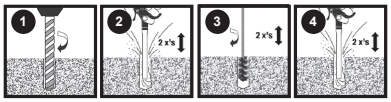
ULTRABOND® HYB-2CC Adhesive Anchor Installation Instructions

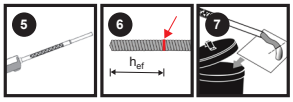
Installation Instructions

Drilling and Cleaning - Hammer Drilled Holes



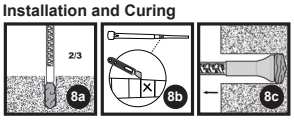
1. Using a rotary hammer drill and standard carbide bit, drill hole to specified diameter and depth required by the anchor rod or rebar. In case of standing water in drilled hole, all water must be removed from hole prior to cleaning.
2. Starting at the bottom of the anchor hole, blow out hole 2 cycles (2X) using oil free compressed air (minimum pressure of 87 psi (6 bar).
3. Select the correct wire brush for the hole diameter. Brush for 2 cycles (2X) in up/down twisting motion.
4. Repeat step 2, then confirm that hole is clean and free of dust.

Dispensing Preparation - Cartridge Systems

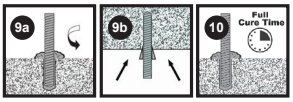


5. Check the expiration date on the cartridge to ensure it is not expired. **Do not use expired product!** Cartridge temperature must be between 41 °F - 104 °F (5 °C - 40 °C) when in use. Remove protective cap. Screw on proper, non-modified ATC mixing nozzle to cartridge. Ensure mixing element is inside the nozzle. Load cartridge into the correct dispensing tool.
6. Prior to inserting the anchor rod or rebar into the filled drilled hole, mark the embedment depth position on the anchor. Verify the anchor is straight and free of surface damage.
7. Dispense and waste 3 full strokes material to ensure uniform gray color before injecting into hole. Review and note the published working and cure times prior to injection of the mixed adhesive into the clean anchor hole.

Installation and Curing



8a. Fill hole 2/3 full with mixed adhesive starting at the bottom and slowly withdraw as hole fills using an extension tube as needed.
8b. If extension tube (Part # T16EXTL) is required, first cut the tip of the mixer nozzle at position "X."
8c. Use piston plugs for overhead and vertically inclined installations, all installations with drill hole depth > 10" (250 mm), with anchor rod 5/8" to 1-1/4" (M16 to M30) diameter and rebar sizes #5 to #10 (Ø14 to Ø32). Insert piston plug to the back of the drilled hole and inject as described above.



9a. Fully insert clean threaded rod or rebar with slow turning motion to the bottom of the hole. Observe gel (working) time.
9b. Ensure the anchor is fully seated at the bottom of the hole and that some adhesive has flowed from the hole and all around the top of the anchor. If not, the installation must be repeated. For horizontal, inclined or overhead installations, use wedges to support the anchor while curing.
10. Do not disturb, torque or apply load until full cure time has passed.

Reference Commentary

Drilling and Cleaning - Hammer Drilled Holes

Read and follow manufacturer's operations manual for the selected rotary drill.
R1. Drill bit should conform to ANSI B212.15. Refer to the installation tables for ULTRABOND HYB-2CC applicable hole diameters and embedment depth ranges. **CAUTION:** Always wear appropriate personal protection equipment (PPE) for eyes, ears and skin to help avoid inhalation of dust during the drilling and cleaning process. Refer to the Safety Data Sheet (SDS) for details prior to proceeding.
R2. **BLOW (2X) – BRUSH (2X) – BLOW (2X)**. The compressed air wand should be inserted to the bottom of the hole, have a minimum pressure of 87 psi (6 bar) and be moved in an up/down motion to remove debris.
R3. Refer to the installation tables for ULTRABOND HYB-2CC for wire brush selection. **CAUTION:** The brush should be clean and contact the walls of the hole. If it does not, the brush is either too worn or small and should be replaced with a new brush of the correct diameter. A brush extension must be used for drill hole depth > 6 inches (150 mm). The wire brush diameter must be checked periodically during use.
R4. After final blow step is completed, visually inspect the hole to confirm it is clean and free of dust, debris, ice, grease, oil or other foreign material. **NOTE:** If installation will be delayed for any reason, cover cleaned holes to prevent contamination.

