GENERAL INFORMATION

AC100+ GOLD®

Vinylester Injection Adhesive Anchoring System

PRODUCT DESCRIPTION

The AC100+ Gold is a two-component vinylester adhesive anchoring system. The system includes injection adhesive in plastic cartridges, mixing nozzles, dispensing tools and hole cleaning equipment. The AC100+ Gold is designed for bonding threaded rod and reinforcing bar elements into drilled holes in concrete and masonry base materials.

GENERAL APPLICATIONS AND USES

- Bonding threaded rod and reinforcing bar into hardened concrete and masonry
- Evaluated for use in dry and water-saturated concrete (including water filled holes)
- Suitable to resist loads in cracked or uncracked concrete base materials
- Can be installed in a wide range of base material temperatures; qualified for structural applications in concrete as low as 14ºF
- Qualified for seismic (earthquake) and wind loading

FEATURES AND BENEFITS

+ Designed for use with threaded rod and reinforcing bar hardware elements
+ Consistent performance in low and high strength concrete
+ Evaluated and recognized for freeze/thaw performance (interior and exterior applications)
+ Evaluated and recognized for a range of embedments
+ Versatile low odor formula with quick cure time
+ Evaluated and recognized for long term and short term loading (see performance tables)
+ Mixing nozzles proportion adhesive and provide simple delivery method into drilled holes
+ Cartridge design allows for multiple uses using extra mixing nozzles

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES) ESR-2582 for concrete
- International Code Council, Evaluation Service (ICC-ES) ESR-3200 for masonry
- Code compliant with the 2015 IRC, 2015 IBC, 2012 IBC, 2012 IRC, 2009 IBC, and 2009 IRC.
- Tested in accordance with ASTM E488 / ACI 355.4 and ICC-ES AC308 for use in structural concrete with ACI 318-14 Chapter 17 or ACI 318-11/08 Appendix D.
- Compliant with NSF/ANSI Standard 61 for drinking water system components – health effects; meets requirements for materials in contact with potable water and water treatment
- Conforms to requirements of ASTM C 881 and AASHTO M235, Types I, II, IV and V, Grade 3, Classes A & B (meets Type III with exception of elongation)
- Department of Transportation listings – see www.powers.com or contact transportation agency

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchors, 04 05 19.16 - Masonry Anchors and 05 05 19 - Post-Installed Concrete Anchors. Adhesive anchoring system shall be AC100+ Gold as supplied by Powers Fasteners Inc., Towson, MD. Anchors shall be installed in accordance with published instructions and requirements of the Authority Having Jurisdiction.

CODE LISTED
ICC-ES ESR-2582
CONCRETE

This Product Available In

Powers Design Assist
Real-Time Anchor Design Software
www.powersdesignassist.com

SECTION CONTENTS

AC100+ GOLD COAXIAL CARTRIDGE WITH MIXING NOZZLE

AC100+ GOLD DUAL CARTRIDGE WITH MIXING NOZZLE AND EXTENSION

PACKAGING

Coaxial Cartridge

- 10 fl. oz. (280 ml or 17.1 in³)

Dual (side-by-side Cartridge)

- 12 fl. oz. (345 ml or 21.0 in³)
- 28 fl. oz. (825 ml or 50.3 in³)

STORAGE LIFE & CONDITIONS

Eighteen months in a dry, dark environment with temperature ranging from 32°F and 86°F (-0°C to 30°C)

ANCHOR SIZE RANGE (TYP.)

- 3/8" to 1-1/4" diameter rod
- No. 3 to No. 10 rebar

SUITABLE BASE MATERIALS

- Normal-weight Concrete
- Grouted concrete masonry (CMU)
- Hollow concrete masonry (CMU)
- Brick masonry

PERMISSIBLE INSTALLATION CONDITIONS (ADHESIVE)

- Dry concrete
- Water-saturated concrete (wet)
- Water-filled holes (flooded)

REFERENCE DATA (ASD)

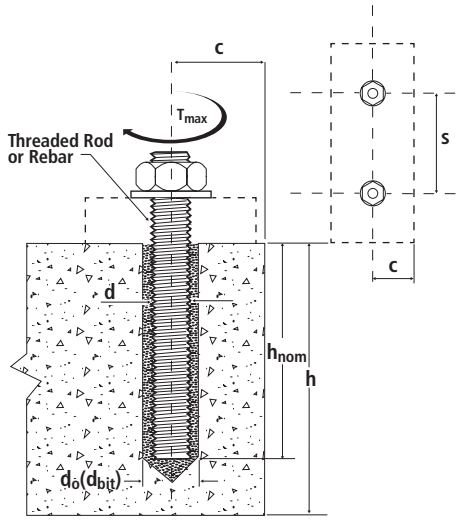
Allowable Stress Design (ASD) Installation Table for AC100+ Gold (Solid Concrete Base Materials)

Dimension/Property		Notation	Units	Nominal Anchor Size									
Threaded rod		-	-	3/8"	1/2"	-	5/8"	3/4'"	7/8"	1"	-	1-1/4"	-
Reinforcing bar		-	-	#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)	1.250 (31.8)
Nominal diameter of drilled hole		d_{bit}	in.	7/16 ANSI	9/16 ANSI	5/8 ANSI	11/16 or 3/4 ANSI	7/8 ANSI	1 ANSI	1-1/8 ANSI	1-3/8 ANSI	1-3/8 ANSI	1-1/2 ANSI
Minimum nominal embedment depth		h_{nom}	in. (mm)	2-3/8 (61)	2-3/4 (70)		3-1/8 (79)	3-1/2 (89)	3-1/2 (89)	4 (102)	4-1/2 (114)	5 (127)	5 (127)
Maximum torque (only possible after full cure time of adhesive)	A36 or F1554 carbon steel rod	T_{max}	ft.-lb. (N-m)	10 (13)	25 (34)		50 (68)	90 (122)	125 (169)	165 (224)	-	280 (379)	-
	F593 Condition CW stainless steel rod or ASTM A193, Grade B7 carbon steel rod	T_{max}	ft.-lb. (N-m)	16 (22)	33 (45)		60 (81)	105 (142)	125 (169)	165 (224)	-	280 (379)	-

Allowable Stress Design (ASD) Installation Table for AC100+ Gold (Hollow Base Material with Screen Tube)

Dimension/Property	Notation	Units	Nominal Size - Stainless Steel					Nominal Size - Plastic			
Threaded Rod	-	-	1/4"	3/8"	1/2"	5/8"	3/4"	1/4"	3/8"	1/2"	5/8"
Nominal threaded rod diameter	d	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)
Nominal screen tube diameter	-	in.	1/4	3/8	1/2	5/8	3/4	1/4	3/8	1/2	5/8
Nominal diameter of drilled hole	d_{bit}	in. (mm)	3/8 ANSI	1/2 ANSI	5/8 ANSI	3/4 ANSI	7/8 ANSI	1/2 ANSI	9/16 ANSI	3/4 ANSI	7/8 ANSI
Maximum torque (only possible after full cure time of adhesive)	T_{max}	ft.-lbf. (N-m)	4 (5)	6 (8)	10 (14)	10 (14)	10 (14)	4 (5)	6 (8)	10 (14)	10 (14)

Detail of Steel Hardware Elements used with Injection Adhesive System



Nomenclature

d = Diameter of anchor
d_{bit} = Diameter of drilled hole
h = Base material thickness
The greater of:
[h_{nom} + 1-1/4"] and [h_{nom} + 2d_{bit}]
h_{nom} = Minimum embedment depth

Threaded Rod and Deformed Reinforcing Bar Material Properties

Steel Description (General)	Steel Specification (ASTM)	Nominal Anchor Size (inch)	Minimum Yield Strength, f_y (ksi)	Minimum Ultimate Strength, f_u (ksi)
Carbon Rod	A 36 or F1554 Grade 36	3/8 through 1-1/4	36.0	58.0
Stainless Rod (Alloy 304 / 316)	F 593, Condition CW	3/8 through 5/8	65.0	100.0
		3/4 through 1-1/4	45.0	85.0
High Strength Carbon Rod	A 193 Grade B7	3/8 through 1-1/4	105.0	125.0
Grade 60 Reinforcing Bar	A 615, A 767, or A 996	3/8 through 1-1/4 (#3 through #10)	60.0	90.0
Grade 40 Reinforcing Bar	A 615 or A 767	3/8 through 1-1/4 (#3 through #6)	40.0	60.0

Allowable Load Capacities for AC100+ Gold Installed into Normal-Weight Concrete with Threaded Rod and Reinforcing Bar (Based on Bond Strength/Concrete Capacity)[1,2,3,4,5,6]

Nominal Rod Diameter or Rebar Size (in. or #)	Minimum Embedment Depth (in.)	Minimum Concrete Compressive Strength, (f'c)			
		3,000 psi	4,000 psi	5,000 psi	6,000 psi
		Tension (lbs)			
3/8 or #3	2-3/8	1,045	1,085	1,115	1,145
	3-1/2	1,540	1,600	1,645	1,685
	4-1/2	1,980	2,055	2,115	2,170
1/2 or #4	2-3/4	1,720	1,785	1,840	1,885
	4-3/8	2,740	2,845	2,925	2,995
	6	3,755	3,900	4,015	4,110
5/8 or #5	3-1/8	2,420	2,515	2,585	2,650
	5-1/4	4,140	4,300	4,425	4,530
	7-1/2	5,960	6,190	6,370	6,525
3/4 or #6	3-1/2	2,870	2,980	3,065	3,140
	6-1/4	5,795	6,015	6,190	6,340
	9	8,715	9,050	9,315	9,540
7/8 or #7	3-1/2	2,870	2,980	3,065	3,140
	7	7,905	8,205	8,450	8,650
	10-1/2	12,940	13,435	13,830	14,160
1 or #8	4	3,505	3,640	3,745	3,835
	8	10,030	10,410	10,720	10,975
	12	16,555	17,185	17,690	18,115
1-1/4 or #10	5	4,900	5,085	5,235	5,360
	10	14,200	14,740	15,175	15,540
	15	23,500	24,395	25,115	25,715

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0 which includes assessment of freezing/thawing conditions and sensitivity to sustained loads (e.g. creep resistance). Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances and where the minimum member thickness is the greater of [h_{nom} + 1-1/4"] and [h_{nom} + 2d_{bit}].
4. The tabulated load values are applicable for dry concrete. Holes must be drilled with a hammer drill and an ANSI carbide drill bit. Installations in wet concrete or in water-filled holes may require a reduction in capacity. Contact Powers for more information concerning these installation conditions.
5. Adhesives experience reductions in capacity at elevated temperatures. See the In-Service Temperature chart for allowable load capacity reduction factors.
6. Allowable bond strength/concrete capacity must be checked against allowable steel strength to determine the controlling allowable load. Allowable shear capacity is controlled by allowable steel strength for the given conditions.

