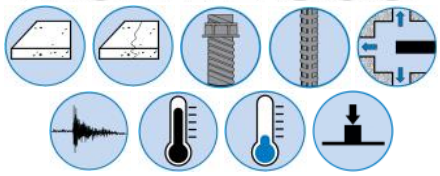
ULTRABOND® ACRYL-8CC



ESR-4249

Product Description

ULTRABOND® ACRYL-8CC is a two-component (10:1 mix ratio by volume), high strength, styrene-free, vinylester adhesive anchoring system tested for use with threaded rod and reinforcing bar for cracked and uncracked concrete conditions in accordance with ACI 355.4 and ICC-ES AC308. It has an installation temperature range between 14 °F to 104 °F (-10 °C to 40 °C) and an extended in-service temperature range between 14 °F to 248 °F (-10 °C to 120 °C).

General Uses & Applications

- Anchoring threaded rod and reinforcing bar (rebar) into cracked or uncracked concrete using a hammer drill
- Suitable for dry, water saturated, & water-filled conditions using threaded rod or rebar
- Vertical down, horizontal, upwardly inclined and overhead installations

Advantages & Features

- ICC-ES ESR-4249 for use in cracked and uncracked normal weight and lightweight concrete
- Resists static, wind and earthquake loading in tension and shear - (IBC Seismic Design Categories A through F)
- Certified - Drinking Water System Components (NSF/ANSI 61) Joining and Sealing
- Full cure in 45 minutes at 70 °F (21 °C)
- Resists sustained loads up to 161 °F (72 °C)
- Withstands freeze-thaw conditions

STANDARDS & APPROVALS

CODE COMPLIANT:
IBC/IRC 2015, 2012, 2009, 2006 and 2010 FBC
ICC-ES (Concrete) ESR-4249

NSF/ANSI 61

ASTM C881-15 & AASHTO M235
Type I, II, IV & V Grade 3 Class A, B & C

Availability: Adhesives Technology Corp. (ATC) products are available online and through select distributors providing all your construction needs. Please contact ATC for a distributor near you or visit www.atcepoxy.com for online purchasing options or to search for a distributor by zip code.

Color & Ratio: Part A (Resin) light beige: Part B (Hardener) Black, Mixed Ratio: 1:1 by volume, Mixed Color - Gray

Storage & Shelf Life: 18 months when stored in unopened containers in dry conditions. Store between 41 °F (5 °C) and 77°F (25 °C).

Installation & Coverage: Manufacturer's Printed Installation Instructions (MPII) are available in this Technical Data Sheet (TDS). Due to occasional updates and revisions, always verify that you are using the most current version of the MPII. In order to achieve maximum results, proper installation is imperative.

Clean-Up: Clean uncured materials from tools and equipment with mild solvents. Cured material can only be removed mechanically.

Limitations & Warnings:

- Do not thin with solvents, as this will prevent cure
- For anchoring applications, concrete should be a minimum of 21 days old prior to anchor installation per ACI 355.4

Safety: Please refer to the Safety Data Sheet (SDS) for ULTRABOND ACRYL-8CC. Call ATC for more information at 1 -800-892-1880.

Specification: Anchoring adhesive shall be a two component, 10:1 ratio by volume, vinylester anchoring system supplied in pre-measured cartridges. Adhesive must meet the requirements of ICC-ES AC308, ACI 355.4 and ASTM C881-15 specification for Type I, II, IV, and V, Grade 3 Class A, B & C. Adhesive must have a heat deflection temperature of 192 °F (89 °C) per ASTM D648 and have a compressive yield strength of 11,430 psi (78.8 MPa) at 75 °F (24 °C) after a 7 day cure per ASTM D695. Adhesive shall be ULTRABOND ACRYL-8CC from Adhesives Technology Corp., Pompano Beach, Florida. Anchors shall be installed per the Manufacturer's Printed Installation Instructions (MPII) for ULTRABOND ACRYL-8CC anchoring system.

ORDERING INFORMATION

TABLE 1: ULTRABOND ACRYL-8CC adhesive, packaging, dispensing tools and accessories[1]

Package Size	10 fl. oz. (296 ml) Cartridge	28 fl. oz. (825 ml) Cartridge
Part #	A10-ACRYL8CC	A28-ACRYL8CC
Mixing Nozzle	T10-8CC	T28-8CC
Manual Dispensing Tool	TM10	N/A
Pneumatic Dispensing Tool	N/A	TA28
SDS Brush Adaptor	BA-SDS	
Brush Extension	BA-EXT	
Nozzle Extension Tubing	T-8CCEXTPK	
Retention Wedge	WEDGE	

1. Each cartridge is packaged with one mixing nozzle.

A10-ACRYL8CC

A28-ACRYL8CC

TABLE 2: ULTRABOND ACRYL-8CC installation parameters, brushes and piston plugs

Threaded Rod in.	Rebar #	Drill Bit Diameter in.	Maximum Installation Torque ft-lbs. (N-m)		Brush Part #	Piston Plug Part #
			A36/A307 Carbon Steel	A193 B7 Carbon Steel or F593 SS		
3/8	3	7/16	10 (14)	16 (22)	BA716	----
1/2	-----	9/16	25 (34)	33 (45)	BA916	
-----	4	5/8	-----		BA58	
5/8	5	3/4	50 (68)	60 (81)	BA34	PA34
3/4	6	7/8	90 (122)	105 (142)	BA78	PA78
7/8	7	1	125 (170)		BA100	PA100
1	8	1 1/8	165 (224)		BA118	PA118
1 1/4	9	1 3/8	280 (380)		BA138	PA138
-----	10	1 1/2	-----		BA112	PA112

