

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

DIVISION: 04—MASONRY
Section: 04081—Masonry Anchorage

REPORT HOLDER:

POWERS FASTENERS, INC.
2 POWERS SQUARE
NEW ROCHELLE, NEW YORK 10801
(914) 235-6300
www.powers.com
engineering@powers.com

EVALUATION SUBJECT:

POWERS POWER-FAST EPOXY ADHESIVE ANCHORING SYSTEM

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2000 *International Building Code*® (IBC)
- 2000 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)
- 1999 *Standard Building Code*® (SBC)

Properties evaluated:

Structural

2.0 USES

The anchoring system is an alternative to the cast-in-place anchors described in Sections 1912 and 2107.1.5 of the IBC and Sections 1923.1 and 2107 of the UBC. The anchors are permitted to be used where an engineered design is submitted in accordance with Section R301.1.2 of the IRC.

3.0 DESCRIPTION

3.1 General:

The Power-Fast Adhesive Anchor System consists of an adhesive and threaded rods or steel reinforcing bars.

3.2 Materials:

3.2.1 Adhesive: The Power-Fast epoxy adhesive is a two-component structural epoxy that is packaged in equal-volume, dual plastic cartridges that separate the adhesive components and allow for multiple uses. The components include a base resin and a hardener that are mixed in a 1-to-1 ratio as they are dispensed through a disposable static-element mixing nozzle (supplied by Powers Fasteners, Inc.). The Power-Fast epoxy adhesive is available in Standard Set and Fast Set formulas. The Fast Set formula

includes an admixture for a faster curing time than the Standard Set formula. Cure times, as recommended by the manufacturer, are noted in Table 18. The minimum shelf life of the adhesives is two years when stored in a dry environment at temperatures between 40°F and 90°F (4.4°C to 32.2°C).

3.2.2 Screen Tube: Screen tubes consist of stainless steel mesh that is open at one end and closed at the other. The screen tube diameters correspond to the desired anchor diameter, and the tube length is based on required embedment depth.

3.2.3 Threaded Rods: Threaded rods shall have a diameter from 3/8 inch to 1 1/4 inches (9.5 to 31.8 mm) and shall be manufactured from carbon steel in compliance with ASTM A 36; ASTM A 307, Grade C; or ASTM A 193, Grade B7; or shall be stainless steel in compliance with AISI Type 304 or 316. When anchors are used for exterior installations, zinc coating on threaded rods shall be either hot-dipped in accordance with ASTM A 153 with a Class C or D coating weight, or mechanically deposited in accordance with ASTM B 695 with a Class 65 coating having a minimum thickness of 2.1 mils (0.533 mm). Specification and installation requirements for the threaded rods are listed in Tables 2, 4 and 5.

3.2.4 Reinforcing Bars: Deformed reinforcing bars range in size from No. 3 to No. 10 and shall be manufactured from steel conforming to ASTM A 615, A 616, A 617, or A 706 Grade 40 or 60. Specification and installation requirements for reinforcing bars are listed in Tables 3, 4 and 5.

3.2.5 Normal-weight Concrete: Normal-weight stone aggregate concrete shall have a minimum compressive strength, at the time of anchor installation, as noted in Tables 7 through 11, 13 and 14, and shall comply with Sections 1903 and 1905 of the IBC or the UBC.

3.2.6 Structural Lightweight Concrete: Structural lightweight concrete shall have a minimum compressive strength, at the time of anchor installation, as noted in Table 15, and shall comply with Sections 1903 and 1905 of the IBC or the UBC.

3.2.7 Concrete Masonry Units: When prism tests are required, the concrete masonry must have a minimum compressive strength of 1,500 psi (9.58 MPa) at the time of anchor installation. Concrete masonry units may be lightweight, normal-weight, or heavyweight blocks, minimum Grade N, Type II, in accordance with UBC Standard 21-4 or ASTM C 90-99 (IBC or IRC).

Mortar must be minimum Type N in accordance with Section 2103.3 of the UBC, Section 2103.7 of the IBC, or Section R607 of the IRC. Grout shall comply with Section 2103.4 of the UBC, Section 2103.10 of the IBC, or Section R609.1.1 of the IRC, and shall have a minimum compressive strength of 2,000 psi (13.78 MPa).

***Corrected January 2006**

ES REPORTS™ are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The allowable tension and shear loads for the anchors are noted in Tables 7 through 17, 21 and 22. The minimum concrete thickness shall be 1.5 times the anchor embedment depth (h_e). The anchor spacing and edge distance requirements are given in Tables 6 and 12 for concrete, and in Tables 16 and 17 for concrete masonry. The allowable tension and shear loads for the adhesives must be adjusted for elevated temperatures in accordance with Figure 1. Allowable loads for anchors subjected to combined tension and shear forces are determined by the following equation:

$$(P_s / P_t) + (V_s / V_t) \leq 1$$

where:

P_s = Applied service tension load.

P_t = Service tension load.

V_s = Applied service shear load.

V_t = Service shear load.

When using the basic load combinations in accordance with IBC Section 1605.3.1.1 or UBC Section 1612.3.1, allowable loads are not permitted to be increased for wind or earthquake loading. When using the alternate basic load combinations in IBC Section 1605.3.2, SBC Section 1609.1 or UBC Section 1612.3.2, that include wind or earthquake loads, the allowable shear and tension loads for anchors installed in normal-weight concrete and concrete masonry are permitted to be increased by 33 $\frac{1}{3}$ percent. Alternatively, the alternate basic load combinations may be reduced by a factor of 0.75 when using IBC Section 1605.3.2.