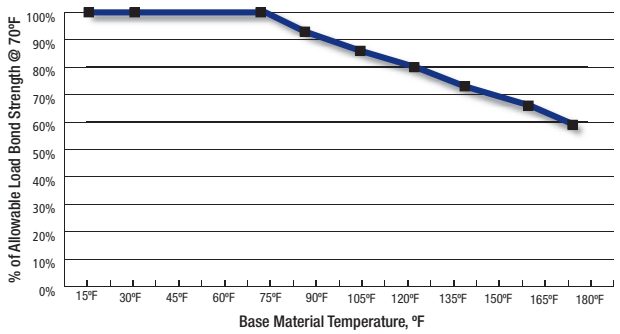
Allowable Load Capacities for AC100+ Gold Installed into Normal-Weight Concrete with Threaded Rod and Reinforcing Bar (Based on Steel Strength)[1,2,3]

Nominal Rod Diameter or Rebar Size (in. or #)	Steel Elements - Threaded Rod and Reinforcing Bar									
	A36 or F1554, Grade 36		A 193, Grade B7 or F1554, Grade 105		F 593, CW (SS)		Grade 60 Rebar		Grade 40 Rebar	
	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)
3/8 or #3	2,115 (9.4)	1,090 (4.8)	4,555 (20.3)	2,345 (10.4)	3,645 (16.2)	1,880 (8.4)	3,280 (14.6)	1,690 (7.5)	2,185 (9.7)	1,125 (5.0)
1/2 or #4	3,760 (16.7)	1,935 (8.6)	8,100 (36.0)	4,170 (18.5)	6,480 (28.8)	3,340 (14.9)	5,830 (25.9)	3,005 (13.4)	3,890 (17.3)	2,005 (8.9)
5/8 or #5	5,870 (26.1)	3,025 (13.5)	12,655 (56.3)	6,520 (29.0)	10,125 (45.0)	5,215 (23.2)	9,110 (40.5)	4,695 (20.9)	6,075 (27.0)	3,130 (13.9)
3/4 or #6	8,455 (37.6)	4,355 (19.4)	18,225 (81.1)	9,390 (41.8)	12,390 (55.1)	6,385 (28.4)	13,120 (58.4)	6,760 (30.1)	8,745 (38.9)	4,505 (20.0)
7/8 or #7	11,510 (51.2)	5,930 (26.4)	24,805 (110.3)	12,780 (56.8)	16,865 (75.0)	8,690 (38.7)	17,860 (79.4)	9,200 (40.9)	11,905 (53.0)	6,135 (27.3)
1 or #8	15,035 (66.9)	7,745 (34.5)	32,400 (144.1)	16,690 (74.2)	22,030 (98.0)	11,350 (50.5)	23,325 (103.8)	12,015 (53.4)	15,550 (69.2)	8,010 (35.6)
#9	-	-	-	-	-	-	29,680 (132.0)	15,290 (68.0)	19,785 (88.0)	10,195 (45.3)
1-1/4	23,490 (104.5)	12,100 (53.8)	50,620 (225.2)	26,080 (116.0)	34,425 (153.1)	17,735 (78.9)	-	-	-	-
#10	-	-	-	-	-	-	37,625 (167.4)	19,380 (86.2)	25,080 (111.6)	12,920 (57.5)

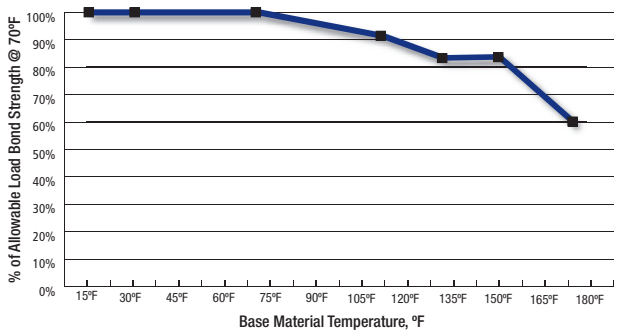
AISC defined steel strength (ASD): Tensile = 0.33 • F_u • A_{nom}, Shear = 0.17 • F_u • A_{nom}

1. Allowable load capacities listed are calculated for the steel element type. Consideration of applying additional safety factors may be necessary depending on the application, such as life safety or overhead.
2. Allowable bond strength/concrete capacity must be checked against allowable steel strength to determine the controlling allowable load.
3. Allowable shear capacity is controlled by steel strength for the given conditions described on the previous page.

Load-Temperature Reduction Curve Concrete Base Materials



Load-Temperature Reduction Curve Masonry Units

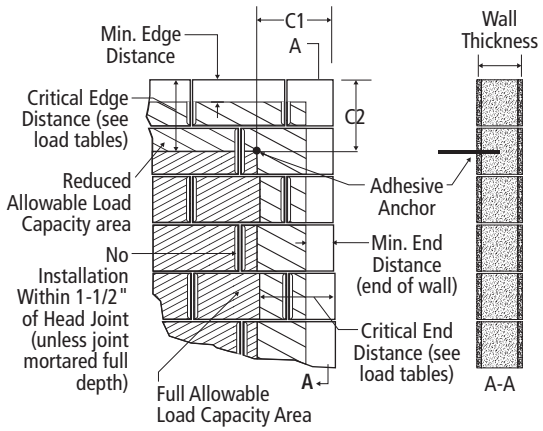


Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold into Grout Filled Concrete Masonry (Based on Bond Strength/Masonry Strength)[1,2,3,7,9,12,17]

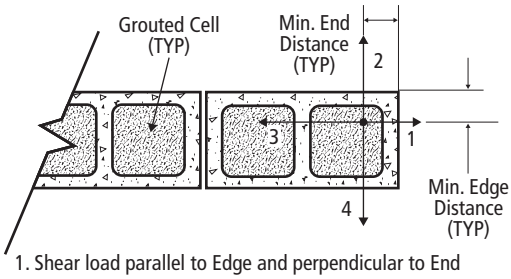
Anchor Diameter d (inch)	Minimum Embedment hnom (inch)	Critical Spacing Distance scr (inch)	Minimum Edge Distance cmin (inch)	Minimum End Distance cmin (inch)	Tension Load (lbs)	Direction of Shear Loading	Shear Load (lbs)
Anchor Installed Into Grouted Masonry Wall Faces[4,5,6,8,10,11,13]							
3/8	3	6	3	3	615	Towards Edge/End	275
		6	3	3	615	Away From Edge/End	340
		6	3	4	735[17]	Any	490[17]
		6	12	12	960[17]	Any	855[17]
1/2	4	8	3	3	720	Towards Edge/End	429
		8	3	3	720	Away From Edge/End	1320
		8	4	4	985[17]	Any	655[17]
		8	12	12	960	Towards Edge/End	1430
		8	12	12	960	Away From Edge/End	1760
		8	7-3/4 (Bed Joint)	3	935	Load To Edge	460
5/8	5	10	3	3	712	Towards Edge/End	459
		10	3	3	712	Away From Edge/End	1410
		10	12	12	1095	Towards Edge/End	1530
		10	12	12	1095	Away From Edge/End	1880
		10	7-3/4 (Bed Joint)	3	1030[17]	Load To Edge	590[17]
3/4	6	12	4	4	754	Towards Edge/End	628
		12	4	4	754	Away From Edge/End	1448
		12	12	12	1160	Towards Edge/End	1570
		12	12	12	1160	Away From Edge/End	1930
		12	7-3/4 (Bed Joint)	4	945	Load To Edge	565
Anchor Installed Into Tops of Grouted Masonry Walls[14,15]							
Anchor Diameter d (inch)	**Minimum Embedment hnom (inch)**	**Minimum Spacing Distance**	**Minimum Edge Distance cmin (inch)**	**Minimum End Distance cmin (inch)**	**Tension Load (lbs)**	**Direction of Shear Loading**	**Shear Load (lbs)**
1/2	2.75	1 anchor per cell	1.75	4	595[17]	Any	300[17]
	4	1 anchor per cell	1.75	3	520	Load To Edge	190
	4	1 anchor per cell	1.75	3	520	Load To End	300
	10	1 anchor per block[16]	1.75	10.5	1670	Load To Edge	190
	10	1 anchor per block[16]	1.75	10.5	1670	Load To End	300
5/8	5	1 anchor per cell	1.75	3	745	Load To Edge	240
	5	1 anchor per cell	1.75	3	745	Load To End	300
	12.5	1 anchor per block[16]	2.75	10.5	2095	Load To Edge	240
	12.5	1 anchor per block[16]	2.75	10.5	2095	Load To End	300
3/4	6	1 anchor per cell	2.75	4	1260	Load To Edge	410
	6	1 anchor per cell	2.75	4	1260	Load To End	490

1. Tabulated load values are for anchors installed in nominal 8-inch wide (203 mm) Grade N, Type II, lightweight, medium-weight or normal-weight grout filled concrete masonry units with a minimum masonry strength, f'm, of 1,500 psi (10.3 MPa) conforming to ASTM C 90. If the specified compressive strength of the masonry, f'm, is 2,000 psi (13.8 MPa) minimum the tabulated values may be increased by 4 percent (multiplied by 1.04).
2. Allowable bond or masonry strengths in tension and shear are calculated using a safety factor of 5.0 and must be checked against the allowable tension and shear capacities for threaded rod based on steel strength to determine the controlling factor. See allowable load table based on steel strength.
3. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.
4. Anchors may be installed in the grouted cells, cell webs and bed joints not closer than 1-1/2-inch from the vertical mortar joint (head joint) provided the minimum edge and end distances are maintained. Anchors may be placed in the head joint if the vertical joint is mortared full-depth.
5. A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements.
6. The critical spacing, s_{cr}, for use with the anchor values shown in this table is 16 anchor diameters. The critical spacing, s_{cr}, distance is the distance where the full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. For 3/8-inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 0.70 and a shear reduction factor of 0.45. For ½ - and 5/8 – inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 0.85 and a shear reduction factor of 0.45. For 3/4-inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 1.00 and a shear reduction factor of 0.45.
7. Spacing distance is measured from the centerline to centerline between two anchors.
8. The critical edge or end distance, c_{cr}, is the distance where full load values in the table may be used. The minimum edge or end distance, c_{min}, is the minimum distance for which values are available and installation is permitted.
9. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.
10. Linear interpolation of load values between the minimum spacing, s_{min}, and critical spacing, s_{cr}, distances and between minimum edge or end distance, c_{min}, and critical edge or end distance, c_{cr}, is permitted.
11. The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge and end distances are maintained.
12. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.
13. Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. 3/8-inch and 1/2-inch diameter anchors are permitted in nominally 6-inch-thick concrete masonry). The 5/8-inch and 3/4-inch diameter anchors must be installed in minimum nominally 8-inch-thck concrete masonry.
14. Anchors must be installed into the grouted cell; anchors are not permitted to be installed in a head joint, flange or wen of the concrete masonry unit.
15. Allowable shear loads parallel or perpendicular to the edge of a masonry wall may be applied in or out of plane.
16. Anchors with minimum spacing distance of one anchor per block may not be installed in adjacent cells (i.e. one cell must separate the anchor locations).
17. Tabulated values not included in ESR-3200.

AC100+ Gold Adhesive Anchors Installed into Grouted Concrete Masonry Wall

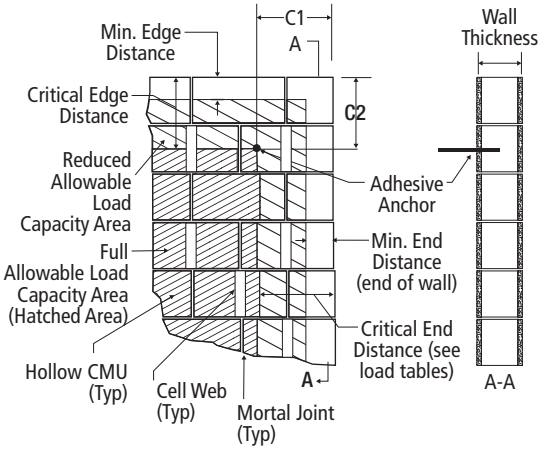


AC100+ Gold Adhesive Anchors Installed into Top of Grouted Concrete Masonry Wall

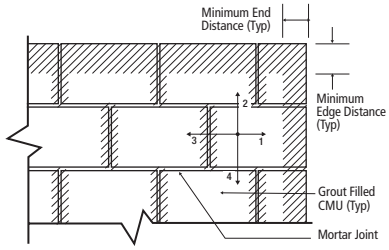


1. Shear load parallel to Edge and perpendicular to End
2. Shear load parallel to End and perpendicular to Edge
3. Shear load parallel to Edge and perpendicular away from End
4. Shear load parallel to End and perpendicular to opposite Edge

AC100+ Gold Adhesive Anchors Installed into Hollow Concrete Masonry Wall



Direction of Shear Loading in Relation to Edge and End of Masonry Wall



1. Shear load parallel to Edge and perpendicular to End
2. Shear load parallel to End and perpendicular to Edge
3. Shear load parallel to Edge and perpendicular away from End
4. Shear load parallel to End and perpendicular away from Edge

Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold Into Hollow Concrete Masonry Walls with Stainless Steel and Plastic Screen Tubes[1,2,3,4,5,6,7,8,9,10,11,12,13]

Anchor Diameter d (inch)	Screen Tube (type)	Minimum Embedment hnom (inch)	Critical Spacing Distance scr (inch)	Minimum Edge Distance cmin (inch)	Minimum End Distance cmin (inch)	Allowable Load		
						Tension Load (lbs)	Direction of Shear Loading	Shear Load (lbs)
1/4 (6.4)	Stainless Steel	1-1/4 (31.8)	4 (101.6)	1-1/2 (38.1)	1-1/2 (38.1)	280 (1.2)	Towards Edge/End	140 (0.6)
		1-1/4 (31.8)	4 (101.6)	3 (76.2)	3 (76.2)	350 (1.6)	Towards Edge/End	275 (1.2)
		1-1/4 (31.8)	4 (101.6)	1-1/2 (38.1)	1-1/2 (38.1)	280 (1.2)	Away From Edge/End	235 (1.0)
		1-1/4 (31.8)	4 (101.6)	3 (76.2)	3 (76.2)	350 (1.6)	Away From Edge/End	465 (2.1)
	Plastic[14]	1-1/4 (31.8)	1 anchor per cell	3 (76.2)	3 (76.2)	140 (0.6)	Towards Edge/End	235 (1.0)
3/8 (9.5)	Stainless Steel	1-1/4 (31.8)	6 (152.4)	1-7/8 (47.6)	1-7/8 (47.6)	320 (1.4)	Towards Edge/End	145 (0.6)
		1-1/4 (31.8)	6 (152.4)	3-3/4 (95.3)	3-3/4 (95.3)	400 (1.8)	Towards Edge/End	290 (1.3)
		1-1/4 (31.8)	6 (152.4)	1-7/8 (47.6)	1-7/8 (47.6)	320 (1.4)	Away From Edge/End	245 (1.1)
		1-1/4 (31.8)	6 (152.4)	3-3/4 (95.3)	3-3/4 (95.3)	400 (1.8)	Away From Edge/End	490 (2.2)
	Plastic	1-1/4 (31.8)	1 anchor per cell	3 (76.2)	3 (76.2)	140 (0.6)	Towards Edge/End	235 (1.0)
1/2 (12.7)	Stainless Steel	1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Away From Edge/End	730 (3.2)
	Plastic	1-1/4 (31.8)	1 anchor per cell	3 (76.2)	3 (76.2)	150 (0.7)	Towards Edge/End	215 (1.0)
5/8 (15.9)	Stainless Steel	1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Away From Edge/End	730 (3.2)
	Plastic	1-1/4 (31.8)	1 anchor per cell	3 (76.2)	3 (76.2)	150 (0.7)	Towards Edge/End	215 (1.0)
3/4 (19.1)	Stainless Steel	1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (31.8)	8 (203.2)	3-3/4 (95.3)	3-3/4 (95.3)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (285.8)	11-1/4 (285.8)	400 (1.8)	Away From Edge/End	730 (3.2)

1. Tabulated load values are for anchors installed in hollow concrete masonry with minimum masonry strength, f'm, of 1,500 psi (10.3 MPa). Concrete masonry units must be lightweight, medium-weight or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.
2. Anchors must be installed into the hollow cell; anchors are not permitted to be installed in a mortar joint, flange or web of the concrete masonry unit.
3. A maximum of two anchor may be installed in a single masonry cell in accordance with the spacing and edge distance requirements, except as noted in the table.
4. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.
5. Edge or end distance is measured from anchor centerline to the closest unrestrained edge of the CMU block.
6. The critical spacing, s_{cr}, for use with the anchor values shown in this table is 16 anchor diameters, except as noted in the table. The critical spacing, s_{cr}, distance is the distance where the full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. The spacing may be reduced to 8 anchor diameters by multiplying the tension load value by a reduction factor of 0.60 and multiplying the shear load value by a reduction factor of 0.45.
7. Spacing distance is measured from the centerline to centerline between two anchors.
8. Linear interpolation of load values between the minimum spacing, s_{min}, and critical spacing, s_{cr}, distances and between minimum edge or end distance, c_{min}, and critical edge or end distance, c_{cr}, is permitted if applicable.
9. Concrete masonry width (wall thickness) may be minimum nominal 6-inch-thick provided the minimum embedment (i.e. face shell thickness) is maintained.
10. The tabulated values are applicable for anchors in the ends of hollow concrete masonry units where minimum face shell thickness, minimum edge and end distances are maintained.
11. Anchors are recognized to resist dead, live and wind tension and shear load applications.
12. Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values.
13. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.
14. Tabulated values not included in ESR-3200.

Ultimate and Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold into Brick Masonry Walls[1,2,3]

Anchor Diameter d in.	Drill Diameter dbit in.	Minimum Embedment Depth in.	Minimum End Distance in.	Minimum Edge Distance in.	Ultimate Load		Allowable Load	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Anchors Installed into the Face of Brick Masonry Walls								
3/8	1/2	3.5 (88.9)	2.5 (63.5)	2.5 (63.5)	3,600 (16.0)	4,505 (20.0)	720 (3.2)	900 (4.0)
		3.5 (88.9)	6 (152.4)	6 (152.4)	5,845 (26.0)	4,580 (20.4)	1,170 (5.2)	915 (4.1)
		6 (152.4)	6 (152.4)	6 (152.4)	10,420 (46.4)	-	2,085 (9.3)	-
1/2	5/8	6 (152.4)	8 (203.2)	8 (203.2)	11,500 (51.2)	9,300 (41.4)	2,300 (10.2)	1,860 (8.3)
Anchors Installed into the Top of Brick Masonry Walls								
3/8	1/2	3.5 (88.9)	2.5 (63.5)	2.5 (63.5)	3,665 (16.3)	2,435 (10.8)	735 (3.3)	485 (2.2)

1. Tabulated load values are for anchors installed in minimum 2 wythe, Grade SW, solid clay brick masonry conforming to ASTM C 62. Motar must be N, S or M.
2. Allowable loads are calculated using an applied safety factor or 5.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
3. Allowable loads apply to installations in the face of brick or mortar joint.

STRENGTH DESIGN (SD)

Strength Design Installation Table for AC100+ Gold

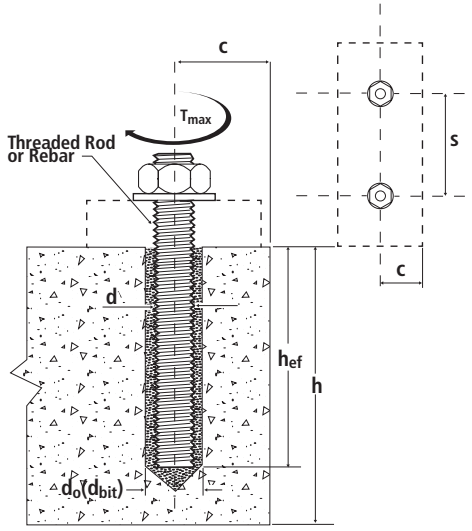
CODE LISTED ICC-ES ESR-2582

Parameter	Symbol	Units	Fractional Nominal Rod Diameter (Inch) / Reinforcing Bar Size									
			3/8 or #3	1/2	#4	5/8 or #5	3/4 or #6	7/8 or #7	1 or #8	#9	1-1/4	#10
Threaded rod outside diameter	d	inch (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)	-
Rebar nominal outside diameter	d	inch (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 (28.7)	-	1.250 (31.8)
Carbide drill bit nominal size	d_o (d_{bit})	inch	7/16	9/16	5/8	11/16 or 3/4	7/8	1	11/8	13/8	13/8	11/2
Minimum embedment	$h_{ef,min}$	inch (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)	5 (127)
Maximum embedment	$h_{ef,max}$	inch (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)	15 (381)
Minimum member thickness	h_{min}	inch (mm)	h_{ef} + 1-1/4 (h_{ef} + 30)			h_{ef} + 2d_o						
Minimum anchor spacing	s_{min}	inch (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)	6-1/4 (159)
Minimum edge distance	c_{min}	inch (mm)	17/8 (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)	6-1/4 (159)
Max. rod torque[2]	T_{max}	ft-lbs	15	33		60	105	125	165	-	280	-
Max. torque[2,3] (A36/Grade 36 rod)	T_{max}	ft-lbs	10	25		50	90	125	165	-	280	-
Max. torque[2,4] (Class 1 SS rod)	T_{max}	ft-lbs	5	20		40	60	100	165	-	280	-
Minimum edge distance, reduced[5]	$c_{min,red}$	inch (mm)	1-3/4 (45)	1-3/4 (45)		1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)

For pound-inch units: 1 mm = 0.03937 inch, 1 N-m = 0.7375 ft-lbf. For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

1. For use with the design provisions of ACI 318-14 Ch. 17 or ACI 318-11 Appendix D as applicable and ICC-ES AC308, Section 4.2 and ESR-2582
2. Torque may not be applied to the anchors until the full cure time of the adhesive has been achieved.
3. These torque values apply to ASTM A 36 / F 1554 Grade 36 carbon steel threaded rods
4. These torque values apply to ASTM A 193 Grade B8/B8M (Class 1) stainless steel threaded rods.
5. For installation between the minimum edge distance, c_{min}, and the reduced minimum edge distance, $c_{min,red}$, the maximum torque must be reduced (multiplied) by a factor of 0.45.

Detail of Steel Hardware Elements used with Injection Adhesive System



Threaded Rod and Deformed Reinforcing Bar Material Properties

Steel Description (General)	Steel Specification (ASTM)	Nominal Anchor Size (inch)	Minimum Yield Strength, f_y (ksi)	Minimum Ultimate Strength, f_u (ksi)
Carbon rod	ASTM A 36 and F 1554 Grade 36	3/8 through 1-1/4	36.0	58.0
	ASTM F 1554 Grade 55	3/8 through 1-1/4	55.0	75.0
	ASTM A 449	3/8 through 1	92.0	120.0
		1-1/4	81.0	105.0
High Strength Carbon rod	ASTM A 193 Grade B7 and F 1554 Grade 105	3/8 through 1-1/4	105.0	125.0
Stainless rod (Alloy 304/316)	ASTM F 593 Condition CW	3/8 through 5/8	65.0	100.0
		3/4 through 1-1/4	45.0	85.0
	ASTM A 193 Grade B8/B8M, Class 1	3/8 through 1-1/4	30.0	75.0
	ASTM A 193 Grade B8/B8M2, Class 2B	3/8 through 1-1/4	75.0	95.0
Reinforcing Bar	ASTM A 615, A 767, Grade 75	3/8 through 1-1/4 (#3 through #10)	75.0	100.0
	ASTM A 615, A 767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	90.0
	ASTM A 706, A 767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	80.0
	ASTM A 615, A 767, Grade 40	3/8 through 1-1/4 (#3 through #10)	40.0	60.0

Steel Tension and Shear Design for Threaded Rod in Normal Weight Concrete (For use with load combinations taken from ACI 318-14 Section 5.3)

