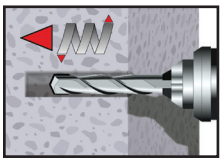
ULTRA-FAST ANCHORING ADHESIVE

Technical Performance Specifications

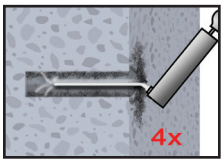
ICC INSTALLATION INSTRUCTIONS - CONCRETE



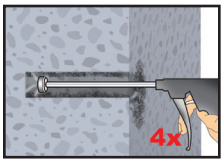
1. Drill a hole into the base material with a hammer drill tool to the size and embedment required by the selected steel hardware element. The tolerances of the carbide drill bit must meet the requirements of ANSI Standard B212.15.

Precaution: Wear suitable eye and skin protection. Avoid inhalation of dusts during drilling and/or removal.

Note: In case of standing water in the drilled bore hole, all the water has to be removed from the hole (e.g. vacuum, compressed air, etc.) prior to cleaning.



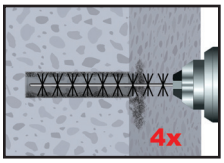
or



2a. In case of standing water in the drilled bore hole, all the water has to be removed from the hole (e.g. vacuum, compressed air, etc.) prior to cleaning.

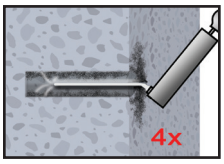
Starting from the bottom or back of the anchor hole, blow the hole clean a minimum of four times (4x).

- Use a compressed air nozzle (min. 90 psi) or a hand pump (min. volume 25 fl. oz.) for anchor rod 3/8" to 3/4" diameter or reinforcing bar (rebar) sizes #3 to #6.
- Use a compressed air nozzle (min. 90 psi) for anchor rod 7/8" to 1-1/4" diameter and rebar sizes #7 to #10. A hand pump must not be used with these anchor sizes.

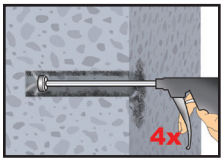


2b. Determine brush diameter for the drilled hole and attach the brush with adapter to a rotary drill tool or battery screw gun. Brush the hole with the selected wire brush a minimum of four times (4x). A brush extension must be used for holes drilled deeper than the listed brush length.

The wire brush diameter must be checked periodically during use ($\varnothing_{brush} > D_{min}$). The brush should resist insertion into the drilled hole - if not the brush is too small and must be replaced with the proper brush diameter.



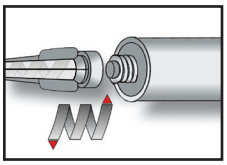
or



2c. Finally, blow the hole clean again a minimum of four times (4x).

- Use a compressed air nozzle (min. 90 psi) or a hand pump (min. volume 25 fl. oz.) for anchor rod 3/8" to 3/4" diameter or reinforcing bar (rebar) sizes #3 to #6.
- Use a compressed air nozzle (min. 90 psi) for anchor rod 7/8" to 1-1/4" diameter and rebar sizes #7 to #10. A hand pump must not be used with these anchor sizes.

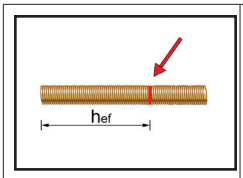
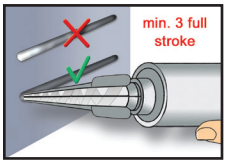
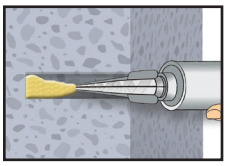
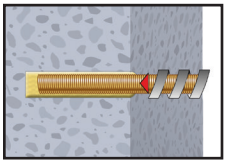
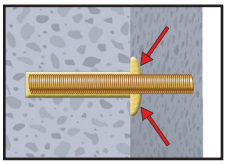
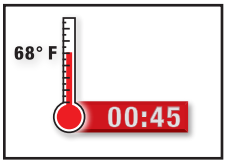
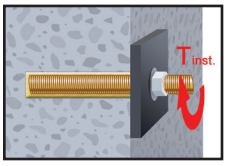
When finished the hole should be clean and free of dust, debris, ice, grease, oil or other foreign material.



