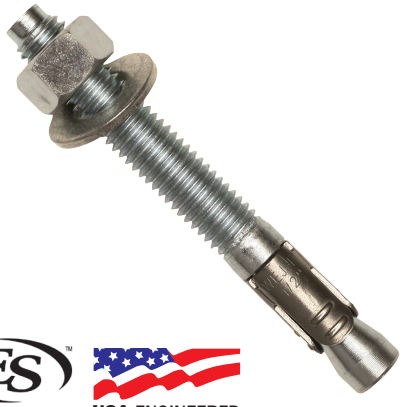
Ankr-TITE® CCAT Wedge Anchors

wej-it HIGH-PERFORMANCE ANCHORS

Description

The Ankr-TITE CCAT Wedge Anchor is a high-strength, fully threaded, and torque-controlled expansion anchor engineered for superior performance in **cracked concrete** in seismic and wind load conditions. The anchor meets **Category 1** design criteria. Suitable to be used in a variety of base materials, including: normal-weight concrete, structural sand-lightweight concrete and concrete over steel deck. A zinc-plated grade 5 steel bolt supports the 316 stainless steel clip. 3/8" for uncracked concrete only.



ICC ES ESR-2777 Category 1

USA ENGINEERED

Key Features & Benefits

- Engineered to provide superior performance in cracked concrete in both seismic and wind load conditions
- **Category 1** design criteria ICC-ES Report Number ESR-2777
- **Bolt Size is Hole Size®**
- Safe and reliable expansion mechanism works in both normal and extreme load conditions
- 360° segment contact equalizes load distribution, increasing load-carrying capacity
- Unique **safety shoulder** supports the clip when the anchor is under strain
- Corrosion-resistant **316 stainless steel clip** increases service life and strength
- Dog point prevents damage during installation
- 4-line marking around the length ID stamp eases post-installation inspection
- Design meets strict acceptance criteria in the 2012, 2009, 2006 and 2003 International Building Code for post-installed anchoring applications

Applications

- Seismic and wind loading
- Medium to heavy duty
- Cable trays
- Foundation posts
- Cracked Concrete
- Normal Weight Concrete
- Lightweight Concrete
- Solid Masonry

Specifications, Listings and Approvals

Diameters: 3/8" - 1"

Materials:

Anchor Body:
C1035 carbon steel

Anchor Clip:
AISI Type 316 stainless steel

Washer:
ASTM F844

Nut: ASTM A563 Grade A

Finish: Zinc plated to ASTM B633 with clear chromate added

Federal Specifications:
– QQZ-325, Type II, Class 3

Code Compliance:
– **ICC-ES Report Number ESR-2777 Category 1: Cracked and Uncracked Concrete**
– **COLA RR 24939**
– 2012, 2009, 2006, and 2003 International Building Codes (IBC)
– 2012, 2009, 2006, and 2003 International Residential Code (IRC)
– 1999 Standard Building Code (SBC)
– 1997 Uniform Building Code (UBC)
– 2007 Florida Building Code (BC & RC)
– Miami-Dade NOA: #09-0319.05 HVHZ

Installation Information

Instructions

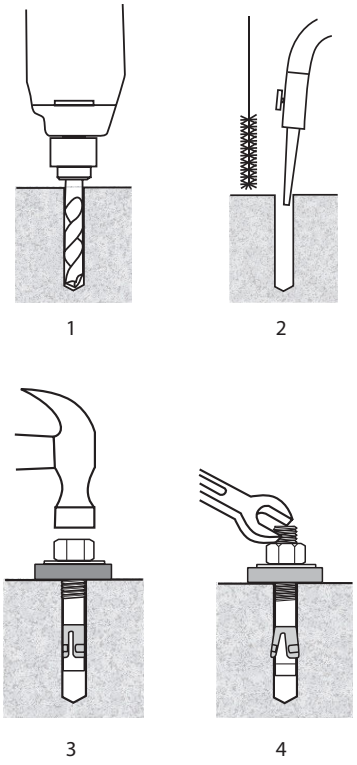
1. Drill the hole, at a diameter equal to the anchor diameter, perpendicular to the work surface. To assure full holding power, do not ream the hole or allow the drill to wobble.

   Drill the hole deeper than the intended embedment, but not closer than two diameters to the bottom (opposite) surface of the concrete.