CODE LISTED ICC-ES ESR-2582

Design Information		Symbol	Units	Nominal Rod Diameter[1] (inch)						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Threaded rod nominal outside diameter		d	inch (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 effective cross-sectional area		A_{se}	inch² (mm²)	0.0775 (50)	0.1419 (92)	0.2260 (146)	0.3345 (216)	0.4617 (298)	0.6057 (391)	0.9691 (625)
ASTM A 36 and ASTM F 1554 Grade 36	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (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}	lbf (kN)	2,695 (12.0)	4,940 (22.0)	7,860 (35.0)	11,640 (51.8)	16,070 (71.4)	21,080 (93.8)	33,725 (150.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM F 1554 Grade 55	Nominal strength as governed by steel strength(for a single anchor)	N_{sa}	lbf (kN)	5,810 (25.9)	10,640 (47.3)	16,950 (75.4)	25,085 (111.6)	34,625 (154.0)	45,425 (202.0)	72,680 (323.3)
		v_{sa}	lbf (kN)	3,485 (15.5)	6,385 (28.4)	10,170 (45.2)	15,050 (67.0)	20,775 (92.4)	27,255 (121.2)	43,610 (194.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 193 Grade B7 and ASTM F 1554 Grade 105	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (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}	lbf (kN)	5,815 (25.9)	10,640 (7.3)	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	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 449	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	9,300 (41.4)	17,025 (75.7)	27,120 (120.6)	40,140 (178.5)	55,905 (248.7)	72,685 (323.3)	101,755 (452.6)
		V_{sa}	lbf (kN)	5,580 (24.8)	10,215 (45.4)	16,270 (72.4)	24,085 (107.1)	33,540 (149.2)	43,610 (194.0)	61,050 (271.6)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM F 593 CW Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (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}	lbf (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 (219.8)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[3]	ϕ	-	0.65						
	Strength reduction factor for shear[3]	ϕ	-	0.60						
ASTM A 193 Grade B8/B8M, Class 1 Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)[4]	N_{sa}	lbf (kN)	4,420 (19.7)	8,090 (36.0)	12,880 (57.3)	19,065 (84.8)	26,315 (117.1)	34,525 (153.6)	55,240 (245.7)
		V_{sa}	lbf (kN)	2,650 (11.8)	4,855 (21.6)	7,730 (34.4)	11,440 (50.9)	15,790 (70.2)	20,715 (92.1)	33,145 (147.4)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	7,365 (32.8)	13,480 (60.0)	21,470 (95.5)	31,775 (141.3)	43,860 (195.1)	57,545 (256.0)	92,065 (409.5)
		V_{sa}	lbf (kN)	4,420 (19.7)	8,085 (36.0)	12,880 (57.3)	19,065 (84.8)	26,315 (117.1)	34,525 (153.6)	55,240 (245.7)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N. For pound-inch units: 1 mm = 0.03937 inches, 1 N = 0.2248 lbf.

1. Values provided for steel element material types are based on minimum specified strengths 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, except where noted. Nuts and washers must be appropriate for the rod. Nuts must have specified proof load stresses equal to or greater than the minimum tensile strength of the specified threaded rod.
2. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. 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 D.4.4. Values correspond to ductile steel elements.
3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. 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 D.4.4. Values correspond to brittle steel elements
4. In accordance with ACI 318-14 17.4.1.2 and 17.5.1.2 or ACI 318-11 D.5.1.2 and D.6.1.2, as applicable, the calculated values for nominal tension and shear strength for ASTM A193 Grade B8/B8M Class 1 stainless steel threaded rods are based on limiting the specified tensile strength of the anchor steel to 1.9fy or 57,000 psi (393 MPa).

Steel Tension and Shear Design for Reinforcing Bars in Normal Weight Concrete (For use with load combinations taken from ACI 318-14 Section 5.3)

CODE LISTED ICC-ES ESR-2582

Design Information		Symbol	Units	Nominal Reinforcing Bar Size (Rebar)[1]							
				No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Rebar nominal outside diameter		d	inch (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 (28.7)	1.250 (32.3)
Rebar effective cross-sectional area		A_{se}	inch² (mm²)	0.110 (71.0)	0.200 (129.0)	0.310 (200.0)	0.440 (283.9)	0.600 (387.1)	0.790 (509.7)	1.000 (645.2)	1.270 (819.4)
ASTM A 615 Grade 75	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	11,000 (48.9)	20,000 (89.0)	31,000 (137.9)	44,000 (195.7)	60,000 (266.9)	79,000 (351.4)	100,000 (444.8)	127,000 (564.9)
		V_{sa}	lbf (kN)	6,600 (29.4)	12,000 (53.4)	18,600 (82.7)	26,400 (117.4)	36,000 (160.1)	47,400 (210.8)	60,000 (266.9)	76,200 (338.9)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[3]	ϕ	-	0.65							
	Strength reduction factor for shear[3]	ϕ	-	0.60							
ASTM A 615 Grade 60	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (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}	lbf (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 (305.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							
ASTM A 706 Grade 60	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	8,800 (39.1)	16,000 (71.2)	24,800 (110.3)	35,200 (156.6)	48,000 (213.5)	63,200 (281.1)	80,000 (355.9)	101,600 (452.0)
		V_{sa}	lbf (kN)	5,280 (23.5)	9,600 (42.7)	14,880 (66.2)	21,120 (94.0)	28,800 (128.1)	37,920 (168.7)	48,000 (213.5)	60,960 (271.2)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							
ASTM A 615 Grade 40	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	6,600 (29.4)	12,000 (53.4)	18,600 (82.7)	26,400 (117.4)	In accordance with ASTM A 615, Grade 40 bars are furnished only in sizes No. 3 through No. 6			
		V_{sa}	lbf (kN)	3,960 (17.6)	7,200 (32.0)	11,160 (49.6)	15,840 (70.5)				
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80				
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							

1. Values provided for reinforcing bar material types based on minimum specified strengths 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.
2. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. 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 D.4.4. Values correspond to ductile steel elements. In accordance with ACI 318-14 17.2.3.4.3(a)(vi) or ACI 318-11 D.3.3.4.3(a)6, as applicable, deformed reinforcing bars meeting this specification used as ductile steel elements to resist earthquake effects shall be limited to reinforcing bars satisfying the requirements of ACI 318-14 20.2.2.4 and 20.2.2.5 or ACI 318-11 21.1.5.2 (a) and (b), as applicable.
3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. 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 D.4.4. Values correspond to brittle steel elements.

Concrete Breakout Design Information for Threaded Rod and Reinforcing Bars (For use with loads combinations taken from ACI 318-14 Section 5.3)[1]

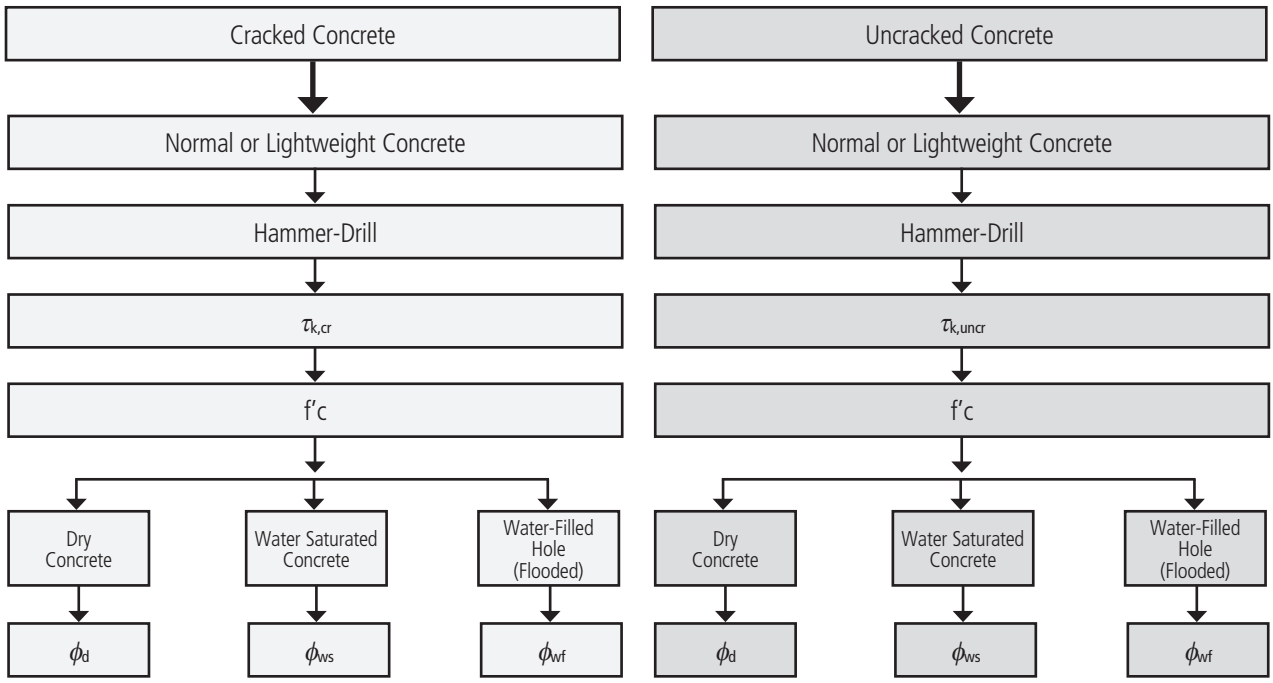
CODE LISTED ICC-ES ESR-2582

Design Information	Symbol	Units	Nominal Rod Diameter (inch) / Reinforcing Bar Size							
			3/8 or #3	1/2 or #4	5/8 or #5	3/4 or #6	7/8 or #7	1 or #8	#9	1-1/4 or #10
Effectiveness factor for cracked concrete	$k_{c,cr}$	- (SI)	Not Applicable	17 (7.1)						
Effectiveness factor for uncracked concrete	$k_{c,uncr}$	- (SI)	24 (10.0)							
Minimum embedment	$h_{ef,min}$	inch (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	$h_{ef,max}$	inch (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)
Minimum anchor spacing	s_{min}	inch (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 edge distance[2]	c_{min}	inch (mm)	5*d* where *d* is nominal outside diameter of the anchor							
Minimum edge distance, reduced[2]	$c_{min,red}$	inch (mm)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	2-3/4 (70)	2-3/4 (70)
Minimum member thickness	h_{min}	inch (mm)	h_{ef} + 1-1/4 (h_{ef} + 30)		h_{ef} + 2d_o where d_o is hole diameter;					
Critical edge distance—splitting (for uncracked concrete only)[3]	c_{ac}	inch	$c_{ac} = h_{ef} \cdot (\frac{\tau_{uncr}}{1160})^{0.4} \cdot [3.1\text{-}0.7 \frac{h}{h_{ef}}]$							
		(mm)	$c_{ac} = h_{ef} \cdot (\frac{\tau_{uncr}}{8})^{0.4} \cdot [3.1\text{-}0.7 \frac{h}{h_{ef}}]$							
Strength reduction factor for tension, concrete failure modes, Condition B[4]	ϕ	-	0.65							
Strength reduction factor for shear, concrete failure modes, Condition B[4]	ϕ	-	0.70							

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N. For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf.

1. Additional setting information is described in the installation instructions.
2. For installation between the minimum edge distance, c_{min}, and the reduced minimum edge distance, $c_{min,red}$, the maximum torque applied must be reduced (multiplied) by a factor of 0.45.
3. $\tau_{k,uncr}$ need not be taken as greater than: $\frac{k_{uncr} \cdot \sqrt{h_{ef} \cdot f'c}}{\pi \cdot d}$ and $\frac{h}{h_{ef}}$ need not be taken as larger than 2.4.
4. Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pryout governs, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. 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 D.4.4.

FLOWCHART FOR THE ESTABLISHMENT OF DESIGN BOND STRENGTH



Bond Strength Design Information for Threaded Rods (For use with load combinations taken from ACI 318-14 Section 5.3)[1,2]

Design Information		Symbol	Units	Nominal Rod Diameter (Inch) / Reinforcing Bar Size						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Minimum embedment		$h_{ef,min}$	inch (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		$h_{ef,max}$	inch (mm)	4-1/2 (114)	6 (152)	7-1/2 (191)	9 (229)	10-1/2 (267)	12 (305)	15 (381)
75°F (24°C) Maximum Long-Term Service Temperature; 104°F (40°C) Maximum Short-Term Service Temperature[4,9]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	871 (6.0)	907 (6.3)	907 (6.3)	907 (6.3)	918 (6.3)	918 (6.3)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,305 (9.0)	1,030 (7.1)
122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	498 (3.4)	519 (3.6)	519 (3.6)	519 (3.6)	519 (3.6)	525 (3.6)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	743 (5.1)	588 (4.1)
									Not applicable in water-filled hole installation condition	
162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	245 (1.7)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	366 (2.5)	Not Applicable
								Not applicable in water-filled hole installation condition		
Permissible installation conditions[6]	Dry concrete	ϕ_d	-	0.65				0.65	0.65	0.65
	Water-saturated concrete	ϕ_{ws}	-	0.55				0.55	0.55	0.55
	Water-filled hole (flooded)	ϕ_{wf}	-	0.45				0.45	0.45	0.45
		κ_{wf}		0.78				0.70	0.69	0.67
Reduction factor for seismic tension		$\alpha_{N,seis}$	-	0.95						

For SI: 1 inch = 25.4 mm, 1 psi = 0.006894 MPa. For pound-inch units: 1 mm = 0.03937 inch, 1 MPa = 145.0 psi.

