

## Power-Fast+® Epoxy Adhesive Anchoring System

### PRODUCT DESCRIPTION

The Power-Fast+ Epoxy adhesive system is a two-component structural epoxy which is packaged in engineered plastic cartridges. It is used with either a manual, pneumatic or power-operated injection tool and proportionally mixed through a static-element mixing nozzle. Power-Fast+ is a premium, non-sag, high strength epoxy which has been vigorously tested to meet or exceed required standards as an anchoring and bonding adhesive. Power-Fast+ is available in Fast Set and Standard Set formulas.

Power-Fast+ Epoxy, formerly known as *Rawl Foil-Fast*, is designed for use in anchoring threaded rods, bolts, reinforcing bars, and smooth dowels into concrete and masonry base materials. The system can also be used to anchor into hollow masonry materials using rod and rebar with screen tubes. In addition to anchoring applications, Power-Fast+ is used for bonding steel and cured concrete to cured concrete, for pick proofing applications, for surface sealing cracks and for placing injection ports.

### GENERAL APPLICATIONS AND USES

- Heavy duty anchoring such as rebar, threaded anchor rod, and threaded bolts in solid concrete, grout filled block, stone, masonry, etc.
- Used in wet environments, moderate to high temperatures and whenever solvent or styrene fumes are not acceptable
- Anchoring with screen tubes in hollow block or brick
- High strength bonding to concrete, steel, wood, etc.
- Optimal for unreinforced masonry (URM) retrofit projects
- Ideal for crack sealing and port placement prior to epoxy resin crack injection
- Commonly used for pick-proof applications in prison and security projects

### FEATURES AND BENEFITS

- Listed and approved to resist dead loads, live loads, and short-term loads such as those resulting from wind or earthquake
- Non-shrink, non-sag, moisture tolerant, high strength, structural epoxy gel
- 100% solids, styrene and solvent-free, low odor, smooth paste formulation
- The plus symbol “+” in Power-Fast+ designates a nozzle is packaged with each cartridge (except for Jumbo cartridge packaging)
- Available in five cartridge sizes to match project and application
- Excellent resistance to chemicals
- Meets the requirements of ASTM C881, Types I, II, IV and V, Grade 3
- Meets current building code and DOT requirements
- Suitable for oversized and diamond cored holes
- Independently tested and qualified to ASTM E1512, AC58 and AC60 criteria, including creep resistance, freeze-thaw cycling and simulated seismic/wind conditions

### APPROVALS AND LISTINGS

International Code Council, Evaluation Service (ICC-ES) ESR-1531  
(formerly listed in ICBO ES ER-4514)

Southern Building Code Conference International (SBCCI) #9943A

City of Los Angeles (COLA) Research Report LARR-25230

City of Los Angeles (COLA) Research Report LARR-24979 for Unreinforced Masonry (URM)

Florida Building Code Approval – FL2209.05

Miami-Dade County Notice of Acceptance (NOA) 04-0823.06

ANSI/NSF 61 – Drinking Water System Components Compliant

Meets ASTM C881 and AASHTO M235

Various North American Departments of Transportation (DOT) – See [www.powers.com](http://www.powers.com)

### GUIDE SPECIFICATIONS

**CSI Divisions:** *03151-Concrete Anchoring, 04081-Masonry Anchorage and 05090-Metal Fastening.* Epoxy adhesive system shall be standard set or fast set Power-Fast+ as supplied by Powers Fasteners, Inc., Brewster, NY.

### SECTION CONTENTS Page No.

General Information.....	209
Material and Installation Specifications.....	210
Installation Guidelines.....	211
Steel Specifications.....	212
Performance Data.....	213
Design Criteria.....	223
Ordering Information.....	226



Power-Fast+ Coaxial Cartridge



Power-Fast+ Dual Cartridge

### PACKAGING

#### Coaxial Cartridge

10 fl. oz. (295 ml or 18.0 in<sup>3</sup>)

#### Dual (Side-by-Side) Cartridge

15 fl. oz. (440 ml or 27.1 in<sup>3</sup>)  
 22 fl. oz. (650 ml or 39.7 in<sup>3</sup>)  
 44 fl. oz. (1300 ml or 79.4 in<sup>3</sup>)  
 56 fl. oz. (1650 ml or 101.0 in<sup>3</sup>)

### ANCHOR SIZE RANGE (TYP.)

1/4" to 1-1/2" diameter rod  
 No.3 to No.11 reinforcing bar  
 3/4" to 1-1/2" smooth dowel bar  
 3/8" to 3/4" internally threaded inserts

### SUITABLE BASE MATERIALS

Normal-Weight Concrete  
 Structural Lightweight Concrete  
 Grouted Concrete Masonry  
 Hollow CMU  
 Brick Masonry  
 Stone

**MATERIAL AND INSTALLATION SPECIFICATIONS**

**Physical Properties for Adhesive**

Shelf Life	2 years for components
Storage Conditions	Store dry at 40° to 90°F
Injection Temperature	For best results, condition material to 60°F min.
Color	Component A – White Component B – Dark Gray
Mixing Ratio	1:1 by volume
Mixed Consistency	Smooth, non-sag, uniform gray paste
Shore Hardness (ASTM D2240)	D 86 – 90
Compressive Strength (ASTM D 695)	11,125 psi, 1 day 14,740 psi, 7 days
Tensile Strength (ASTM D 638)	7,250 psi, Fast Set 7,400 psi, Standard Set
Flexural Strength (ASTM D 790)	6,200 psi, Fast Set 6,700 psi, Standard Set
Slant Shear Strength (ASTM D732)	4,900 psi, Fast Set – 1 day 6,700 psi, Standard Set – 14 day
Water Absorption (ASTM D 570)	Less than 1% (0.59%)
Bond Strength (Dry cure)	3,000 psi, concrete to concrete 3,000 psi, steel to concrete
Shrinkage (ASTM D 2566)	Not measurable
Heat Deflection (ASTM D 648)	140°F (60°C)

**Setting Times**

Base Material Temp. (°F)	Maximum Gel Time <sup>1,2</sup> (Minutes)		Minimum Curing Time <sup>2,3</sup> (Hours)		Full Curing Time <sup>4</sup> (Hours)	
	Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set
40	30	60	8	16	36	48
60	20	45	3	7	24	36
75	15	35	2	6	24	24
90	10	20	1 1/2	4	16	24

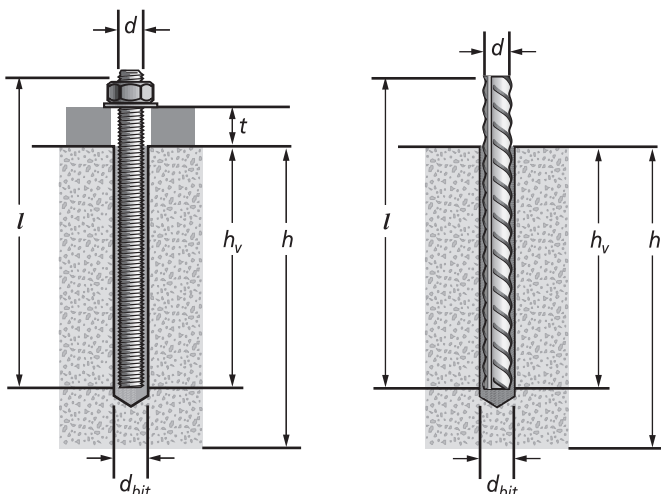
°C = 5/9 (°F-32)

1. The gel time is the maximum time during which the epoxy can be worked before it begins to harden.
2. Anchors must not be disturbed between the maximum gel time and the minimum curing time.
3. The Power-Fast+ adhesive can support the weight of the anchor element (not including any fixture) at half of the minimum cure time.
4. The full curing time is the minimum time required for the epoxy to harden and achieve its ultimate load capacities. Anchors may not be tightened until the full curing time has elapsed.

**Installation Specifications**

Property	Rod Diameter, <i>d</i> (in.)										
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 3/8	1 1/2	
$A_{nom}$ = Nominal area of threaded rod (inch <sup>2</sup> )	0.0491	0.1105	0.1963	0.3068	0.4418	0.6013	0.7854	1.2272	1.4840	1.7660	
$A_{se}$ = Tensile stress area of rod (inch <sup>2</sup> )	0.0318	0.0775	0.1419	0.2260	0.3345	0.4617	0.6057	0.9691	1.1549	1.4053	
$d_{bit}$ = Nominal bit diameter (inch)	5/16	7/16	9/16	3/4	7/8	1	1 1/8	1 3/8	1 1/2	1 5/8	
$T_{max}$ = Max. tightening torque range (ft.-lbs.)	$4d \leq h_v < 9d$	2-3	7-8	17-20	25-30	40-45	65-75	100-110	160-175	210-235	275-300
	$h_v \geq 9d$	4-5	15-17	35-40	70-80	120-130	185-200	275-300	375-425	500-550	650-725

Property	Reinforcing Bar Sizes, <i>d</i>									
	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	
<i>d</i> = Nominal bar diameter (inch)	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	
$d_{ef}$ = Effective anchor diameter (inch)	0.375	0.500	0.625	0.750	0.875	1.000	1.128	1.270	1.410	
$A_{br}$ = Nominal area of reinforcing bar (inch <sup>2</sup> )	0.110	0.200	0.310	0.440	0.600	0.790	1.000	1.270	1.560	
$d_{bit}$ = Nominal bit diameter (inch)	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 5/8	



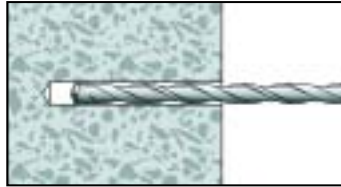
**Nomenclature**

- d* = Diameter of rod or rebar
- $d_{bit}$  = Diameter of drill bit
- h* = Base material thickness.  
The minimum value of *h* should be 1.5 *h<sub>v</sub>*.
- $h_v$  = Minimum embedment depth
- l* = Overall length of rod or rebar
- t* = Fixture thickness
- $T_{max}$  = Maximum tightening torque  
(Only possible after full cure)

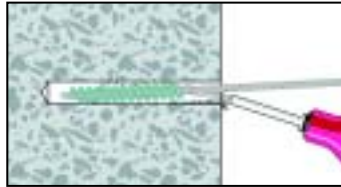
**INSTALLATION GUIDELINES**

**Solid Base Materials**

Drill a hole to the size and embedment required. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15.

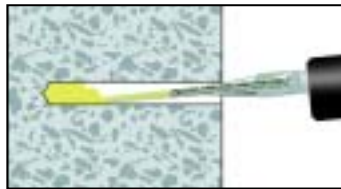


*Starting from the bottom or back of the anchor hole, blow clean with compressed air, brush the hole with a nylon brush, and blow it clean again.*

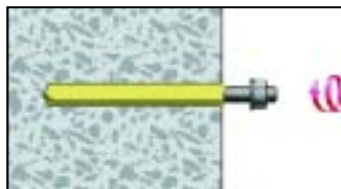


Vacuuming only is not sufficient. Blow out bulbs generally do not provide enough dust removal for most drilled anchor holes. Holes should be clean and sound. They may be dry or damp, but should be free of standing water or frost. If using reinforcing bar, be sure the bar will fit into the drilled hole. If a larger hole is required, the diameter should be as close as possible to the diameter of the reinforcing bar.

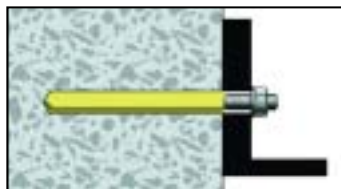
*Prior to dispensing into anchor hole, balance the cartridge and visually inspect that adhesive components are uniformly mixed.* Fill the hole approximately half way with adhesive starting from the bottom or back of the anchor hole. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets.



Push the threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive. Be sure the rod is fully seated at the bottom of the hole and that some adhesive has flowed from the top of the hole. The threaded rod or reinforcing bar used should be free of dirt, grease, oil or other foreign material.