2. A clean hole is necessary for proper performance. Clean the hole using a nylon brush and compressed air.

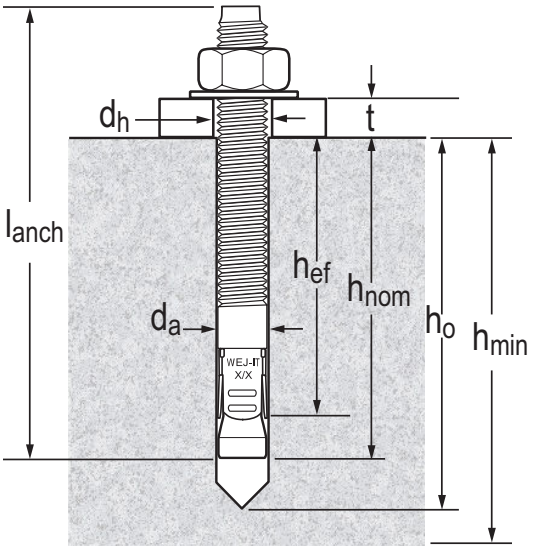
3. Assemble the nut and washer so that the top of the anchor extends above the nut slightly. Install the anchor through the material to be fastened.

4. Installing the Ankr-TITE CCAT anchors with a torque wrench is recommended for optimum performance. Refer to torque recommendations on this page.



NOTE: Always wear safety glasses. Follow drill manufacturer's instructions. Use only solid carbide-tipped drill bits meeting ANSI B212.15 diameter standards.

Anchor Installation Details



l_{anch}: Anchor Length
d_a: Anchor Diameter
d_h: Minimum Fixture Clearance Hole Effective
h_{ef}: Embedment Depth
h_{nom}: Minimum Nominal Embedment Depth
h_o: Minimum Hole Depth
h_{min}: Minimum Concrete Thickness
t: Fixture Height

Installation Data[1]

Characteristic	Symbol	Units	Nominal Anchor Dia. (in.)							
			3/8	1/2		5/8		3/4		
Anchor Diameter	$d_a[d_o]^3$	in.	3/8	1/2		5/8		3/4		
Minimum Fixture Clearance Hole Diamete	d_h	in.	7/16	9/16		7/16		13/16		
Drill Bit Diameter	d_{bit}	in.	3/8	1/2		5/8		3/4		
Installation Torque	T_{inst}	ft-lbf	25	75		125		225		
Min. Nom. Embedment Depth	h_{nom}	in.	2-3/8	3-1/4	5-1/2	4	6-3/8	4-1/2	7-3/4	
Minimum Hole Depth	h_o	in.	2-5/8	3-1/2	5-3/4	4-1/4	6-5/8	4-3/4	8	
Effective Embedment Depth	h_{ef}	in.	2	2-3/4	5	3-3/8	5-3/4	3-3/4	7	
Critical Edge Distance	c_{ac}	in.	4	4-1/8	7-1/2	5	8-5/8	7-1/2	10-1/2	
Min. Edge Distance	c_{min}	in.	2-1/2	5-1/2		5		5-5/8		
Min. Spacing	s_{min}	in.	3-5/8	8-1/4		9-1/4		5-5/8		
Min. Concrete Thickness	h_{min}	in.	4	6	10	6-3/4	11-1/2	7-1/2	14	

Anchor Data	Symbol	Units	Nominal Anchor Dia. (in.)			
			3/8	1/2	5/8	3/4
Specified Yield Strength of Anchor Steel	f_{ya}	psi	76,750	88,000	83,000	73,000
Specified Tensile Strength of Anchor Steel	f_{uta}	psi	95,940	110,000	104,000	91,000
Effective Tensile and Shear Stress Area	$A_{se,N}[A_{se}]^3$	in^2	0.054	0.116	0.144	0.219
Axial stiffness in service load Range	β	ib/in	329,000[4]	36,694	66,733	94,794

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m, 1 psi = 6.89 Pa, 1 in2 = 645 mm2, 1 lb/in = 0.175 N/mm.

[1] The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D.

[2] For installations through the soffit of steel deck into concrete see the installation details on page 4 of this report. In addition, anchors shall have a minimum axial spacing along the flute equal to the greater of 3 hef or 1.5 times the flute width.

[3] The notation in brackets is for the 2006 IBC.

[4] For the 3/8 -inch-diameter anchor stiffness values are based on uncracked testing only.