MATERIAL SPECIFICATION

TABLE 3: ULTRABOND ACRYL-8CC performance to **ASTM C881-15**[1,2,3]

Property	Cure Time	ASTM Standard	Units	Sample Conditioning Temperature			
				Class A	Class B	Optional	Class C
				14 °F (-10 °C)	50 °F (10 °C)	75 °F (24 °C)	104 °F (40 °C)
Gel Time - 60 Gram Mass[4]	----	C881	min	16	8	5	5
Consistency or Viscosity	----	C881	----	Non-sag			
Compressive Yield Strength	7 day	D695	psi (MPa)	12,820 (88.4)	13,490 (93.0)	11,430 (78.8)	11,830 (81.6)
Compressive Modulus	7 day	D695	psi (MPa)	497,300 (3,429)	491,600 (3,389)	374,400 (2,581)	299,100 (2,062)
Tensile Strength[5]	7 day	D638	psi (MPa)	2,510 (17.3)			
Tensile Elongation[5]	7 day	D638	%	0.9			
Bond Strength Hardened to Hardened Concrete	2 day	C882	psi (MPa)	2,530 (17.4)	2,440 (16.8)	2,320 (16.0)	2,600 (17.9)
Bond Strength Hardened to Hardened Concrete	14 day	C882	psi (MPa)	1,870 (12.9)	3,020 (20.8)	2,940 (20.3)	3,130 (21.6)
Bond Strength Fresh to Hardened Concrete	14 day	C882	psi (MPa)	2,510 (17.3)			
Heat Deflection Temperature	7 day	D648	°F (°C)	192 (89)			
Water Absorption	14 day	D570	%	0.74			
Linear Coefficient of Shrinkage	48 hr	D2566	%	0.005			

1. Product testing results based on representative lot(s). Average results will vary according to the tolerances of the given property.
2. Full cure time is listed above to obtain the given properties for each product characteristic.
3. Results may vary due to environmental factors such as temperature, moisture and type of substrate.
4. Gel time may be lower than the minimum required for ASTM C881 Type I and IV.
5. Optional testing for Grade 3 systems.

TABLE 4: ULTRABOND ACRYL-8CC **CURE SCHEDULE**[1,2,3,4,5]

Base Material Temperature °F (°C)	Working Time	Full Cure Time
14 (-10)	90 min	24 hr
23 (-5)	90 min	14 hr
32 (0)	45 min	7 hr
41 (5)	25 min	2 hr
50 (10)	15 min	90 min
70 (21)	6 min	45 min
86 (30)	4 min	25 min
95 (35)	2 min	20 min
104 (40)	1.5 min	15 min

For **SI**: °F = °C x 9/5 + 32

1. Working and full cure times are approximate, may be linearly interpolated between listed temperatures and are based on cartridge/nozzle system performance.
2. For installations between 14 °F and 23 °F (-10 °C and -5 °C) the cartridge temperature must be conditioned to between 70 °F and 75 °F (21 °C and 24 °C).
3. Application Temperature: Substrate and ambient air temperature should be from 14 °F and 104 °F (-10 and 40 °C).
4. For installations in wet base materials, the full cure time should be doubled.
5. Storage Temperature is 41 °F to 77 °F (5 °C and 25 °C).

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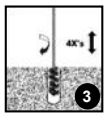
INSTALLATION INSTRUCTIONS (MPII)

Drilling and Cleaning

Using a rotary hammer drill, and a bit which conforms to ANSI B212.15 and is the appropriate size for the anchor diameter to be installed, drill the hole to the specified embedment depth. **CAUTION:** Always wear appropriate personal protection equipment (PPE) for eyes, ears & skin and avoid inhalation of dust during the drilling and cleaning process. Refer to the Safety Data Sheet (SDS) for details prior to proceeding.

BLOW (4X) - BRUSH (4X) - BLOW (4X) BLOW - **NOTE:** Remove any standing water from hole prior to beginning the cleaning process. Using oil free compressed air with a minimum pressure of 90 psi (6 bar), insert the air wand to the bottom of the drilled hole and blow out the debris with an up/down motion for a minimum of 4 seconds/cycles (4X). For drilled holes < 7/8 in. diameter, a hand pump (supplied by ATC) may be used instead of compressed air.



BRUSH - Select the correct wire brush size for the drilled hole diameter, making sure that the brush is long enough to reach the bottom of the drilled hole. Reaching the bottom of the hole, using a brush extension if required, brush in an up/down and twisting motion for 4 cycles (4X). **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.

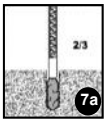
BLOW - Blow the hole out once more to remove brush debris using oil free compressed air with a minimum pressure of 90 psi (6 bar). Insert the air wand to the bottom of the drilled hole and blow out the debris with an up/down motion for a minimum of 4 seconds/cycles (4X). Visually inspect the hole to confirm it is clean. **NOTE:** If installation will be delayed for any reason, cover cleaned holes to prevent contamination.

Cartridge Preparation

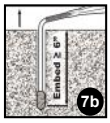
CAUTION: Check the expiration date on the cartridge to ensure it is not expired. **Do not use expired product!** Remove the protective cap from the cartridge and insert the cartridge into the recommended dispensing tool (see Table 1). Screw on the proper ATC mixing nozzle to the cartridge (see Table 1). Do not modify mixing nozzle and confirm that internal mixing element is in place prior to dispensing adhesive. Never use without the mixing nozzle! Take note of the air and base material temperatures, review the working/full cure time chart (see Table 4) and condition the cartridge accordingly prior to starting the injection process.

