Description

Our CIA-EA Epoxy Acrylate adhesive anchor system has been specially formulated as a high-performance, two component adhesive anchor system for threaded bars in uncracked concrete.

Base Material

- Uncracked concrete
- Hard natural stone
- Solid rock
- Solid masonry

Features

- Fixing close to free edges
- Versatile range of embedment depths
- Anchoring without expansion forces
- Component volume ratio of 10:1
- Extended working time
- High load capacities

Approvals

- IAPMO-UES ER-0311
- Certified to ANSI / NSF - 61 by UL

Shelf Life

Cartridges should be stored in their original packaging, the correct way up, in cool conditions (+41°F to +77°F) out of direct sunlight. When stored correctly, the shelf life will be for a minimum of 15 months from the date of manufacture.

Health & Safety

For health and safety information, please refer to the relevant Safety Data Sheet.

Working & Loading Times

Cartridge Temperature	T Work (minutes)	Base Material Temperature	T Load
Minimum +41°F	12	+23°F to +32°F	24 hours
		+32°F to +41°F	180 minutes
+41°F to +50°F	8	+41°F to +50°F	100 minutes
+50°F to +68°F	4	+50°F to +68°F	70 minutes
+68°F to +77°F	3	+68°F to +77°F	40 minutes
+77°F to +86°F	2	+77°F to +86°F	40 minutes
+86°F	1	+86°F	40 minutes

T Work is the typical time to gel at the highest temperature in the range
T Load is the typical time to reach full capacity

Number of Holes per Cartridge - Estimating Sheet

Anchor Size		(in.)	5/16	3/8	1/2	1/2	5/8	5/8	3/4	3/4	1	1	1-1/4
Drill Hole Dia.		(in.)	3/8	1/2	9/16	7/16	3/4	11/16	7/8	13/16	1-1/8	1-1/16	1-3/8
Embedment Depth:		(in.)	2-3/8	2-3/8	2-3/4	2-3/4	3-1/8	3-1/8	3-3/4	3-3/4	4	4	5
Estimated Number of Fixings*	Cartridge Volume	250 ml	68	38	26	43	12	15	7	9	4	5	2
		300 ml	83	47	37	61	20	24	15	17	9	10	6
		600 ml	176	99	67	112	33	39	20	23	11	13	6
		850 ml	254	143	97	161	48	57	29	34	16	18	8

*Number of fixings assumes 30ml wastage in initial extrusion and holes filled to 3/4 full

Installation Specification

Property	Symbol	Unit						
Threaded Rod Diameter	d_a	in	5/16	3/8	1/2	5/8	3/4	1
Drill Bit Diameter	d_o	in	3/8	1/2	9/16	11/16	13/16	1-1/16
Cleaning Brush Size	d_b	in	0.551		0.787		1.142	
Minimum Embedment Depth	$h_{ef,min}$	in	2-3/8	2-3/4	3-1/8	3-3/4	4	4
Maximum Embedment Depth	$h_{ef,max}$	in	6-1/4	7-1/2	10	12-1/2	15	20
Minimum Concrete Thickness	h_{min}	in	$1.5\ h_{ef}$					
Critical Anchor Spacing	S_{cr}	in	$2.0\ c_{ac}$					
Critical Edge Distance	c_{ac}	in	$c_{ac} = h_{ef} * (\tau_{k,uncr} / 1160)^{0.4} * \max[3.1 - 0.7(h / h_{ef}); 1.4]$					
Maximum Tightening Torque	T_{inst}	ft.lb	7.5	15	25	55	80	120