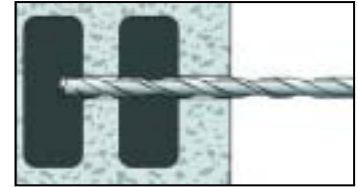


Allow the adhesive to cure for the specified time prior to applying any load. Do not disturb or load the anchor until it is fully cured.



**Hollow Base Materials**

Drill a hole to the size and embedment for the required screen size. The tolerances of the drill bit used should meet the requirements of ANSI B212.15.

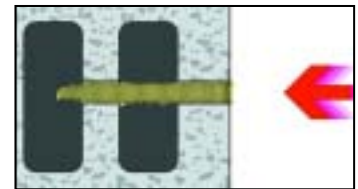


*Starting from the bottom or back of the anchor hole, blow the hole clean with compressed air, brush the hole with a nylon brush and blow it clean again.* Vacuuming only is not sufficient. Blow out bulbs generally do not provide enough dust removal for most drilled anchor holes.

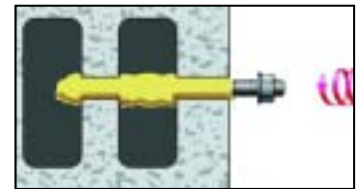
*Prior to dispensing into screen tube, visually inspect that adhesive components are uniformly mixed.* Fill the screen tube with adhesive starting from the bottom of the screen. The screen tube should be completely filled prior to inserting it in the anchor hole.



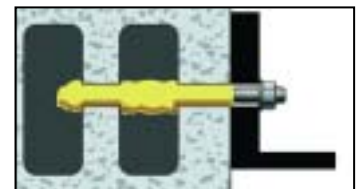
Insert the filled screen tube into the anchor hole until it is fully seated at the required embedment.



Push the threaded rod into the screen while turning slightly to ensure positive dispensing of the adhesive. Be sure the rod is fully inserted down to the end of the screen tube. The threaded rod or reinforcing bar used should be free of dirt, grease, oil, or other foreign material.



Allow the adhesive to cure for the specified time prior to applying any load. Do not disturb or load the anchor until it is fully cured.



Prior to use, read product label, Material Safety Data Sheet and injection tool instructions.

**ADHESIVES**

**STEEL SPECIFICATIONS**

**Material Properties for Threaded Rod and Reinforcing Bar**

Anchor Type	Steel Description	Steel Specification (ASTM)	Rod Dia. or Rebar Size (inch or No.)	Minimum Yield Strength, $f_y$ (ksi)	Minimum Ultimate Strength, $f_u$ (ksi)
Threaded Rod	Standard carbon rod	A36	All	36.0	58.0
		A 307, Grade C	3/8 thru 4	36.0	58.0
	High strength carbon rod	A 193, Grade B7	3/8 thru 2 1/2	105.0	120.0
		Stainless Rod (Type 304 / 316 SS)	F 593, Condition CW	3/8 thru 5/8	65.0
3/4 thru 1 1/2	45.0			85.0	
Reinforcing Bar	Grade 40 Rebar	A 615, A 616, A 617, A 706 or A 767	All	40.0	70.0
	Grade 60 Rebar			60.0	90.0

**Allowable Steel Strength Capacities for Threaded Rod**

Anchor Diameter $d$ in. (mm)	Allowable Tension				Allowable Shear			
	ASTM A36 lbs. (kN)	ASTM A307 Grade C lbs. (kN)	ASTM A193 Grade B7 lbs. (kN)	ASTM F593 304/316 SS lbs. (kN)	ASTM A36 lbs. (kN)	ASTM A307 Grade C lbs. (kN)	ASTM A193 Grade B7 lbs. (kN)	ASTM F593 304/316 SS lbs. (kN)
1/4 (6.4)	940 (4.2)	940 (4.2)	2,160 (9.7)	1,210 (5.4)	485 (2.2)	485 (2.2)	1,030 (4.6)	625 (2.8)
3/8 (9.5)	2,115 (9.5)	2,115 (9.5)	4,375 (19.7)	3,630 (16.3)	1,090 (4.9)	1,090 (4.9)	2,255 (10.1)	1,870 (8.4)
1/2 (12.7)	3,755 (16.9)	3,755 (16.9)	7,775 (35.0)	6,470 (29.1)	1,940 (8.7)	1,940 (8.7)	4,055 (18.2)	3,330 (15.0)
5/8 (15.9)	5,870 (26.4)	5,870 (26.4)	12,150 (54.7)	10,130 (45.6)	3,025 (13.6)	3,025 (13.6)	6,260 (28.2)	5,210 (23.4)
3/4 (19.1)	8,455 (38.0)	8,455 (38.0)	17,495 (78.7)	12,400 (55.8)	4,355 (19.6)	4,355 (19.6)	9,010 (40.5)	6,390 (28.8)
7/8 (22.2)	11,510 (51.8)	11,510 (51.8)	23,810 (107.1)	16,860 (75.9)	5,930 (26.7)	5,930 (26.7)	12,265 (55.2)	8,680 (39.1)
1 (25.4)	15,035 (67.7)	15,035 (67.7)	31,100 (140.0)	22,020 (99.1)	7,745 (34.9)	7,745 (34.9)	16,020 (72.1)	11,340 (51.0)
1 1/4 (31.8)	23,485 (105.7)	23,485 (105.7)	48,560 (218.5)	34,420 (154.9)	12,100 (54.5)	12,100 (54.5)	25,035 (112.7)	17,730 (79.8)
1 3/8 (34.9)	28,400 (127.8)	28,400 (127.8)	58,760 (264.4)	41,625 (187.3)	14,630 (65.8)	14,630 (65.8)	30,270 (136.2)	21,440 (96.5)
1 1/2 (38.1)	33,800 (152.1)	33,800 (152.1)	69,930 (314.7)	49,535 (222.9)	17,410 (78.3)	17,410 (78.3)	36,025 (162.1)	25,515 (114.8)

Steel strength capacities are based on the design criteria listed in the *AISC Manual of Steel Construction*.

**Allowable Steel Strength Capacities for Reinforcing Bar**

Bar Size	Tension lbs. (kN)		Shear lbs. (kN)	
	Grade 40	Grade 60	Grade 40	Grade 60
No. 3 (3/8")	2,200 (9.9)	2,640 (11.9)	1,310 (5.9)	1,680 (7.6)
No. 4 (1/2")	4,000 (18.0)	4,800 (21.6)	2,380 (10.7)	3,060 (13.8)
No. 5 (5/8")	6,200 (27.9)	7,440 (33.5)	3,690 (16.6)	4,740 (21.3)
No. 6 (3/4")	8,800 (39.6)	10,560 (47.5)	5,235 (23.6)	6,730 (30.3)
No. 7 (7/8")	12,000 (54.0)	14,400 (64.8)	7,140 (32.1)	9,180 (41.3)
No. 8 (1")	15,800 (71.1)	18,960 (85.3)	9,400 (42.3)	12,085 (54.4)
No. 9 (1 1/8")	20,000 (90.0)	24,000 (108.0)	11,900 (53.6)	15,300 (68.9)
No. 10 (1 1/4")	25,400 (114.3)	30,480 (137.2)	15,115 (68.0)	19,430 (87.4)
No. 11 (1 3/8")	31,200 (140.4)	37,440 (168.5)	16,920 (76.1)	20,305 (91.4)

Steel strength capacities are based on the requirements of ASTM A 615.

Note:  
Allowable design load must be the lesser of allowable steel strength (as shown on this page) and the allowable bond capacities.

Allowable steel strength values for threaded rod are based on the following equations:

$$T = 0.33 * f_u * A_{nom}$$

$$V = 0.17 * f_u * A_{nom}$$

And, the allowable steel strength values for reinforcing bar are based on the following equations:

$$T = f_s * A_{br}$$

$$V = 0.17 * f_s * A_{br}$$

Where:

$T$  = Allowable tension load (pounds).

$V$  = Allowable shear load (pounds).

$f_u$  = Minimum specified ultimate stress (psi)

$f_s$  = Allowable tensile stress of reinforcement bar (psi)

$A_{nom}$  = Nominal cross-sectional area of threaded rod (in<sup>2</sup>).

$A_{br}$  = Nominal cross-sectional area of reinforcing bar (in<sup>2</sup>).

**PERFORMANCE DATA**

**Ultimate Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3</sup>**

Rod Diameter <i>d</i> in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )							
			2,000 psi (13.8 MPa)		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		5,000 psi (34.5 MPa)	
			Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/16	1 (25.4)	1,400 (6.3)	2,465 (11.1)	1,500 (6.8)	2,465 (11.1)	1,600 (7.2)	2,465 (11.1)	1,905 (8.6)	2,465 (11.1)
		2 (50.8)	2,370 (10.7)	2,465 (11.1)	2,660 (12.0)	2,465 (11.1)	2,950 (13.3)	2,465 (11.1)	3,685 (16.6)	2,465 (11.1)
		3 (76.2)	3,860 (17.4)	2,465 (11.1)	4,165 (18.7)	2,465 (11.1)	4,470 (20.1)	2,465 (11.1)	5,355 (24.1)	2,465 (11.1)
3/8 (9.5)	7/16	1 1/2 (38.1)	3,460 (15.6)	4,600 (20.7)	3,920 (17.6)	4,600 (20.7)	4,400 (19.8)	4,600 (20.7)	5,200 (23.4)	4,600 (20.7)
		3 3/8 (85.7)	9,560 (43.0)	6,000 (27.0)	11,040 (49.7)	6,000 (27.0)	11,780 (53.0)	6,000 (27.0)	12,520 (56.3)	6,000 (27.0)
		5 1/4 (133.4)	14,000 (63.0)	6,480 (29.2)	15,380 (69.2)	6,480 (29.2)	15,560 (70.0)	6,480 (29.2)	15,640 (70.4)	6,480 (29.2)
1/2 (12.7)	9/16	2 (50.8)	4,800 (21.6)	6,800 (30.6)	7,240 (32.6)	6,800 (30.6)	10,820 (48.7)	6,800 (30.6)	14,460 (65.1)	6,800 (30.6)
		4 1/2 (114.3)	12,980 (58.4)	12,800 (57.6)	13,600 (61.2)	12,800 (57.6)	18,860 (84.9)	12,800 (57.6)	21,760 (97.9)	12,800 (57.6)
		7 (177.8)	20,880 (94.0)	12,800 (57.6)	24,380 (109.7)	12,800 (57.6)	26,440 (119.0)	12,800 (57.6)	28,500 (128.3)	12,800 (57.6)
5/8 (15.9)	3/4	2 1/2 (63.5)	6,900 (31.1)	9,600 (43.2)	8,280 (37.3)	9,600 (43.2)	9,400 (42.3)	9,600 (43.2)	10,500 (47.3)	9,600 (43.2)
		5 5/8 (142.9)	19,340 (87.0)	22,800 (102.6)	22,240 (100.1)	22,800 (102.6)	23,400 (105.3)	22,800 (102.6)	24,580 (110.6)	22,800 (102.6)
		8 3/4 (222.3)	30,820 (138.7)	22,800 (102.6)	32,040 (144.2)	22,800 (102.6)	36,760 (165.4)	22,800 (102.6)	38,280 (172.3)	22,800 (102.6)
3/4 (19.1)	7/8	3 (76.2)	9,600 (43.2)	14,400 (64.8)	12,200 (54.9)	14,400 (64.8)	14,840 (66.8)	14,400 (64.8)	17,440 (78.5)	14,400 (64.8)
		6 3/4 (171.5)	28,160 (126.7)	25,600 (115.2)	33,480 (150.7)	25,600 (115.2)	37,520 (168.8)	25,600 (115.2)	43,080 (193.9)	25,600 (115.2)
		10 1/2 (266.7)	39,760 (178.9)	29,250 (131.6)	45,520 (204.8)	29,250 (131.6)	47,680 (214.6)	29,250 (131.6)	49,800 (224.1)	29,250 (131.6)
7/8 (22.2)	1	3 1/2 (88.9)	10,920 (49.1)	14,000 (63.0)	13,320 (59.9)	14,000 (63.0)	15,580 (70.1)	14,000 (63.0)	17,820 (80.2)	14,000 (63.0)
		7 7/8 (200.0)	32,680 (147.1)	36,800 (165.6)	38,400 (172.8)	36,800 (165.6)	42,160 (189.7)	36,800 (165.6)	45,900 (206.6)	36,800 (165.6)
		12 1/4 (311.2)	52,360 (235.6)	36,800 (165.6)	61,440 (276.5)	36,800 (165.6)	67,240 (302.6)	36,800 (165.6)	73,000 (328.5)	36,800 (165.6)
1 (25.4)	1 1/8	4 (101.6)	13,540 (60.9)	18,400 (82.8)	16,340 (73.5)	18,400 (82.8)	18,780 (84.5)	18,400 (82.8)	21,200 (95.4)	18,400 (82.8)
		9 (228.6)	39,760 (178.9)	50,000 (225.0)	48,520 (218.3)	50,000 (225.0)	56,740 (255.3)	50,000 (225.0)	64,920 (292.1)	50,000 (225.0)
		14 (355.6)	58,900 (265.1)	53,135 (239.1)	68,760 (309.4)	53,135 (239.1)	74,600 (335.7)	53,135 (239.1)	80,420 (361.9)	53,135 (239.1)
1 1/4 (31.8)	1 3/8	5 (127.0)	18,000 (81.0)	22,000 (99.0)	24,080 (108.4)	22,000 (99.0)	30,760 (138.4)	22,000 (99.0)	38,780 (174.5)	22,000 (99.0)
		11 1/4 (285.8)	52,920 (238.1)	72,000 (324.0)	66,800 (300.6)	72,000 (324.0)	83,920 (377.6)	72,000 (324.0)	100,900 (454.1)	72,000 (324.0)
		17 1/2 (444.5)	91,480 (411.7)	83,450 (375.5)	109,240 (491.6)	83,450 (375.5)	123,280 (554.8)	83,450 (375.5)	137,240 (617.6)	83,450 (375.5)
1 3/8 (34.9)	1 1/2	5 1/2 (139.7)	30,330 (136.5)	47,980 (215.9)	36,610 (164.7)	47,980 (215.9)	42,890 (193.0)	47,980 (215.9)	49,550 (223.0)	47,980 (215.9)
		12 3/8 (314.3)	68,250 (307.1)	78,905 (355.1)	82,375 (370.7)	78,905 (355.1)	96,500 (434.3)	78,905 (355.1)	111,490 (501.7)	78,905 (355.1)
		16 1/2 (419.1)	90,995 (409.5)	97,460 (438.6)	109,825 (494.2)	97,460 (438.6)	128,660 (579.0)	97,460 (438.6)	148,650 (668.9)	97,460 (438.6)
1 1/2 (38.1)	1 5/8	6 (152.4)	35,760 (160.9)	55,520 (249.8)	43,160 (194.2)	55,520 (249.8)	50,560 (227.5)	55,520 (249.8)	58,415 (262.9)	55,520 (249.8)
		13 1/2 (342.9)	80,455 (362.0)	91,305 (410.9)	97,105 (437.0)	91,305 (410.9)	113,760 (511.9)	91,305 (410.9)	131,430 (591.4)	91,305 (410.9)
		18 (457.2)	107,275 (482.7)	112,780 (507.5)	129,475 (582.6)	112,780 (507.5)	151,680 (682.6)	112,780 (507.5)	167,245 (752.6)	112,780 (507.5)

