TECHNICAL DATA SHEET:

ROD HANGERS

ZINC PLATED FOR CONCRETE

ICC ESR-5217

AF Rod Hanger features an internal thread to facilitate bolt and rod connections. It is a one piece, steel anchor designed for rod hanging applications such as mechanical/fire sprinkler systems, ductwork/HVAC, electrical and pipe hanging. Evaluated for use in cracked concrete and seismic applications. The rod hanger can be installed into substrates such as concrete, brick, hollow brick, precast plank concrete, block, wood, metal deck and steel purlins.

ICC Evaluation is for cracked and uncracked concrete substrates.

PERFORMANCE DATA

AFR Rod Hanger With Hex Coupler Head Installation Parameters[1]

Characteristics	Symbol	Unit	Nominal Anchor Diameter			
			1/4"		3/8"	
Drill Bit Diameter	d_o	in (mm)	1/4 (6.4)		3/8 (9.5)	
Nominal Embedment Depth	h_{nom}	in (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Effective Embedment Depth	h_{ef}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)
Minimum Hole Depth	h_{hole}	in (mm)	2 (51)	2-7/8 (73)	2 (51)	2-7/8 (73)
Fixture Hole Diameter	d_r	in (mm)	3/8 (9.5)		1/2 (12.7)	
Maximum Installation Torque[2]	$T_{inst,max}$	ft.lb (Nm)	21 (29)		N/A	
Maximum Impact Wrench Torque Rating	$T_{impact,max}$	ft.lb (Nm)	135 (185)		135 (185)	
Minimum Concrete Thickness	h_{min}	in (mm)	4 (102)	4-3/8 (110)	4 (102)	4-3/8 (110)
Critical Edge Distance	c_{ac}	in (mm)	1.5 h_{ef}			
Minimum Edge Distance (c_{min})	c_{min}	in (mm)	1-3/4 (44)			
Minimum Spacing (s_{min})	s_{min}	in (mm)	3 (76)			
Internal Thread Size	-	-	1/4-20 or 3/8-16 (UNC Coarse)		3/8-16 or 1/2-13 (UNC Coarse)	

1. The tabulated data is to be used in conjunction with the design criteria given in ACI 318 (-19 and -14) Chapter 17 or ACI 318-11 Appedix D, as applicable.
2. N/A - Manual torque wrench installation not evaluated.

PERFORMANCE DATA

AFR Rod Hanger Anchor With Hex Coupler Head Design Design Information[1,2]

Characteristics	Symbol	Unit	Nominal Anchor Diameter			
			1/4"		3/8"	
Drill Bit Diameter	d_o	in (mm)	1/4 (6.4)		3/8 (9.5)	
Nominal Embedment Depth	h_{nom}	in (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)
Effective Embedment Depth	h_{ef}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)
Anchor Category	1, 2 or 3	-	3	2	1	1
Steel Strength in Tension & Shear						
Minimum Specified Ultimate Strength	f_{uta}	psi (N/mm^2)	101,525 (700)		101,525 (700)	
Minimum Specified Yield Strength	f_y	psi (N/mm^2)	81,220 (560)		81,220 (560)	
Effective Stress Area (Screw Anchor Body)	A_{se}	in^2 (mm^2)	0.0453 (29.2)		0.1020 (65.8)	
Steel Strength in Tension	N_{sa}	lb (kN)	4,585 (20.4)		10,355 (46.1)	
Strength Reduction Factor for Steel Failure in Tension	Φ_{sa}	-	0.65			
Steel Strength in Shear	V_{sa}	lb (kN)	1,350 (6.0)		3,150 (14.0)	
Steel Strength in Shear, Seismic	$V_{sa,eq}$	lb (kN)	1,125 (5.0)		1,800 (8.0)	
Strength Reduction Factor for Steel Failure in Shear	Φ_{sa}	-	0.60			
Pullout Strength in Tension[3]						
Pullout Strength in Uncracked Concrete	$N_{p,uncr}$	lb (kN)	N/A	4,025 (17.9)	2,990 (13.3)	N/A
Pullout Strength in Cracked Concrete	$N_{p,cr}$	lb (kN)	605 (2.7)	1,080 (4.8)	1,755 (7.8)	2,630 (11.7)
Pullout Strength in Cracked Concrete, Seismic	$N_{p,eq}$	lb (kN)	605 (2.7)	1,080 (4.8)	1,755 (7.8)	2,630 (11.7)
Normalization Exponent, Uncracked Concrete	n	-	0.50		0.50	
Normalization Exponent, Cracked Concrete	n	-	0.40		0.50	
Strength Reduction Factor for Pullout Strength in Tension	Φ_p	-	0.45	0.55	0.65	0.65
Concrete Breakout Strength in Tension						
Effective Embedment	h_{er}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)
Effectiveness Factor for Uncracked Concrete	k_{uncr}	in-lb (SI)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)
Effectiveness Factor for Cracked Concrete	k_{cr}	in-lb (SI)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)
Strength Reduction Factor for Concrete Breakout Strength in Tension	Φ_{cb}	-	0.45	0.55	0.65	0.65