Allowable Steel Strength for Threaded Rods

		Carbon Steel ASTM F 1554 Grade 36 (A307 Gr.C)		Carbon Steel ASTM A 193 B7		Stainless Steel ASTM F 593 CW		Stainless Steel ASTM F 593 SH	
Anchor Diameter (in)		Allowable Tension, N_{all}	Allowable Shear, V_{all}	Allowable Tension, N_{all}	Allowable Shear, V_{all}	Allowable Tension, N_{all}	Allowable Shear, V_{all}	Allowable Tension, N_{all}	Allowable Shear, V_{all}
3/8”	lb	2,110	1,080	4,550	2,345	3,630	1,870	4,190	2,160
	kN	9.4	4.8	20.2	10.4	16.1	8.3	18.6	9.6
1/2”	lb	3,750	1,930	8,100	4,170	6,470	3,330	7,450	3,840
	kN	16.7	8.6	36.0	18.5	28.8	14.8	33.1	17.1
5/8”	lb	5,870	3,030	12,655	6,520	10,130	5,220	11,640	6,000
	kN	26.1	13.5	56.3	29.0	45.1	23.2	51.8	26.7
3/4”	lb	8,460	4,360	18,220	9,390	12,400	6,390	15,300	7,880
	kN	37.6	19.4	81.0	41.8	55.2	28.4	68.1	35.1
7/8”	lb	11,500	5,930	24,800	12,780	16,860	8,680	20,830	10,730
	kN	51.2	26.4	110.3	56.8	75.0	38.6	92.7	47.7
1”	lb	15,020	7,740	32,400	16,690	22,020	11,340	27,210	14,020
	kN	66.8	34.4	144.1	74.2	97.9	50.4	121.0	62.4
1 - 1/4”	lb	23,480	12,100	50,610	26,070	34,420	17,730	38,470	19,820
	kN	104.4	53.8	225.1	116.0	153.1	78.9	171.1	88.2

Allowable Tension, Nall = 0.33 x fu x nominal cross sectional area
Allowable Shear, Vall = 0.17 x fu x nominal cross section area

Allowable Steel Strength for Rebar

Rebar Size		Carbon Steel ASTM A 615 Grade 60	
		Allowable Tension, N_{all}	Allowable Shear, V_{all}
#3	lb	3,280	1,690
	kN	14.6	7.5
#4	lb	5,831	3,004
	kN	25.9	13.4
#5	lb	9,111	4,693
	kN	40.5	20.9
#6	lb	13,121	6,759
	kN	58.4	30.1
#7	lb	17,859	9,200
	kN	79.4	40.9
#8	lb	23,326	12,016
	kN	103.8	53.4
#10	lb	37,623	19,381
	kN	167.4	86.2

Tension = 0.33 x fu x nominal cross sectional area
Shear = 0.17 x fu x nominal cross section area

Allowable Steel Strength for Rebar

Rebar Size		Carbon Steel CAN/CSA-G30.18 Gr.400	
		Allowable Tension, N_{all}	Allowable Shear, V_{all}
10M	lb	4,016	2,069
	kN	17.9	9.2
15M	lb	8,052	4,148
	kN	35.8	18.5
20M	lb	11,960	6,161
	kN	53.2	27.4
25M	lb	19,975	10,290
	kN	88.9	45.8
30M	lb	28,121	14,486
	kN	125.1	64.4
35M	lb	40,089	20,652
	kN	178.3	91.9

1. Above values for reinforcing steel assume the design method is the same as a post-installed adhesive anchor, under the principles of anchor design (failure modes will be concrete breakout, pryout, steel failure, or adhesive bond) and not under the principles of reinforcing steel design (failure modes are typically splitting failure, inadequatebar development etc..).

Allowable Load Data in Tension and Shear

Anchor Diameter	Embedment Depth	Allowable Concrete Capacity / Bond Strength					
		Tension (lb)			Shear (lb)		
		f'_c = 2,500psi	f'_c = 4,000psi	f'_c = 8,000psi	f'_c = 2,500psi	f'_c = 4,000psi	f'_c = 8,000psi
5/16”	2-3/8”	1,390	1,457	1,562	1,854	1,943	2,082
	3-1/16”	1,793	1,879	2,014	2,390	2,505	2,685
	3-3/4”	2,195	2,301	2,466	2,927	3,068	3,288
3/8”	2-3/8”	1,507	1,579	1,693	2,009	2,106	2,257
	3-7/16”	2,181	2,286	2,450	2,908	3,048	3,266
	4-1/2”	2,855	2,992	3,207	3,806	3,990	4,276
1/2”	2-3/4”	2,397	2,513	2,693	3,197	3,350	3,591
	4-3/8”	3,814	3,998	4,285	5,085	5,330	5,713
	6”	5,231	5,482	5,876	6,974	7,310	7,835
5/8”	3-1/8”	3,065	3,212	3,443	4,087	4,283	4,591
	5-5/16”	5,210	5,461	5,853	6,947	7,281	7,804
	7-1/2”	7,356	7,710	8,263	9,808	10,280	11,017
3/4”	3-1/2”	3,495	3,663	3,926	4,659	4,884	5,234
	6-1/4”	6,240	6,541	7,010	8,320	8,721	9,347
	9”	8,986	9,418	10,094	11,981	12,558	13,459
1”	4”	5,378	5,637	6,042	7,171	7,516	8,056
	8”	10,757	11,274	12,084	14,342	15,033	16,112
	12”	16,135	16,912	18,125	21,514	22,549	24,167