**ADHESIVES**

1. Ultimate load capacities are listed for the Standard Set formula and should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load.  
 2. Reduce the above ultimate load values by 25 percent when calculating ultimate load capacities for the Fast Set formula.  
 3. Linear interpolation may be used to determine ultimate load capacities for intermediate embedments and compressive strengths.

**PERFORMANCE DATA**

**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3,4,5</sup>**

ADHESIVES

Rod Diameter <i>d</i> in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )							
			2,000 psi (13.8 MPa)		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		5,000 psi (34.5 MPa)	
			Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/16	1 (25.4)	350 (1.6)	615 (2.8)	375 (1.7)	615 (2.8)	400 (1.8)	615 (2.8)	475 (2.1)	615 (2.8)
		2 (50.8)	595 (2.7)	615 (2.8)	665 (3.0)	615 (2.8)	740 (3.3)	615 (2.8)	920 (4.1)	615 (2.8)
		3 (76.2)	965 (4.3)	615 (2.8)	1,040 (4.7)	615 (2.8)	1,120 (5.0)	615 (2.8)	1,340 (6.0)	615 (2.8)
3/8 (9.5)	7/16	1 1/2 (38.1)	865 (3.9)	1,150 (5.2)	980 (4.4)	1,150 (5.2)	1,100 (5.0)	1,150 (5.2)	1,300 (5.9)	1,150 (5.2)
		3 3/8 (85.7)	2,390 (10.8)	1,500 (6.8)	2,760 (12.4)	1,500 (6.8)	2,945 (13.3)	1,500 (6.8)	3,130 (14.1)	1,500 (6.8)
		5 1/4 (133.4)	3,500 (15.8)	1,620 (7.3)	3,845 (17.3)	1,620 (7.3)	3,890 (17.5)	1,620 (7.3)	3,910 (17.6)	1,620 (7.3)
1/2 (12.7)	9/16	2 (50.8)	1,200 (5.4)	1,700 (7.7)	1,810 (8.1)	1,700 (7.7)	2,705 (12.2)	1,700 (7.7)	3,615 (16.3)	1,700 (7.7)
		4 1/2 (114.3)	3,245 (14.6)	3,200 (14.4)	3,400 (15.3)	3,200 (14.4)	4,715 (21.2)	3,200 (14.4)	5,440 (24.5)	3,200 (14.4)
		7 (177.8)	5,220 (23.5)	3,200 (14.4)	6,095 (27.4)	3,200 (14.4)	6,610 (29.7)	3,200 (14.4)	7,125 (32.1)	3,200 (14.4)
5/8 (15.9)	3/4	2 1/2 (63.5)	1,725 (7.8)	2,400 (10.8)	2,070 (9.3)	2,400 (10.8)	2,350 (10.6)	2,400 (10.8)	2,625 (11.8)	2,400 (10.8)
		5 5/8 (142.9)	4,835 (21.8)	5,700 (25.7)	5,560 (25.0)	5,700 (25.7)	5,850 (26.3)	5,700 (25.7)	6,145 (27.7)	5,700 (25.7)
		8 3/4 (222.3)	7,705 (34.7)	5,700 (25.7)	8,010 (36.0)	5,700 (25.7)	9,190 (41.4)	5,700 (25.7)	9,570 (43.1)	5,700 (25.7)
3/4 (19.1)	7/8	3 (76.2)	2,400 (10.8)	3,600 (16.2)	3,050 (13.7)	3,600 (16.2)	3,710 (16.7)	3,600 (16.2)	4,360 (19.6)	3,600 (16.2)
		6 3/4 (171.5)	7,040 (31.7)	6,400 (28.8)	8,370 (37.7)	6,400 (28.8)	9,380 (42.2)	6,400 (28.8)	10,770 (48.5)	6,400 (28.8)
		10 1/2 (266.7)	9,940 (44.7)	7,315 (32.9)	11,380 (51.2)	7,315 (32.9)	11,920 (53.6)	7,315 (32.9)	12,450 (56.0)	7,315 (32.9)
7/8 (22.2)	1	3 1/2 (88.9)	2,730 (12.3)	3,500 (15.8)	3,330 (15.0)	3,500 (15.8)	3,895 (17.5)	3,500 (15.8)	4,455 (20.0)	3,500 (15.8)
		7 7/8 (200.0)	8,170 (36.8)	9,200 (41.4)	9,600 (43.2)	9,200 (41.4)	10,540 (47.4)	9,200 (41.4)	11,475 (51.6)	9,200 (41.4)
		12 1/4 (311.2)	13,090 (58.9)	9,200 (41.4)	15,360 (69.1)	9,200 (41.4)	16,810 (75.6)	9,200 (41.4)	18,250 (82.1)	9,200 (41.4)
1 (25.4)	1 1/8	4 (101.6)	3,385 (15.2)	4,600 (20.7)	4,085 (18.4)	4,600 (20.7)	4,695 (21.1)	4,600 (20.7)	5,300 (23.9)	4,600 (20.7)
		9 (228.6)	9,940 (44.7)	12,500 (56.3)	12,130 (54.6)	12,500 (56.3)	14,185 (63.8)	12,500 (56.3)	16,230 (73.0)	12,500 (56.3)
		14 (355.6)	14,725 (66.3)	13,285 (59.8)	17,190 (77.4)	13,285 (59.8)	18,650 (83.9)	13,285 (59.8)	20,105 (90.5)	13,285 (59.8)
1 1/4 (31.8)	1 3/8	5 (127.0)	4,500 (20.3)	5,500 (24.8)	6,020 (27.1)	5,500 (24.8)	7,690 (34.6)	5,500 (24.8)	9,695 (43.6)	5,500 (24.8)
		11 1/4 (285.8)	13,230 (59.5)	18,000 (81.0)	16,700 (75.2)	18,000 (81.0)	20,980 (94.4)	18,000 (81.0)	25,225 (113.5)	18,000 (81.0)
		17 1/2 (444.5)	22,870 (102.9)	20,865 (93.9)	27,310 (122.9)	20,865 (93.9)	30,820 (138.7)	20,865 (93.9)	34,310 (154.4)	20,865 (93.9)
1 3/8 (34.9)	1 1/2	5 1/2 (139.7)	7,585 (34.1)	11,995 (54.0)	9,155 (41.2)	11,995 (54.0)	10,725 (48.3)	11,995 (54.0)	12,390 (55.8)	11,995 (54.0)
		12 3/8 (314.3)	17,065 (76.8)	19,725 (88.8)	20,595 (92.7)	19,725 (88.8)	24,125 (108.6)	19,725 (88.8)	27,875 (125.4)	19,725 (88.8)
		16 1/2 (419.1)	22,750 (102.4)	24,365 (109.6)	27,455 (123.5)	24,365 (109.6)	32,165 (144.7)	24,365 (109.6)	37,165 (167.2)	24,365 (109.6)
1 1/2 (38.1)	1 5/8	6 (152.4)	8,940 (40.2)	13,880 (62.5)	10,790 (48.6)	13,880 (62.5)	12,640 (56.9)	13,880 (62.5)	14,605 (65.7)	13,880 (62.5)
		13 1/2 (342.9)	20,115 (90.5)	22,825 (102.7)	24,275 (109.2)	22,825 (102.7)	28,440 (128.0)	22,825 (102.7)	32,860 (147.9)	22,825 (102.7)
		18 (457.2)	26,820 (120.7)	28,195 (126.9)	32,370 (145.7)	28,195 (126.9)	37,920 (170.6)	28,195 (126.9)	41,810 (188.1)	28,195 (126.9)

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.  
 2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.  
 3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments and compressive strengths.  
 4. Allowable design load should be the lesser of the bond or allowable steel strength.  
 5. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.