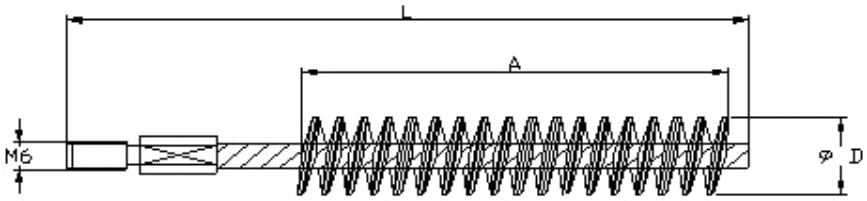
3. Check adhesive expiration date on cartridge label. Do not use expired product. Review Material Safety Data Sheet (MSDS) before use. Cartridge temperature must be between 41°F - 95°F (5°C - 35°C) when in use. Review working and cure times. Consideration should be given to the reduced gel (working) time of the adhesive in warm temperatures.

Attach a supplied mixing nozzle to the cartridge. Do not modify the mixer in any way and make sure the mixing element is inside the nozzle. Load the cartridge into the correct dispensing tool.

Note: 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.

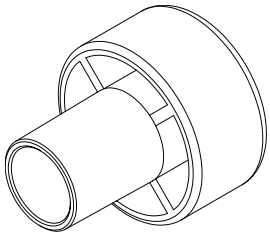
	**4.** Prior to inserting the anchor rod or rebar into the filled bore hole, the position of the embedment depth has to be marked on the anchor. Verify anchor element is straight and free of surface damage.
	**5.** Adhesive must be properly mixed to achieve published properties. Prior to dispensing adhesive into the drilled hole, separately dispense at least three full strokes of adhesive through the mixing nozzle until the adhesive is a consistent gray color. Review and note the published working and cure times prior to injection of the mixed adhesive into the cleaned anchor hole.
	**6.** Fill the cleaned hole approximately two-thirds full with mixed adhesive starting from the bottom or back of the anchor hole. Slowly withdraw the mixing nozzle as the hole fills to avoid creating air pockets or voids. If the bottom or back of the anchor hole is not reached with the mixing nozzle, only an extension nozzle (3/8" dia.) must be used with the mixing nozzle. Piston plugs must be used with an attached mixing nozzle and extension tube for horizontal and overhead installations with anchor rod 5/8" to 1-1/4" diameter and rebar sizes #5 to #10. Insert piston plug to the back of the drilled hole and inject as described in the method above. During installation, the piston plug will be naturally extruded from the drilled hole by the adhesive pressure. **Attention!** Do not install anchors overhead without proper training and installation hardware provided by CTS. Contact CTS for details prior to use.
	**7.** The anchor should be free of dirt, grease, oil or other foreign material. Push clean threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. Observe the gel (working) time.
	**8.** Be sure that 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 there is not enough adhesive in the hole, the installation must be repeated. For overhead applications, and applications between horizontal and overhead, the anchor must be secured from moving/falling during the cure time (e.g. wedges). Minor adjustments to the anchor may be performed during the gel time, but the anchor shall not be moved after placement and during cure.
	**9.** Allow the adhesive anchor to cure to the specified full curing time prior to applying any load. Do not disturb, torque or load the anchor until it is fully cured.
	**10.** After full curing of the adhesive anchor, a fixture can be installed to the anchor and tightened up to the maximum torque by using a calibrated torque wrench. Take care not to exceed the maximum torque for the selected anchor.

CLEANING OF THE DRILL HOLE - CONCRETE



Brush:
Brush length: 3.15"
M6 thread for drilling machine connection

Blower



Piston plug

Threaded rod	Rebar	Bore hole-∅	Brush-∅	Min. brush-∅	Piston plug
(Inch)	(Inch)	(Inch)	d_b (Inch)	$d_{b,min}$ (Inch)	(Nr.)
3/8	—	7/16	0.528	0.458	—
—	#3	1/2	0.591	0.520	—
1/2	—	9/16	0.654	0.582	—
—	#4	5/8	0.720	0.650	—
5/8	#5	3/4	0.846	0.775	—
3/4	#6	7/8	0.976	0.905	—
7/8	#7	1	1.122	1.030	#7
1	#8	1-1/8	1.252	1.160	#8
1-1/4	#9	1-3/8	1.504	1.410	#9
—	#10	1-1/2	1.630	1.535	#10