4.2 Installation:

4.2.1 General: Anchors shall be installed in accordance with the manufacturer's published installation instructions and the requirements of this report. The anchors shall not be installed until the concrete or concrete masonry has reached its minimum design compressive strength. Anchor holes are predrilled into concrete or masonry substrates at a predetermined depth, using a rotary hammer drill with a carbide-tipped drill bit that complies with ANSI B212.15-1994. The anchor hole must be cleaned of dust and debris using compressed air and a nylon brush. Holes are permitted to be dry or damp, but standing water shall be removed. The hole diameter, embedment depth, spacing, edge distance, and concrete shall comply with the requirements of this report.

4.2.2 Installation in Normal-weight and Structural Lightweight Concrete, and Grouted Concrete Masonry: The Power-Fast epoxy adhesive is injected into the hole from a static-element mixing nozzle, starting at the bottom, until the hole is approximately one-half full. The threaded rod or reinforcing bar is inserted into the hole, while rotating, to the required embedment depth. See Figures 2, 3 and 4 for installation details concerning permitted anchor location in concrete masonry substrates. The anchors must be allowed to cure in accordance with Table 18 prior to application of the design load.

4.2.3 Installation in Hollow Concrete Masonry: A rotary drill or rotary hammer drill set in rotation-only mode is used to drill the holes. The Power-Fast epoxy adhesive is injected into a screen tube until the tube is completely full. The screen tube is then inserted into the predrilled hole. A threaded rod is inserted to the bottom of the epoxy-filled screen tube, while rotating, to ensure complete coating of the rod. See Figures 2, 3 and 4 for installation details concerning permitted anchor location in concrete masonry substrates. The anchors must be allowed to cure in accordance with Table 18 prior to application of the design load.

4.3 Special Inspection:

Adhesive anchor installations require special inspection in accordance with IBC Section 1704 or UBC Section 1701. Special inspection in accordance with Section 1704 of the IBC shall be provided for installations under the IRC. The code official shall receive a report, from an approved special inspector, that includes the following details:

1. Adhesive anchor description, including the adhesive product name and expiration date; and anchor bolt or rod material, grade, diameter, length and cleanliness.
2. Hole description, including verification of drill bit compliance with ANSI B212.15-1994, hole depth and cleanliness.
3. Installation description, including verification of compressive strength for concrete by ASTM C 42 methods, or in accordance with Section 2105.3 of the IBC or Section 2105.3.5 of the UBC for concrete masonry compressive strength installation temperature and verification of anchor installation and location (spacing and edge distance) in accordance with the published installation instructions and this report.

5.0 CONDITIONS OF USE

The Power-Fast Epoxy Adhesive Anchor System described in this report complies with those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The adhesive shall be identified and the anchors shall be installed in accordance with the manufacturer's installation instructions and this report.
- 5.2 Anchors are installed in holes predrilled into concrete or concrete masonry using a carbide-tipped drill bit manufactured within the range of maximum and minimum drill tip dimensions of ANSI B212.15-1994.
- 5.3 Calculations showing that the applied loads comply with this report shall be submitted to the building official for review and acceptance.
- 5.4 Special inspection in accordance with Section 4.3 of this report shall be provided for all anchor installations.
- 5.5 The Power-Fast epoxy adhesive is permitted to be used in normal-weight concrete to resist dead loads, live loads, and short-term loads such as those resulting from wind or earthquake.
- 5.6 The Power-Fast epoxy adhesive anchor is permitted to be used in grouted concrete masonry to resist dead loads, live loads, and short-term loads such as those resulting from wind or earthquake.
- 5.7 When using basic load combinations in accordance with IBC Section 1605.3.1.1 or UBC Section 1612.3.1 for anchors installed in normal-weight concrete and masonry, allowable loads are not permitted to be increased for wind or earthquake loading. When using the alternate basic load combinations in IBC Section 1605.3.2 or UBC Section 1612.3.2 that include wind or seismic loads, the allowable shear and tension loads for anchors installed in normal-weight concrete and concrete masonry are permitted to be increased by 33 $\frac{1}{3}$ percent. Alternatively, the alternate basic load combinations may be reduced by a factor of 0.75 when using IBC Section 1605.3.2.
- 5.8 The Power-Fast epoxy adhesive anchor is permitted to be used in structural lightweight concrete to resist dead loads, live loads, and short-term loads such as those resulting from wind. Use of the anchors to resist seismic loads in structural lightweight concrete is beyond the

scope of this report. The allowable loads or load combinations for the adhesive anchors in structural lightweight concrete shall not be adjusted for anchors subjected to wind loads.

- 5.9** Anchors shall not be permitted for use in conjunction with fire-resistive construction. Exceptions would be:
- Anchors resist wind or seismic loading only
 - For other than wind or seismic loading, special consideration is given to fire exposure conditions
- 5.10** Adhesive anchors may be used to resist tension and shear forces in overhead or wall installations only if consideration is given to the effects of elevated temperature conditions on anchor performance. Figure 1 describes load reduction factors for elevated temperatures.
- 5.11** Since an ICC-ES acceptance criteria for evaluating the performance of adhesive anchors subjected to vibratory or shock loads is unavailable at this time, the use of these adhesive anchors under these conditions is beyond the scope of this report.
- 5.12** Since an ICC-ES acceptance criteria for evaluating the performance of adhesive anchors in cracked concrete and masonry is unavailable at this time, the use of the adhesive anchors is limited to installation in uncracked concrete and masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.
- 5.13** Anchors are limited to interior use, except that installation, in severe, moderate, or negligible exterior weathering locations, in accordance with Figure 21-1-1 of UBC Standard 21-1 or Figure 1 of ASTM C62-97a (IBC or IRC), is permitted when stainless steel or zinc coated threaded rods are installed.
- 5.14** Anchors are permitted in dry-hole and damp-hole installations.
- 5.15** Where the evaluation report does not include the edition of any referenced standard, the applicable edition of the referenced standard is as specified in the code (UBC, SBC or IBC) that is applicable to the specific building project.
- 5.16** The adhesive is manufactured at 2 Powers Square, New Rochelle, New York, under a quality control program with inspections by CEL Consulting (AA-639).