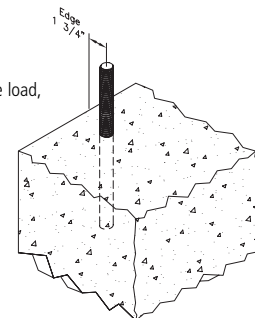
**PERFORMANCE DATA**

**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ at 1-3/4" from Edge of Normal-Weight Concrete**<sup>1,2,3,4,5</sup>

Rod Dia. <i>d</i> in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	Tension, lbs. (kN)				Shear, lbs. (kN)			
					Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )				<i>f'<sub>c</sub></i> = 2,000 psi (13.8 MPa)		<i>f'<sub>c</sub></i> ≥ 2,500 psi (17.2 MPa)	
					2,000 psi (13.8 MPa)	3,000 psi (20.7 MPa)	4,000 psi (27.6 MPa)	5,000 psi (34.5 MPa)	Towards the Free Edge	Parallel to the Free Edge	Towards the Free Edge	Parallel to the Free Edge
1/2 (12.7)	9/16	4 1/2 (114.3)	1 3/4 (44.5)	7 (177.8)	2,150 (9.7)	2,530 (11.4)	2,915 (13.1)	3,295 (14.8)	565 (2.5)	1,455 (6.5)	620 (2.8)	1,600 (7.2)
		5 (127.0)			2,405 (10.8)	2,790 (12.6)	3,170 (14.3)	3,555 (16.0)				
		5 1/2 (139.7)			2,660 (12.0)	3,045 (13.7)	3,430 (15.4)	3,815 (17.2)				
		6 (139.7)			2,915 (12.0)	3,305 (13.7)	3,690 (15.4)	4,080 (17.2)				
		6 1/2 (165.1)			3,175 (14.3)	3,565 (16.0)	3,950 (17.8)	4,340 (19.5)				
		7 (177.8)			3,430 (15.4)	3,820 (17.2)	4,210 (18.9)	4,600 (20.7)				
5/8 (15.9)	3/4	5 5/8 (142.9)	1 3/4 (44.5)	8 3/4 (222.3)	2,615 (11.8)	3,260 (14.7)	3,905 (17.6)	4,550 (20.5)	620 (2.8)	2,060 (9.3)	680 (3.1)	2,260 (10.2)
		6 1/4 (158.8)			3,010 (13.5)	3,690 (16.6)	4,375 (19.7)	5,055 (22.7)				
		6 7/8 (174.6)			3,405 (15.3)	4,125 (18.6)	4,840 (21.8)	5,560 (25.0)				
		7 1/2 (190.5)			3,805 (17.1)	4,560 (20.5)	5,310 (23.9)	6,065 (27.3)				
		8 1/8 (206.4)			4,200 (18.9)	4,990 (22.5)	5,780 (26.0)	6,570 (29.6)				
		8 3/4 (222.3)			4,595 (20.7)	5,420 (24.4)	6,250 (28.1)	7,075 (31.8)				
7/8 (22.2)	1	7 7/8 (200.0)	1 3/4 (44.5)	12 1/4 (311.2)	5,055 (22.7)	5,415 (24.4)	5,775 (26.0)	6,135 (27.6)	930 (4.2)	2,650 (11.9)	1,020 (4.6)	2,910 (13.1)
		8 3/4 (222.3)			5,585 (25.1)	6,045 (27.2)	6,500 (29.3)	6,960 (31.3)				
		9 5/8 (244.5)			6,120 (27.5)	6,675 (30.0)	7,230 (32.5)	7,785 (35.0)				
		10 1/2 (266.7)			6,650 (29.9)	7,300 (32.9)	7,955 (35.8)	8,605 (38.7)				
		11 3/8 (288.9)			7,185 (32.3)	7,935 (35.7)	8,680 (39.1)	9,430 (42.4)				
		12 1/4 (311.2)			7,715 (34.7)	8,560 (38.5)	9,410 (42.3)	10,255 (46.1)				

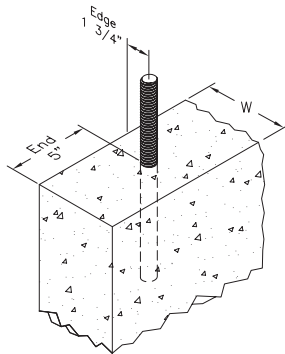
**ADHESIVES**

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.
2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments and compressive strengths.
4. Allowable design load should be the lesser of the bond or allowable steel strength.
5. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.



**PERFORMANCE DATA**

ADHESIVES



**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Normal-Weight Concrete Stem Walls<sup>1,2,3,4,5</sup>**

Rod Diameter <i>d</i> in. (mm)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Min. Wall Width <i>w</i> in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	<i>f<sub>c</sub></i> ≥ 2,500 psi (17.2 MPa)
						Tension lbs. (kN)
1/2 (12.7)	9/16	7 (177.8)	6 (152.4)	1 3/4 (44.5)	5 (127.0)	2,830 (12.7)
5/8 (15.9)	3/4	8 3/4 (222.3)	6 (152.4)	1 3/4 (44.5)	5 (127.0)	3,675 (16.5)
		10 (254.0)			5 (127.0)	3,730 (16.8)
		10 (254.0)			10 (254.0)	3,915 (17.6)
		12 1/2 (317.5)			5 (127.0)	3,835 (17.3)
3/4 (19.1)	7/8	12 1/2 (317.5)	6 (152.4)	1 3/4 (44.5)	5 (127.0)	4,055 (18.2)
7/8 (22.2)	1	12 1/4 (311.2)	8 (203.2)	1 3/4 (44.5)	5 (127.0)	4,890 (22.0)
		15 (381.0)			5 (127.0)	5,530 (24.6)
		15 (381.0)			10 (254.0)	6,565 (29.5)
		17 1/2 (444.5)			5 (127.0)	6,110 (27.5)

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.
2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments.
4. Allowable design load should be the lesser of the bond or allowable steel strength.
5. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.

**Ultimate and Allowable Bond Strength Capacities for Internally Threaded Inserts Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3,4</sup>**



Internally Threaded Insert

Steel Insert Size <i>d</i> in. (mm)	Thread Depth in. (mm)	Outside Diameter in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	<i>f<sub>c</sub></i> ≥ 4,000 psi (27.6 MPa)			
					Ultimate		Allowable	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/8 (9.5)	1 1/2 (38.1)	17/32 (13.5)	9/16	3 1/2 (88.9)	7,880 (35.5)	6,480 (29.2)	1,970 (8.9)	1,620 (7.3)
1/2 (12.7)	1 5/8 (41.3)	21/32 (16.7)	3/4	4 1/4 (108.0)	10,960 (49.3)	11,120 (50.0)	2,740 (12.3)	2,780 (12.5)
5/8 (15.9)	2 3/8 (60.3)	29/32 (23.0)	1	5 (127.0)	15,600 (70.2)	17,650 (79.4)	3,900 (17.6)	4,415 (19.9)
3/4 (19.1)	2 3/4 (69.9)	1 (25.4)	1 1/8	6 5/8 (168.3)	22,440 (101.0)	29,250 (131.6)	5,610 (25.2)	7,315 (32.9)

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.
2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
3. Allowable design load should be the lesser of the bond or allowable steel strength.
4. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.

**PERFORMANCE DATA**

**Ultimate and Allowable Bond Strength Capacities for Reinforcing Bar Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3,4,5</sup>**

Bar Size No. (in.)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )						Shear, lbs (kN)	
			Tension, lbs (kN)						<i>f'<sub>c</sub></i> ≥ 2,000 psi (13.8 MPa)	
			2,000 psi (13.8 MPa)		4,000 psi (27.6 MPa)		6,000 psi (41.4 MPa)			
			Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)	Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)	Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)	Ultimate Shear lbs. (kN)	Allowable Shear lbs. (kN)
No. 3 (3/8")	1/2	2 1/4 (57.2)	7,425 (33.4)	1,855 (8.3)	11,085 (49.9)	2,770 (12.5)	12,130 (54.6)	3,035 (13.7)	6,480 (29.2)	1,620 (7.3)
		3 3/8 (85.7)	11,140 (50.1)	2,785 (12.5)	16,630 (74.8)	4,160 (18.7)	18,200 (81.9)	4,550 (20.5)	8,300 (37.4)	2,075 (9.3)
		4 1/2 (114.3)	14,855 (66.8)	3,715 (16.7)	22,180 (99.8)	5,545 (25.0)	24,270 (109.2)	6,070 (27.3)	8,300 (37.4)	2,075 (9.3)
No. 4 (1/2")	5/8	3 (76.2)	9,625 (43.3)	2,405 (10.8)	14,370 (64.7)	3,595 (16.2)	15,725 (70.8)	3,930 (17.7)	11,120 (50.0)	2,780 (12.5)
		4 1/2 (114.3)	14,440 (65.0)	3,610 (16.2)	21,560 (97.0)	5,390 (24.3)	23,590 (106.2)	5,900 (26.6)	14,820 (66.7)	3,705 (16.7)
		6 (152.4)	19,255 (86.6)	4,815 (21.7)	28,745 (129.4)	7,185 (32.3)	31,460 (141.6)	7,865 (35.4)	14,820 (66.7)	3,705 (16.7)
No. 5 (5/8")	3/4	3 3/4 (95.3)	13,415 (60.4)	3,355 (15.1)	20,030 (90.1)	5,010 (22.5)	21,915 (98.6)	5,480 (24.7)	17,660 (79.5)	4,415 (19.9)
		5 5/8 (142.9)	20,120 (90.5)	5,030 (22.6)	30,040 (135.2)	7,510 (33.8)	32,870 (147.9)	8,220 (37.0)	26,240 (118.1)	6,560 (29.5)
		7 1/2 (190.5)	26,825 (120.7)	6,705 (30.2)	40,050 (180.2)	10,015 (45.1)	43,825 (197.2)	10,955 (49.3)	26,240 (118.1)	6,560 (29.5)
No. 6 (3/4")	7/8	4 1/2 (114.3)	17,545 (79.0)	4,385 (19.7)	26,195 (117.9)	6,550 (29.5)	28,665 (129.0)	7,165 (32.2)	21,900 (98.6)	5,475 (24.6)
		6 3/4 (171.5)	26,320 (118.4)	6,580 (29.6)	39,295 (176.8)	9,825 (44.2)	43,000 (193.5)	10,750 (48.4)	28,060 (126.3)	7,015 (31.6)
		9 (228.6)	35,095 (157.9)	8,775 (39.5)	52,395 (235.8)	13,100 (59.0)	57,340 (258.0)	14,335 (64.5)	28,060 (126.3)	7,015 (31.6)
No. 7 (7/8")	1	5 1/4 (133.4)	22,215 (100.0)	5,555 (25.0)	33,165 (149.2)	8,290 (37.3)	36,295 (163.3)	9,075 (40.8)	36,060 (162.3)	9,015 (40.6)
		7 7/8 (200.0)	33,320 (149.9)	8,330 (37.5)	49,745 (223.9)	12,435 (56.0)	54,435 (245.0)	13,610 (61.2)	49,220 (221.5)	12,305 (55.4)
		10 1/2 (266.7)	44,425 (199.9)	11,105 (50.0)	66,325 (298.5)	16,580 (74.6)	72,580 (326.6)	18,145 (81.7)	49,220 (221.5)	12,305 (55.4)
No. 8 (1")	1 1/8	6 (152.4)	32,225 (145.0)	8,055 (36.2)	48,110 (216.5)	12,030 (54.1)	52,650 (236.9)	13,165 (59.2)	53,140 (239.1)	13,285 (59.8)
		9 (228.6)	48,340 (217.5)	12,085 (54.4)	72,170 (324.8)	18,045 (81.2)	78,975 (355.4)	19,745 (88.9)	59,140 (266.1)	14,785 (66.5)
		12 (304.8)	64,455 (290.0)	16,115 (72.5)	96,230 (433.0)	24,060 (108.3)	105,305 (473.9)	26,325 (118.5)	59,140 (266.1)	14,785 (66.5)
No. 9 (1 1/8")	1 3/8	6 3/4 (171.5)	37,145 (167.2)	9,285 (41.8)	55,455 (249.5)	13,865 (62.4)	60,685 (273.1)	15,170 (68.3)	68,300 (307.4)	17,075 (76.8)
		10 1/8 (257.2)	55,720 (250.7)	13,930 (62.7)	83,190 (374.4)	20,800 (93.6)	91,035 (409.7)	22,760 (102.4)	80,460 (362.1)	20,115 (90.5)
		13 1/2 (342.9)	74,295 (334.3)	18,575 (83.6)	110,920 (499.1)	27,730 (124.8)	121,380 (546.2)	30,345 (136.6)	80,460 (362.1)	20,115 (90.5)
No. 10 (1 1/4")	1 1/2	7 1/2 (190.5)	49,375 (222.2)	12,345 (55.6)	73,715 (331.7)	18,430 (82.9)	80,665 (363.0)	20,165 (90.7)	83,460 (375.6)	20,865 (93.9)
		11 1/4 (285.8)	74,060 (333.3)	18,515 (83.3)	110,570 (497.6)	27,645 (124.4)	120,995 (544.5)	30,250 (136.1)	84,300 (379.4)	21,075 (94.8)
		15 (381.0)	98,745 (444.4)	24,685 (111.1)	147,425 (663.4)	36,855 (165.8)	161,325 (726.0)	40,330 (181.5)	84,300 (379.4)	21,075 (94.8)
No. 11 (1 3/8")	1 5/8	8 1/4 (209.6)	58,695 (264.1)	14,675 (66.0)	87,630 (394.3)	21,910 (98.6)	95,895 (431.5)	23,975 (107.9)	97,460 (438.6)	24,365 (109.6)
		12 3/8 (314.3)	88,040 (396.2)	22,010 (99.0)	131,440 (591.5)	32,860 (147.9)	143,835 (647.3)	35,960 (161.8)	97,460 (438.6)	24,365 (109.6)
		16 1/2 (419.1)	117,385 (528.2)	29,345 (132.1)	175,250 (788.6)	43,815 (197.2)	191,780 (863.0)	47,945 (215.8)	97,460 (438.6)	24,365 (109.6)

**ADHESIVES**

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.  
 2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.  
 3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments and compressive strengths.  
 4. Allowable design load should be the lesser of the bond or allowable steel strength.  
 5. Allowable loads for reinforcing bars to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.