SETTING PARAMETER - CONCRETE

Anchor size			3/8	1/2	5/8	3/4	7/8	1	1- 1/4
Effectness factor (cracked concrete)	$k_{c,cr}$	[-]	17						
Effectness factor (uncracked concrete)	$k_{c,uncr}$	[-]	24						
Min. edge distance	C_{min}	[inch]	1.88	2.50	3.13	3.75	4.38	5.00	6.25
Min. axial distance	S_{min}	[inch]	1.88	2.50	3.13	3.75	4.38	5.00	6.25
Embedment depth (hammer drilled)	$h_{ef,min}$	[inch]	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	5
	$h_{ef,max}$	[inch]	7-1/2	10	12-1/2	15	17-1/2	20	25
Min. part thickness	h_{min}	[inch]	h_{ef} + 1-1/4"			$h_{ef} + 2d_0$			
Anchor diameter	d_a	[inch]	3/8	1/2	5/8	3/4	7/8	1	1-1/4
Drill diameter	d_0	[mm]	7/16	9/16	3/4	7/8	1	1 -1/8	1 -3/8
Installation torque	$T_{inst.}$	[ft-lb]	15	33	60	105	125	165	280

Anchor size			#3	#4	#5	#6	#7	#8	#9	#10
Effectness factor (cracked concrete)	$k_{c,cr}$	[-]	17							
Effectness factor (uncracked concrete)	$k_{c,uncr}$	[-]	24							
Min. edge distance	C_{min}	[inch]	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
Min. axial distance	S_{min}	[inch]	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
Embedment depth	$h_{ef,min}$	[inch]	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	4-1/2	5
	$h_{ef,max}$	[inch]	7-1/2	10	12-1/2	15	17-1/2	20	22-1/2	25
Min. part thickness	h_{min}	[inch]	h_{ef} + 1-1/4"		$h_{ef} + 2d_0$					
Anchor diameter	d_a	[inch]	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4
Drill diameter	d_0	[mm]	1/2	5/8	3/4	7/8	1	1-1/8	1-3/8	1-1/2
Installation torque	$T_{inst.}$	[ft-lb]	15	33	60	105	125	165	220	280

PERFORMANCE DATA - CONCRETE (THREADED ROD) [1)]

TENSION LOADS - Design acc. to ACI 318-11 Appendix D

Anchor size				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Steel failure										
Nominal strength tension as governed by steel strength, ASTM A36		N_{sa}	[lb]	4,495	8,230	13,110	19,400	26,780	35,130	56,210
Nominal strength tension as governed by steel strength, ASTM A193 Grade B7		N_{sa}	[lb]	9,685	17,735	28,250	41,810	57,710	75,710	121,135
Reduction factor		ϕ		0.75						
Nominal strength tension as governed by steel strength, ASTM F593 CW Stainless		N_{sa}	[lb]	7,750	14,190	22,600	28,430	39,245	51,485	82,370
Reduction factor		ϕ		0.65						
Pullout and concrete cone failure										
Characteristic bond strength3) in concrete 2,500 psi										
Temperature Range: 75°F/104°F 1)	uncracked concrete	$\tau_{k,uncr}$	[psi]	1,450	1,450	1,450	1,450	1,450	1,305	1,030
	cracked concrete	$\tau_{k,cr}$		—	871	907	907	907	918	918
Temperature Range: 122°F/176°F 1)	uncracked concrete	$\tau_{k,uncr}$		823	823	823	823	823	743	588
	cracked concrete	$\tau_{k,cr}$		—	498	519	519	519	519	525
Temperature Range: 161°F/248°F 1)	uncracked concrete	$\tau_{k,uncr}$		405	405	405	405	405	366	—
	cracked concrete	$\tau_{k,cr}$		—	245	255	255	255	255	255
Strength reduction factor for permissible installation condition	dry	ϕ_d		0.65						
	wet	ϕ_{ws}		0.55						
	water-filled	ϕ_{wf}		0.45						
		κ_{wf}		0.78	0.78	0.78	0.78	0.70	0.69	0.67
Embedment depth		$h_{ef,min}$	[inch]	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	5
		$h_{ef,max}$	[inch]	7-1/2	10	12-1/2	15	17-1/2	20	25
Increasing factor				$(f'_c/2{,}500)^{0.13}$						
Concrete breakout										
Effectness factor (cracked concrete)		$k_{c,cr}$	[-]	17						
Effectness factor (uncracked concrete)		$k_{c,uncr}$	[-]	24						
Reduction factor Condition B[2)]		ϕ		0.65						
Seismic										
Reduction factor for seismic tension		$\alpha_{N,seis}$	[-]	1.0						