6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Adhesive Anchors in Concrete and Masonry Elements (AC58), dated November 2001, including the following optional tests: static tension and shear tests (Test Series 5, 6, 7, 9, 13, 14), creep, dampness (Test Series 19), freezing and thawing (Test Series 20), and seismic (Test Series 21).
- 6.2** A quality control manual.

7.0 IDENTIFICATION

The adhesive anchors shall be identified on the packaging with the Powers Fasteners name, the product name, the batch number, the expiration date, and the evaluation report number (ESR-1531 or ER-4514).

TABLE 1 – APPLICATION DESCRIPTIONS

BASE MATERIAL	ADHESIVE	ANCHOR MATERIAL	SPECIFICATION DATA	LOAD DATA
Normal-weight concrete	Power-Fast	Threaded rod	Tables 2,4,5 & 6	Tables 7 through 11
		Reinforcing bar	Tables 3,4,5, & 12	Tables 13 & 14
Lightweight concrete	Power-Fast	Threaded rod	Tables 2,4,5 & 6	Table 15
Hollow concrete masonry	Power-Fast	Threaded rod with screen tubes	Tables 4 & 5	Table 16
Grouted concrete masonry	Power-Fast	Threaded rod	Tables 4 & 5	Table 17

TABLE 2 – SPECIFICATIONS FOR INSTALLATION OF THREADED RODS IN CONCRETE WITH POWER-FAST EPOXY ADHESIVE

PROPERTY	THREADED ROD DIAMETER (d)						
	3/8 inch	1/2 inch	5/8 inch	3/4 inch	7/8 inch	1 inch	1-1/4 inch
A_{nom} = Nominal area of threaded rod (inch ²)	0.1105	0.1963	0.3068	0.4418	0.6013	0.7854	1.2272
A_{se} = Tensile stress area of rod (inch ²)	0.0775	0.1419	0.2260	0.3345	0.4617	0.6057	0.9691
d_{bit} = Nominal bit diameter (inch)	7/16	9/16	3/4	7/8	1	1-1/8	1-3/8

For SI: 1 inch = 25.4 mm, 1 ft.-lb. = 1.35 N-m, 1 inch² = 645.2 mm²

TABLE 3 – SPECIFICATIONS FOR INSTALLATION OF REINFORCING BARS IN CONCRETE WITH POWER-FAST EPOXY ADHESIVE

PROPERTY	REINFORCING BAR SIZES							
	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
d = Nominal bar diameter (inch)	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4
d_{ef} = Effective anchor diameter (inch)	0.375	0.500	0.625	0.750	0.875	1.000	1.128	1.270
A_{br} = Nominal area of reinforcing bar (inch ²)	0.110	0.200	0.310	0.440	0.600	0.790	1.000	1.270
d_{bit} = Nominal bit diameter (inch)	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2

For SI: 1 inch = 25.4 mm, 1 inch² = 645.2 mm²

TABLE 4 - SPECIFICATIONS FOR MATERIAL PROPERTIES OF THREADED ROD AND REINFORCING BAR

THREADED ROD				
Steel Description (General)	Steel Specification (ASTM)	Rod Diameters (inch)	Minimum Yield Strength f_y (ksi)	Minimum Ultimate Strength f_u (ksi)
Standard carbon rod	A 36	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	100.0
		3/4 thru 1-1/2	45.0	85.0
REINFORCING BAR				
Steel Description (General)	Steel Specification (ASTM)	Rebar Size (No.)	Minimum Yield Strength f_y (ksi)	Minimum Ultimate Strength f_u (ksi)
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

For SI: 1 inch = 25.4 mm, 1 ksi = 6.89 Mpa

TABLE 5 - ALLOWABLE LOAD CAPACITIES FOR THREADED ROD AND REINFORCING BAR BASED ON STEEL STRENGTH^{1,2,3}

THREADED ROD								
ROD DIAMETER (inch)	Tension (pounds)				Shear (pounds)			
	Steel Specification				Steel Specification			
	ASTM A 36	ASTM A 307, Gr. C	ASTM A 193, Gr. B7	ASTM F 593 304 / 316 SS	ASTM A 36	ASTM A 307, Gr. C	ASTM A 193, Gr. B7	ASTM F 593 304 / 316 SS
3/8	2,115	2,115	4,375	3,630	1,090	1,090	2,255	1,870
1/2	3,755	3,755	7,775	6,470	1,940	1,940	4,005	3,330
5/8	5,870	5,870	12,150	10,130	3,025	3,025	6,260	5,210
3/4	8,455	8,455	17,495	12,400	4,355	4,355	9,010	6,390
7/8	11,510	11,510	23,810	16,860	5,930	5,930	12,265	8,680
1	15,035	15,035	31,100	22,020	7,745	7,745	16,020	11,340
1-1/4	23,485	23,485	48,560	34,420	12,100	12,100	25,035	17,730
REINFORCING BAR								
REBAR SIZE (No.)	Tension (pounds)				Shear (pounds)			
	Steel Specification				Steel Specification			
	ASTM A 615, A 616, A 617, A 706, or A 767				ASTM A 615, A 616, A 617, A 706, or A 767			
	Grade 40		Grade 60		Grade 40		Grade 60	
3	2,200		2,640		1,310		1,680	
4	4,000		4,800		2,380		3,060	
5	6,200		7,440		3,690		4,740	
6	8,800		10,560		5,235		6,730	
7	12,000		14,400		7,140		9,180	
8	15,800		18,960		9,400		12,085	
9	20,000		24,000		11,900		15,300	
10	25,400		30,480		15,115		19,430	

For SI: 1 inch = 25.4 mm, 1 lbf = 4.48 N

¹The tabulated allowable load capacities for steel strength are provided for reference. These values must be compared with the corresponding allowable bond strength capacities for the Power-Fast adhesive anchors, diameter to diameter. Allowable design load must be the lesser of allowable steel strength as shown above and the allowable bond capacities as shown in Tables 7 through 11, and 13 through 17.