1. The above values represent mean ultimate values and allowable working loads. The allowable working loads have been reduced using a safety factor of 4.0 for tension and 3.0 for shear, however, in some cases, such as life safety, safety factors of 10.0 or higher may be necessary.
2. Allowable loads must be checked against steel capacity. The lowest value controls.
3. Tabulated data is applicable to single anchors in normal weight concrete unaffected by edge or spacing reduction factors. Values are valid for anchors installed into dry concrete in holes drilled with a hammer drill and ANSI carbide drill bit.
4. Service temperatures should remain approximately constant. The maximum long term temperature being 122°F and the maximum short term temperature being 176°F. Short term temperatures are those that occur over brief intervals, for example, diurnal cycling.
5. Linear interpolation is allowed.

Solid Substrate Installation Method

1. Drill the hole to the correct diameter and depth. This can be done with either a rotary percussion or rotary hammer drilling machine depending upon the substrate.

2. Thoroughly clean the hole in the following sequence using the appropriate wire brush from Table 11 of ER-0311 with the required extensions and a source of clean compressed air. For holes of 15 3/4" (400mm) or less deep, a blow pump may be used:

Blow Clean x2.

Brush Clean x2.

Blow Clean x2.

Brush Clean x2.

Blow Clean x2.

3. Select the appropriate static mixer nozzle for the installation, open the cartridge/foil pack and screw nozzle onto the mouth of the cartridge. Insert the cartridge into a good quality applicator.

4. Extrude the first part of the cartridge to waste until an even colour has been achieved without streaking in the resin.

5. If necessary, cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for rebars /8" (16mm) dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.

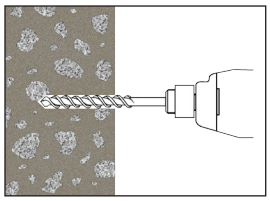
6. Insert the mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and withdraw the nozzle completely.

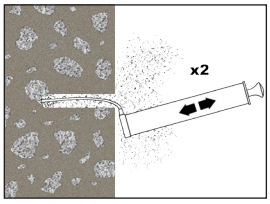
7. Insert the clean threaded bar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time (see table on page 1).

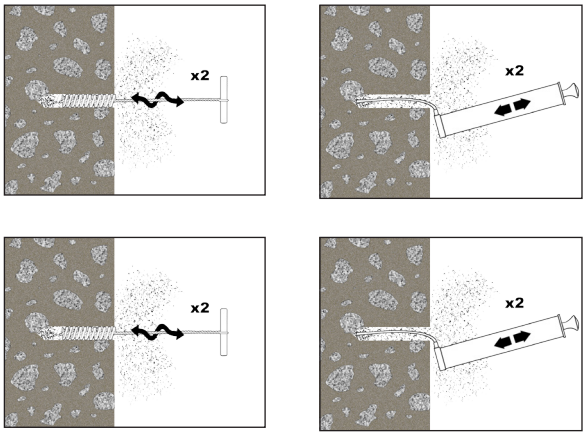
8. Any excess resin will be expelled from the hole evenly around the steel element showing that the hole is full. This excess resin should be removed from around the mouth of the hole before it sets.

9. Leave the anchor to cure. Do not disturb the anchor until the appropriate loading time, on page 1, has elapsed depending on the substrate conditions and ambient temperature.

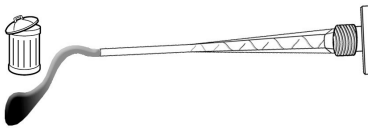
10. Attach the fixture and tighten the nut to the recommended torque, Do not overtighten.