Dispensing Preparation - Cartridge Systems

R5. Review Safety Data Sheet (SDS) before use. Review working and cure times. Consideration should be given to the reduced gel (working) time of the adhesive in warm temperatures. For permitted range of base matierial see the Cure Schedule. Always use a new mixing nozzle with new cartridges of adhesive and also for all work interruptions exceeding the published gel (working) time of the adhesive. Never re-use nozzles and do not attempt to force adhesive out of a hardened mixing nozzle. Shelf life of ULTRABOND HYB-2CC is 18 months when stored at temperatures between 41 °F (5 °C) and 77 °F (25 °C). **Optional**: Before attaching mixing nozzle, balance the cartridge by dispensing a small amount of material until both components are flowing evenly. For a cleaner environment, hand mix the two components and let cure prior to disposal in accordance with local regulations.
R6. Refer to the installation tables for ULTRABOND HYB-2CC applicable embedment depth ranges.
R7. Test bead of mixed adhesive must be uniform in color and free of streaks, as adhesive must be properly mixed in order to perform as published. Dispose of the test bead according to federal, state and local regulations. **CAUTION:** When changing cartridges, never re-use nozzles and do not attempt to force adhesive out of a hardened mixing nozzle. Leave the mixing nozzle attached to the cartridge upon completion of work.

Installation and Curing

NOTE: Building Code Requirements for Structural Concrete (ACI 318-14 and later) requires the Installer to be certified where adhesive anchors are to be installed in horizontal to vertically inclined (overhead) installations. The engineering drawings must be followed. For all applications not covered by this document, or for all installation questions, please contact Adhesives Technology Corp.
R8a. Be careful not to withdraw the mixing nozzle too quickly as this may trap air in the adhesive. Extension tubing (Part #'s T16EXT or T16EXTL) can be connected as needed onto the outside tip of the mixing nozzle. **NOTE:** When using a pneumatic dispensing tool, ensure that pressure is set at 90 psi (6.2 bar) maximum.
R8b. This step is not necessary if using extension tube (Part # T16EXT).
R8c. Refer to the installation tables for ULTRABOND HYB-2CC for piston plug selection. During installation the piston plug will be naturally extruded from the drilled hole by the adhesive pressure. **CAUTION:** In addition to the installer being certified, do not install adhesive anchors overhead or vertically inclined without installation hardware supplied by ATC.

R9a. Prior to inserting the threaded rod or rebar into the hole, make sure it is straight, clean and free of oil/dirt and that the necessary embedment depth is marked on the anchor element. Insert the anchor elements into the hole while turning 1 - 2 rotations prior to the anchor reaching the bottom of the hole. Excess adhesive should be visible on all sides of the fully installed rod or rebar. Reinforcing bars must not be bent after installation except as set forth in ACI 318-14 Section 26.6.3.1 (b) or ACI 318-11 Section 7.3.2, as applicable, with the additional condition that the bars must be bent cold, and heating of reinforcing bars to facilitate field bending is not permitted. **CAUTION:** Use extra care with deep embedment or high temperature installations to ensure that he working time has not elapsed prior to the anchor being fully installed. Adjustments to the anchor alignment may only performed during the published working time for a given temperature.
R9b. For overhead, horizontal and inclined (between horizontal and overhead), wedges should be used to support the anchor while the adhesive is curing. Take appropriate steps to protect the exposed threads of the anchor element from uncured adhesive until after the full cure time has elapsed.
R10. The amount of time needed to reach full cure is base material dependent. Refer to the chart for appropriate full cure time for a given temperature. Refer to the installation tables for ULTRABOND HYB-2CC to ensure proper torque is used. Take care not to exceed the maximum torque for the selected anchor. After full cure time has passed, a fixture can be installed to the anchor and tightened up to the maximum torque.

ULTRABOND® HYB-2CC Adhesive Anchor Installation Instructions

INSTALLATION PARAMETERS FOR FRACTIONAL THREADED ROD AND REBAR

	Characteristic		Symbol	Units	Fractional Threaded Rod (inch)							
					3/8	1/2	5/8	3/4	7/8	1	N/A	1 1/4
					Fractional Rebar Size							
					#3	#4	#5	#6	#7	#8	#9	#10
Threaded Rod	Nominal Anchor Diameter		d_a	in.	0.375	0.500	0.625	0.750	0.875	1.000		1.250
	Drill Size		d_o	in.	7/16	9/16	11/16	7/8	1	1 1/8		1 3/8
	Brush Part #		----	----	BP716	BP916	BP1116	BP78	BP100	BP118		BP138
	Piston Plug Part #		----	----	Not Required		PA1116-5PK	PA78-5PK	PA100-5PK	PA118-5PK	N/A	PA138-5PK
	Brush Diameter		----	in.	0.528	0.654	0.787	0.976	1.122	1.252		1.504
	Maximum Tightening Torque	A36/A307 Carbon Steel	$T_{inst,max}$	Ft-lb (N-m)	15 [1] (20)	30 (41)	44 (60)	66 (89)	96 (130)	147 (199)		221 (300)
Rebar	Nominal Anchor Diameter		d_a	in.	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250
	Drill Size		d_o	in.	1/2	5/8	3/4	7/8	1	1 1/8	1 3/8	1 1/2
	Brush Part #		----	----	BP12	BP58	BP34	BP78	BP100	BP118	BP138	BP112
	Piston Plug Part #		----	----	Not Required		PA34-5PK	PA78-5PK	PA100-5PK	PA118-5PK	PA138-5PK	PA112-5PK
	Brush Diameter		----	in.	0.528	0.720	0.846	0.976	1.122	1.252	1.504	1.630