The data in this table are evaluated according AC308-11 and ACI 355.4.

1 Long term temperature/ Short term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Room temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirement of ACI 355.4, Table 8.1 and consequently is not applicable to design under ACI 318-14, ACI 318-11 or current and past editions of the International Building Code (IBC). The tabulated values are provided for analysis and evaluation of existing conditions only.

2 Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pullout or pryout governs, as set forth in ACI 318-11 D.4.3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318-11 9.2 are used. 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.

3 Characteristic bond strengths are for sustained loads including dead and live loads. For load combinations consisting of short-term loads only such as wind or seismic, bond strengths may be increased by 43 percent for Temperature Range 122°F/176°F and 122 percent for Temperature Range 161°F/248°F.

PERFORMANCE DATA - CONCRETE (THREADED ROD)

SHEAR LOADS - Design acc. to ACI 318-11 Appendix D

Anchor size			3/8	1/2	5/8	3/8	7/8	1	1-1/4
Steel failure									
Nominal shear strength as governed by steel strength, ASTM A36	V_{sa}	[lb]	2,695	4,940	7,860	11,640	16,065	21,080	33,725
Nominal shear strength as governed by steel strength, ASTM A193 Grade B7	V_{sa}	[lb]	4,845	10,640	16,950	25,085	34,625	45,425	72,680
Reduction factor	ϕ		0.65						
Reduction factor for seismic shear	ϕ		0.85	0.85	0.85	0.85	0.85	0.80	0.80
Nominal shear strength as governed by steel strength, ASTM F593 CW Stainless	V_{sa}	[lb]	4,650	8,515	13,560	17,055	23,545	30,890	49,420
Reduction factor	ϕ		0.60						
Reduction factor for seismic shear	ϕ		0.85	0.85	0.85	0.85	0.85	0.80	0.80
Concrete edge failure									
Effective length of anchor in shear loading	l_e	[Inch]	min (h_{ef} ; $8d_a$)						
Outside diameter of anchor	d_a	[Inch]	3/8	1/2	5/8	3/8	7/8	1	1-1/4
Reduction factor Condition B[1)]	ϕ		0.65						

The data in this table are evaluated according AC308-11 and ACI 355.4.

1 Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pullout or pryout governs, as set forth in ACI 318-11 D.4.3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318-11 9.2 are used. 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.

PERFORMANCE DATA - CONCRETE (REBAR)