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PERFORMANCE DATA

AFR Rod Hanger Anchor With Hex Coupler Head Design Design Information[1,2]

Characteristics	Symbol	Unit	Nominal Anchor Diameter			
			1/4"		3/8"	
Concrete Breakout Strength in Tension						
Axial Stiffness in Service Load Range in Uncracked Concrete	β_{uncr}	lb/inch x 10^5 (N/mm)	2.719 (48)	1.928 (34)	6.240 (109)	4.502 (79)
COV for β_{uncr}	v	%	38			
Axial Stiffness in Service Load Range in Cracked Concrete	β_{cr}	lb/inch x 10^5 (N/mm)	1.451 (25)	1.100 (19)	3.318 (58)	2.563 (45)
COV for β_{cr}	v	%	48			
Concrete Breakout Strength in Shear						
Nominal Diameter	d_o[2]	in (mm)	0.250 (6.4)		0.375 (9.5)	
Load Bearing Length of Anchor	l_e	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)
Reduction Factor of Concrete Breakout Strength in Shear	Φ_{cb}	-	0.70			
Concrete Pryout Strength in Shear						
Coefficient for Pryout Strength	k_{cp}	-	1.0	1.0	1.0	1.0
Reduction Factor for Pryout Strength in Shear	Φ_{cp}	-	0.70			

1. The tabulated data is to be used in conjunction with the design criteria given in ACI 318 (-19 and -14) Chapter 17 or ACI 318-11 Appedix D, as applicable.
2. The strength reduction factor applies when the load combination from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appedix C are used, the appropriate value of *f* must be determined in accordance with ACI 318-11 D.4.5.

Example AFR Rod Hanger With Coupler Head Allowable Stress Design Values For Illustrative Purposes[1,23,4,5,6,7,8,9,10]

Nominal Anchor Diameter d_o (inch)	Nominal Embedment Depth h_{nom} (inch)	Allowable Tension Load $T_{allowable,ASD}$ (lb)
1/4	1-5/8	504
1/4	2-1/2	1,271
3/8	1-5/8	613
3/8	2-1/2	1,313

1. Single anchor
2. Single tension loading only
3. Concrete determined to remain uncracked for the life of the anchorage.
4. Load combinations taken from ACI 318 (-19 or -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable with no seismic loading.
5. 30% Dead Load (D) and 70% Live Load (L), controlling load combination 1.2 D +1.6L.
6. Calculation of the weighted average of a= 1.2 x 0.3 +1.6 x 0.7 = 1.48
7. Nominal weight concrete, f'_c=2,500 psi.
8. $c_{a1} = c_{a2} \geq c_{ac}$
9. Concrete thickness $h \geq h_{min}$
10. Values are for Condition B (supplementary reinforcement in accordance with ACI 318 (-19 or -14) 17.3.3 or ACI 318-11 D.4.3 is not provided)