[1]for ASTM 36 and F1554 Grade 36, T_{max} = 11 ft.-lb.

INSTALLATION PARAMETERS FOR METRIC THREADED ROD AND REBAR

Characteristic		Symbol	Units	Metric Threaded Rod							Metric Rebar Size							
				M10	M12	M16	M20	M24	M27	M30	10	12	14	16	20	25	28	32
Nominal Anchor Diameter		d_a	mm	10	12	16	20	24	27	30	10	12	14	16	20	25	28	32
Drill Size		d_o	mm	12	14	18	22	28	30	35	14	16	18	20	25	32	35	40
Brush Part #		----	----	BP716	BPM14	BP1116	BPM24	BPM28	BP118	BPM35	BPM14	BPM16	BP1116	BPM20	BPM25	BPM32	BPM35	BPM40
Piston Plug Part #		----	----	Not Required		PAM18-5PK	PA78-5PK	PA118-5PK	PAM30-5PK	PAM138-5PK	Not Required		PAM18-5PK	PAM20-5PK	PAM100-5PK	PAM32-5PK	PA138-5PK	PAM40-5PK
Brush Diameter		----	mm	13.5	15.5	20	24	30	32	37	15.5	17.5	20	22	27	34	37	43.5
Maximum Tightening Torque	A36/A307 Carbon Steel	$T_{inst,max}$	N-m (Ft-lb)	20 (15)	40 (30)	80 (59)	120 (89)	170 (125)	250 (184)	300 (221)	20 (15)	40 (30)	45 (33)	80 (59)	120 (89)	175 (129)	250 (184)	300 (221)

CONCRETE BREAKOUT DESIGN INFORMATION FOR FRACTIONAL THREADED ROD AND REBAR

Design Information	Symbol	Units	Fractional Threaded Rod Diameter (inch)							
			3/8	1/2	5/8	3/4	7/8	1	N/A	1 1/4
			Fractional Rebar Size							
			#3	#4	#5	#6	#7	#8	#9	#10
Minimum Embedment Depth	$h_{ef,min}$	in. (mm)	2 3/8 (60)	2 3/4 (70)	3 1/8 (79)	3 1/2 (89)	3 1/2 (89)	4 (102)	4 1/2 (114)	5 (127)
Maximum Embedment Depth	$h_{ef,max}$	in. (mm)	7 1/2 (191)	10 (254)	12 1/2 (318)	15 (381)	17 1/2 (445)	20 (508)	22 1/2 (572)	25 (635)
Maximum Embedment Depth (PIR)	$h_{ef,max}$	in. (mm)	22 1/2 (572)	30 (762)	37 1/2 (953)	45 (1143)	52 1/2 (1334)	60 (1524)	67 1/2 (1715)	75 (1905)
Minimum Spacing Distance	s_{min}	in. (mm)	1 7/8 (48)	2 1/2 (64)	3 (76)	3 5/8 (92)	4 1/4 (108)	4 3/4 (121)	5 1/4 (133)	5 7/8 (149)
Minimum Edge Distance with 100% T_{max}	c_{min}	in. (mm)	1 5/8 (41)	1 3/4 (44)	2 (51)	2 3/8 (60)	2 1/2 (64)	2 3/4 (70)	3 (76)	3 1/4 (83)
Minimum Edge Distance with 45% T_{max}	c_{min}	in. (mm)	----		1 3/4 (44)				2 3/4 (70)	
Minimum Concrete Thickness	h_{min}	in. (mm)	h_{ef} + 1.25 (h_{ef} + 30)		h_{ef} + 2d_o where d_o is the hold diameter					

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 006894 MPa. For pound-inch units: 1 mm = 0.03937 inches, 1 N = 0.2248 lbf, 1 MPa = 145.0 psi.