TENSION LOADS - Design acc. to ACI 318-11 Appendix D

Anchor size				#3	#4	#5	#6	#7	#8	#9	#10
Steel failure											
Nominal tension strength as governed by steel strength, ASTM A615 Grade 60		N_{sa}	[lb]	9,900	18,000	27,900	39,600	54,000	71,100	90,000	114,300
Reduction factor		ϕ		0.65							
Nominal tension strength as governed by steel strength, ASTM A706, Grade 60		N_{sa}	[lb]	8,800	16,000	24,800	35,200	48,000	63,200	80,000	101,600
Reduction factor		ϕ		0.75							
Pullout and concrete cone failure											
Characteristic bond strength[3] in concrete 2500 psi											
Temperature Range: 75°F/104°F [1]	uncracked conc.	$\tau_{k,uncr}$	[psi]	1,450	1,450	1,450	1,450	1,450	1,305	1,160	1,030
	cracked conc.	$\tau_{k,cr}$		—	871	907	907	907	918	918	918
Temperature Range: 122°F/176°F [1]	uncracked conc.	$\tau_{k,uncr}$		823	823	823	823	823	743	668	588
	cracked conc.	$\tau_{k,cr}$		—	331	345	345	345	345	345	349
Temperature Range: 161°F/248°F [1]	uncracked conc.	$\tau_{k,uncr}$		405	405	405	405	405	366	329	—
	cracked conc.	$\tau_{k,cr}$		142	163	170	170	170	170	172	172
Strength reduction factor for permissible istallation condition	dry	ϕ_d		0.65							
	wet	ϕ_{ws}		0.55							
	water-filled	ϕ_{wf}		0.45							
		κ_{wf}		0.78	0.78	0.78	0.78	0.70	0.69	0.68	0.67
Embedment depth		$h_{ef,min}$	[inch]	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	4-1/2	5
		$h_{ef,max}$	[inch]	7-1/2	10	12-1/2	15	17-1/2	20	22-1/2	25
Increasing factor				$(f'_c/2500)^{0.13}$							
Concrete breakout											
Effectness factor (cracked concrete)		$k_{c,uncr}$	[-]	17							
Effectness factor (uncracked concrete)		$k_{c,uncr}$	[-]	24							
Reduction factor Condition B[2]		ϕ		0.65							
Concrete breakout											
Reduction factor for seismic tension		$\alpha_{N,seis}$	[-]	1.0							

The data in this table are evaluated according AC308-11 and ACI 355.4.

1 Long term temperature/ Short term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Room temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirement of ACI 355.4, Table 8.1 and consequently is not applicable to design under ACI 318-14, ACI 318-11 or current and past editions of the International Building Code (IBC). The tabulated values are provided for analysis and evaluation of existing conditions only.

2 Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pullout or pryout governs, as set forth in ACI 318-11 D.4.3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318-11 9.2 are used. 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.

3 Characteristic bond strengths are for sustained loads including dead and live loads. For load combinations consisting of short-term loads only such as wind or seismic, bond strengths may be increased by 43 percent for Temperature Range 122°F/176°F and 122 percent for Temperature Range 161°F/248°F.

PERFORMANCE DATA - CONCRETE (REBAR)

SHEAR LOADS - Design acc. to ACI 318-11 Appendix D, hammer and diamond drilled bore holes

Anchor size			#3	#4	#5	#6	#7	#8	#9	#10
Steel failure										
Nominal shear strength as governed by steel strength, ASTM A615 Grade 60	V_{sa}	[lb]	5,940	10,800	16,740	23,760	32,400	42,660	54,000	68,580
Reduction factor	ϕ		0.60							
Reduction factor for seismic shear	ϕ		0.70							
Nominal shear strength as governed by steel strength, ASTM A706, Grade 60	V_{sa}	[lb]	5,280	9,600	14,880	21,120	28,800	37,920	48,000	60,960
Reduction factor	ϕ		0.65							
Reduction factor for seismic shear	ϕ		0.70							
Concrete edge failure										
Effective length of anchor in shear loading	l_e	[Inch]	min (h_{ef} ; $8d_a$)							
Outside diameter of anchor	d_a	[Inch]	3/8	1/2	5/8	3/8	7/8	1	1-1/8	1-1/4
Reduction factor Condition B[1)]	ϕ		0.65							

The data in this table are evaluated according AC308-11 and ACI 355.4.

1 Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pullout or pryout governs, as set forth in ACI 318-11 D.4.3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318-11 9.2 are used. 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.

ALLOWABLE LOADS - CONCRETE (THREADED ROD)

The allowable loads are only valid for single anchor for a roughly design, if the following conditions are valid:
min edge distance $c_a \geqq c_{ac}$ min spacing $S \geqq 2 \times C_{Na}$
min thickness concrete $h \geqq 2 \times h_{ef}$ concrete compressive strength $f'c \geqq 2500$ psi
Static loads only. Allowable stress design conversion α=1.2D + 1.6L = 1.4
If the conditions are not fulfilled the loads must be calculated acc. to ACI 318-11 Appendix D.
The safety factors are already included in the allowable loads.