Dispense three full strokes of material from the mixing nozzle onto a disposable surface until the product is a uniform gray color with no streaks, as adhesive must be properly mixed in order to perform as published. Dispose of the initial amount of adhesive according to federal, state and local regulations prior to injection into the drill hole. **CAUTION**: When changing cartridges, never re-use nozzles. For a new cartridge (or if working time has been exceeded), ensure that cartridge opening is clean, install a new nozzle and repeat steps 5 & 6 accordingly. After finishing work, leave the mixing nozzle attached to the cartridge.

Installation and Curing (Vertical Down, Horizontal & Overhead)

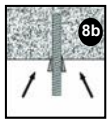


NOTE: The engineering drawings must be followed. For any applications not covered by this document, or for any installation questions, please contact Adhesives Technology Corp. Insert the mixing nozzle, using an extension tube if necessary, to the bottom of the hole and fill from the bottom to the top approximately 2/3 full, being careful not to withdraw the nozzle too quickly as this may trap air in the adhesive. NOTE: Building Code Requirements for Structural Concrete (ACI 318-11) requires the Installer to be certified where adhesive anchors are to be installed in horizontal or overhead installations.



Piston plugs must be used with the extension tube attached to the supplied nozzle for horizontal and overhead installations with anchor sizes 5/8 in. to 1 1/4 in. diameter and rebar sizes of #5 to #10. Select the proper piston plug for the drill hole diameter as given in Table 2.

Prior to inserting the threaded rod or rebar into the hole, make sure it is straight, clean and free of oil and dirt and that the necessary embedment depth is marked on the anchor element. Insert the anchor element 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 anchor. **CAUTION**: Use extra care with deep embedment or high temperature installations to ensure that the working time has not elapsed prior to the anchor being fully installed.



For overhead installations, 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.

Do not disturb, torque or apply any load to the installed anchor until the specified full cure time has passed. The amount of time needed to reach full cure is base material temperature dependent - refer to Table 4 for appropriate full cure time. Use caution not to exceed the maximum specified torque once the anchor has fully cured.

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TABLE 5: ULTRABOND ACRYL-8CC **STEEL** design information for **THREADED ROD**[1]

Design Information		Symbol	Units	Threaded Rod						
				3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"
Nominal Anchor Diameter		d	in. (mm)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.250 (31.8)
Threaded Rod Cross-Sectional Area		A_{se}	in.^{2} (mm^2)	0.078 (50)	0.142 (92)	0.226 (146)	0.335 (216)	0.462 (298)	0.606 (391)	0.969 (625)
ASTM A36 Grade 36 F1554 Grade 36	Nominal Strength as Governed by Steel Strength	N_{sa}	lb. (kN)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)	19,400 (86.3)	26,780 (119.1)	35,130 (156.3)	56,210 (250.0)
		V_{sa}	lb. (kN)	2,695 (12.0)	4,940 (22.0)	7,860 (35.0)	11,640 (51.8)	16,070 (71.5)	21,080 (93.8)	33,725 (150.0)
	Reduction Factor for Seismic Shear	$\alpha_{V,seis}$	----	Not Applicable	0.85				0.80	
	Strength Reduction Factor for Tension[3]	ϕ	----	0.75						
	Strength Reduction actor for Shear[3]	ϕ	----	0.65						
ASTM A193 B7 ASTM F1554 Grade 105	Nominal Strength as Governed by Steel Strength	N_{sa}	lb. (kN)	9,685 (43.1)	17,735 (78.9)	28,250 (125.7)	41,810 (186.0)	57,710 (256.7)	75,710 (336.8)	121,135 (538.8)
		V_{sa}	lb. (kN)	4,845 (21.5)	10,640 (47.3)	16,950 (75.4)	25,085 (111.6)	34,625 (154.0)	45,425 (202.1)	72,680 (323.3)
	Reduction Factor for Seismic Shear	$\alpha_{V,seis}$	----	Not Applicable	0.85				0.80	
	Strength Reduction Factor for Tension[3]	ϕ	----	0.75						
	Strength Reduction Factor for Shear[3]	ϕ	----	0.65						
ASTM F593 CW1 Stainless Types 304 & 316	Nominal Strength as Governed by Steel Strength	N_{sa}	lb (kN)	7,750 (34.5)	14,190 (63.1)	22,600 (100.5)	28,430 (126.5)	39,245 (174.6)	51,485 (229.0)	82,370 (366.4)
		V_{sa}	lb (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	17,060 (75.9)	23,545 (104.7)	30,890 (137.4)	49,425 (219.9)
	Reduction Factor for Seismic Shear	$\alpha_{V,seis}$	----	Not Applicable	0.85				0.80	
	Strength Reduction Factor for Tension[2]	ϕ	----	0.65						
	Strength Reduction Factor for Shear[2]	ϕ	----	0.60						

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. Values provided for common rod material types are based on specified strength and calculated in accordance with ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. (D-2) and Eq. (D-29), as applicable. Nuts and washers must be appropriate for the rod strength and type.
2. For use with load combinations of IBC Section 1605.2, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D4.4. Values correspond to a brittle steel element.
3. For use with load combinations of IBC Section 1605.2, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D4.4. Values correspond to a ductile steel element.