²Steel strength values for threaded rod are based on the equations:

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

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

where:

T = Allowable tension load (pounds).

V = Allowable shear load (pounds).

f_u = Minimum specified ultimate strength of threaded rod (psi). Refer to Table 4 for values.

A_{nom} = Nominal cross-sectional area of threaded rod (square inches). Refer to Table 2 for values.

³Steel strength values for reinforcing bar are based on the equations:

$$T = f_s A_{br}$$

$$V = 0.17 f_u A_{br}$$

where:

T = Allowable tension load (pounds).

V = Allowable shear load (pounds).

f_s = Tensile stress in reinforcement (psi), based on permissible service load stresses in accordance with Section A.3.2 of Appendix A of ACI 318-99:

Grade 40 rebar: Allowable tensile stress is 20,000 psi.

Grade 60 rebar: Allowable tensile stress is 24,000 psi.

f_u = Minimum specified ultimate strength of reinforcing bar (psi). Refer to Table 4 for values.

A_{br} = Nominal cross-sectional area of reinforcing bar (square inches). Refer to Table 3 for values.

TABLE 6 – REDUCTION FACTORS FOR SPACING AND EDGE DISTANCE USING POWER-FAST EPOXY ADHESIVE WITH THREADED RODS INSTALLED IN CONCRETE¹

ANCHOR DIMENSION	LOAD TYPE	CRITICAL DISTANCE (Full anchor capacity)	CRITICAL LOAD FACTOR	MINIMUM DISTANCE ² (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	$c_{cr} = 12d$	$F_V = 1.0$	$c_{min} (0.3 \times c_{cr}) = 4d$	$F_V = 0.20$

d = Anchor diameter. When adjacent anchors are different sizes or embedments, use largest value for d .

s = The measure between anchors, centerline to centerline distance.

s_{cr} = The minimum anchor spacing distance at which the anchor load capacity is not influenced by adjacent anchors.

s_{min} = The minimum anchor spacing distance at which the anchors are tested for recognition.

c = The measure between the anchor centerline and the free edge of the base material.

c_{cr} = The minimum anchor edge distance at which the anchor load capacity is not influenced by the edge of the base material.

c_{min} = The minimum edge distance at which the anchors are tested for recognition.

F_N = Reduction factor applied to tension load capacities when spacing and edge distances are at minimum distances.

F_V = Reduction factor applied to shear load capacities when spacing and edge distances are at minimum distances.

¹Load values in the tables shall be multiplied by the reduction factors when spacing and edge distances are less than critical distances.

Linear interpolation is allowed for spacing and edge distances that fall between critical and minimum distances. When a group of anchors are affected by both reduced spacing and reduced edge distance, the spacing and edge distance reduction factors must be combined (multiplied).

²Minimum anchor spacing distance, s_{min} , for tension may be further reduced from 8 diameters to 4 diameters provided that the tension load values in the tables are reduced by an additional 5 percent.

**TABLE 7 – ALLOWABLE TENSION LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH
THREADED ROD IN CONCRETE^{1,2,3,4,5,6}**