Anchor size			3/8	1/2	5/8	3/4	7/8	1	1-1/4
Allowable tension load for all Steel strength									
Temperature Range: 75°F/104°F 1)	$N_{allowable,ucr}$	[lb]	2,151	3,688	5,122	7,991	11,474	14,752	16,009
	$N_{allowable,cr}$	[lb]	—	2,215	3,204	4,998	71,77	10,377	14,269
Temperature Range: 122°F/176°F 1)	$N_{allowable,ucr}$	[lb]	1,221	2,093	2,907	4,535	6,512	8,399	9,139
	$N_{allowable,cr}$	[lb]	—	1,267	1,833	2,860	4,107	5,867	8,160
Temperature Range: 161°F/248°F 1)	$N_{allowable,ucr}$	[lb]	601	1,030	1,431	2,232	3,205	4,137	—
	$N_{allowable,cr}$	[lb]	—	623	901	1,405	2,018	2,883	3,964
Allowable shear load for steel strength, ASTM A36									
Temperature Range: 75°F/104°F 1)	$V_{allowable,ucr}$	[lb]	1,251	2,294	3,649	5,404	7,459	9,787	15,658
	$V_{allowable,cr}$	[lb]	—	2,294	3,649	5,404	7,459	9,787	15,365
Temperature Range: 122°F/176°F 1)	$V_{allowable,ucr}$	[lb]	1,251	2,294	3,649	5,404	7,459	9,787	15,655
	$V_{allowable,cr}$	[lb]	—	2,294	3,649	5,404	7,459	9,787	15,365
Temperature Range: 161°F/248°F 1)	$V_{allowable,ucr}$	[lb]	1,251	2,294	3,466	5,404	7,459	9,787	—
	$V_{allowable,cr}$	[lb]	—	1,732	2,503	3,905	5,608	8,011	11,015
Allowable shear load for steel strength, ASTM A193 Grade B7									
Temperature Range: 75°F/104°F 1)	$V_{allowable,ucr}$	[lb]	2,249	4,940	7,045	11,204	15,298	20,497	21,511
	$V_{allowable,cr}$	[lb]	—	3,843	5,032	8,003	10,927	14,641	15,365
Temperature Range: 122°F/176°F 1)	$V_{allowable,ucr}$	[lb]	2,249	4,940	7,045	11,204	15,298	20,497	21,511
	$V_{allowable,cr}$	[lb]	—	3,520	5,032	7,949	10,927	14,641	153,65
Temperature Range: 161°F/248°F 1)	$V_{allowable,ucr}$	[lb]	1,670	2,863	3,976	6,203	8,906	11,498	—
	$V_{allowable,cr}$	[lb]	—	1,732	2,503	3,905	5,608	8,011	11,015
Allowable shear load for steel strength, ASTM F593 CW Stainless									
Temperature Range: 75°F/104°F 1)	$V_{allowable,ucr}$	[lb]	1,993	3,649	5,811	7,309	10,091	13,239	21,180
	$V_{allowable,cr}$	[lb]	—	3,649	5,032	7,309	10,091	13,239	15,365
Temperature Range: 122°F/176°F 1)	$V_{allowable,ucr}$	[lb]	1,993	3,649	5,811	7,309	10,091	13,239	21,180
	$V_{allowable,cr}$	[lb]	—	3,520	5,032	7,309	10,091	13,239	15,365
Temperature Range: 161°F/248°F 1)	$V_{allowable,ucr}$	[lb]	1,670	2,863	3,976	6,203	8,906	11,498	—
	$V_{allowable,cr}$	[lb]	—	1,732	2,503	3,905	5,608	8,011	11,015
Embedment depth	h_{ef}	[Inch]	3-1/2	4-1/2	5	6-1/2	8	10	11
Edge distance	c_{ca}	[Inch]	6.51	8.36	9.29	12.08	14.87	17.82	17.83
Axial distance	C_{Na}	[Inch]	4.31	5.74	7.18	8.61	10.05	10.89	12.10

1 Long term temperature/ Short term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Room temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirement of ACI 355.4, Table 8.1 and consequently is not applicable to design under ACI 318-14, ACI 318-11 or current and past editions of the International Building Code (IBC). The tabulated values are provided for analysis and evaluation of existing conditions only.