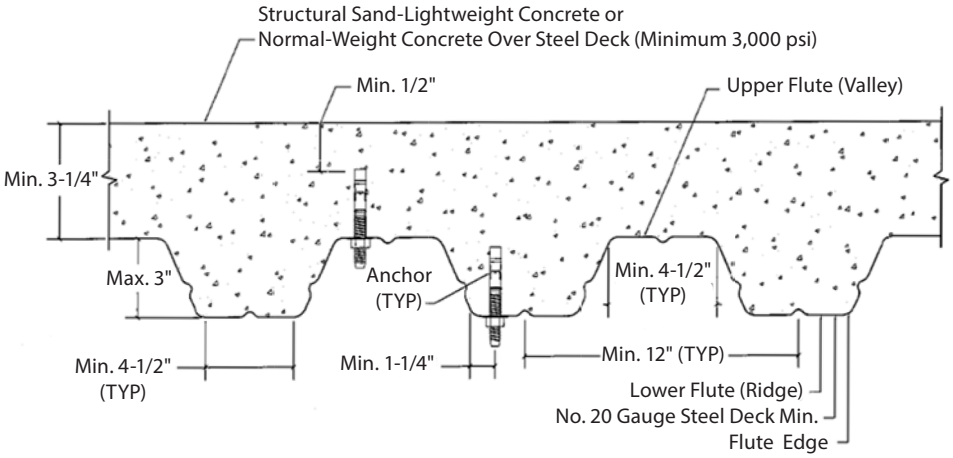
Length Identification Codes (in.)

Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
From	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	11	12
Up to but not Including	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	11	12	13

Torque Values

Anchor Dia. (in.)	Recommended Setting Torque (ft. lb.)
3/8	25
1/2	75
5/8	125
3/4	225
1	290

Installation Data: In Soffit of Concrete over Steel Deck[1]



[1] Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum hole clearance is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

Given: Calculate the factored resistance strength, φN_n and the allowable stress design value, $T_{allowable,ASD}$ for a 1/2" diameter Ankr-TITE® CCAT Wedge Anchor, assuming the given conditions in the table "Allowable Stress Values [1,2,3,4,5,6,7,8]" on page 6.	
Calculations in accordance with ACI 318-11 Appendix D and this report:	**Code Reference**
Step 1. Calculate steel strength of a single anchor in tension: $\varphi N_{sa} = (0.65)(12{,}760) = 8{,}294$ lbs.	D.5.1.2
Step 2. Calculate concrete breakout strength of a single anchor in tension: $\varphi N_{cb} = \varphi\,(A_{nc}/A_{nco})\,\psi_{ed,N}\psi_{c,N}\psi_{cp,N}N_b$ $N_b = k_c\,\lambda_a(\sqrt{f'_c})\,(h_{ef})^{1.5}$ $N_b = (24)\,(1.0)(\sqrt{2{,}500})\,(2.75^{1.5} = 5{,}472$ lbs. $\varphi N_{cb} = (0.65)\,(68.1/68.1)\,(1.0)(1.0)(1.0)(5{,}472) = 3{,}557$ lbs.	D.5.2.1
Step 3. Calculate pullout strength: $\varphi N_{pn} = \varphi N_{p,uncr}\psi_{c,p}\,(f'_{c,act}/2500)^n$ $\varphi N_{pn} = (0.65)(4{,}737)(1)(1)^{0.5} = 3{,}079$ lbs.	D.5.3.2
Step 4. Determine controlling resistance strength in tension: $\varphi N_n = \min\lvert\varphi N_{sa}, \varphi N_{cb}, \varphi N_{pn}\rvert = \varphi N_{pn} = 3{,}079$ lbs.	D.4.1.1
Step 5. Calculate allowable stress design conversion factor for loading condition: Controlling load combination 1.2D + 1.6*L* $\alpha = 1.2(30\%) + 1.6(70\%) = 1.48$	9.2
Step 6. Calculate allowable stress design value: $T_{allowable,ASD} = \varphi N_n/\alpha = 3{,}079/1.48 = 2{,}080$ lbs.	