TABLE 6: ULTRABOND ACRYL-8CC **CONCRETE BREAKOUT** design information for **THREADED ROD**

Design Information	Symbol	Units	Threaded Rod						
			3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"
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)	5 (127)
Maximum Embedment Depth	$h_{ef,max}$	in. (mm)	4 1/2 (114)	6 (152)	7 1/2 (191)	9 (229)	10 1/2 (267)	12 (305)	15 (381)
Effectiveness Factor for Cracked Concrete	$k_{c,cr}$	---- SI	Not Applicable	17 (7.1)					
Effectiveness Factor for Uncracked Concrete	$k_{c,uncr}$	---- SI	24 (10)						
Minimum Spacing Distance	s_{min}	in. (mm)	$S_{min} = C_{min}$						
Minimum Edge Distance	c_{min}	in. (mm)	1 7/8 (48)	2 1/2 (64)	3 1/8 (79)	3 3/4 (95)	4 3/8 (111)	5 (127)	6 1/4 (159)
Minimum Concrete Thickness	h_{min}	in. (mm)	h_{ef} + 1.25 , [≥ 3.937] (h_{ef} + 30 , [≥ 100])		h_{ef} + 2d_0 where d_o is the hole diameter				
Critical Edge Distance (Uncracked Concrete Only)	c_{ac}	in.	$C_{ac} = h_{ef} \cdot \left(\frac{\min(\tau_{k,uncr}\,;\,\tau_{k,max})}{1160} \right)^{0.4} \cdot \max\left[\left(3.1 - 0.7\,\frac{h}{h_{ef}} \right); 1.4 \right]$						
		mm	$C_{ac} = h_{ef} \cdot \left(\frac{\min(\tau_{k,uncr}\,;\,\tau_{k,max})}{8} \right)^{0.4} \cdot \max\left[\left(3.1 - 0.7\,\frac{h}{h_{ef}} \right); 1.4 \right]$						
Strength Reduction Factor for Tension, Concrete Failure Mode, Condition B[1]	ϕ	----	0.65						
Strength Reduction Factor for Shear, Concrete Failure Mode, Condition B[1]	ϕ	----	0.70						

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. Values provided for post-installed anchors with category as determined from ACI 355.4 given for Condition B. Condition B applies without supplementary reinforcement or where pullout (bond) or pryout govern, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, while condition A requires supplemental reinforcement. Values are for use with the load combinations Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 Section 9.2, as applicable, as set forth in ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4.

TABLE 7: ULTRABOND ACRYL-8CC **BOND STRENGTH** design information for **THREADED ROD**[1,3,4]

Design Information				Symbol	Units	Threaded Rod						
						3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"
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)	5 (127)
Maximum Embedment Depth				$h_{ef,max}$	in. (mm)	4 1/2 (114)	6 (152)	7 1/2 (191)	9 (229)	10 1/2 (267)	12 (305)	15 (381)
Dry and Water Saturated Concrete	Maximum Long Term Temperature **122 °F** (50 °C) Maximum Short Term Temperature **176 °F** (80 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	498 (3.4)	519 (3.6)	519 (3.6)	519 (3.6)	519 (3.6)	525 (3.6)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	712 (4.9)	742 (5.1)	742 (5.1)	742 (5.1)	742 (5.1)	751 (5.2)
		Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	743 (5.1)	588 (4.1)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,062 (7.3)	841 (5.8)
	Maximum Long Term Temperature **161 °F** (72 °C) Maximum Short Term Temperature **248 °F** (120 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	245 (1.7)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	544 (3.8)	566 (3.9)	566 (3.9)	566 (3.9)	566 (3.9)	566 (3.9)
		Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	366 (2.5)	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	899 (6.2)	899 (6.2)	899 (6.2)	899 (6.2)	899 (6.2)	813 (5.6)	----
	Reduction Factors for Dry Holes in Concrete			ϕ_d	----	0.65						
	Reduction Factors for Water Saturated Holes in Concrete			ϕ_{ws}	----	0.55						
Water-Filled Holes in Concrete	Maximum Long Term Temperature **122 °F** (50 °C) Maximum Short Term Temperature **176 °F** (80 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	388 (2.7)	405 (2.8)	405 (2.8)	363 (2.5)	358 (2.5)	352 (2.4)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	555 (3.8)	579 (4.0)	579 (4.0)	520 (3.6)	512 (3.5)	503 (3.5)
		Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	642 (4.4)	642 (4.4)	642 (4.4)	642 (4.4)	576 (4.0)	----	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	918 (6.3)	918 (6.3)	918 (6.3)	918 (6.3)	824 (5.7)	----	----
	Maximum Long Term Temperature **161 °F** (72 °C) Maximum Short Term Temperature **248 °F** (120 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	191 (1.3)	199 (1.4)	199 (1.4)	179 (1.2)	176 (1.2)	171 (1.2)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	424 (2.9)	442 (3.0)	442 (3.0)	396 (2.7)	391 (2.7)	379 (2.6)
		Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	316 (2.2)	316 (2.2)	316 (2.2)	316 (2.2)	----	----	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	701 (4.8)	701 (4.8)	701 (4.8)	701 (4.8)	----	----	----
	Reduction Factors for Water-Filled Holes in Concrete			ϕ_{wf}	----	0.45						
Reduction Factor for Seismic Tension[5]				$\alpha_{N,seis}$	----	0.95						

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. Characteristic bond strength values correspond to concrete compressive strength f'_c =2,500 psi (17.2 MPa). For uncracked 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 $(f'_c/2{,}500)^{0.13}$ (for SI: $(f'_c/17.2)^{0.13}$).
2. Lightweight concrete may be used by applying a reduction factor as given in ACI 318-14 17.2.6 or ACI 318-11 Appendix D section D3.6 as applicable.
3. Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a results of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
4. Characteristic bond strength values are for sustained loads (when noted), including dead and live loads.
5. For structures in regions assigned to Seismic Design Category C, D, E, or F the bond strength values must be multiplied by $\alpha_{n,seis}$.