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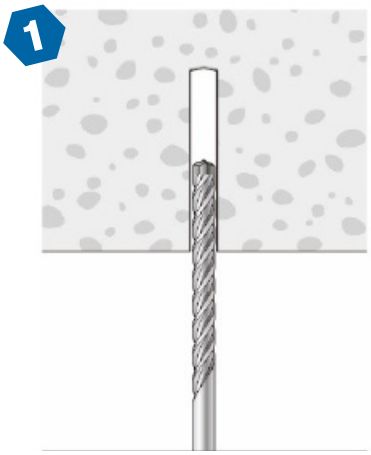
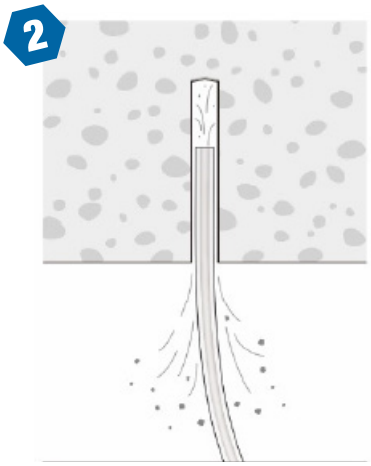
ICC ESR-5217

INSTALLATION INSTRUCTIONS

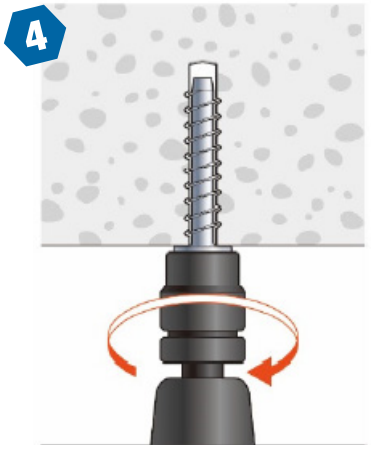


1. Drill a hole into the base material to the required depth using a drill bit that meets the requirements of ANSI B212.15.



2. Remove dust and debris from the hole using a hand pump or compressed air.

3. Select a powered impact wrench of a torque wrench, attach an appropriate sized hex socket to the wrench and mount the screw anchor head into the socket.

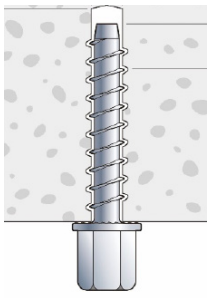


4. Install the anchor with an impact wrench through the surface. The correct force should be considered during the installation to make sure the socket doesn't do damage to the member surface or self-inflict any dmagae to its connecting threads.

ORDERING INFORMATION

ZINC PLATED - FOR CONCRETE

Part#	Screw Size	Drill Size	Rod Size	Socket Size	Qty/Box
1AFR14	1/4 x 1-5/8	1/4	1/4	1/2	50
1AFR38	1/4 x 1-5/8	1/4	3/8	1/2	50
1AFR385	1/4 x 2-1/2	1/4	3/8	1/2	50
1AFR12	3/8 x 2-1/2	3/8	1/2	3/4	25



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ORDERING INFORMATION

ACCESSORIES

Part#	Description	Image
5DSPE-14-6	1/4" x 6-3/4" Enduro SDS-Plus 4 Cutter Bit	
5DSPE-38-6	3/8" x 6-3/4" Enduro SDS-Plus 4 Cutter Bit	
5MNS121304	1/2 x 1-3/4 Magnetic Nut Setter	
5DWMT73934	1/2 Impact Deep Well Socket 1/2-Square Drive	
5DWMT73939B	3/4 Impact Deep Well Socket - 1/2 Square Drive	
51837573	1/2-Square Impact Socket Extension/Adapter 1/4 Hex Shank