**PERFORMANCE DATA**

**Minimum Development Lengths for Reinforcing Bar Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3</sup>**

ADHESIVES

Bar Size No. (in.)	Drill Bit Dia. $d_{bit}$ in.	Min. Embed. Depth $h_v$ in. (mm)	Tension									Grade 60 Rebar ( $f_y = 60$ ksi, $f_u = 90$ ksi)	
			Minimum Concrete Compressive Strength ( $f'_c$ )										
			2,000 psi (13.8 MPa)			4,000 psi (27.6 MPa)			6,000 psi (41.4 MPa)				
			Ultimate Bond Strength lbs. (kN)	Embed. at Yield Strength in. (mm)	Embed. at Tensile Strength in. (mm)	Ultimate Bond Strength lbs. (kN)	Embed. at Yield Strength in. (mm)	Embed. at Tensile Strength in. (mm)	Ultimate Bond Strength lbs. (kN)	Embed. at Yield Strength in. (mm)	Embed. at Tensile Strength in. (mm)	Yield Strength lbs. (kN)	Ultimate Tensile Strength lbs. (kN)
No. 3 (3/8")	1/2	2 1/4 (57.2)	7,425 (33.4)	2 (50.8)	3 (76.2)	11,085 (49.9)	1 3/8 (34.0)	2 (51.0)	12,130 (54.6)	1 1/4 (31.1)	1 7/8 (46.7)	6,600 (29.7)	9,900 (44.6)
		3 3/8 (85.7)	11,140 (50.1)			16,630 (74.8)			18,200 (81.9)				
		4 1/2 (114.3)	14,855 (66.8)			22,180 (99.8)			24,270 (109.2)				
No. 4 (1/2")	5/8	3 (76.2)	9,625 (43.3)	3 3/4 (95.0)	5 5/8 (142.5)	14,370 (64.7)	2 1/2 (63.6)	3 3/4 (95.4)	15,725 (70.8)	2 1/2 (58.2)	3 3/8 (87.2)	12,000 (54.0)	18,000 (81.0)
		4 1/2 (114.3)	14,440 (65.0)			21,560 (97.0)			23,590 (106.2)				
		6 (152.4)	19,255 (86.6)			28,745 (129.4)			31,460 (141.6)				
No. 5 (5/8")	3/4	3 3/4 (95.3)	13,415 (60.4)	5 1/4 (132.1)	7 3/4 (198.1)	20,030 (90.1)	3 1/2 (88.4)	5 1/4 (132.7)	21,915 (98.6)	3 (80.8)	4 3/4 (121.3)	18,600 (83.7)	27,900 (125.6)
		5 5/8 (142.9)	20,120 (90.5)			30,040 (135.2)			32,870 (147.9)				
		7 1/2 (190.5)	26,825 (120.7)			40,050 (180.2)			43,825 (197.2)				
No. 6 (3/4")	7/8	4 1/2 (114.3)	17,545 (79.0)	6 3/4 (172.0)	10 1/4 (257.9)	26,195 (117.9)	4 1/2 (115.2)	6 3/4 (172.8)	28,665 (129.0)	4 (105.3)	6 1/4 (157.9)	26,400 (118.8)	39,600 (178.2)
		6 3/4 (171.5)	26,320 (118.4)			39,295 (176.8)			43,000 (193.5)				
		9 (228.6)	35,095 (157.9)			52,395 (235.8)			57,340 (258.0)				
No. 7 (7/8")	1	5 1/4 (133.4)	22,215 (100.0)	8 1/2 (216.1)	12 3/4 (324.2)	33,165 (149.2)	5 3/4 (144.8)	8 1/2 (217.1)	36,295 (163.3)	5 (132.3)	7 3/4 (198.4)	36,000 (162.0)	54,000 (243.0)
		7 7/8 (200.0)	33,320 (149.9)			49,745 (223.9)			54,435 (245.0)				
		10 1/2 (266.7)	44,425 (199.9)			66,325 (298.5)			72,580 (326.6)				
No. 8 (1")	1 1/8	6 (152.4)	32,225 (145.0)	8 3/4 (224.4)	13 1/4 (336.2)	48,110 (216.5)	6 (150.3)	8 3/4 (225.2)	52,650 (236.9)	5 1/2 (137.3)	8 1/8 (205.8)	47,450 (213.5)	71,100 (320.0)
		9 (228.6)	48,340 (217.5)			72,170 (324.8)			78,975 (355.4)				
		12 (304.8)	64,455 (290.0)			96,230 (433.0)			105,305 (473.9)				
No. 9 (1 1/8")	1 3/8	6 3/4 (171.5)	37,145 (167.2)	11 (276.9)	16 1/4 (415.4)	55,455 (249.5)	7 1/4 (185.5)	11 (278.2)	60,685 (273.1)	6 1/2 (169.5)	10 (254.3)	60,000 (270.0)	90,000 (405.0)
		10 1/8 (257.2)	55,720 (250.7)			83,190 (374.4)			91,035 (409.7)				
		13 1/2 (342.9)	74,295 (334.3)			110,920 (499.1)			121,380 (546.2)				
No. 10 (1 1/4")	1 1/2	7 1/2 (190.5)	49,375 (222.2)	11 5/8 (294.0)	17 1/4 (441.0)	73,715 (331.7)	8 (196.9)	11 5/8 (295.4)	80,665 (363.0)	7 (180.0)	10 5/8 (269.9)	76,200 (342.9)	114,300 (514.4)
		11 1/4 (285.8)	74,060 (333.3)			110,570 (497.6)			120,995 (544.5)				
		15 (381.0)	98,745 (444.4)			147,425 (663.4)			161,325 (726.0)				
No. 11 (1 3/8")	1 5/8	8 1/4 (209.6)	58,695 (264.1)	13 (334.2)	19 3/4 (501.3)	87,630 (394.3)	9 (223.8)	13 (335.8)	95,895 (431.5)	8 (204.5)	12 1/8 (306.8)	93,600 (421.2)	140,400 (631.8)
		12 3/8 (314.3)	88,040 (396.2)			131,440 (591.5)			143,835 (647.3)				
		16 1/2 (419.1)	117,385 (528.2)			175,250 (788.6)			191,780 (863.0)				

1. Ultimate bond strength capacities listed are for the Standard Set formula.  
 2. Reduce the tabulated ultimate bond strength capacities by 25 percent for the Fast Set formula. Increase development lengths accordingly.  
 3. Linear interpolation may be used to determine rebar development lengths for intermediate compressive strengths.

**PERFORMANCE DATA**

**Ultimate and Allowable Bond Strength Capacities for Smooth Dowel Bars Installed with Power-Fast+ in Normal-Weight Concrete<sup>1,2,3,4,5</sup>**

Dowel Size <i>d</i>	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Bond Strength						Steel Strength	
			Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )						Grade 60 Dowel	
			2,000 psi (13.8 MPa)		4,000 psi (27.6 MPa)		6,000 psi (41.4 MPa)		Yield Tension lbs. (kN)	Ultimate Tension lbs. (kN)
			Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)	Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)	Ultimate Tension lbs. (kN)	Allowable Tension lbs. (kN)		
3/4 (19.1)	7/8	7 (177.8)	28,600 (128.7)	7,150 (32.2)	38,100 (171.5)	9,525 (42.9)	42,320 (190.4)	10,580 (47.6)	26,400 (118.8)	39,600 (178.2)
		9 (228.6)	36,800 (165.6)	9,200 (41.4)	48,980 (220.4)	12,245 (55.1)	54,420 (244.9)	13,605 (61.2)	26,400 (118.8)	39,600 (178.2)
1 (25.4)	1 1/8	7 (177.8)	36,670 (165.0)	9,170 (41.3)	48,800 (219.6)	12,200 (54.9)	54,230 (244.0)	13,560 (61.0)	47,400 (213.3)	71,100 (320.0)
		9 (228.6)	47,150 (212.2)	11,790 (53.1)	62,750 (282.4)	15,690 (70.6)	69,730 (313.8)	17,435 (78.5)	47,400 (213.3)	71,100 (320.0)
1 1/4 (31.8)	1 3/8	7 (177.8)	44,480 (200.2)	11,120 (50.0)	59,200 (266.4)	14,800 (66.6)	65,775 (296.0)	16,445 (74.0)	73,590 (331.2)	110,390 (496.8)
		9 (228.6)	57,180 (257.3)	14,295 (64.3)	76,100 (342.5)	19,025 (85.6)	84,560 (380.5)	21,140 (95.1)	73,590 (331.2)	110,390 (496.8)
1 1/2 (38.1)	1 5/8	7 (177.8)	52,280 (235.3)	13,070 (58.8)	69,580 (313.1)	17,395 (78.3)	77,315 (347.9)	19,330 (87.0)	105,975 (476.9)	158,960 (715.3)
		9 (228.6)	67,200 (302.4)	16,800 (75.6)	89,460 (402.6)	22,365 (100.6)	99,400 (447.3)	24,850 (111.8)	105,975 (476.9)	158,960 (715.3)

1. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.
2. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments and compressive strengths.
4. Allowable design load should be the lesser of the bond or allowable steel strength.
5. Allowable loads for reinforcing bars to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.