Performance Data

Characteristic Tension Strength Design Values [1,2,3,6,7,8,9]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)							
			3/8†	1/2		5/8		3/4	
Anchor Category	*1*, *2* or *3*	–	3	1		1		1	
Effective Embedment Depth	h_{ef}	in.	2	2-3/4	5	3-3/8	5-3/4	3-3/4	7
Steel Strength in Tension (ACI 318 D.5.1)[4]									
Tension Resistance of Steel	N_{sa}	lbf	5,180	12,760		14,980		19,930	
Strength Reduction Factor – Steel Failure	$ø_{sa}$	–	0.65						
Concrete Breakout Strength In Tension (ACI 318 D.5.2)									
Effectiveness Factor – Uncracked Concrete	K_{uncr}	–	24						
Effectiveness Factor – Cracked Concrete	K_{cr}	–	–	17					
Modification factor for cracked and uncracked concrete[7]	ψc,N	–	–	1.00					
Strength Reduction Factor – Concrete Breakout Failure	$ø_{cb}$	–	0.45	0.65					
Pull-Out Strength in Tension (ACI 318 D.5.3)									
Pull-Out Resistance, Uncracked Concrete (f'c=2,500 psi)	$N_{p,uncr}$	lbf	N/A[5]	4,737	5,115	7,082	12,734	N/A[5]	16,607
Pull-Out Resistance, Cracked Concrete (f'c=2,500 psi)	$N_{p,cr}$	lbf	–	2,616	3,584	5,144	6,645	N/A[5]	11,849
Strength Reduction Factor – Pull-Out Failure	$ø_{p}$	–	0.45	0.65					
Tension Strength for Seismic Applications (ACI D.3.3.3)									
Tension Resistance Factor of Single Anchor for Seismic Loads (f'c=2,500 psi)	$N_{p,eq}$	lbf	–	2,616	3,584	5,144	6,645	N/A[5]	11,849
Strength Reduction Factor – Pullout Failure	$ø_{eq}$	–	–	0.65					
Pull-Out Strength in Tension for Concrete Over Steel Deck									
Characteristic Pull-Out Strength, Uncracked Concrete Over Steel Deck, according to the illustration on page 4	$N_{p,deck\ uncr}$	lbf	-	2,475		4,061		–	
Characteristic Pull-Out Strength, Cracked Concrete Over Steel Deck, according to the illustration on page 4	$N_{p,deck\ cr}$	lbf	–	1,361		2,965		–	
Reduction Factor for Pull-Out Strength	ø	–	–	0.65					

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

[1] The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D; for anchors resisting

[2] Installation must comply with published instructions and details.

[3] All values of ø apply to the load combinations of IBC Section 1605.2, or ACI 318.9.2. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ø must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5). For reinforcement that complies with ACI 318 Appendix D requirements for Condition A, the appropriate ø factor must be determined in accordance with ACI 318-11 D.4.3.

[4] The Ankr-TITE anchor is considered a brittle steel element as defined by ACI 318 D.1.

[5] Pullout strength will not control design of indicated anchors.

[6] The nominal pullout strength in tension can be adjusted in accordance with Section 4.1.4 of this report.

[7] For all cases ψc,N=1.0. The appropriate effectiveness factor for cracked concrete, kcr or uncracked concrete kuncr must be used.

[8] The 3 /8-inch-diameter anchor must be limited to uncracked concrete.

[9] Portions of the table showing "-" in lieu of a numerical value indicate that that specific use is beyond the scope of this report.

Performance Data

Characteristic Shear Strength Design Values [1,2,3,6,7]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)						
			3/8 [6]	1/2		5/8		3/4	
Anchor Category	1, 2, or 3	–	3	1		1		1	
Effective Embedment Depth	h_{ef}	in.	2	2-3/4	5	3-3/8	5-3/4	3-3/4	7
Steel Strength in Shear (ACI 318 D.6.1)[4]									
Shear Resistance of Steel	V_{sa}	lbf	3,108	3,599	7,195	7,217	8,986	8,683	11,957
Strength Reduction Factor – Steel Failure	$ø_{sa}$	–	0.60						
Concrete Breakout In Shear (ACI 318 D.6.2)									
Effectiveness Factor – Uncracked Concrete	K_{uncr}	–	-	24					
Effectiveness Factor – Cracked Concrete	K_{cr}	–	–	17					
Ratio of Kuncr/Kcr	Xc,N	–	–	1.41					
Strength Reduction Factor – Concrete Breakout	$ø_{cb}$	–	0.65	0.7					
Pry-Out Strength in Shear									
Pry-Out Resistance, Uncracked Concrete (f'c=2,500 psi)	$V_{pn,cr}$	lbf	-	5,804	7,257	7,217	8,986	8,683	11,957
Pry-Out Resistance, Cracked Concrete (f'c=2,500 psi)	$V_{pn,uncr}$	lbf	-	3,599	7,159	7,217	8,986	8,683	11,957
Coefficient for Pry-out Strength (1.0 for *hef* < 2.5 in., 2.0 for *hef* > 2.5 in.)	k_{cp}	–	1	2					
Strength Reduction Factor – Pry-Out Failure[3]	$ø_{p}$	–	0.60	0.70					
Shear Strength for Seismic Applications (ACI 318 D.3.3.3)									
Shear Resistance of Single Anchor for Seismic Loads (f'c= 2,500 psi)	V_{eq}	lbf	–	3,239	6,476	5,055	8,154	8,504	11,957
Strength Reduction Factor – Pull-Out Failure	$ø_{eq}$	–	–	0.70					
Shear Strength for Sand-Lightweight and Normal-weight Concrete Over Steel Deck [5]									
Steel Strength in Shear for Concrete Over Steel Deck, according to the illustration on page 4	$V_{sa,deck}$	lbf	3,108	3,200	–	3,890	–	–	
Steel Strength in Shear, Concrete Over Steel Deck, Seismic, according to the illustration on page 4	$V_{sa,deck,eq}$	lbf	–	2,880	–	2,725	–	–	
Reduction Factor for Steel Strength in Shear, Concrete Over Steel Deck	$ø$	–	0.60	0.65					

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

[1] The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D; for anchors resisting seismic load combinations the additional requirements of ACI 318 D.3.3 must apply.