1. Bond strength values correspond to a normal-weight concrete compressive strength f'c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'c between 2,500 psi and 8,000 psi (17.2 MPa and 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. The modification factor for bond strength of adhesive anchors in lightweight concrete shall be taken as given in ACI 318-14 17.2.6 where applicable.
3. Long-term and short-term temperatures meet the requirements of Section 8.5 of ACI 355.4 and Table 9.1, Temperature Category A.
4. Short-term base material service temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Long-term base material service temperatures are roughly constant over significant periods of time.
5. Characteristic bond strengths are for sustained loads including dead and live loads.
6. Permissible installation conditions include dry concrete, water-saturated concrete and water-filled holes. Water-filled holes include applications in dry or water-saturated concrete where the drilled holes contain standing water at the time of anchor installation.
7. For structures assigned to Seismic Design Categories C, D, E or F, the tabulated bond strength values for cracked concrete must be adjusted by an additional reduction factor, $\alpha_{N,seis}$, as given in this table.
8. Bond strength values for uncracked concrete are applicable for structures assigned to Seismic Design Categories A and B only.
9. **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.**

Bond Strength Design Information for Reinforcing Bar (For use with load combinations taken from ACI 318-14 Section 5.3)[1,2]

Design Information		Symbol	Units	Nominal Rod Diameter (Inch) / Reinforcing Bar Size							
				#3	#4	#5	#6	#7	#8	#9	#10
Minimum embedment		$h_{ef,min}$	inch (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		$h_{ef,max}$	inch (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)
75°F (24°C) Maximum Long-Term Service Temperature; 104°F (40°C) Maximum Short-Term Service Temperature[4,9]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	871 (6.0)	907 (6.3)	907 (6.3)	907 (6.3)	918 (6.3)	918 (6.3)	918 (6.3)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,450 (10.0)	1,305 (9.0)	1,160 (8.0)	1,030 (7.1)
122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	331 (2.3)	345 (2.4)	345 (2.4)	345 (2.4)	345 (2.4)	349 (2.4)	349 (2.4)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	743 (5.1)	655 (4.5)	588 (4.1)
									Not applicable in water-filled hole installation condition		
162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	163 (1.1)	170 (1.2)	170 (1.2)	170 (1.2)	170 (1.2)	170 (1.2)	170 (1.2)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	366 (2.5)	329 (2.3)	Not Applicable
								Not applicable in water-filled hole installation condition			
Permissible installation conditions[6]	Dry concrete	ϕ_d	-	0.65				0.65	0.65	0.65	0.65
	Water-saturated concrete	ϕ_{ws}	-	0.55				0.55	0.55	0.55	0.55
	Water-filled hole (flooded)	ϕ_{wf}	-	0.45				0.45	0.45	0.45	0.45
		κ_{wf}		0.78				0.70	0.69	0.68	0.67
Reduction factor for seismic tension		$\alpha_{N,seis}$	-	0.95							

For SI: 1 inch = 25.4 mm, 1 psi = 0.006894 MPa. For pound-inch units: 1 mm = 0.03937 inch, 1 MPa = 145.0 psi.

1. Bond strength values correspond to a normal-weight concrete compressive strength f'c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'c between 2,500 psi and 8,000 psi (17.2 MPa and 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. The modification factor for bond strength of adhesive anchors in lightweight concrete shall be taken as given in ACI 318-14 17.2.6 where applicable.
3. Long-term and short-term temperatures meet the requirements of Section 8.5 of ACI 355.4 and Table 9.1, Temperature Category A.
4. Short-term base material service temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Long-term base material service temperatures are roughly constant over significant periods of time.
5. Characteristic bond strengths are for sustained loads including dead and live loads.
6. Permissible installation conditions include dry concrete, water-saturated concrete and water-filled holes. Water-filled holes include applications in dry or water-saturated concrete where the drilled holes contain standing water at the time of anchor installation.
7. For structures assigned to Seismic Design Categories C, D, E or F, the tabulated bond strength values for cracked concrete must be adjusted by an additional reduction factor, $\alpha_{N,seis}$, as given in this table.
8. Bond strength values for uncracked concrete are applicable for structures assigned to Seismic Design Categories A and B only.
9. **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.**

Tension and Shear Design Strength for Threaded Rod and Reinforcing Bar Installed in Uncracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 75°F (24°C) Maximum Long-Term Service Temperature; 104°F (40°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8]

STRENGTH DESIGN SD TABLES

Nominal Rod/Rebar Size (in. or #)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
3/8 or #3	2-3/8	2,635	2,490	2,700	2,755	2,805	3,020	2,955	3,180	3,070	3,305
	3	3,330	3,705	3,410	4,100	3,540	4,805	3,735	6,010	3,875	7,045
	4-1/2	4,995	6,765	5,115	7,480	5,310	8,770	5,600	10,965	5,810	12,520
1/2 or #4	2-3/4	3,555	3,305	3,895	3,755	4,330	4,520	4,560	5,655	4,735	6,625
	4	5,920	6,560	6,065	7,255	6,295	8,505	6,635	10,635	6,890	12,470
	6	8,885	11,950	9,095	13,215	9,445	15,490	9,955	19,380	10,335	22,255
5/8 or #5	3-1/8	4,310	4,120	4,720	4,680	5,450	5,720	6,400	7,510	6,625	8,805
	5	8,720	9,985	9,475	11,310	9,835	13,255	10,370	16,580	10,765	19,430
	7-1/2	13,880	18,625	14,210	20,595	14,755	24,140	15,550	30,195	16,145	34,775
3/4 or #6	3-1/2	5,105	5,015	5,595	5,700	6,460	6,970	7,805	9,255	8,315	11,275
	6	11,465	13,595	12,560	15,445	14,165	18,715	14,930	23,410	15,500	27,440
	9	19,985	26,300	20,465	29,085	21,245	34,090	22,395	42,640	23,250	49,980
7/8 or #7	3-1/2	5,105	4,930	5,595	5,605	6,460	6,855	7,725	9,100	8,225	11,130
	7	14,445	16,605	15,825	18,865	18,275	23,075	20,320	29,490	21,095	34,565
	10-1/2	26,540	32,800	27,855	36,635	28,920	42,940	30,485	53,710	31,645	62,955
1 or #8	4	6,240	6,115	6,835	6,945	7,895	8,495	9,255	11,280	9,850	13,800
	8	17,650	19,750	19,335	22,435	22,325	27,440	23,890	34,530	24,800	40,475
	12	31,980	38,790	32,745	42,900	33,995	50,280	35,835	62,895	37,200	73,720
#9	5	7,445	7,110	8,155	8,080	9,420	9,880	10,535	13,125	11,220	16,055
	10	21,060	23,055	23,070	26,190	25,495	31,480	26,875	39,375	27,900	46,150
	15	35,975	44,235	36,840	48,920	38,240	57,335	40,310	71,720	41,850	84,065
1-1/4	5	8,720	8,170	9,555	9,285	10,990	11,355	12,015	15,085	12,740	18,300
	10	24,665	26,380	26,920	29,930	27,950	35,080	29,460	43,880	30,585	51,435
	15	39,435	49,290	40,385	54,510	41,920	63,895	44,190	79,920	45,875	93,675
#10	5	8,720	8,160	9,555	9,270	10,865	11,335	11,875	15,060	12,585	18,270
	10	24,665	26,430	26,920	29,985	27,950	35,145	29,460	43,960	30,585	51,525
	15	39,435	49,385	40,385	54,610	41,920	64,010	44,190	80,070	45,875	93,850

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed following methodology in ACI 318-14, Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls. **This temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirements from 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.**
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for short-term static loads only, seismic loading is not considered with these tables.
6. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14, Ch.17.
7. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14, Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14, Ch.17 and ICC-ES AC308 and ESR-2582.
8. 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.

Tension and Shear Design Strength for Threaded Rod and Reinforcing Bar Installed in Uncracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

Nominal Rod/Rebar Size (in. or #)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
3/8 or #3	2-3/8	1,495	1,610	1,535	1,650	1,590	1,715	1,675	1,805	1,740	1,875
	3	1,890	2,955	1,935	3,270	2,010	3,830	2,120	4,565	2,200	4,735
	4-1/2	2,835	5,395	2,905	5,965	3,015	6,495	3,180	6,845	3,300	7,105
1/2 or #4	2-3/4	2,310	2,780	2,365	3,075	2,455	3,605	2,590	4,505	2,690	5,280
	4	3,360	5,230	3,440	5,785	3,575	6,780	3,765	8,110	3,910	8,420
	6	5,040	9,530	5,165	10,540	5,360	11,545	5,650	12,170	5,865	12,630
5/8 or #5	3-1/8	3,280	3,695	3,360	4,085	3,490	4,785	3,680	5,990	3,820	7,020
	5	5,250	8,155	5,380	9,015	5,585	10,565	5,885	12,675	6,110	13,160
	7-1/2	7,880	14,850	8,065	16,420	8,375	18,035	8,825	19,015	9,165	19,735
3/4 or #6	3-1/2	4,285	4,730	4,380	5,230	4,535	6,130	4,760	7,670	4,925	8,990
	6	7,565	11,515	7,745	12,730	8,040	14,925	8,475	18,250	8,795	18,950
	9	11,345	20,970	11,615	23,190	12,060	25,975	12,710	27,380	13,195	28,420
7/8 or #7	3-1/2	4,370	4,930	4,475	5,470	4,635	6,410	4,865	8,020	5,040	9,400
	7	10,295	14,500	10,540	16,035	10,940	18,795	11,535	23,510	11,975	25,790
	10-1/2	15,440	26,410	15,810	29,210	16,415	34,235	17,300	37,265	17,960	38,685
1 or #8	4	5,210	6,045	5,325	6,685	5,515	7,835	5,795	9,800	6,000	11,490
	8	12,140	17,000	12,430	18,800	12,905	22,040	13,600	27,565	14,120	30,410
	12	18,205	30,965	18,645	34,245	19,355	40,140	20,400	43,940	21,180	45,615
#9	5	5,795	6,845	5,925	7,570	6,135	8,875	6,445	11,100	6,670	13,010
	10	13,545	19,320	13,865	21,365	14,395	25,045	15,175	31,325	15,755	33,930
	15	20,315	35,195	20,800	38,920	21,595	45,620	22,760	49,025	23,630	50,895
1-1/4	5	6,575	7,695	6,720	8,510	6,955	9,975	7,305	12,480	7,565	14,625
	10	15,010	21,630	15,370	23,920	15,955	28,035	16,820	35,065	17,460	37,605
	15	22,515	39,390	23,055	43,560	23,930	51,060	25,225	54,335	26,190	56,405
#10	5	6,490	7,685	6,635	8,495	6,870	9,960	7,215	12,455	7,470	14,600
	10	15,010	21,665	15,370	23,960	15,955	28,085	16,820	35,130	17,460	37,605
	15	22,515	39,465	23,055	43,640	23,930	51,155	25,225	54,335	26,190	56,405

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14, Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14, Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14, Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14, Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension and Shear Design Strength for Threaded Rod and Reinforcing Bar Installed in Uncracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