**Ultimate and Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Structural Lightweight Concrete<sup>1,2,3,4,5</sup>**

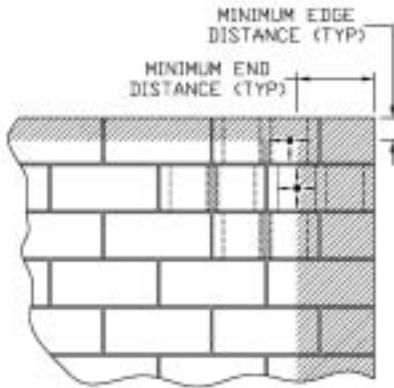
Rod Diameter <i>d</i> in. (mm)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	<i>f'<sub>c</sub></i> ≥ 3,000 psi (20.7 MPa)			
			Ultimate Load		Allowable Load	
			Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/8 (9.5)	7/16	1 1/2 (38.1)	3,280 (14.8)	5,160 (23.2)	820 (3.7)	1,290 (5.8)
		1 7/8 (47.6)	4,300 (19.4)	5,220 (23.5)	1,075 (4.8)	1,305 (5.9)
		2 1/4 (57.2)	5,300 (23.9)	5,300 (23.9)	1,325 (6.0)	1,325 (6.0)
		2 5/8 (66.7)	6,320 (28.4)	5,360 (24.1)	1,580 (7.1)	1,340 (6.0)
		3 (76.2)	7,320 (32.9)	5,440 (24.5)	1,830 (8.2)	1,360 (6.1)
		3 3/8 (85.7)	8,340 (37.5)	5,500 (24.8)	2,085 (9.4)	1,375 (6.2)
		2 (50.8)	5,100 (23.0)	8,020 (36.1)	1,275 (5.7)	2,005 (9.0)
1/2 (12.7)	9/16	2 1/2 (63.5)	6,740 (30.3)	8,320 (37.4)	1,685 (7.6)	2,080 (9.4)
		3 (76.2)	8,380 (37.7)	8,620 (38.8)	2,095 (9.4)	2,155 (9.7)
		3 1/2 (88.9)	10,040 (45.2)	8,940 (40.2)	2,510 (11.3)	2,235 (10.1)
		4 (101.6)	11,680 (52.6)	9,240 (41.6)	2,920 (13.1)	2,310 (10.4)
		4 1/2 (114.3)	13,320 (59.9)	9,540 (42.9)	3,330 (15.0)	2,385 (10.7)
		2 1/2 (63.5)	6,880 (31.0)	11,440 (51.5)	1,720 (7.7)	2,860 (12.9)
5/8 (15.9)	3/4	3 1/8 (79.4)	8,580 (38.6)	12,040 (54.2)	2,145 (9.7)	3,010 (13.5)
		3 3/4 (95.3)	10,280 (46.3)	12,640 (56.9)	2,570 (11.6)	3,160 (14.2)
		4 3/8 (111.1)	12,000 (54.0)	13,240 (59.6)	3,000 (13.5)	3,310 (14.9)
		5 (127.0)	13,700 (61.7)	13,840 (62.3)	3,425 (15.4)	3,460 (15.6)
		5 5/8 (142.9)	15,400 (69.3)	14,440 (65.0)	3,850 (17.3)	3,610 (16.2)
		2 1/2 (63.5)	6,880 (31.0)	11,440 (51.5)	1,720 (7.7)	2,860 (12.9)

1. The values listed above are ultimate and allowable bond capacities for Power-Fast+ in sand-lightweight concrete.
2. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 4.0.
3. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
4. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments. Allowable loads for intermediate spacing and edge distances may be calculated using spacing and edge distance reduction factors in the Design Criteria section.
5. Allowable design load should be the lesser of the bond or allowable steel strength.

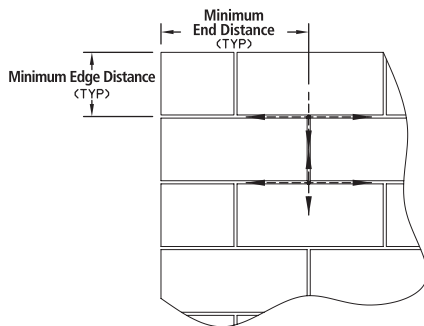
**ADHESIVES**

**PERFORMANCE DATA**

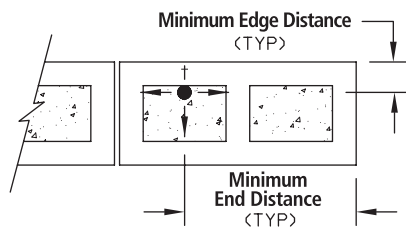
ADHESIVES



**Face Shell**  
(Grouted Cell & Web)  
**Permissible Anchor Locations**  
(Unshaded Area)



**T-Joints**  
**Permissible Anchor Locations**



**Top of Wall**

**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Grout-Filled Concrete Masonry<sup>1,2,3,4,5,6</sup>**

Anchor Installed Through Face Shell						
Rod Diameter <i>d</i> in. (mm)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Minimum Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)
3/8 (9.5)	7/16	3 1/2 (88.9)	3 3/4 (95.3)	12 (304.8)	875 (3.9)	970 (4.4)
			12 (304.8)	12 (304.8)	930 (4.2)	1,005 (4.5)
1/2 (12.7)	9/16	4 1/4 (108.0)	3 3/4 (95.3)	12 (304.8)	1,305 (5.9)	1,370 (6.2)
			12 (304.8)	12 (304.8)	1,585 (7.1)	1,615 (7.3)
5/8 (15.9)	3/4	5 (127.0)	3 3/4 (95.3)	12 (304.8)	1,505 (6.8)	1,370 (6.2)
			12 (304.8)	12 (304.8)	1,780 (8.0)	1,940 (8.7)

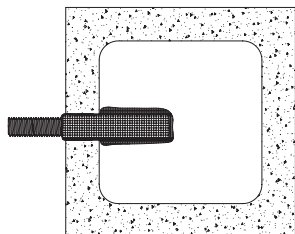
Anchor Installed In Joint						
Rod Diameter <i>d</i> in. (mm)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Minimum Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)
3/8 (9.5)	7/16	3 1/2 (88.9)	8 (203.2)	16 (406.4)	1,025 (4.6)	1,030 (4.6)
1/2 (12.7)	9/16	4 1/4 (108.0)	8 (203.2)	16 (406.4)	1,325 (6.0)	1,830 (8.2)
5/8 (15.9)	3/4	5 (127.0)	8 (203.2)	16 (406.4)	1,730 (7.8)	2,290 (10.3)

Anchor Installed In Cell Opening (Top of Wall) For Sill Plates And Other Attachments							
Rod Dia. <i>d</i> in. (mm)	Drill Bit Diameter <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Min. Edge Distance in. (mm)	Min. End Distance in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)	
						Perpen. to Edge	Parallel to Edge
1/2 (12.7)	9/16	4 1/4 (108.0)	1 3/4 (44.5)	10 3/4 (273.1)	960 (4.3)	255 (1.1)	650 (2.9)
5/8 (15.9)	3/4	5 (127.0)	1 3/4 (44.5)	10 3/4 (273.1)	1,115 (5.0)	320 (1.4)	650 (2.9)

1. Tabulated load values are for anchors installed in minimum Grade N, Type II, lightweight, medium-weight and normal-weight concrete masonry units conforming to ASTM C 90 that have reached the minimum designated ultimate compressive strength at the time of installation ( $f'_m \geq 1,500$  psi).
2. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 5.0.
3. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
4. Allowable design load should be the lesser of the bond or allowable steel strength.
5. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.
6. The critical spacing is 16 anchor diameters for full capacity. The minimum spacing is 8 anchor diameters for 50 percent reduction in load. Linear interpolation may be used to determine reduction factors for intermediate spacing distances.

**PERFORMANCE DATA**

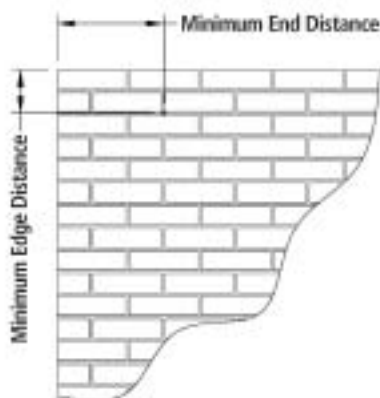
**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Hollow Concrete Masonry<sup>1,2,3,4,5,6</sup>**



1. Tabulated load values are for anchors installed in minimum Type II, Grade N, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90.
2. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 5.0.
3. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.
4. Allowable design load should be the lesser of the bond or allowable steel strength.
5. Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3 percent for the duration of the load, where permitted by code.
6. The critical spacing is 16d for full capacity. The minimum spacing is 8d for 50 percent reduction in load. Linear interpolation may be used to determine reduction factors for intermediate spacing distances.

Rod Dia. <i>d</i> in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Min. Edge Distance in. (mm)	Min. End Distance in. (mm)	Lightweight & medium-weight CMU		Normal-Weight CMU	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	3/8	2 (50.8)	3 3/4 (95.3)	3 3/4 (95.3)	–	–	270 (1.2)	435 (2.0)
3/8 (9.5)	1/2	3 1/2 (88.9)	3 3/4 (95.3)	3 3/4 (95.3)	–	–	455 (2.0)	870 (3.9)
1/2 (12.7)	5/8	3 1/2 (88.9)	3 3/4 (95.3)	3 3/4 (95.3)	135 (0.6)	315 (1.4)	655 (2.9)	1,115 (5.0)
5/8 (15.9)	3/4	3 1/2 (88.9)	3 3/4 (95.3)	3 3/4 (95.3)	135 (0.6)	375 (1.7)	–	–
		4 1/2 (114.3)	3 3/4 (95.3)	3 3/4 (95.3)	–	–	755 (3.4)	1,330 (6.0)
3/4 (19.1)	7/8	6 (152.4)	4 (101.6)	4 (101.6)	–	–	1,015 (4.6)	1,510 (6.8)

**Allowable Bond Strength Capacities for Threaded Rod Installed with Power-Fast+ in Brick Masonry<sup>1,2,3,4</sup>**



1. Tabulated load values are for anchors installed in minimum Grade SW multiple wythe, solid brick masonry conforming to ASTM C62.
2. Allowable bond capacities listed are for the Standard Set formula and are calculated using an applied safety factor of 5.0.
3. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments.
4. Reduce the above allowable bond capacities by 25 percent when calculating allowable bond capacities for the Fast Set formula.

Rod Dia. <i>d</i> in. (mm)	Drill Bit Dia. <i>d<sub>bit</sub></i> in.	Min. Embed. Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Edge and End Distance	Min. Spacing Distance	Brick Masonry <i>f'<sub>m</sub></i> ≥ 1,300 psi (9.0 MPa)	
					Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	3/8	2 (50.8)	2 Bricks or 16 inches (which ever is less)	4" Any Direction	545 (2.5)	365 (1.6)
		3 1/2 (88.9)			605 (2.7)	365 (1.6)
3/8 (9.5)	1/2	3 1/2 (88.9)	2 Bricks or 16 inches (which ever is less)	6" Any Direction	880 (4.0)	900 (4.1)
		6 (152.4)			1,485 (6.7)	900 (4.1)
		10 (254.0)			2,130 (9.6)	900 (4.1)
1/2 (12.7)	5/8	3 1/2 (88.9)	2 Bricks or 16 inches (which ever is less)	8" Any Direction	1,780 (8.0)	1,290 (5.8)
		6 (152.4)			2,250 (10.1)	1,290 (5.8)
		10 (254.0)			2,860 (12.9)	1,290 (5.8)
5/8 (15.9)	3/4	3 1/2 (88.9)	2 Bricks or 16 inches (which ever is less)	12" Any Direction	1,765 (7.9)	1,690 (7.6)
		4 1/2 (114.3)			1,890 (8.5)	1,690 (7.6)
		6 (152.4)			2,515 (11.3)	1,690 (7.6)
		10 (254.0)			2,920 (13.1)	1,690 (7.6)
3/4 (19.1)	7/8	3 1/2 (88.9)	2 Bricks or 16 inches (which ever is less)	2 Bricks or 16" Any Direction (which ever is less)	1,885 (8.5)	2,170 (9.8)
		6 (152.4)			2,170 (9.8)	2,170 (9.8)
		8 (203.2)			2,920 (13.1)	2,170 (9.8)
		13 (330.2)			4,740 (21.3)	2,170 (9.8)

**ADHESIVES**

**PERFORMANCE DATA**

ADHESIVES

**Allowable Bond Strength Capacities for Threaded Rods and Reinforcing Bars for Standard Set Power-Fast+ Epoxy Installed in Unreinforced Masonry<sup>1,2</sup>**

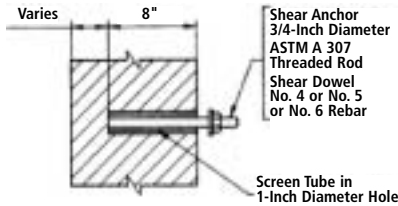


Figure 1

Shear Anchor – Configuration A (See Figure 1)					
Rod Dia. or Rebar Size <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Wall Thickness in. (mm)	Allowable Tension lbs. (kN)	Allowable Shear lbs. (kN)	Maximum Torque ft.-lbs. (Nm)
3/4 (19.1)	8 (203.2)	13 (330.2)	–	1,000 (4.5)	60 (81.3)
No. 4	8 (203.2)	13 (330.2)	–	500 (2.3)	40 (54.2)
No. 5	8 (203.2)	13 (330.2)	–	750 (3.4)	50 (67.8)
No. 6	8 (203.2)	13 (330.2)	–	1,000 (4.5)	60 (81.3)