[2] Installation must comply with published instructions and details.

[3] All values of ø apply to the load combinations of IBC Section 1605.2, or ACI 318 9.2. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ø must be determined in accordance with ACI 318-11 D.4.4. For reinforcement that complies with ACI 318 Appendix D requirements for Condition A, the appropriate ø factor must be determined in accordance with ACI 318-11 D.4.4.

[4] The Ankr-TITE anchor is considered a brittle steel element as defined by ACI 318 D.1.

[5] Shear loads for anchors installed through steel deck into concrete may be applied in any direction.

[6] The 3 /8-inch-diameter anchor must be limited to uncracked concrete.

[7] Portions of the table showing "-" in lieu of a numerical value indicate that that specific use is beyond the scope of this report.

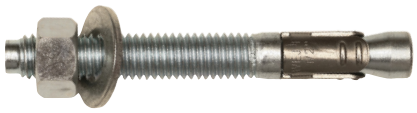
Allowable Stress Design Values [1,2,3,4,5,6,7,8]

Anchor Dia. (in.)	Nom. Embedment h_{nom} (in.)	Effective Embedment h_{ef} (in.)	Allowable Tension Load (lb.)
3/8	2-3/8	2	1,050
1/2	3-1/4	2-3/4	2,080
	5-1/2	5	2,246
5/8	4	3-3/8	3,110
	6-3/8	5-3/4	5,593
3/4	4-1/2	3-3/4	3,827
	7-3/4	7	7,294

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

[1] Single anchor with static tension only
[2] Concrete determined to remain uncracked for the life of the anchorage
[3] Load combinations from ACI 318 9.2 (no seismic loading)
[4] 30% dead load and 70% live load, controlling load combination 1.2D + 1.6L
[5] Calculation of weighed average: α = 1.2(0.3) + 1.6(0.7) = 1.48
[6] f'c = 2,500 psi normal weight concrete
[7] ca1 = ca2 ≥ cac
[8] h ≥ hmin

Order Information



Ankr-TITE® CCAT Wedge Anchors				
Catalog No.	**Anchor Size (in.)**	**Thread Length (in.)**	**Box Quantity**	**Carton Quantity**
CCAT3830	3/8 x 3	1-3/4	50	400
CCAT3833	3/8 x 3-3/4	2-1/2	50	400
CCAT3850	3/8 x 5	3-1/4	50	400
CCAT3870	3/8 x 7	4-1/2	50	300
CCAT1223	1/2 x 2-3/4	1-1/8	25	200
CCAT1233	1/2 x 3-3/4	2-1/8	25	200
CCAT1241	1/2 x 4-1/4	2-5/8	25	200
CCAT1242*	1/2 x 4-1/2	2-5/8	25	200
CCAT1252	1/2 x 5-1/2	3-3/4	25	150
CCAT1270	1/2 x 7	4-1/2	25	40
CCAT1282	1/2 x 8-1/2	5	10	40
CCAT1210	1/2 x 10	5	10	80
CCAT5832	5/8 x 3-1/2	1-1/2	10	80
CCAT5841	5/8 x 4-1/4	2-3/8	10	80
CCAT5850	5/8 x 5	3-1/8	10	80
CCAT5860	5/8 x 6	4	10	80
CCAT5870	5/8 x 7	4-1/2	10	40
CCAT5882	5/8 x 8-1/2	5	10	40
CCAT5810	5/8 x 10	5	10	40
CCAT3443	3/4 x 4-3/4	2-1/4	10	80
CCAT3452	3/4 x 5-1/2	3-1/4	10	60
CCAT3461	3/4 x 6-1/4	3-3/4	10	60
CCAT3470	3/4 x 7	4-3/4	10	60
CCAT3482	3/4 x 8-1/2	5	10	40
CCAT3410	3/4 x 10	5	10	40
CCAT3412*	3/4 x 12	5	5	20
CCAT1060*	1 x 6	3	5	30
CCAT1090*	1 x 9	5	5	20
CCAT1012*	1 x 12	5	5	20

* Special Order

For more information, please contact:

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