PDA STRENGTH DESIGN SD TABLES

Nominal Rod/Rebar Size (in. or #)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
3/8 or #3	2-3/8	735	795	755	810	785	845	825	890	855	925
	3	930	2,005	955	2,050	990	2,130	1,045	2,245	1,080	2,330
	4-1/2	1,395	3,005	1,430	3,080	1,485	3,195	1,565	3,370	1,625	3,495
1/2 or #4	2-3/4	1,135	2,095	1,165	2,315	1,210	2,605	1,275	2,745	1,325	2,850
	4	1,655	3,565	1,695	3,650	1,760	3,785	1,855	3,990	1,925	4,145
	6	2,480	5,345	2,540	5,470	2,635	5,680	2,780	5,990	2,885	6,215
5/8 or #5	3-1/8	1,615	2,780	1,655	3,075	1,715	3,605	1,810	3,900	1,880	4,045
	5	2,585	5,565	2,645	5,700	2,745	5,915	2,895	6,235	3,005	6,475
	7-1/2	3,875	8,350	3,970	8,550	4,120	8,875	4,345	9,355	4,510	9,715
3/4 or #6	3-1/2	2,170	3,560	2,225	3,940	2,310	4,615	2,435	5,240	2,525	5,440
	6	3,720	8,015	3,810	8,210	3,955	8,520	4,170	8,980	4,330	9,325
	9	5,580	12,025	5,715	12,310	5,935	12,780	6,255	13,475	6,495	13,985
7/8 or #7	3-1/2	2,265	3,725	2,315	4,120	2,400	4,830	2,520	5,425	2,610	5,620
	7	5,065	10,910	5,185	11,170	5,385	11,600	5,675	12,225	5,890	12,690
	10-1/2	7,600	16,365	7,780	16,760	8,075	17,395	8,515	18,340	8,840	19,035
1 or #8	4	2,700	4,555	2,760	5,035	2,860	5,905	3,005	6,465	3,110	6,695
	8	5,980	12,810	6,120	13,185	6,355	13,690	6,700	14,430	6,955	14,980
	12	8,970	19,315	9,185	19,780	9,535	20,535	10,050	21,645	10,435	22,470
#9	4	3,060	5,200	3,130	5,750	3,240	6,740	3,400	7,325	3,520	7,580
	8	6,800	14,650	6,965	15,000	7,230	15,575	7,620	16,415	7,915	17,045
	12	10,205	21,975	10,450	22,505	10,845	23,360	11,435	24,625	11,870	25,565

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension and Shear Design Strength for Threaded Rod and Reinforcing Bar Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 75°F (24°C) Maximum Long-Term Service Temperature; 104°F (40°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8]

Nominal Rod/Rebar Size (in. or #)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
1/2 or #4	2-3/4	2,445	2,360	2,505	2,680	2,600	3,230	2,740	4,040	2,845	4,730
	4	3,555	4,685	3,645	5,185	3,780	6,075	3,985	7,600	4,140	8,905
	6	5,335	8,535	5,465	9,440	5,670	11,065	5,980	12,880	6,205	13,370
5/8 or #5	3-1/8	3,050	2,940	3,345	3,340	3,675	4,085	4,005	5,365	4,145	6,290
	5	5,790	7,135	5,925	8,075	6,155	9,465	6,485	11,840	6,735	13,880
	7-1/2	8,680	13,300	8,890	14,710	9,230	17,245	9,730	20,955	10,100	21,750
3/4 or #6	3-1/2	3,620	3,580	3,965	4,070	4,450	4,980	4,880	6,610	5,200	8,055
	6	8,120	9,710	8,535	11,035	8,860	13,370	9,340	16,725	9,695	19,600
	9	12,500	18,785	12,800	20,775	13,290	24,350	14,010	30,175	14,545	31,325
7/8 or #7	3-1/2	3,620	3,525	3,965	4,000	4,430	4,895	4,835	6,500	5,145	7,950
	7	10,230	11,860	11,210	13,475	12,060	16,485	12,710	21,065	13,195	24,690
	10-1/2	17,015	23,430	17,425	26,170	18,090	30,670	19,070	38,365	19,795	42,635
1 or #8	4	4,420	4,365	4,840	4,960	5,590	6,065	6,510	8,060	6,930	9,855
	8	12,500	14,105	13,695	16,025	15,815	19,600	16,805	24,665	17,445	28,910
	12	22,495	27,710	23,035	30,640	23,910	35,915	25,205	44,925	26,165	52,655
#9	5	5,275	5,080	5,780	5,770	6,670	7,060	8,170	9,375	8,880	11,465
	10	14,920	16,465	16,340	18,710	18,870	22,485	21,270	28,125	22,080	32,965
	15	27,405	31,595	29,155	34,940	30,265	40,955	31,900	51,230	33,120	60,045
1-1/4	5	6,175	5,835	6,765	6,630	7,815	8,110	9,570	10,775	11,050	13,070
	10	17,470	18,845	19,140	21,380	22,100	25,060	26,255	31,345	27,255	36,740
	15	32,095	35,210	35,160	38,935	37,365	45,640	39,385	57,085	40,885	66,910
#10	5	6,175	5,830	6,765	6,620	7,815	8,100	9,570	10,755	11,050	13,050
	10	17,470	18,880	19,140	21,415	22,100	25,100	26,255	31,400	27,255	36,800
	15	32,095	35,275	35,160	39,010	37,365	45,720	39,385	57,190	40,885	67,035

■ - Concrete Breakout Strength ■ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed following methodology in ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls. **This temperature range is not recognized by ACI 318-14 or ACI 318-11 and does not meet the minimum temperature requirements from 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.**
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for short-term static loads only, seismic loading is not considered with these tables.
6. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
7. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
8. 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.

PDA® STRENGTH DESIGN SD TABLES

Tension and Shear Design Strength for Threaded Rod Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term ServiceTemperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

Nominal Rod/Rebar Size (in.)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
1/2	2-3/4	1,400	1,985	1,430	2,195	1,485	2,575	1,565	3,220	1,625	3,505
	4	2,035	3,735	2,085	4,130	2,160	4,655	2,280	4,910	2,365	5,095
	6	3,050	6,570	3,125	6,730	3,245	6,985	3,420	7,365	3,550	7,645
5/8	3-1/8	2,070	2,640	2,120	2,915	2,200	3,420	2,320	4,275	2,410	5,015
	5	3,310	5,825	3,390	6,440	3,520	7,550	3,710	7,995	3,855	8,300
	7-1/2	4,970	10,605	5,085	10,955	5,280	11,375	5,565	11,990	5,780	12,445
3/4	3-1/2	2,705	3,380	2,760	3,735	2,860	4,380	3,000	5,480	3,105	6,420
	6	4,770	8,225	4,885	9,095	5,070	10,660	5,345	11,510	5,550	11,950
	9	7,155	14,980	7,325	15,780	7,605	16,380	8,015	17,265	8,320	17,925
7/8	3-1/2	2,755	3,525	2,820	3,910	2,920	4,580	3,070	5,730	3,180	6,715
	7	6,490	10,360	6,645	11,455	6,900	13,425	7,275	15,665	7,550	16,265
	10-1/2	9,735	18,865	9,970	20,865	10,350	22,295	10,910	23,500	11,325	24,395
1	4	3,640	4,320	3,720	4,775	3,855	5,595	4,045	7,000	4,190	8,205
	8	8,480	12,145	8,680	13,430	9,015	15,740	9,500	19,690	9,865	21,240
	12	12,720	22,120	13,025	24,460	13,520	28,670	14,250	30,695	14,795	31,865
1-1/4	5	5,870	5,495	6,000	6,080	6,210	7,125	6,525	8,915	6,755	10,445
	10	13,400	15,450	13,720	17,085	14,245	20,025	15,015	25,050	15,590	29,360
	15	20,100	28,135	20,585	31,115	21,370	36,470	22,525	45,620	23,385	50,365

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension and Shear Design Strength for Reinforcing Bar Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

PDA® | STRENGTH DESIGN SD TABLES

Nominal Rod/Rebar Size (#)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
#4	2-3/4	930	1,985	950	2,050	990	2,130	1,040	2,245	1,080	2,330
	4	1,350	2,910	1,385	2,980	1,435	3,095	1,515	3,265	1,575	3,385
	6	2,030	4,365	2,075	4,470	2,155	4,645	2,270	4,895	2,360	5,080
#5	3-1/8	1,375	2,640	1,410	2,915	1,465	3,150	1,540	3,320	1,600	3,445
	5	2,200	4,740	2,255	4,855	2,340	5,040	2,465	5,315	2,560	5,515
	7-1/2	3,300	7,115	3,380	7,285	3,510	7,560	3,700	7,970	3,840	8,275
#6	3-1/2	1,795	3,380	1,835	3,735	1,900	4,095	1,995	4,300	2,065	4,450
	6	3,170	6,830	3,245	6,990	3,370	7,260	3,550	7,650	3,690	7,945
	9	4,755	10,240	4,870	10,490	5,055	10,890	5,330	11,475	5,530	11,915
#7	3-1/2	1,830	3,525	1,875	3,910	1,945	4,185	2,040	4,395	2,110	4,550
	7	4,315	9,295	4,420	9,515	4,585	9,880	4,835	10,415	5,020	10,810
	10-1/2	6,475	13,940	6,630	14,275	6,880	14,820	7,255	15,620	7,530	16,215
#8	4	2,420	4,320	2,475	4,775	2,560	5,515	2,690	5,795	2,785	6,000
	8	5,635	12,140	5,770	12,430	5,990	12,905	6,315	13,600	6,555	14,120
	12	8,455	18,210	8,655	18,645	8,985	19,355	9,475	20,405	9,835	21,180
#9	5	3,090	4,890	3,155	5,410	3,270	6,340	3,435	7,395	3,555	7,655
	10	7,215	13,800	7,390	15,260	7,670	16,520	8,085	17,415	8,395	18,080
	15	10,825	23,315	11,085	23,870	11,505	24,780	12,130	26,125	12,590	27,120
#10	5	3,855	5,490	3,940	6,070	4,080	7,115	4,280	8,900	4,435	9,550
	10	8,910	15,475	9,120	17,115	9,470	20,060	9,980	21,500	10,365	22,320
	15	13,365	28,190	13,685	29,470	14,205	30,595	14,975	32,250	15,545	33,480

- Concrete Breakout Strength - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension and Shear Design Strength for Threaded Rod Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

PDA® STRENGTH DESIGN SD TABLES

Nominal Rod/Rebar Size (in.)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
1/2	2-3/4	690	1,480	705	1,515	730	1,575	770	1,660	800	1,725
	4	1,000	2,155	1,025	2,205	1,065	2,290	1,120	2,415	1,165	2,505
	6	1,500	3,235	1,535	3,310	1,595	3,435	1,680	3,620	1,745	3,760
5/8	3-1/8	1,015	1,985	1,040	2,195	1,080	2,330	1,140	2,455	1,185	2,550
	5	1,625	3,505	1,665	3,590	1,730	3,725	1,825	3,925	1,895	4,075
	7-1/2	2,440	5,255	2,500	5,385	2,595	5,590	2,735	5,890	2,840	6,115
3/4	3-1/2	1,365	2,545	1,400	2,815	1,455	3,130	1,530	3,300	1,590	3,425
	6	2,345	5,045	2,400	5,170	2,490	5,365	2,625	5,655	2,725	5,870
	9	3,515	7,570	3,600	7,750	3,735	8,045	3,940	8,485	4,090	8,805
7/8	3-1/2	1,425	2,660	1,460	2,945	1,510	3,255	1,585	3,415	1,640	3,535
	7	3,190	6,870	3,265	7,035	3,390	7,300	3,575	7,700	3,710	7,990
	10-1/2	4,785	10,305	4,900	10,550	5,085	10,955	5,360	11,545	5,565	11,985
1	4	1,885	3,255	1,925	3,595	1,990	4,215	2,090	4,505	2,165	4,665
	8	4,165	8,970	4,265	9,190	4,430	9,540	4,670	10,055	4,845	10,435
	12	6,250	13,460	6,400	13,780	6,640	14,305	7,000	15,080	7,270	15,655

□ - Concrete Breakout Strength □ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension and Shear Design Strength for Reinforcing Bar Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