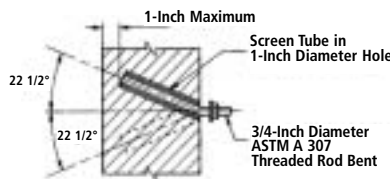


Figure 2

22-1/2° Combination Anchor – Configuration B (See Figure 2)					
Rod Dia. or Rebar Size <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Wall Thickness in. (mm)	Allowable Tension lbs. (kN)	Allowable Shear lbs. (kN)	Maximum Torque ft.-lbs. (Nm)
3/4 (19.1)	Within 1 inch of opposite wall surface	13 (330.2)	1,200 (5.4)	1,000 (4.5)	60 (81.3)

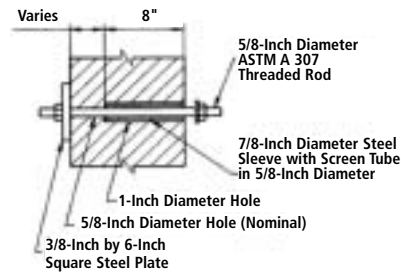


Figure 3

Through Anchor – Configuration C (See Figure 3)					
Rod Dia. or Rebar Size <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Wall Thickness in. (mm)	Allowable Tension lbs. (kN)	Allowable Shear lbs. (kN)	Maximum Torque ft.-lbs. (Nm)
5/8 (15.9)	8 inches from interior wall surface	13 (330.2)	1,200 (5.4)	750 (3.4)	50 (67.8)

1. Allowable shear values are applicable only to anchors where in-place shear tests indicate minimum mortar strength of 50 psi net.  
2. No increase for lateral loading is permitted, such as loading induced by wind or earthquake.

**Spacing and Edge Distance Requirements for Standard Set Power-Fast Epoxy Adhesive Installed in Unreinforced Masonry**

Anchor Description	Minimum Vertical Spacing in.	Minimum Horizontal Spacing in.	Minimum Edge Distance in.
Shear Anchor Configuration A – (See Figure 1)	16	16	24
22-1/2° Combination Anchor Configuration B – (See Figure 2)	16	16	24
Through-bolt Anchor Configuration C – (See Figure 3)	16	24	16

**DESIGN CRITERIA**

**Combined Loading**

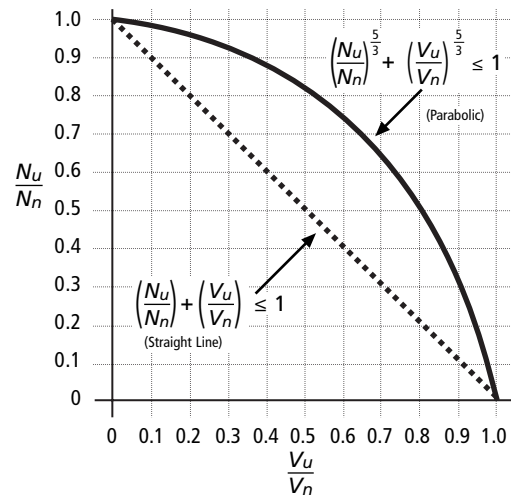
For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$\left(\frac{N_u}{N_n}\right)^{\frac{5}{3}} + \left(\frac{V_u}{V_n}\right)^{\frac{5}{3}} \leq 1$$

Where:  $N_u$  = Applied Service Tension Load  
 $N_n$  = Allowable Tension Load  
 $V_u$  = Applied Service Shear Load  
 $V_n$  = Allowable Shear Load

Load combinations may be analyzed more conservatively with the following proportion:

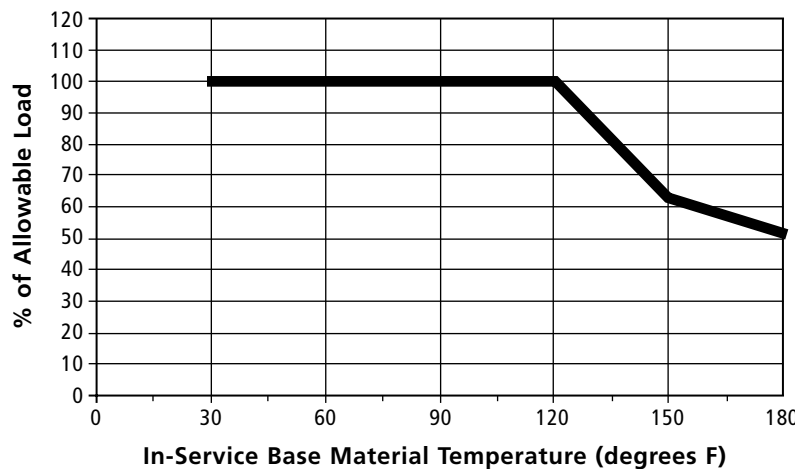
$$\left(\frac{N_u}{N_n}\right) + \left(\frac{V_u}{V_n}\right) \leq 1$$



**ADHESIVES**

**In-Service Temperature**

Allowable tension and shear load bond strength reduction based on in-service temperature for the Power-Fast+ Epoxy adhesive.



Degree Fahrenheit (°F)	Degree Celsius (°C)	Percent Allowable Load (%)
32	0	100
70	21	100
90	32	100
120	49	100
150	65	63
180	82	52

**Load Adjustment Factors for Spacing and Edge Distances for Normal-Weight and Structural Lightweight Concrete<sup>1,2</sup>**

Threaded Rods <sup>1</sup>					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 16d$	$F_N = F_V = 1.0$	$s_{min} (0.5 \times s_{cr}) = 8d$	$F_N = F_V = 0.70$
Edge Distance (c)	Tension	$c_{cr} = 10d$	$F_N = 1.0$	$c_{min} (0.4 \times c_{cr}) = 4d$	$F_N = 0.55$
	Shear Towards Edge	$c_{cr} = 12d$	$F_V = 1.0$	$c_{min} (0.33 \times c_{cr}) = 4d$	$F_V = 0.20$
	Shear Parallel to Edge	$c_{cr} = 12d$	$F_V = 1.0$	$c_{min} (0.33 \times c_{cr}) = 4d$	$F_V = 0.60$
Reinforcing Bar <sup>2</sup>					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 18d$	$F_N = F_V = 1.0$	$s_{min} (0.5 \times s_{cr}) = 9d$	$F_N = F_V = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 12d$	$F_N = 1.0$	$c_{min} (0.5 \times c_{cr}) = 6d$	$F_N = 0.55$
	Shear Towards Edge	$c_{cr} = 16d$	$F_V = 1.0$	$c_{min} (0.25 \times c_{cr}) = 4d$	$F_V = 0.15$
	Shear Parallel to Edge	$c_{cr} = 16d$	$F_V = 1.0$	$c_{min} (0.25 \times c_{cr}) = 4d$	$F_V = 0.55$

1. Minimum anchor spacing distance, ( $s_{min}$ ) for normal-weight concrete may be further reduced from 8 diameters (8d) to 4 diameters (4d) provided that the allowable load values in the tables are reduced by an additional 5 percent. Linear interpolation is allowed for spacing distances between 8 diameters and 4 diameters.  
 2. Minimum anchor spacing distance, ( $s_{min}$ ) for normal-weight concrete may be further reduced from 9 diameters (9d) to 4.5 diameters (4.5d) provided that the allowable load values in the tables are reduced by an additional 5 percent. Linear interpolation is allowed for spacing distances between 9 diameters and 4.5 diameters.

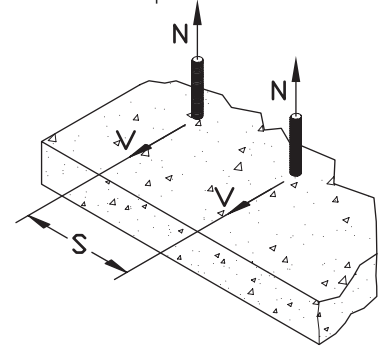
**DESIGN CRITERIA**

**Load Adjustment Factors for Threaded Rod in Normal-Weight and Lightweight Concrete**

ADHESIVES

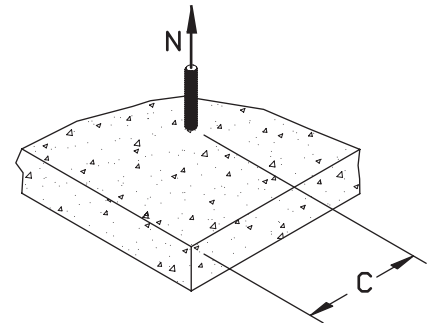
Spacing, Tension ( $F_N$ ) & Shear ( $F_V$ )											
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 3/8	1 1/2	
$S_{cr}$ (in.)	4	6	8	10	12	14	16	20	22	24	
$S_{min}$ (in.)	1	1 1/2	2	2 1/2	3	3 1/2	4	5	5 1/2	6	
Spacing, $s$ (inches)	1	0.65									
	1 1/2	0.68	0.65								
	2	0.70	0.67	0.65							
	2 1/2	0.78	0.68	0.66	0.65						
	3	0.85	0.70	0.68	0.66	0.65					
	3 1/2	0.93	0.75	0.69	0.67	0.66	0.65				
	4	1.00	0.80	0.70	0.68	0.67	0.66	0.65			
	5		0.90	0.78	0.70	0.68	0.67	0.66	0.65		
	5 1/2		0.95	0.81	0.73	0.69	0.68	0.67	0.66	0.65	
	6		1.00	0.85	0.76	0.70	0.69	0.68	0.66	0.66	0.65
	7			0.93	0.82	0.75	0.70	0.69	0.67	0.67	0.66
	8			1.00	0.88	0.80	0.74	0.70	0.68	0.68	0.67
	10				1.00	0.90	0.83	0.78	0.70	0.69	0.68
	11					0.95	0.87	0.81	0.73	0.70	0.69
	12					1.00	0.91	0.85	0.76	0.73	0.70
	14						1.00	0.93	0.86	0.78	0.75
16							1.00	0.91	0.84	0.80	
20								1.00	0.95	0.90	
22									1.00	0.95	
24										1.00	

Notes: For anchors loaded in tension and shear, the critical spacing ( $S_{cr}$ ) is equal to 16 anchor diameters ( $16d$ ) at which the anchor achieves 100% of load. Minimum spacing ( $S_{min}$ ) is equal to 8 anchor diameters ( $8d$ ) at which the anchor achieves 70% of load. Minimum anchor spacing distance,  $S_{min}$  may be further reduced to 4 anchor diameters ( $4d$ ) provided that the load values in the tables are reduced by an additional 5%. The spacing table reflects this relationship.



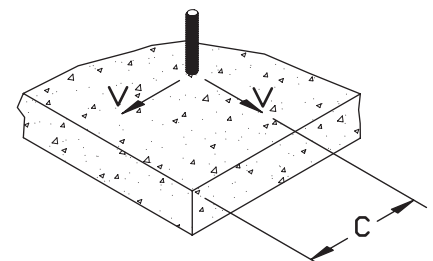
Edge Distance, ( $F_N$ ) Tension											
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 3/8	1 1/2	
$C_{cr}$ (in.)	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	12 1/2	13 3/4	15	
$C_{min}$ (in.)	1	1 1/2	2	2 1/2	3	3 1/2	4	5	5 1/2	6	
Edge Distance, $c$ (inches)	1	0.55									
	1 1/2	0.70	0.55								
	2	0.85	0.65	0.55							
	2 1/2	1.00	0.75	0.63	0.55						
	3		0.85	0.70	0.61	0.55					
	3 1/2		0.95	0.78	0.67	0.60	0.55				
	3 3/4		1.00	0.81	0.70	0.63	0.57				
	4			0.85	0.73	0.65	0.59	0.55			
	5			1.00	0.85	0.75	0.68	0.63	0.55		
	5 1/2				0.91	0.80	0.72	0.66	0.58	0.55	
	6				0.97	0.85	0.76	0.70	0.61	0.58	0.55
	6 1/4				1.00	0.88	0.79	0.72	0.63	0.59	0.56
	7 1/2					1.00	0.89	0.81	0.70	0.66	0.63
	8 3/4						1.00	0.91	0.78	0.73	0.69
	10							1.00	0.85	0.80	0.75
	12 1/2								1.00	0.93	0.88
13 3/4									1.00	0.94	
15										1.00	

Notes: For anchors loaded in tension, the critical edge distance ( $C_{cr}$ ) is equal to 10 anchor diameters ( $10d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $C_{min}$ ) is equal to 4 anchor diameters ( $4d$ ) at which the anchor achieves 55% of load.