CONCRETE BREAKOUT DESIGN INFORMATION FOR METRIC THREADED ROD AND REBAR

Design Information	Symbol	Units	Metric Threaded Rod							Metric Rebar Size							
			M10	M12	M16	M20	M24	M27	M30	10	12	14	16	20	25	28	32
Minimum Embedment Depth	$h_{ef,min}$	mm (in.)	60 (2.4)	70 (2.8)	80 (3.1)	90 (3.5)	96 (3.8)	108 (4.3)	120 (4.7)	60 (2.4)	70 (2.8)	75 (3.0)	80 (3.1)	90 (3.5)	100 (3.9)	112 (4.4)	128 (5.0)
Maximum Embedment Depth	$h_{ef,max}$	mm (in.)	200 (7.9)	240 (9.4)	320 (12.6)	400 (15.7)	480 (18.9)	540 (21.3)	600 (23.6)	200 (7.9)	240 (9.4)	280 (11.0)	320 (12.6)	400 (15.7)	500 (19.7)	560 (22.0)	640 (25.2)
Maximum Embedment Depth (PIR)	$h_{ef,max}$	mm (in.)	----	----	----	----	----	----	----	600 (23.6)	720 (28.3)	840 (33.1)	960 (37.8)	1200 (47.2)	1500 (59.1)	1680 (66.1)	1920 (75.6)
Minimum Spacing Distance	s_{min}	mm (in.)	50 (2.0)	60 (2.4)	80 (3.1)	100 (3.9)	120 (4.7)	135 (5.3)	150 (5.9)	50 (2.0)	60 (2.4)	70 (2.8)	80 (3.1)	100 (3.9)	125 (4.9)	140 (5.5)	160 (6.3)
Minimum Edge Distance with 100% T_{max}	c_{min}	mm (in.)	45 (1.8)	45 (1.8)	55 (2.2)	60 (2.4)	70 (2.8)	75 (3.0)	80 (3.1)	45 (1.8)	45 (1.8)	50 (2.0)	55 (2.2)	60 (2.4)	70 (2.8)	75 (3.0)	85 (3.3)
Minimum Edge Distance with 45% T_{max}	c_{min}	mm (in.)	----		45 (1.8)				70 (2.8)	----		45 (1.8)				70 (2.8)	
Minimum Concrete Thickness	h_{min}	mm (in.)	h_{ef} + 30 (h_{ef} + 1.25)		h_{ef} + 2d_o where d_o is the hold diameter					h_{ef} + 30 (h_{ef} + 1.25)		h_{ef} + 2d_o where d_o is the hold diameter					

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 006894 MPa. For pound-inch units: 1 mm = 0.03937 inches, 1 N = 0.2248 lbf, 1 MPa = 145.0 psi.

CURE SCHEDULE[1]

Base Material Tempature °F	(°C)	Working Time	Full Cure Time
23 to 31	(-5 to -1)	50 min	5 hr
32 to 40	(0 to 4)	25 min	3.5 hr
41 to 49	(5 to 9)	15 min	2 hr
50 to 58	(10 to 14)	10 min	1 hr
59 to 67	(15 to 19)	6 min	40 min
68 to 85	(20 to 29)	3 min	30 min
86 to 104	(30 to 40)	2 min	30 min

Condition (warm) cartridge to 41 °F to 104 °F for installations from 23 °F to 40 °F.

ADHESIVE DISPENSING TOOLS AND MIXING NOZZLES

Accessory	9.5 fl. oz. (280 ml) Cartridge	27.9 fl. oz. (825 ml) Cartridge
Part #	A10-HYB2CC	A28-HYB2CC
Manual Dispensing Tool	TM10-HYB	TM28HD
Pneumatic Dispensing Tool	----	TA28-HYB
Recommended Mixing Nozzle	T16-3PK	
Brush Extension	BP-EXT	
Brush Extension with Handle	BP-EXTH	
Nozzle Extension Tubing	T16EXT	T16EXTL
Retention Wedge	WEDGE	

POST-INSTALLED REBAR hef ≥ 20d

Cartridge Size fl. oz.	Injection Tools	d_s	h_{ef}	Extension Tube
9.5	Manual Tool	≤ #5 ≤ 16 (mm)	≤ 27-1/2 (inch) ≤ 700 (mm)	T16EXT
28	Pneumatic Tool	≤ #5 ≤ 16 (mm)	≤ 39-1/2 (inch) ≤ 1,000 (mm)	
		≤ #8 ≤ 25 (mm)	≤ 27-1/2 (inch) ≤ 700 (mm)	
		≤ #10 ≤ 32 (mm)	≤ 75 (inch) ≤ 1,920 (mm)	T16EXTL

450 East Copans Rd. | Pompano Beach, FL 33064 | 1(800) 892-1880 | www.atcepoxy.com

ADHESIVES TECHNOLOGY® CORP.

Rev 022620T1.0