ROD DIAMETER <i>d</i> (inch)	CRITICAL SPACING <i>S_{cr}</i> (inches)	CRITICAL EDGE DISTANCE <i>C_{cr}</i> (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)							
				<i>f'c</i> = 2000 psi		<i>f'c</i> = 3000 psi		<i>f'c</i> = 4000 psi		<i>f'c</i> = 5000 psi	
				Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set
3/8	6	3 ¾	1 1/2	650	865	735	980	835	1,110	975	1,300
			1 7/8	880	1,170	1,000	1,335	1,105	1,475	1,250	1,665
			2 1/4	1,105	1,475	1,270	1,690	1,385	1,845	1,525	2,030
			2 5/8	1,335	1,780	1,540	2,050	1,660	2,210	1,795	2,395
			3	1,565	2,085	1,805	2,405	1,935	2,580	2,075	2,765
			3 3/8	1,795	2,390	2,070	2,760	2,210	2,945	2,350	3,130
			3 3/4	1,960	2,610	2,240	2,985	2,345	3,125	2,465	3,285
			4 1/8	2,125	2,835	2,410	3,210	2,480	3,305	2,580	3,440
			4 1/2	2,290	3,055	2,580	3,440	2,615	3,485	2,700	3,600
			4 7/8	2,460	3,280	2,750	3,665	2,750	3,665	2,815	3,755
1/2	8	5	5 1/4	2,625	3,500	2,920	3,890	2,885	3,845	2,935	3,910
			2	900	1,200	1,360	1,810	2,030	2,705	2,710	3,615
			2 1/2	1,210	1,610	1,600	2,130	2,330	3,105	2,985	3,980
			3	1,515	2,020	1,835	2,445	2,630	3,509	3,260	4,345
			3 1/2	1,940	2,425	2,075	2,765	2,935	3,910	3,535	4,710
			4	2,125	2,835	2,310	3,080	3,235	4,315	3,805	5,075
			4 1/2	2,435	3,245	2,550	3,400	3,535	4,715	4,080	5,440
			5	2,730	3,640	2,955	3,940	3,820	5,095	4,330	5,775
			5 1/2	3,025	4,035	3,360	4,480	4,105	5,475	4,585	6,115
			6	3,325	4,430	3,760	5,015	4,390	5,850	4,840	6,450
5/8	10	6 ¼	6 1/2	3,620	4,825	4,165	5,555	4,675	6,230	5,095	6,790
			7	3,915	5,220	4,570	6,095	4,960	6,610	5,345	7,125
			2 1/2	1,295	1,725	1,555	2,070	1,765	2,350	1,970	2,625
			3 1/8	1,760	2,345	2,080	2,770	2,290	3,050	2,450	3,330
			3 3/4	2,230	2,970	2,600	3,465	2,815	3,750	3,025	4,035
			4 3/8	2,695	3,590	3,125	4,165	3,340	4,450	3,550	4,735
			5	3,160	4,215	3,645	4,860	3,865	5,150	4,080	5,440
			5 5/8	3,625	4,835	4,170	5,560	4,390	5,850	4,610	6,145
			6 1/4	4,060	5,410	4,540	6,050	4,890	6,520	5,125	6,830
			6 7/8	4,490	5,985	4,905	6,540	5,390	7,185	5,635	7,515
3/4	12	7 1/2	7 1/2	4,915	6,555	5,275	7,030	5,890	7,855	6,150	8,200
			8 1/8	5,350	7,130	5,640	7,520	6,390	8,520	6,665	8,885
			8 3/4	5,780	7,705	6,010	8,010	6,895	9,190	7,180	9,570
			3	1,800	2,400	2,290	3,050	2,785	3,710	3,270	4,360
			3 3/4	2,500	3,330	3,085	4,115	3,635	4,845	4,230	5,640
			4 1/2	3,190	4,255	3,885	5,180	4,485	5,980	5,195	6,925
			5 1/4	3,890	5,185	4,680	6,240	5,335	7,110	6,155	8,205
			6	4,585	6,110	5,480	7,305	6,185	8,245	7,120	9,490
			6 3/4	5,280	7,040	6,280	8,370	7,035	9,380	8,080	10,770
			7 1/2	5,715	7,620	6,730	8,970	7,420	9,890	8,330	11,105
7/8	14	8 3/4	8 1/4	6,150	8,200	7,180	9,575	7,795	10,395	8,580	11,440
			9	6,585	8,780	7,630	10,175	8,180	10,905	8,835	11,780
			9 3/4	7,020	9,360	8,085	10,780	8,560	11,410	9,085	12,115
			10 1/2	7,455	9,940	8,535	11,380	8,940	11,920	9,340	12,450
			3 1/2	2,050	2,730	2,500	3,330	2,920	3,895	3,340	4,455
			4 3/8	2,865	3,820	3,440	4,585	3,920	5,225	4,395	5,860
			5 1/4	3,680	4,905	4,380	5,840	4,915	6,555	5,450	7,265
			6 1/8	4,495	5,995	5,320	7,090	5,910	7,880	6,500	8,665
			7	5,310	7,080	6,260	8,345	6,910	9,210	7,555	10,070
			7 7/8	6,130	8,170	7,200	9,600	7,905	10,540	8,605	11,475
8 3/4	6,865	9,155	8,065	10,750	8,845	11,795	9,625	12,830			
9 5/8	7,605	10,140	8,930	11,905	9,790	13,050	10,640	14,185			
10 1/2	8,340	11,120	9,790	13,055	10,725	14,300	11,655	15,540			
11 3/8	9,080	12,105	10,660	14,210	11,665	15,555	12,670	16,895			
12 1/4	9,820	13,090	11,520	15,360	12,610	16,810	13,690	18,250			

(Continued)

TABLE 7 – ALLOWABLE TENSION LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN CONCRETE^{1,2,3,4,5,6,7} (Continued)

ROD DIAMETER <i>d</i> (inch)	CRITICAL SPACING <i>s_{cr}</i> (inches)	CRITICAL EDGE DISTANCE <i>c_{cr}</i> (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)										
				<i>f'c</i> = 2000 psi		<i>f'c</i> = 3000 psi		<i>f'c</i> = 4000 psi		<i>f'c</i> = 5000 psi				
				Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set			
1	16	10	4	2,540	3,385	3,065	4,085	3,520	4,695	3,975	5,300			
			5	3,520	4,695	4,270	5,695	4,945	6,595	5,615	7,485			
			6	4,505	6,005	5,480	7,305	6,370	8,490	7,255	9,670			
			7	5,490	7,320	6,685	8,910	7,795	10,390	8,895	11,860			
			8	6,475	8,630	7,890	10,520	9,215	12,285	10,535	14,045			
			9	7,455	9,940	9,100	12,130	10,640	14,185	12,175	16,230			
			10	8,170	10,895	9,855	13,140	11,310	15,080	12,755	17,005			
			11	8,890	11,855	10,615	14,155	11,980	15,970	13,335	17,780			
			12	9,610	12,810	11,375	15,165	12,650	16,865	13,915	18,555			
			13	10,330	13,770	12,135	16,180	13,315	17,755	14,500	19,330			
			14	11,045	14,725	12,895	17,190	13,990	18,650	15,080	20,105			
			1 1/4	20	12 1/2	5	3,375	4,500	4,515	6,020	5,770	7,690	7,270	9,695
						6 1/4	4,685	6,245	6,115	8,155	7,765	10,350	9,600	12,800
						7 1/2	5,995	7,990	7,720	10,290	9,755	13,005	11,930	15,905
8 3/4	7,305	9,740				9,325	12,430	11,750	15,665	14,260	19,015			
10	8,615	11,485				10,925	14,565	13,740	18,320	16,590	22,120			
11 1/4	9,925	13,230				12,525	16,700	15,735	20,980	18,920	25,225			
12 1/2	11,370	15,160				14,115	18,820	17,215	22,950	20,280	27,040			
13 3/4	12,815	17,085				15,710	20,945	18,685	24,915	21,645	28,860			
15	14,260	19,015				17,300	23,065	20,165	26,885	23,005	30,675			
16 1/4	15,705	20,940				18,891	25,188	21,640	28,850	24,370	32,495			
	17 1/2	17,155	22,870	20,485	27,310	23,115	30,820	25,735	34,310					

