTM XXX*] steel. The rod shall be protected against corrosion by zinc plating [*or by other means of coating which provides equivalent protection*] to the thickness of [*microns*].