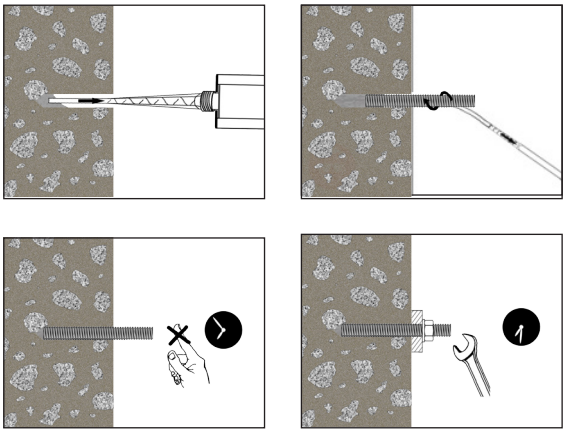






If the hole collects water after the initial cleaning, this water must be removed before injecting the resin.





Note for decreased installation temperature:
When installing CIA-EA at decreased installation temperature (+32°F < T < +50°F (0°C < T < +10°C)) the cartridge must be conditioned to +68°F (+20°C).

Solid Substrate Installation Method - Overhead

1. Drill the hole to the correct diameter and depth. This can be done with either a rotary percussion or rotary hammer drilling machine depending upon the substrate.

2. Thoroughly clean the hole in the following sequence using the appropriate wire brush from Table 11 of ER-0311 with the required extensions and a source of clean compressed air. For holes of 15 3/4" (400mm) or less deep, a blow pump may be used:

Blow Clean x2.

Brush Clean x2.

Blow Clean x2.

Brush Clean x2.

Blow Clean x2.

3. Select the appropriate static mixer nozzle for the installation, open the cartridge/foil pack and screw nozzle onto the mouth of the cartridge. Insert the cartridge into a good quality applicator.

4. Extrude the first part of the cartridge to waste until an even colour has been achieved without streaking in the resin.

5. If necessary, cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for rebars /8" (16mm) dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.

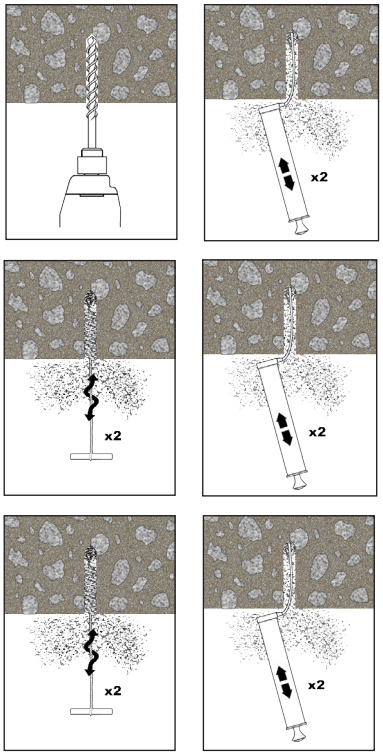
6. Insert the mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and withdraw the nozzle completely.

7. Insert the clean threaded bar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time (see table on page 1).

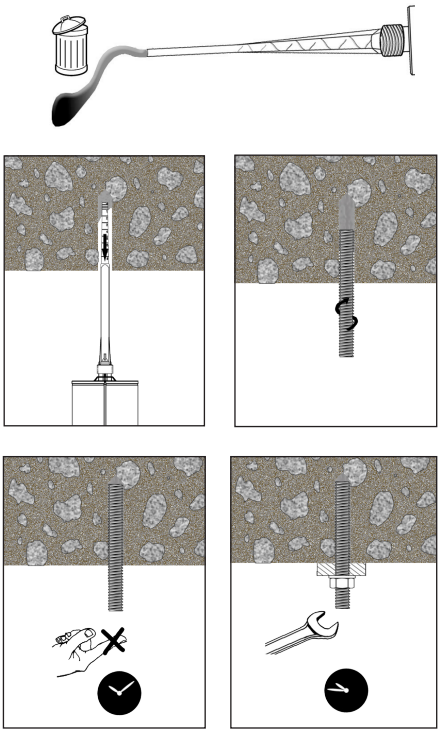
8. Any excess resin will be expelled from the hole evenly around the steel element showing that the hole is full. This excess resin should be removed from around the mouth of the hole before it sets.

9. Leave the anchor to cure. Do not disturb the anchor until the appropriate loading time, on page 1, has elapsed depending on the substrate conditions and ambient temperature.

10. Attach the fixture and tighten the nut to the recommended torque, Do not overtighten.



If the hole collects water after the initial cleaning, this water must be removed before injecting the resin.



Note for decreased installation temperature:
When installing CIA-EA at decreased installation temperature (+32°F < T < +50°F (0°C < T < +10°C)) the cartridge must be conditioned to +68°F (+20°C).