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

²Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive have been calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength have been calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing and edge distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate embedment depths may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 8 – ALLOWABLE SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN CONCRETE^{1,2,3,4,5,6,7}

ROD DIAMETER d (inch)	CRITICAL SPACING s_{cr} (inches)	CRITICAL EDGE DISTANCE c_{cr} (inches)	MINIMUM EMBEDMENT h_v (inches)	ALLOWABLE SHEAR LOAD BASED ON BOND OR CONCRETE CAPACITY (pounds)	
				$f'_c \geq 2000$ psi	
				Fast Set	Standard Set
3/8	6	4 1/2	1 1/2	865	1,150
			1 7/8	915	1,220
			2 1/4	970	1,290
			2 5/8	1,020	1,360
			3	1,075	1,430
			3 3/8	1,125	1,500
1/2	8	6	2	1,275	1,700
			2 1/2	1,500	2,000
			3	1,725	2,300
			3 1/2	1,950	2,600
			4	2,175	2,900
			4 1/2	2,400	3,200
5/8	10	7 1/2	2 1/2	1,800	2,400
			3 1/8	2,295	3,060
			3 3/4	2,790	3,720
			4 3/8	3,285	4,380
			5	3,780	5,040
			5 5/8	4,275	5,700
3/4	12	9	3	2,700	3,600
			3 3/4	3,120	4,160
			4 1/2	3,540	4,720
			5 1/4	3,960	5,280
			6	4,380	5,840
			6 3/4	4,800	6,400
7/8	14	10 1/2	3 1/2	2,625	3,500
			4 3/8	3,480	4,640
			5 1/4	4,335	5,780
			6 1/8	5,190	6,920
			7	6,045	8,060
			7 7/8	6,900	9,200
1	16	12	4	3,450	4,600
			5	4,635	6,180
			6	5,820	7,760
			7	7,005	9,340
			8	8,190	10,920
			9	9,375	12,500
1 1/4	20	15	5	4,125	5,500
			6 1/4	6,000	8,000
			7 1/2	7,875	10,500
			8 3/4	9,750	13,000
			10	11,625	15,500
			11 1/4	13,500	18,000

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

²Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report. Allowable shear loads in this table for anchors using ASTM A 193, Grade B threaded rods with embedment depths of 9 diameters and greater may not be increased and must be reduced using a load factor of 0.94 when used to resist earthquake loads.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing and edge distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate embedment depths may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, h_v .

TABLE 9 – ALLOWABLE TENSION LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN CONCRETE FOR SILL PLATES AND OTHER ATTACHMENTS^{1,2,3,4,5,6,7}

ROD DIAMETER <i>d</i> (inch)	CRITICAL EDGE DISTANCE (inches)	CRITICAL END DISTANCE (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)							
				<i>f</i> ' _c = 2000 psi		<i>f</i> ' _c = 3000 psi		<i>f</i> ' _c = 4000 psi		<i>f</i> ' _c = 5000 psi	
				Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set
1/2	1 3/4	7	4 1/2	1,615	2,150	1,900	2,530	2,185	2,915	2,470	3,295
			5	1,805	2,405	2,095	2,790	2,380	3,170	2,665	3,555
			5 1/2	1,995	2,660	2,285	3,045	2,575	3,430	2,860	3,815
			6	2,185	2,915	2,480	3,305	2,770	3,690	3,060	4,080
			6 1/2	2,380	3,175	2,675	3,565	2,965	3,950	3,255	4,340
			7	2,575	3,430	2,865	3,820	3,160	4,210	3,450	4,600
5/8	1 3/4	8 3/4	5 5/8	1,960	2,615	2,445	3,260	2,930	3,905	3,415	4,550
			6 1/4	2,260	3,010	2,770	3,690	3,280	4,375	3,790	5,055
			6 7/8	2,555	3,405	3,095	4,125	3,630	4,840	4,170	5,560
			7 1/2	2,855	3,805	3,420	4,560	3,985	5,310	4,550	6,065
			8 1/8	3,150	4,200	3,745	4,990	4,335	5,780	4,930	6,570
			8 3/4	3,445	4,595	4,065	5,420	4,690	6,250	5,305	7,075
7/8	1 3/4	12 1/4	7 7/8	3,790	5,055	4,060	5,415	4,330	5,775	4,600	6,135
			8 3/4	4,190	5,585	4,535	6,045	4,875	6,500	5,220	6,960
			9 5/8	4,590	6,120	5,005	6,675	5,425	7,230	5,840	7,785
			10 1/2	4,990	6,650	5,475	7,300	5,965	7,955	6,455	8,605
			11 3/8	5,390	7,185	5,950	7,935	6,510	8,680	7,075	9,430
			12 1/4	5,785	7,715	6,420	8,560	7,060	9,410	7,690	10,255

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

²Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate edge distances and embedment depths may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 10 – ALLOWABLE SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN CONCRETE FOR SILL PLATES AND OTHER ATTACHMENTS^{1,2,3,4,5,6,7}

ROD DIAMETER <i>d</i> (inch)	CRITICAL EDGE DISTANCE (inches)	CRITICAL END DISTANCE (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE SHEAR LOAD BASED ON BOND CAPACITY (pounds)							
				Parallel to the Free Edge				Towards the Free Edge			
				<i>f</i> ' _c = 2000 psi		<i>f</i> ' _c ≥ 2500 psi		<i>f</i> ' _c = 2000 psi		<i>f</i> ' _c ≥ 2500 psi	
				Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set	Fast Set	Std. Set
1/2	1 3/4	7	4 1/2	1,090	1,455	1,200	1,600	425	565	465	620
5/8	1 3/4	8 3/4	5 5/8	1,545	2,060	1,695	2,260	465	620	510	680
7/8	1 3/4	12 1/4	7 7/8	1,990	2,650	2,185	2,910	700	930	765	1,020

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.

²Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report. Allowable shear loads in this table for anchors using ASTM A 193, Grade B7 threaded rods with embedment depths of 9 diameters and greater may not be increased and must be reduced by a load factor of 0.94 when used to resist earthquake loads.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate edge distances may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 11 – ALLOWABLE TENSION LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN CONCRETE STEM WALLS FOR SILL PLATES AND OTHER ATTACHMENTS^{1,2,3,4,5,6,7}

ROD DIAMETER <i>d</i> (inch)	CRITICAL EDGE DISTANCE (inches)	CRITICAL END DISTANCE (inches)	CONCRETE WALL WIDTH (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)	
					<i>f</i> ' _c ≥ 2500 psi	
					Fast Set	Standard Set
1/2	1 ¾	5	6	7	2,125	2,830
5/8	1 ¾	5	6	8 ¾	2,755	3,675
		10		10	2,935	3,915
		5		10	2,800	3,730
		5		12 1/2	2,875	3,835
3/4	1 ¾	5	6	12 1/2	3,040	4,055
7/8	1 ¾	5	8	12 1/4	3,670	4,890
		5		15	4,150	5,530
		10		15	4,925	6,565
		5		17 ½	4,585	6,110

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation.

²Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased by 33-1/3% for the duration of the load in accordance with Section 4.1 of this report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate edge distances and embedment depths may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 12 – REDUCTION FACTORS FOR SPACING AND EDGE DISTANCE USING POWER-FAST EPOXY ADHESIVE WITH REINFORCING BARS INSTALLED IN CONCRETE¹

ANCHOR DIMENSION	LOAD TYPE	CRITICAL DISTANCE (Full anchor capacity)	CRITICAL LOAD FACTOR	MINIMUM DISTANCE (Reduced capacity)	MINIMUM LOAD FACTOR
Spacing (<i>s</i>)	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 (<i>c</i>)	Tension	$c_{cr} = 12d$	$F_N = 1.0$	$c_{min} (0.5 \times c_{cr}) = 6d$	$F_N = 0.55$
	Shear	$c_{cr} = 16d$	$F_V = 1.0$	$c_{min} (0.25 \times c_{cr}) = 4d$	$F_V = 0.15$

d = Anchor diameter. When adjacent anchors are different sizes or embedments, use largest value for *d*.

s = The measure between anchors, centerline to centerline distance.

s_{cr} = The minimum anchor spacing distance at which the anchor load capacity is not influenced by adjacent anchors.

s_{min} = The minimum anchor spacing distance at which the anchors are tested for recognition.

c = The measure between the anchor centerline and the free edge of the base material.

c_{cr} = The minimum anchor edge distance at which the anchor load capacity is not influenced by the edge of the base material.

c_{min} = The minimum edge distance at which the anchors are tested for recognition.

F_N = Reduction factor applied to tension load capacities when spacing and edge distances are at minimum distances.

F_V = Reduction factor applied to shear load capacities when spacing and edge distances are at minimum distances.

¹Load values in the tables shall be multiplied by the reduction factors when spacing and edge distances are less than critical distances.

Linear interpolation is allowed for spacing and edge distances that fall between critical and minimum distances. When a group of anchors are affected by both reduced spacing and reduced edge distance, the spacing and edge distance reduction factors must be combined (multiplied).

TABLE 13 – ALLOWABLE TENSION LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH REINFORCING BAR IN CONCRETE^{1,2,3,4,5,6,7,8}

REINFORCING BAR SIZE <i>d</i> (No.)	MINIMUM SPACING <i>S_{cr}</i> (inches)	CRITICAL EDGE DISTANCE <i>C_{cr}</i> (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)	
				<i>f'c</i> ≥ 2000 psi	
				Fast Set	Standard Set
No. 3	6 3/4	4 1/2	3 3/8	2,090	2,785
No. 4	9	6	4 1/2	2,710	3,610
No. 5	11 1/4	7 1/2	5 5/8	3,775	5,030
No. 6	13 1/2	9	6 3/4	4,935	6,580
No. 7	15 3/4	10 1/2	7 7/8	6,250	8,330
No. 8	18	12	9	9,065	12,085
No. 9	20 1/4	13 1/2	10 1/8	10,450	13,930
No. 10	22 1/2	15	11 1/4	13,885	18,515

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation.

²Allowable loads for reinforcing bars to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴For earthquake application with Grade 40 reinforcing bar, reduce the allowable steel strength in Table 5 using a load factor of 0.83.

⁵Linear interpolation for allowable loads for anchors may be used for intermediate spacing and edge distances using factors shown in Table 12.