TABLE 8: ULTRABOND ACRYL-8CC **STEEL** design information for **REBAR**[1]

Design Information		Symbol	Units	Rebar Size							
				#3	#4	#5	#6	#7	#8	#9	#10
Nominal Anchor Diameter		d	in. (mm)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.125 (28.6)	1.250 (31.8)
Rebar Cross-Sectional Area		A_{se}	in^2 (mm^2)	0.110 (71)	0.200 (129)	0.310 (200)	0.440 (284)	0.600 (387)	0.790 (510)	1.000 (645)	1.270 (819)
ASTM A615 Grade 40	Nominal Strength as Governed by Steel Strength	N_{sa}	lb. (kN)	6,600 (29.4)	12,000 (53.4)	18,600 (82.7)	26,400 (117.4)	Grade 40 reinforcing bars are only available in sizes #3 through #6 per ASTM A615			
		V_{sa}	lb. (kN)	3,960 (17.6)	7,200 (32.0)	11,160 (49.6)	15,840 (70.5)				
	Reduction Factor for Seismic Shear	$\alpha_{V,seis}$	----	Not Applicable	0.70						
	Strength Reduction Factor for Tension[2]	ϕ		0.65							
	Strength Reduction Factor for Shear[2]	ϕ	----	0.60							
ASTM A615 Grade 60	Nominal Strength as Governed by Steel Strength	N_{sa}	lb. (kN)	9,900 (44.0)	18,000 (80.1)	27,900 (124.1)	39,600 (176.1)	54,000 (240.2)	71,100 (316.3)	90,000 (400.3)	114,300 (508.4)
		V_{sa}	lb. (kN)	5,940 (26.4)	10,800 (48.0)	16,740 (74.5)	23,760 (105.7)	32,400 (144.1)	42,660 (189.8)	54,000 (240.2)	68,580 (305.1)
	Reduction Factor for Seismic Shear	$\alpha_{V,seis}$	----	Not Applicable	0.70						
	Strength Reduction Factor for Tension[2]	ϕ	----	0.65							
	Strength Reduction Factor for Shear[2]	ϕ	----	0.60							

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi
1. Values provided for common rod material types are based on specified strength and calculated in accordance with ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. (D-2) and Eq. (D-29), as applicable. Nuts and washers must be appropriate for the rod strength and type.
2. For use with load combinations of IBC Section 1605.2, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D4.4. Values correspond to a brittle steel element.

TABLE 9: ULTRABOND ACRYL-8CC **CONCRETE BREAKOUT** design information for **REBAR**

Design Information	Symbol	Units	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)	4 1/2 (114)	6 (152)	7 1/2 (191)	9 (229)	10 1/2 (267)	12 (305)	13 1/2 (343)	15 (381)
Effectiveness Factor Cracked Concrete	$k_{c,cr}$	---- SI	Not Applicable	17 (7.1)						
Effectiveness Factor Uncracked Concrete	$k_{c,uncr}$	---- SI	24 (10)							
Minimum Spacing Distance	s_{min}	in. (mm)	$S_{min} = C_{min}$							
Minimum Edge Distance	c_{min}	in. (mm)	1 7/8 (48)	2 1/2 (64)	3 1/8 (79)	3 3/4 (95)	4 3/8 (111)	5 (127)	5 5/8 (143)	6 1/4 (159)
Minimum Concrete Thickness	h_{min}	in. (mm)	h_{ef} + 1.25 , [≥ 3.937] (h_{ef} + 30 , [≥ 100])		h_{ef} + 2d_o where d_o is the hole diameter					
Critical Edge Distance (Uncracked Concrete Only)	c_{ac}	in.	$C_{ac} = h_{ef} \cdot \left(\frac{\min(\tau_{k,uncr}; \tau_{k,max})}{1160} \right)^{0.4} \cdot \max\left[\left(3.1 - 0.7 \frac{h}{h_{ef}} \right); 1.4 \right]$							
		mm	$C_{ac} = h_{ef} \cdot \left(\frac{\min(\tau_{k,uncr}; \tau_{k,max})}{8} \right)^{0.4} \cdot \max\left[\left(3.1 - 0.7 \frac{h}{h_{ef}} \right); 1.4 \right]$							
Strength Reduction Factor Tension, Concrete Failure Mode,	ϕ	----	0.65							
Strength Reduction Factor Shear, Concrete Failure Mode,	ϕ	----	0.70							

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. Values provided for post-installed anchors with category as determined from ACI 355.4 given for Condition B. Condition B applies without supplementary reinforcement or where pullout (bond) or pryout govern, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, while condition A requires supplemental reinforcement. Values are for use with the load combinations Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 Section 9.2, as applicable, as set forth in ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4.