Edge Distance, Shear ( $F_V$ )											
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 3/8	1 1/2	
$C_{cr}$ (in.)	3	4 1/2	6	7 1/2	9	10 1/2	12	15	16 1/2	18	
$C_{min}$ (in.)	1	1 1/2	2	2 1/2	3	3 1/2	4	5	5 1/2	6	
Edge Distance, $c$ (inches)	1	0.20									
	1 1/2	0.40	0.20								
	2	0.60	0.33	0.20							
	2 1/2	0.80	0.47	0.30	0.20						
	3	1.00	0.60	0.40	0.28	0.20					
	3 1/2		0.73	0.50	0.36	0.27	0.20				
	4		0.87	0.60	0.44	0.33	0.26	0.20			
	4 1/2		1.00	0.70	0.52	0.40	0.31	0.25			
	5			0.80	0.60	0.47	0.37	0.30	0.20		
	5 1/2			0.90	0.68	0.53	0.43	0.35	0.24	0.20	
	6			1.00	0.76	0.60	0.49	0.40	0.28	0.24	0.20
	7 1/2				1.00	0.80	0.66	0.55	0.40	0.35	0.30
	9					1.00	0.83	0.70	0.52	0.45	0.40
	10 1/2						1.00	0.85	0.64	0.56	0.50
	12							1.00	0.76	0.67	0.60
	15								1.00	0.89	0.80
16 1/2									1.00	0.90	
18										1.00	

Notes: For anchors loaded in shear, the critical edge distance ( $C_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $C_{min}$ ) is equal to 4 anchor diameters ( $4d$ ) at which the anchor achieves 20% of load. Minimum edge distance ( $C_{min}$ ) for anchors loaded in shear parallel to the edge is equal to 4 anchor diameters ( $4d$ ) at which the anchor achieves 60% of load.



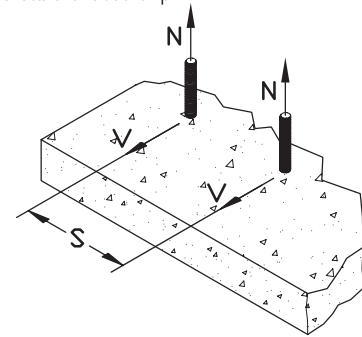
**DESIGN CRITERIA**

**Load Adjustment Factors for Reinforcing Bar in Normal-Weight Concrete**

Spacing ( $F_s$ ) Tension & Shear										
Rebar Size	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	
$s_{cr}$ (in.)	6 3/4	9	11 1/4	13 1/2	15 3/4	18	20 1/4	22 1/2	24 3/4	
$s_{min}$ (in.)	1 3/4	2 1/4	2 7/8	3 3/8	4	4 1/2	5	5 5/8	6 1/4	
Spacing, $s$ (inches)	1 3/4	0.45								
	2 1/4	0.47	0.45							
	2 7/8	0.48	0.46	0.45						
	3 3/8	0.50	0.48	0.46	0.45					
	4	0.59	0.49	0.47	0.46	0.45				
	4 1/2	0.67	0.50	0.48	0.47	0.46	0.45			
	5	0.74	0.56	0.49	0.47	0.46	0.46	0.45		
	5 5/8	0.83	0.63	0.50	0.48	0.47	0.46	0.46	0.45	
	6 1/4	0.93	0.69	0.56	0.49	0.48	0.47	0.46	0.46	0.45
	6 3/4	1.00	0.75	0.60	0.50	0.49	0.48	0.47	0.46	0.45
	7 7/8		0.88	0.70	0.58	0.50	0.49	0.48	0.47	0.46
	9		1.00	0.80	0.67	0.57	0.50	0.49	0.48	0.47
	10 1/8			0.90	0.75	0.64	0.56	0.50	0.49	0.48
	11 1/4			1.00	0.83	0.71	0.63	0.56	0.50	0.49
	12 3/8				0.92	0.79	0.69	0.61	0.55	0.50
	13 1/2				1.00	0.86	0.75	0.67	0.60	0.58
	15 3/4					1.00	0.88	0.78	0.70	0.67
	18						1.00	0.89	0.80	0.75
20 1/4							1.00	0.90	0.83	
22 1/2								1.00	0.92	
24 3/4									1.00	

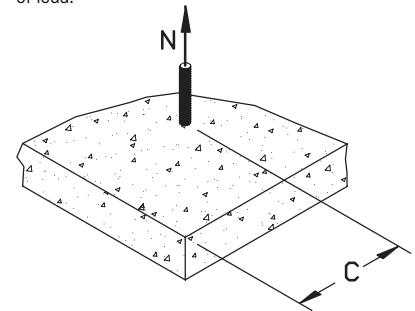
Notes: For anchors loaded in tension and shear, the critical spacing ( $s_{cr}$ ) is equal to 18 anchor diameters ( $18d$ ) at which the anchor achieves 100% of load.

Minimum spacing ( $s_{min}$ ) is equal to 9 anchor diameters ( $9d$ ) at which the anchor achieves 50% of load. Minimum anchor spacing distance,  $s_{min}$  may be further reduced to 4.5 anchor diameters ( $4.5d$ ) provided that the load values in the tables are reduced by an additional 5%. The spacing table reflects this relationship.



Edge Distance, ( $F_N$ ) Tension										
Rebar Size	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	
$c_{cr}$ (in.)	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	16 1/2	
$c_{min}$ (in.)	2 1/4	3	3 3/4	4 1/2	5 1/4	6	6 3/4	7 1/2	8 1/4	
Edge Distance, $c$ (inches)	2 1/4	0.55								
	3	0.70	0.55							
	3 3/4	0.85	0.66	0.55						
	4 1/2	1.00	0.78	0.64	0.55					
	5 1/4		0.89	0.73	0.63	0.55				
	6		1.00	0.82	0.70	0.61	0.55			
	6 3/4			0.91	0.78	0.68	0.61	0.55		
	7 1/2			1.00	0.85	0.74	0.66	0.60	0.55	
	8 1/4				0.93	0.81	0.72	0.65	0.60	0.55
	9				1.00	0.87	0.78	0.70	0.64	0.59
	10 1/2					1.00	0.89	0.80	0.73	0.67
	12						1.00	0.90	0.82	0.75
	13 1/2							1.00	0.91	0.84
	15								1.00	0.92
16 1/2									1.00	

Notes: For anchors loaded in tension, the critical edge distance ( $c_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $c_{min}$ ) is equal to 6 anchor diameters ( $6d$ ) at which the anchor achieves 55% of load.

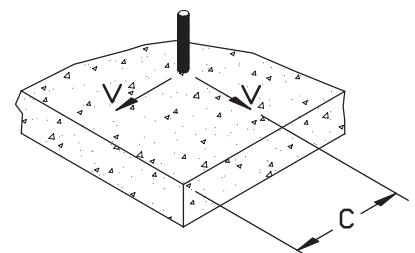


Edge Distance, Shear ( $F_V$ )										
Rebar Size	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	
$c_{cr}$ (in.)	6	8	10	12	14	16	18	20	22	
$c_{min}$ (in.)	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	
Edge Distance, $c$ (inches)	1 1/2	0.15								
	2	0.24	0.15							
	2 1/2	0.34	0.22	0.15						
	3	0.43	0.29	0.21	0.15					
	3 1/2	0.53	0.36	0.26	0.20	0.15				
	4	0.62	0.43	0.32	0.24	0.19	0.15			
	4 1/2	0.72	0.50	0.38	0.29	0.23	0.19	0.15		
	5	0.81	0.58	0.43	0.34	0.27	0.22	0.18	0.15	
	5 1/2	0.91	0.65	0.49	0.39	0.31	0.26	0.21	0.18	0.15
	6	1.00	0.72	0.55	0.43	0.35	0.29	0.24	0.21	0.18
	8		1.00	0.77	0.62	0.51	0.43	0.37	0.32	0.28
	10			1.00	0.81	0.68	0.58	0.50	0.43	0.38
	12				1.00	0.84	0.72	0.62	0.55	0.48
	14					1.00	0.86	0.75	0.66	0.59
	16						1.00	0.87	0.77	0.69
	18							1.00	0.89	0.79
20								1.00	0.90	
22									1.00	

Notes: For anchors loaded in shear, the critical edge distance ( $c_{cr}$ ) is equal to 16 anchor diameters ( $16d$ ) at which the anchor achieves 100% of load.

Minimum edge distance ( $c_{min}$ ) is equal to 4 anchor diameters ( $4d$ ) at which the anchor achieves 15% of load.

Minimum edge distance ( $c_{min}$ ) for anchors loaded in shear parallel to the edge is equal to 4 anchor diameters ( $4d$ ) at which the anchor achieves 55% of load.



**ORDERING INFORMATION**

**Power-Fast+ Cartridges**

Cat. No.	Description	Standard Box	Standard Ctn.	Pallet
8424	10 oz. Quik-Shot Cartridge – Fast Set	12	36	648
8402	15 oz. Cartridge – Fast Set	–	12	960
8403	15 oz. Cartridge – Standard Set	–	12	960
8422	22 oz. Cartridge – Fast Set	–	12	432
8423	22 oz. Cartridge – Standard Set	–	12	432
8443	44 oz. Jumbo Cartridge – Standard Set	–	6	288
8436	56 oz. Jumbo Cartridge – Standard Set	–	6	288



Power-Fast mixing nozzles should be used to ensure complete and proper mixing of the epoxy components. Jumbo Cartridges are not packaged with a mixing nozzle.

**Cartridge System Mixing Nozzles**

Cat. No.	Description	Standard Box	Standard Carton
7908	Extra Nozzles for Power-Fast+ (with 9" Extension)	2	24
7919	Extra Nozzles for Power-Fast+ (bulk quantity)	–	400
7921	Turbo Nozzles for Jumbo Power-Fast+ (8443 & 8436)	2	24



**Manual Injection Dispensing Tools**

Cat. No.	Description	Standard Box	Standard Carton
8437	10 oz. Heavy Duty Caulking Gun	1	12
8463	10 oz. High Performance Caulking Gun	1	10
8415	15 oz. High Performance Manual Tool	1	10
8416	15 oz. Standard All Metal Manual Tool	1	8
8421	22 oz. High Performance Manual Tool	1	10
8409	22 oz. Standard All Metal Manual Tool	1	8



**Pneumatic Injection Dispensing Tools**

Cat. No.	Description	Standard Box	Standard Carton
8407	15 oz. High Performance Pneumatic Tool	1	1
8413	22 oz. High Performance Pneumatic Tool	1	1
8445	44 oz. High Performance Pneumatic Tool	1	1
8438	56 oz. High Performance Pneumatic Tool	1	1



Maximum operating pressure – 125 psi.  
 Normal operating pressure – 80 to 100 psi.  
 Maximum free air required – 1 cfm based on average use.

**Battery Injection Dispensing Tools**

Cat. No.	Description	Standard Box	Standard Carton
8442	22 oz. High Performance Battery Tool	1	1

Battery and charger are included. Additional batteries are available for purchase upon request.