Nominal Rod/Rebar Size (#)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
#4	2-3/4	460	985	470	1,010	485	1,050	515	1,105	530	1,145
	4	665	1,435	680	1,470	710	1,525	745	1,605	775	1,670
	6	1,000	2,150	1,025	2,200	1,060	2,285	1,120	2,410	1,160	2,500
#5	3-1/8	680	1,460	695	1,495	720	1,550	760	1,635	790	1,700
	5	1,085	2,335	1,110	2,395	1,155	2,485	1,215	2,620	1,260	2,720
	7-1/2	1,625	3,505	1,665	3,590	1,730	3,725	1,825	3,925	1,895	4,075
#6	3-1/2	910	1,965	935	2,010	970	2,085	1,020	2,200	1,060	2,285
	6	1,560	3,365	1,600	3,445	1,660	3,575	1,750	3,770	1,815	3,915
	9	2,345	5,045	2,400	5,170	2,490	5,365	2,625	5,655	2,725	5,870
#7	3-1/2	950	2,050	975	2,095	1,005	2,170	1,055	2,280	1,095	2,360
	7	2,125	4,580	2,175	4,690	2,260	4,870	2,385	5,130	2,475	5,325
	10-1/2	3,190	6,870	3,265	7,035	3,390	7,300	3,575	7,700	3,710	7,990
#8	4	1,255	2,705	1,285	2,765	1,330	2,860	1,395	3,005	1,445	3,110
	8	2,775	5,980	2,845	6,125	2,950	6,360	3,110	6,705	3,230	6,960
	12	4,165	8,970	4,265	9,190	4,430	9,540	4,670	10,055	4,845	10,435
#9	5	1,580	3,405	1,615	3,480	1,675	3,605	1,755	3,785	1,820	3,915
	10	3,515	7,570	3,600	7,750	3,735	8,045	3,940	8,485	4,090	8,805
	15	5,270	11,355	5,400	11,630	5,605	12,070	5,910	12,725	6,135	13,210

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. 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.

Tension Design of Steel Elements (Steel Strength)[1,2]

Steel Elements - Threaded Rod and Reinforcing Bar										
Nominal Rod/Rebar Size (in. or No.)	ASTM A36 and ASTM F1554 Grade 36	ASTM F1554 Grade 55	ASTM A193 Grade B7 and ASTM F1554 Grade 105	ASTM F593 CW Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M, Class 1 Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	ASTM A615 Grade 75 Rebar	ASTM A615 Grade 60 Rebar	ASTM A706 Grade 60 Rebar	ASTM A615 Grade 40 Rebar
	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)
3/8 or #3	3,370	4,360	7,265	5,040	3,315	5,525	7,150	7,425	6,600	4,950
1/2 or #4	6,175	7,980	13,300	9,225	6,070	10,110	13,000	13,500	12,000	9,000
5/8 or #5	9,835	12,715	21,190	14,690	9,660	16,105	20,150	20,925	18,600	13,950
3/4 or #6	14,550	18,815	31,360	18,480	14,300	23,830	28,600	29,700	26,400	19,800
7/8 or #7	20,085	25,970	43,285	25,510	19,735	32,895	39,000	40,500	36,000	-
1 or #8	26,350	34,070	56,785	33,465	25,895	43,160	51,350	53,325	47,400	-
#9	-	-	-	-	-	-	65,000	67,500	60,000	-
1-1/4 or #10	42,160	54,510	9,100	53,540	41,430	69,050	82,550	85,725	76,200	-

■ - Steel Strength

1. Steel tensile design strength according to ACI 318-14 Ch.17 Appendix D, $\phi N_{sa} = \phi \bullet A_{se,N} \bullet f_{uta}$
2. The tabulated steel design strength in tension must be checked against the bond strength/concrete capacity design strength to determine the controlling failure mode, the lowest load level controls.

Shear Design of Steel Elements (Steel Strength)[1,2]

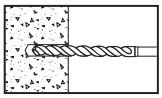
Steel Elements - Threaded Rod and Reinforcing Bar										
Nominal Rod/Rebar Size (in. or No.)	ASTM A36 and ASTM F1554 Grade 36	ASTM F1554 Grade 55	ASTM A193 Grade B7 and ASTM F1554 Grade 105	ASTM F593 CW Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M, Class 1 Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	ASTM A615 Grade 75 Rebar	ASTM A615 Grade 60 Rebar	ASTM A706 Grade 60 Rebar	ASTM A615 Grade 40 Rebar
	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)
3/8 or #3	1,755	2,265	3,775	2,790	1,725	2,870	3,960	3,860	3,430	2,575
1/2 or #4	3,210	4,150	6,915	5,110	3,155	5,255	7,200	7,020	6,240	4,680
5/8 or #5	5,115	6,610	11,020	8,135	5,025	8,375	11,160	10,880	9,670	7,255
3/4 or #6	7,565	9,785	16,305	10,235	7,435	12,390	15,840	15,445	13,730	10,295
7/8 or #7	10,445	13,505	22,505	14,130	10,265	17,105	21,600	21,060	18,720	-
1 or #8	13,700	17,715	29,525	18,535	13,465	22,445	28,440	27,730	24,650	-
#9	-	-	-	-	-	-	36,000	35,100	31,200	-
1-1/4 or #10	21,920	28,345	4,735	29,655	21,545	35,905	45,720	44,575	39,625	-

■ - Steel Strength

1. Steel shear design strength according to ACI 318-14 Ch.17 Appendix D, $\phi V_{sa} = \phi \bullet 0.60 \bullet A_{se,V} \bullet f_{uta}$
2. The tabulated steel design strength in shear must be checked against the bond strength/concrete capacity design strength to determine the controlling failure mode, the lowest load level controls.

INSTALLATION INSTRUCTIONS (SOLID BASE MATERIALS)

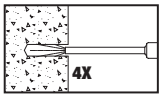
DRILLING



1- Drill a hole into the base material with a rotary hammer drill tool to the size and embedment required by the selected steel anchor element (see installation specifications for threaded rod and reinforcing bar). The tolerances of the carbide drill bit must meet ANSI Standard B212.15.

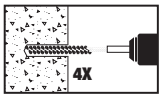
- Precaution: Use suitable eye and skin protection. Avoid inhalation of dust during drilling and/or removal.
- Note! In case of standing water in the drilled hole (flooded hole condition), all the water has to be removed from the hole (e.g. vacuum, compressed air, etc.) prior to cleaning.

HOLE CLEANING DRY (BLOW 4X, BRUSH 4X, BLOW 4X)



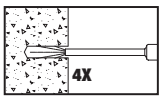
2a- Starting from the bottom or back of the anchor hole, blow the hole clean using a compressed air nozzle (min. 90 psi) or a hand pump (supplied by Powers Fasteners) a minimum of four times (4x).

- 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 shall not be used with these anchor sizes.



2b- Determine wire brush diameter (see installation specifications) and attach the brush with adaptor to a rotary drill tool or battery screwgun. Brush the hole with the selected wire brush a minimum of four times (4x). A brush extension (supplied by Powers Fasteners, Cat. #08282) should be used for holes drilled deeper than the listed brush length.

- The wire brush diameter should be checked periodically during use. The brush must be replaced if it becomes worn and does not come into contact with the sides of the drilled hole.



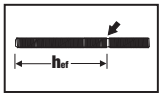
2c- Finally, blow the hole clean again a minimum of four times (4x).

- 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 shall 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.

PREPARING

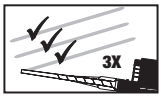
3- Check adhesive expiration date on cartridge label. Do not use expired product. Review Safety Data Sheet (SDS) before use. Cartridge temperature must be between 23°F - 95°F (-5°C - 35°C) when in use unless otherwise noted. Review gel (working) and cure time table. Consideration should be given to the reduced gel 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 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

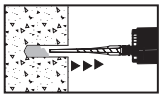
- Verify anchor element is straight and free of surface damage.



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. Do not attach a used nozzle when changing to a new cartridge.

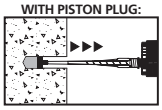
- Review and note the published working and cure times (see gel time and curing time table) prior to injection of the mixed adhesive into the cleaned anchor hole.

INSTALLATION

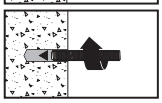


6- Fill the cleaned hole half to two-thirds full with mixed adhesive starting from the bottom or back of the anchor hole. Slowly withdraw the mixing nozzle as the hole fills to avoid creating air pockets or voids. For embedment depth greater than 7-1/2" an extension nozzle must be used with the mixing nozzle.

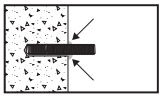
WITH PISTON PLUG:



- Piston plugs (see installation specifications) must be used with and attached to the mixing nozzle and extension tube for horizontal and overhead installations in concrete except with anchor rod 3/8" and rebar size #3. 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 Powers Fasteners. Contact Powers for details prior to use.

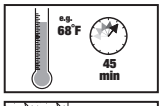


7- The anchor should be free of dirt, grease, oil or other foreign material. Push clean threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. Observe the gel (working) time.



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. The anchor shall not be moved after placement and during cure.

CURING AND LOADING



9- Allow the adhesive anchor to cure to the specified full curing time prior to applying any load (reference gel time and curing time table).

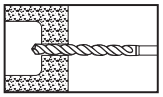
- Do not disturb, torque or load the anchor until it is fully cured.

10- After full curing of the adhesive anchor, a fixture can be installed to the anchor and tightened up to the maximum torque (reference gel time and curing table) by using a calibrated torque wrench.

- Take care not to exceed the maximum torque for the selected anchor.

INSTALLATION INSTRUCTIONS (HOLLOW BASE MATERIALS)

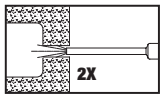
DRILLING



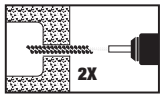
1- Drill a hole into the base material with a rotary drill tool to the size and embedment for the required by the selected screen tube size and steel anchor element (see installation specifications for threaded rod in hollow base material with screen tube supplied by Powers Fasteners). The tolerances of the drill bit used should meet the requirements of ANSI B212.15.

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

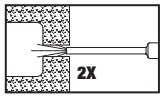
HOLE CLEANING (BLOW 2X, BRUSH 2X, BLOW 2X)



2- Starting from the bottom or back of the anchor hole, blow the hole clean with a hand pump (min. volume 25 fl.oz. supplied by Powers Fasteners) or compressed air nozzle a minimum of two times (2x).



- Determine the wire brush diameter (see installation specifications) and attach the brush with adaptor to a rotary drill tool or battery screw gun. Brush the hole with the selected wire brush a minimum of two times (2x). A brush extension (supplied by Powers Fasteners, Cat #08282) should be used for holes drilled deeper than the listed brush length.
- The wire brush should be checked periodically during use. The brush must be replaced if it becomes worn and does not come in contact with sides of the drill hole.

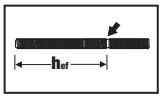


- Finally, blow the hole clean again a minimum of two times (2x)
- When finished the hole should be clean and free of dust, debris, ice, grease, oil or other foreign material.

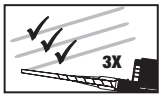
PREPARING

3- Check adhesive expiration date on cartridge label. Do not use expired product. Review Safety Data Sheet (SDS) before use. Cartridge temperature must be between 23°F - 95°F (-5°C - 35°C) when in use unless otherwise noted. Review gel (working) time and curing time table. 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 working time of the adhesive.



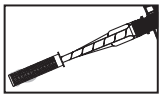
4- Prior to inserting the anchor into the filled screen tube, the position of the embedment depth has to be marked on the anchor. Verify anchor element is straight and free of surface damage.



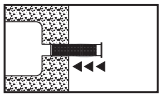
5- Adhesive must be properly mixed to achieve published properties. Prior to dispensing adhesive into the drilled hole, separately dispense at least three full strokes of adhesive through the mixing nozzle until the adhesive is a consistent GRAY color. Do not attach a used nozzle when changing to a new cartridge.

- Review and note the published working and cure times (see gel time and curing time table) prior to injection of the mixed adhesive into the screen tube.