TABLE 10: ULTRABOND ACRYL-8CC **BOND STRENGTH** design information for **REBAR**[1,3,4]

Design Information				Symbol	Units	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)	4 1/2 (114)	6 (152)	7 1/2 (191)	9 (229)	10 1/2 (267)	12 (305)	13 1/2 (343)	15 (381)
Dry and Water Saturated Concrete	Maximum Long Term Temperature **122 °F** (50 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	331 (2.3)	345 (2.4)	345 (2.4)	345 (2.4)	345 (2.4)	349 (2.4)	349 (2.4)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	473 (3.3)	493 (3.4)	493 (3.4)	493 (3.4)	493 (3.4)	499 (3.4)	499 (3.4)
	Maximum Short Term Temperature **176 °F** (80 °C)	Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	743 (5.1)	668 (4.6)	588 (4.1)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,177 (8.1)	1,062 (7.3)	955 (6.6)	841 (5.8)
	Maximum Long Term Temperature **161 °F** (72 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	163 (1.1)	170 (1.2)	170 (1.2)	170 (1.2)	170 (1.2)	172 (1.2)	172 (1.2)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	362 (2.5)	377 (2.6)	377 (2.6)	377 (2.6)	377 (2.6)	382 (2.6)	382 (2.6)
	Maximum Short Term Temperature **248 °F** (120 °C)	Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	366 (2.5)	329 (2.3)	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	899 (6.2)	899 (6.2)	899 (6.2)	899 (6.2)	899 (6.2)	813 (5.6)	730 (5.0)	----
	Reduction Factors for Dry Holes in Concrete			ϕ_d	----	0.65							
	Reduction Factors for Water Saturated Holes in Concrete			ϕ_{ws}	----	0.55							
Water-Filled Holes in Concrete	Maximum Long Term Temperature **122 °F** (50 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	258 (1.8)	269 (1.9)	269 (1.9)	242 (1.7)	238 (1.6)	237 (1.6)	234 (1.6)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	369 (2.5)	385 (2.7)	385 (2.7)	346 (2.4)	340 (2.3)	339 (2.3)	335 (2.3)
	Maximum Short Term Temperature **176 °F** (80 °C)	Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	642 (4.4)	642 (4.4)	642 (4.4)	642 (4.4)	576 (4.0)	----	----	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	918 (6.3)	918 (6.3)	918 (6.3)	918 (6.3)	824 (5.7)	----	----	----
	Maximum Long Term Temperature **161 °F** (72 °C)	Cracked Concrete	Characteristic Bond Strength with Sustained Load	$T_{k,cr}$	psi (MPa)	----	127 (0.9)	133 (0.9)	133 (0.9)	119 (0.8)	117 (0.8)	117 (0.8)	115 (0.8)
			Characteristic Bond Strength without Sustained Load		psi (MPa)	----	282 (1.9)	295 (2.0)	295 (2.0)	264 (1.8)	260 (1.8)	260 (1.8)	255 (1.8)
	Maximum Short Term Temperature **248 °F** (120 °C)	Uncracked Concrete[2]	Characteristic Bond Strength with Sustained Load	$T_{k,uncr}$	psi (MPa)	316 (2.2)	316 (2.2)	316 (2.2)	316 (2.2)	----	----	----	----
			Characteristic Bond Strength without Sustained Load		psi (MPa)	702 (4.8)	702 (4.8)	702 (4.8)	702 (4.8)	----	----	----	----
	Reduction Factors for Water-Filled Holes in Concrete			ϕ_{wf}	----	0.45							
Reduction Factor for Seismic Tension[5]				$\alpha_{N,seis}$	----	1.00							

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 0.006897 MPa
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. Characteristic bond strength values correspond to concrete compressive strength f'_c =2,500 psi (17.2 MPa). For uncracked 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 $(f'_c/2{,}500)^{0.13}$ (for SI: $(f'_c/17.2)^{0.13}$).
2. Lightweight concrete may be used by applying a reduction factor as given in ACI 318-14 17.2.6 or ACI 318-11 Appendix D section D3.6 as applicable.
3. Short term elevated concrete temperatures are those that occur over brief intervals, e.g., as a results of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.
4. Characteristic bond strength values are for sustained loads (when noted), including dead and live loads.
5. For structures in regions assigned to Seismic Design Category C, D, E, or F the bond strength values must be multiplied by $\alpha_{n,seis}$.

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TABLE 11: ULTRABOND ACRYL-8CC allowable **TENSION** loads for **THREADED ROD** in normal-weight concrete[1]

Threaded Rod Diameter in.	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Allowable Tension Load Based on Bond Strength / Concrete Capacity[2,3] lbs. (kN)	Allowable Tension Load Based on Steel Strength[4]		
			$f'_c \geq 2{,}500$ psi (17.4 MPa)	ASTM F1554 Grade 36 lbs. (kN)	ASTM A193 Grade B7 lbs. (kN)	ASTM F593 304/316 SS lbs. (kN)
3/8	7/16	2 3/8 (60)	1,011 (4.5)	2,114 (9.4)	4,556 (20.3)	3,645 (16.2)
		3 3/8 (86)	1,437 (6.4)			
		4 1/2 (114)	1,916 (8.5)			
1/2	9/16	2 3/4 (70)	1,561 (6.9)	3,758 (16.7)	8,099 (36.0)	6,480 (28.8)
		4 1/2 (114)	2,555 (11.4)			
		6 (152)	3,407 (15.2)			
5/8	3/4	3 1/8 (79)	2,218 (9.9)	5,872 (26.1)	12,655 (56.3)	10,124 (45.0)
		5 5/8 (143)	3,992 (17.8)			
		7 1/2 (191)	5,323 (23.7)			
3/4	7/8	3 1/2 (86)	2,981 (13.7)	8,456 (37.6)	18,224 (81.1)	12,392 (55.1)
		6 3/4 (171)	5,749 (25.6)			
		9 (229)	7,665 (34.1)			
7/8	1	3 1/2 (89)	3,451 (15.4)	11,509 (51.2)	24,804 (110.3)	16,867 (75.0)
		7 7/8 (200)	7,825 (34.8)			
		10 1/2 (267)	10,433 (46.4)			
1	1 1/8	4 (102)	4,101 (18.2)	15,033 (66.9)	32,398 (144.1)	22,030 (98.0)
		9 (229)	9,226 (41.0)			
		12 (305)	12,302 (54.7)			
1 1/4	1 3/8	5 (127)	5,071 (22.6)	23,488 (104.5)	50,621 (225.2)	34,423 (153.1)
		11 1/4 (286)	11,409 (50.7)			
		15 (381)	15,212 (67.7)			