ALLOWABLE LOADS - CONCRETE (REBAR)

The allowable loads are only valid for single anchor for a roughly design, if the following conditions are valid:
min edge distance $c_a \geqq c_{ac}$ min spacing $S \geqq 2 \times C_{Na}$
min thickness concrete $h \geqq 2 \times h_{ef}$ concrete compressive strength $f'c \geqq 2500$ psi
Static loads only. Allowable stress design conversion $\alpha = 1.2D + 1.6L = 1.4$
If the conditions are not fulfilled the loads must be calculated acc. to ACI 318-11 Appendix D.
The safety factors are already included in the allowable loads.

Anchor size			#3	#4	#5	#6	#7	#8	#9	#10
Allowable tension load for all steel strength										
Temperature Range A: 75°F/104°F [1)]	$N_{allowable,ucr}$	[lb]	2,151	3,688	5,122	7,991	11,474	14,752	16,227	16,009
	$N_{allowable,cr}$	[lb]	—	2,215	3,204	4,998	7,177	10,377	12,842	14,269
Temperature Range A: 122°F/176°F [1)]	$N_{allowable,ucr}$	[lb]	1,221	2,093	2,907	4,535	6,512	8,399	9,345	9,139
	$N_{allowable,cr}$	[lb]	—	842	1,219	1,901	2,730	3,900	4,826	5,425
Temperature Range B: 161°F/248°F [1)]	$N_{allowable,ucr}$	[lb]	601	1,030	1,431	2,232	3,205	4,137	4,602	—
	$N_{allowable,cr}$	[lb]	—	415	601	937	1,345	1,922	2,406	2,673
Allowable shear load for all steel strength										
Temperature Range A: 75°F/104°F [1)]	$V_{allowable,ucr}$	[lb]	2,451	4,457	6,909	9,806	13,371	17,606	22,286	21,511
	$V_{allowable,cr}$	[lb]	—	3,843	5,032	8,003	10,927	14,641	16,113	15,365
Temperature Range A: 122°F/176°F [1)]	$V_{allowable,ucr}$	[lb]	2,451	4,457	6,909	9,806	13,371	17,606	22,286	21,511
	$V_{allowable,cr}$	[lb]	—	2,340	3,387	5,284	7,587	10,838	13,413	15,076
Temperature Range B: 161°F/248°F [1)]	$V_{allowable,ucr}$	[lb]	1,670	2,863	3,976	6,203	8,906	11,498	12,791	—
	$V_{allowable,cr}$	[lb]	—	1,152	1,669	2,604	3,738	5,341	6,687	7,430
Embedment depth	h_{ef}	[Inch]	3-1/2	4-1/2	5	6-1/2	8	10	11	11
Edge distance	c_{ca}	[Inch]	6.51	8.36	9.29	12.08	14.87	17.82	18.70	17.83
Axial distance	C_{Na}	[Inch]	4.31	5.74	7.18	8.61	10.05	10.89	11.55	12.10

1 Long term temperature/ Short term temperature. Long term concrete temperatures are roughly constant over significant periods of time. Short term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Room temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirement of ACI 355.4, Table 8.1 and consequently is not applicable to design under ACI 318-14, ACI 318-11 or current and past editions of the International Building Code (IBC). The tabulated values are provided for analysis and evaluation of existing conditions only.

FIRE RESISTANCE

Fire resistance times in combination with threaded rods (3/8" to 1-1/4") made of zinc plated steel, property class ASTM A36 or higher.

	Fire resistance time in minutes			
Anchor size	**30 max F [lbf]**	**60 max F [lbf]**	**90 max F [lbf]**	**120 max F [lbf]**
3/8"	≦ 504	≦ 344	≦ 181	≦ 101
1/2"	≦ 823	≦ 635	≦ 447	≦ 354
5/8"	≦ 1,306	≦ 1,008	≦ 709	≦ 562
3/4"	≦ 1,933	≦ 1,491	≦ 1,049	≦ 831
7/8"	≦ 2,666	≦ 2,057	≦ 1,447	≦ 1,147
1"	≦ 3,498	≦ 2,699	≦ 1,899	≦ 1,505
1-1/4"	≦ 5,592	≦ 4,314	≦ 3,035	≦ 2,405

The special details according to the Assessment Report 21825_2en – condensed version must be observed.