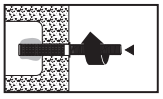
INSTALLATION



6- Select a screen tube of suitable length (supplied by Powers Fasteners). Fill the screen tube full with adhesive starting from the bottom or back of the tube. Slowly withdraw the mixing nozzle as the screen fills to avoid creating air pockets or voids. A plastic extension tube supplied by Powers Fasteners must be used with the mixing nozzle if the back of the screen tube cannot be reached.



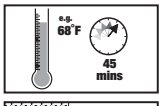
7- Insert the screen tube filled with adhesive into the cleaned anchor hole.



8- Prior to inserting the anchor rod into the screen tube inspect it to ensure that it is free of dirt, grease, oil or other foreign material.

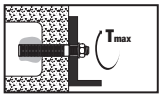
- Push the threaded rod into the screen tube while turning slightly to ensure positive distribution of the adhesive until back of the tube is reached.

CURING AND FIXTURE



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 (see gel time and curing time table).



10- After full curing of the adhesive anchor, a fixture can be installed to the anchor and tightened up to the maximum torque (see installation specifications for threaded rod in hollow base material) by using a calibrated torque wrench.

- Take care not to exceed the maximum torque for the selected anchor.

REFERENCE TABLES FOR INSTALLATION

Gel (working) Time and Curing Table

Temperature of Base Material		Gel (working) Time	Full Curing Time
°F	°C		
14	-10	90 minutes	24 hours
23	-5	90 minutes	14 hours
32	0	45 minutes	7 hours
41	5	25 minutes	2 hours
50	10	15 minutes	90 minutes
68	20	6 minutes	45 minutes
86	30	4 minutes	25 minutes
95	35	2 minutes	20 minutes
104	40	1.5 minutes	15 minutes

The gel (working) times listed for 32°F to 95°F are also applicable for the temperature of the adhesive and use of mixing nozzes during installation.
For installations in base material temperatures between 14°F and 23°F (-10°C and -5°C) the cartridge temperature must be conditioned to between 68°F and 95°F (20°C - 35°C).

Hole Cleaning Equipment Selection Table for AC100+ Gold

Threaded Rod Diameter (inch)	Rebar Size (no.)	ANSI Drill Bit Diameter (inch)	Min. Brush Diameter, D_{min} (inches)	Brush Length, L (inches)	Steel Wire Brush (Cat. #)	Blowout Tool	Number of Cleaning Actions
Solid Base Material							
3/8	#3	7/16	0.475	6-3/4	08284	Hand-pump (Cat#08280) or compressed air nozzle	4x blowing 4x brushing 4x blowing
1/2	-	9/16	0.600	6-3/4	08285		
-	#4	5/8	0.670	6-3/4	08275		
5/8	#5	11/16	0.735	7-7/8	08286		
5/8	#5	3/4	0.780	7-7/8	08278		
3/4	#6	7/8	0.920	7-7/8	08287		
7/8	#7	1	1.045	11-7/8	08288	Compressed air nozzle only	
1	#8	1-1/8	1.175	11-7/8	08289		
1-1/4	#9	1-3/8	1.425	11-7/8	08290		
-	#10	1-1/2	1.550	11-7/8	08291		
Hollow Base Material							
3/8	-	1/2	0.600	6-3/4	08285	Hand pump (Cat# 08280) or compressed air nozzle	2x blowing 2x brushing 2x blowing
3/8	--	9/16	0.735	7-7/8	08286		
1/2	-	5/8	0.735	7-7/8	08286		
1/2	--	3/4	0.780	7-7/8	08278		
5/8	-	3/4	0.780	7-7/8	08278		
5/8	-	7/8	0.920	7-7/8	08287		

An SDS-plus adaptor (Cat. #08283) or Jacobs chuck style adaptor (Cat. #08296) is required to attach a steel wire brush to the drill tool.
A brush extension (Cat#08282) must be used for holes drilled deeper than the listed brush length.

Adhesive Piston Plugs

Threaded Rod Diameter (inch)	Rebar Size (no.)	ANSI Drill Bit Diameter (inch)	Plug Size (inch)	Plastic Plug (Cat. #)	Horizontal Installations
1/2	#4	9/16	9/16	08302	
-	#4	5/8	5/8	08304	
5/8	#5	11/16	11/16	08258	
		3/4	3/4	08259	
3/4	#6	7/8	7/8	08300	
7/8	#7	1	1	08301	
1	#8	1-1/8	1-1/8	08303	
1-1/4	#9	1-3/8	1-3/8	08305	
-	#10	1-1/2	1-1/2	08309	

A plastic extension tube (3/8" dia.) must be used with piston plugs.

PERMISSIBLE INSTALLATION CONDITIONS (ADHESIVE)

Dry Concrete: cured concrete that, at the time of adhesive anchor installation, has not been exposed to water for the preceding 14 days.
Water-Saturated Concrete (wet): cured concrete that, at the time of adhesive anchor installation, has been exposed to water over a sufficient length of time to have the maximum possible amount of absorbed water into the concrete pore structure to a depth equal to the anchor embedment depth.
Water-Filled Holes (flooded): cured concrete that is water-saturated and where the drilled hole contains standing water at the time of anchor installation.

ORDERING INFORMATION

AC100+ Gold Cartridges

Cat No.	Description	Std. Box	Std. Carton	Pallet
8478SD	AC100+ Gold 10 fl. oz. Quik-Shot	12	-	972
8486SD	AC100+ Gold 12 fl. oz. dual cartridge	12	-	864
8490SD	AC100+ Gold 28 fl. oz. dual cartridge	8	-	400

One AC100+ Gold mixing nozzle is packaged with each cartridge.
AC100+ Gold mixing nozzles must be used to ensure complete and proper mixing of the adhesive.

Cartridge System Mixing Nozzles

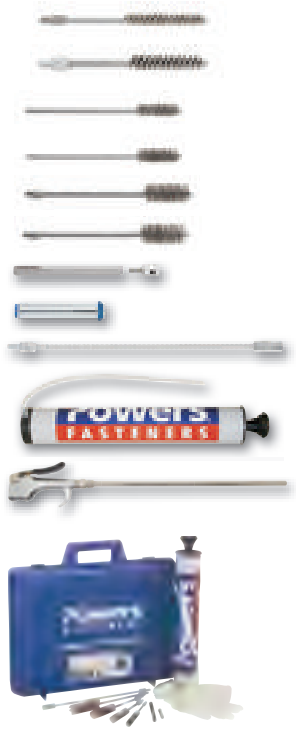
Cat No.	Description	Std. Pack/ Box	Std. Carton
08293	Extra mixing nozzle for AC100+ Gold (10 oz. & 12 oz.)	2	24
08294	Extra mixing nozzle (with a 8" extension) for AC100+ Gold 28 oz.	2	24
08281	Mixing nozzle extension, 8" minimum	2	24
08297	Mixing nozzle extension, 20" long		

Dispensing Tools for Injection Adhesive

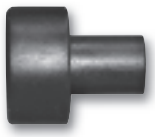
Cat No.	Description	Std. Box	Std. Carton
08437	Manual caulking gun for Quik-Shot	1	12
08479	High performance caulking gun for Quik-Shot	1	6
08485	AC100+ Gold 10 oz. & 12 oz. high performance manual tool	1	20
08494	AC100+ Gold 28 oz. standard all metal manual tool	1	-
08496	AC100+ Gold 28 oz. pneumatic tool	1	-
DCE59501	AC100+ Gold 28 oz. 20v battery powered dispensing tool	1	-

Hole Cleaning Tools and Accessories

Cat No.	Description	Std. Box
08284	Wire brush for 7/16"ANSI hole (3/8" rod or #3 rebar), 6-3/4" length	1
08285	Wire brush for 9/16"ANSI hole (1/2" rod or #4 rebar), 6-3/4" length	1
08286	Wire brush for 11/16"ANSI hole (5/8" rod or #5 rebar), 7-7/8" length	1
08278	Wire brush for 3/4"ANSI hole (5/8" rod or #5 rebar), 7-7/8" length	1
08287	Wire brush for 7/8"ANSI hole (3/4" rod or #6 rebar), 7-7/8" length	1
08288	Wire brush for 1"ANSI hole (7/8" rod or #7 rebar), 11-7/8" length	1
08289	Wire brush for 1-1/8"ANSI hole (1" rod or #8 rebar), 11-7/8" length	1
08290	Wire brush for 1-3/8"ANSI hole (1-1/4" rod or #9 rebar), 11-7/8" length	1
08291	Wire brush for 1-1/2"ANSI hole (#10 rebar), 11-7/8" length	1
08283	SDS-plus adapter for steel brushes	1
08296	Standard drill adapter for steel brushes (e.g. Jacobs Chuck)	1
08282	Steel brush extension, 12" length	1
08280	Hand pump/dust blower (25 fl. oz. cylinder volume)	1
08292	Air compressor nozzle with extension, 18" length	1
52073	Adhesive cleaning kit, includes 4 wire brushes (08284, 08285, 08286, 08287), steel brush extension (08282), SDS-plus adapter (08283), standard drill adapter (08296), hand pump/dust blower (08280), gloves and safety glasses	1



Adhesive Piston Plugs



Cat. No.	Description	ANSI Drill Dia.	Reinforcing Bar Size	Threaded Rod Size	Std. Bag	Std. Ctd.
08302	9/16" Plug	9/16"	1/2"	#4	10	100
08304	5/8" Plug	5/8"	-	#4	10	100
08258	11/16" Plug	11/16"	5/8"	#5	10	100
08259	3/4" Plug	3/4"			10	100
08300	7/8" Plug	7/8"	#6	3/4"	10	100
08301	1" Plug	1"	#7	7/8"	10	100
08303	1-1/8" Plug	1-1/8"	#8	1"	10	100
08305	1-3/8" Plug	1-3/8"	#9	1-1/4"	10	100
08309	1-1/2" Plug	1-1/2"	#10	-	10	100

Stainless Steel Screen Tubes

Cat. No.	Description	Drill Diameter	Standard Carton
07960	1/4" x 2" Screen Tube	3/8"	25
07862	1/4" x 6" Screen Tube*	3/8"	25
07864	1/4" x 8"Screen Tube*	3/8"	25
07856	3/8" x 2" Screen Tube	1/2"	25
07961	3/8" x 3-1/2" Screen Tube	1/2"	25
07962	3/8" x 6" Screen Tube*	1/2"	25
07963	3/8" x 8" Screen Tube*	1/2"	25
07964	3/8" x 10" Screen Tube*	1/2"	25
07959	3/8" x 12" Screen Tube*	1/2"	25
07857	1/2" x 2" Screen Tube	5/8"	25
07965	1/2" x 3-1/2" Screen Tube	5/8"	25
07966	1/2" x 6" Screen Tube*	5/8"	25
07967	1/2" x 8" Screen Tube*	5/8"	25
07968	1/2" x 10" Screen Tube*	5/8"	25
07858	5/8" x 2" Screen Tube	3/4"	25
07969	5/8" x 4-1/2" Screen Tube	3/4"	20
07970	5/8" x 6" Screen Tube	3/4"	20
07971	5/8" x 8" Screen Tube*	3/4"	20
07972	5/8" x 10" Screen Tube*	3/4"	20
07859	3/4" x 2" Screen Tube	7/8"	25
07855	15/16" x 2" Screen Tube	1"	25

Screen tubes are made from a 300 series stainless steel. The nominal diameter of the screen listed indicates the matching rod diameter.

*Includes extension tubing.

Plastic Screen Tubes

Cat. No.	Description	Drill Diameter	Standard Carton
08470	1/4" x 1-3/4" Plastic Screen	1/2"	25
08473	3/8" x 2-3/4" Plastic Screen	9/16"	25
08310	3/8" x 3-1/2" Plastic Screen	9/16"	25
08311	3/8" x 6" Plastic Screen	9/16"	25
08313	3/8" x 8" Plastic Screen	9/16"	25
08315	1/2" x 3-1/2" Plastic Screen	3/4"	25
08317	1/2" x 6" Plastic Screen	3/4"	25
08321	5/8" x 6" Plastic Screen	7/8"	25