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa.
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable tension value for design.
2. Allowable tension loads calculated based on strength design provisions of IBC Section 1605.3 with the following assumptions: Temperature range A: Maximum short term temperature of 176 °F (80 °C), Maximum long term temperature of 122 °F (50°C). Load combination from ACI based on 1.2D + 1.6L assuming dead load of 0.3 and live load of 0.7 giving a weighted average of 1.48. f'_c = 2,500 psi normal-weight uncracked concrete. Single anchor, vertically down with periodic special inspection and no seismic loading. ϕ_d 0.65 for dry concrete, $C_{a1} = C_{a2} \geq C_{ac}$, $h \geq h_{min}$.
3. For long term temperature exposure greater than 122 °F (50 °C) and up to 161 °F (72°C), with short term temperatures up to 248 °F (120 °C), apply a reduction factor of 0.49 to the allowable tension load.
4. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Tensile = 0.33 * F_u * A_{nom}.

TABLE 12: ULTRABOND ACRYL-8CC allowable **SHEAR** loads for **THREADED ROD** in normal-weight concrete[1]

Threaded Rod Diameter in.	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Allowable Shear Load Based on Bond Strength / Concrete Capacity[2,3] lbs. (kN)		Allowable Shear Load Based on Steel Strength[4]					
			$f'_c \geq 2{,}500$ psi (17.4 MPa)		ASTM F1554 Grade 36 lbs. (kN)		ASTM A193 Grade B7 lbs. (kN)		ASTM F593 304/316 SS lbs. (kN)	
3/8	7/16	2 3/8 (60)	1,011	(4.5)	1,089	(4.8)	2,347	(10.4)	1,878	(8.4)
		3 3/8 (86)	2,436	(10.8)						
		4 1/2 (114)	3,832	(17.0)						
1/2	9/16	2 3/4 (70)	1,878	(8.4)	1,936	(8.6)	4,172	(18.6)	3,338	(14.8)
		4 1/2 (114)	4,308	(19.2)						
		6 (152)	6,813	(30.3)						
5/8	3/4	3 1/8 (79)	2,496	(11.1)	3,025	(13.5)	6,519	(29.0)	5,216	(23.2)
		5 5/8 (143)	6,725	(29.9)						
		7 1/2 (191)	10,646	(47.4)						
3/4	7/8	3 1/2 (86)	3,196	(14.2)	4,356	(19.4)	9,388	(41.8)	6,384	(28.4)
		6 3/4 (171)	9,259	(41.2)						
		9 (229)	14,168	(63.0)						
7/8	1	3 1/2 (89)	3,332	(14.8)	5,929	(26.4)	12,778	(56.8)	8,689	(38.7)
		7 7/8 (200)	11,663	(51.9)						
		10 1/2 (267)	17,846	(79.4)						
1	1 1/8	4 (102)	4,084	(18.2)	7,744	(34.4)	16,690	(74.2)	11,349	(50.5)
		9 (229)	13,674	(60.8)						
		12 (305)	20,923	(93.1)						
1 1/4	1 3/8	5 (127)	5,200	(23.1)	12,100	(53.8)	26,078	(116.0)	17,733	(78.9)
		11 1/4 (286)	17,394	(77.4)						
		15 (381)	26,615	(118.4)						

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa.
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable tension value for design.
2. Allowable tension loads calculated based on strength design provisions of IBC Section 1605.3 with the following assumptions: Temperature range A: Maximum short term temperature of 176 °F (80 °C), Maximum long term temperature of 122 °F (50°C). Load combination from ACI based on 1.2D + 1.6L assuming dead load of 0.3 and live load of 0.7 giving a weighted average of 1.48. f'_c = 2,500 psi normal-weight uncracked concrete. Single anchor, vertically down with periodic special inspection and no seismic loading. ϕ_d 0.65 for dry concrete, $C_{a1} = C_{a2} \geq C_{ac}$, $h \geq h_{min}$
3. For long term temperature exposure greater than 122 °F (50 °C) and up to 161 °F (72°C), with short term temperatures up to 248 °F (120 °C), apply a reduction factor of 0.49 to the allowable shear load.
4. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Shear = 0.17 * F_u * A_{nom}.

TABLE 13: ULTRABOND ACRYL-8CC allowable **TENSION** loads for **REBAR** in normal-weight concrete[1]

Rebar Size	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Allowable Tension Load Based on Bond Strength / Concrete Capacity[2,3] lbs. (kN)	Allowable Tension Load Based on Steel Strength[4]	
			$f'_c \geq 2{,}500$ psi (17.4 MPa)	ASTM A615 Grade 60 lbs. (kN)	ASTM A615 Grade 40 lbs. (kN)
#3	1/2	2 3/8 (60)	1,497 (6.7)	2,640 (11.7)	1,760 (7.8)
		3 3/8 (86)	2,127 (9.5)		
		4 1/2 (114)	2,836 (12.6)		
#4	5/8	2 3/4 (70)	2,311 (10.3)	4,800 (21.4)	3,200 (14.2)
		4 1/2 (114)	3,781 (16.8)		
		6 (152)	5,042 (22.4)		
#5	3/4	3 1/8 (79)	3,282 (14.6)	7,440 (33.1)	4,960 (22.1)
		5 5/8 (143)	5,908 (26.3)		
		7 1/2 (191)	7,878 (35.0)		
#6	7/8	3 1/2 (86)	4,412 (13.7)	10,560 (47.0)	7,040 (31.3)
		6 3/4 (171)	8,508 (37.8)		
		9 (229)	11,344 (50.5)		
#7	1 1/8	3 1/2 (89)	5,107 (22.7)	14,400 (64.1)	Grade 40 reinforcing bars are only available in sizes #3 through #6 per ASTM A615
		7 7/8 (200)	11,580 (51.5)		
		10 1/2 (267)	15,440 (68.7)		
#8	1 1/4	4 (102)	6,069 (27.0)	18,960 (84.3)	
		9 (229)	13,655 (60.7)		
		12 (305)	18,207 (81.0)		
#9	1 3/8	4 1/2 (114)	6,906 (30.7)	24,000 (106.8)	
		10 1/8 (257)	15,538 (69.1)		
		13 1/2 (343)	20,717 (92.2)		
#10	1 1/2	5 (127)	7,504 (33.4)	30,480 (135.6)	
		11 1/4 (286)	16,885 (75.1)		
		15 (381)	22,513 (100.1)		

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa.
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable tension value for design.
2. Allowable tension loads calculated based on strength design provisions of IBC Section 1605.3 with the following assumptions: Temperature range A: Maximum short term temperature of 176 °F (80 °C), Maximum long term temperature of 122 °F (50°C). Load combination from ACI based on 1.2D + 1.6L assuming dead load of 0.3 and live load of 0.7 giving a weighted average of 1.48. f'_c = 2,500 psi normal-weight uncracked concrete. Single anchor, vertically down with periodic special inspection and no seismic loading. ϕ_d 0.65 for dry concrete, $C_{a1} = C_{a2} \geq C_{ac}$, $h \geq h_{min}$
3. For long term temperature exposure greater than 122 °F (50 °C) and up to 161 °F (72°C), with short term temperatures up to 248 °F (120 °C), apply a reduction factor of 0.49 to the allowable tension load.
4. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Tensile = 0.33 * F_u * A_{nom}.

TABLE 14: ULTRABOND ACRYL-8CC allowable **SHEAR** loads for **REBAR** in normal-weight concrete[1]

Rebar Size	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Allowable Shear Load Based on Bond Strength / Concrete Capacity[2,3] lbs. (kN)	Allowable Shear Load Based on Steel Strength[4]	
			$f'_c \geq 2{,}500$ psi (17.4 MPa)	ASTM A615 Grade 60 lbs. (kN)	ASTM A615 Grade 40 lbs. (kN)
#3	1/2	2 3/8 (60)	1,497 (6.7)	1,683 (7.5)	1,122 (5.0)
		3 3/8 (86)	3,605 (16.0)		
		4 1/2 (114)	5,672 (25.2)		
#4	5/8	2 3/4 (70)	2,780 (12.4)	3,060 (13.6)	2,040 (9.1)
		4 1/2 (114)	6,376 (28.4)		
		6 (152)	10,084 (44.9)		
#5	3/4	3 1/8 (79)	3,694 (16.4)	4,743 (21.1)	3,162 (14.1)
		5 5/8 (143)	9,953 (44.3)		
		7 1/2 (191)	15,756 (70.1)		
#6	7/8	3 1/2 (86)	4,730 (13.7)	6,732 (29.9)	4,488 (20.0)
		6 3/4 (171)	13,704 (61.0)		
		9 (229)	20,969 (93.3)		
#7	1 1/8	3 1/2 (89)	4,932 (21.9)	9,180 (40.8)	Grade 40 reinforcing bars are only available in sizes #3 through #6 per ASTM A615
		7 7/8 (200)	17,261 (76.8)		
		10 1/2 (267)	26,412 (117.5)		
#8	1 1/4	4 (102)	6,045 (26.9)	12,087 (53.8)	
		9 (229)	20,237 (90.0)		
		12 (305)	30,966 (137.7)		
#9	1 3/8	4 1/2 (114)	6,900 (30.7)	15,300 (68.1)	
		10 1/8 (257)	23,182 (103.1)		
		13 1/2 (343)	35,472 (157.8)		
#10	1 1/2	5 (127)	7,683 (34.2)	19,431 (86.4)	
		11 1/4 (286)	25,791 (114.7)		
		15 (381)	39,464 (175.5)		

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 psi = 0.006897 MPa.
For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf, 1MPa = 145.0 psi

1. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable tension value for design.
2. Allowable tension loads calculated based on strength design provisions of IBC Section 1605.3 with the following assumptions: Temperature range A: Maximum short term temperature of 176 °F (80 °C), Maximum long term temperature of 122 °F (50°C). Load combination from ACI based on 1.2D + 1.6L assuming dead load of 0.3 and live load of 0.7 giving a weighted average of 1.48. f'_c = 2,500 psi normal-weight uncracked concrete. Single anchor, vertically down with periodic special inspection and no seismic loading. ϕ_d 0.65 for dry concrete, $C_{a1} = C_{a2} \geq C_{ac}$, $h \geq h_{min}$
3. For long term temperature exposure greater than 122 °F (50 °C) and up to 161 °F (72°C), with short term temperatures up to 248 °F (120 °C), apply a reduction factor of 0.49 to the allowable shear load.
4. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Shear = 0.17 * F_u * A_{nom}.