⁶Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁷Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁸Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 14 – ALLOWABLE SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH REINFORCING BAR IN CONCRETE^{1,2,3,4,5,6,7,8}

REINFORCING BAR SIZE <i>d</i> (No.)	SPACING <i>S_{cr}</i> (inches)	EDGE DISTANCE <i>C_{cr}</i> (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE SHEAR LOAD BASED ON BOND CAPACITY (pounds)	
				<i>f'c</i> ≥ 2000 psi	
				Fast Set	Standard Set
No. 3	6 3/4	6	3 3/8	1,555	2,075
No. 4	9	9	4 1/2	2,780	3,705
No. 5	11 1/4	11 1/4	5 5/8	4,920	6,560
No. 6	13 1/2	12	6 3/4	5,265	7,015
No. 7	15 3/4	15 3/4	7 7/8	9,230	12,305
No. 8	18	18	9	11,090	14,785
No. 9	20 1/4	20 1/4	10 1/8	15,085	20,115
No. 10	22 1/2	22 1/2	11 1/4	15,805	21,075

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in concrete that has reached the minimum designated ultimate compressive strength at the time of installation.

²Allowable loads for reinforcing bars to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Allowable loads based on bond strength must be multiplied by 0.82 for short term loading due to earthquake and wind. For earthquake application with Grade 40 reinforcing bar, reduce the allowable steel strength in Table 5 using a load factor of 0.83.

⁵Linear interpolation for allowable loads for anchors may be used for intermediate spacing and edge distances using factors shown in Table 12.

⁶Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁷Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁸Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 15 – ALLOWABLE TENSION AND SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN STRUCTURAL LIGHTWEIGHT CONCRETE^{1,2,3,4,5,6,7}

ROD DIAMETER <i>d</i> (inch)	SPACING <i>S_{cr}</i> (inches)	EDGE DISTANCE <i>C_{cr}</i> (inches)	MINIMUM EMBEDMENT <i>h_v</i> (inches)	ALLOWABLE TENSION LOAD BASED ON BOND CAPACITY (pounds)		ALLOWABLE SHEAR LOAD BASED ON BOND CAPACITY (pounds)	
				<i>f'c</i> ≥ 3000 psi			
				Fast Set	Standard Set	Fast Set	Standard Set
3/8	6	3 3/4	1 1/2	615	820	970	1,290
			1 7/8	805	1,075	980	1,305
			2 1/4	995	1,325	995	1,325
			2 5/8	1,185	1,580	1,005	1,340
			3	1,375	1,830	1,020	1,360
			3 3/8	1,565	2,085	1,030	1,375
1/2	8	5	2	955	1,275	1,505	2,005
			2 1/2	1,265	1,685	1,560	2,080
			3	1,570	2,095	1,615	2,155
			3 1/2	1,885	2,510	1,675	2,235
			4	2,190	2,920	1,735	2,310
			4 1/2	2,500	3,330	1,790	2,385
5/8	10	6 1/4	2 1/2	1,290	1,720	2,145	2,860
			3 1/8	1,610	2,145	2,260	3,010
			3 3/4	1,930	2,570	2,370	3,160
			4 3/8	2,250	3,000	2,485	3,310
			5	2,570	3,425	2,595	3,460
			5 5/8	2,890	3,850	2,710	3,610

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in structural lightweight concrete that has reached the minimum designated ultimate compressive strength at the time of installation.

²Allowable loads for threaded rods to resist short-term wind loads may not be increased for the duration of the load in accordance with Section 4.1 of this report. Use of these anchors to resist earthquake loads in structural lightweight concrete is beyond the scope of the report.

³Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 5.33. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 4.0.

⁴Linear interpolation for allowable loads for anchors may be used for intermediate spacing and edge distances using factors shown in Table 6. Linear interpolation for allowable loads for anchors at intermediate embedment depths may also be used.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁷Minimum concrete thickness is 1.5 times the anchor embedment depth, *h_v*.

TABLE 16 – ALLOWABLE TENSION AND SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD AND SCREEN TUBES IN HOLLOW CONCRETE MASONRY UNITS^{1,2,3,4,5,6}

ROD DIA. (inch)	DRILL BIT DIAMETER (inch)	MINIMUM EMBED. (inches)	MIN. EDGE DISTANCE (inches)	MIN. END DISTANCE (inches)	TENSION LOAD (pounds)				SHEAR LOAD (pounds)			
					Fast Set		Std. Set		Fast Set		Std. Set	
					UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC
1/2	5/8	3 1/2	3 3/4	3 3/4	100	80	135	110	235	190	315	255
5/8	3/4	3 1/2	3 3/4	3 3/4	100	80	135	110	275	220	375	300

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹Tabulated load values are for anchors installed in minimum 8-inch wide, Type II, Grade N, lightweight, medium weight, or normal weight concrete masonry units conforming to UBC Standard 21-4 or ASTM C 90.

²Allowable load must be the lesser of allowable bond capacity or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 6.67. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 5.0. The tabulated allowable loads may be increased by 25% for installations under the UBC and SBC.

³Anchors may be installed at any location in the face shell. A maximum of one anchor per cell is allowed.

⁴Embedment depth is the minimum screen tube length as measured from the outside face of the masonry unit.

⁵Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁶Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

TABLE 17 – ALLOWABLE TENSION AND SHEAR LOAD CAPACITIES FOR POWER-FAST EPOXY ADHESIVE INSTALLED WITH THREADED ROD IN GROUT-FILLED CONCRETE MASONRY^{1,2,3,4,5}

ANCHOR INSTALLED THROUGH FACE SHELL (See Figure 2)												
ROD DIA. (inch)	DRILL BIT DIAMETER (inch)	MINIMUM EMBED. (inches)	MIN. EDGE DISTANCE (inches)	MIN. END DISTANCE (inches)	TENSION LOAD (pounds)				SHEAR LOAD (pounds) ⁷			
					Fast Set		Standard Set		Fast Set		Standard Set	
					UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC
3/8	7/16	3 1/2	3 3/4	12	805	645	1,095	875	895	715	1,210	970
			12	12	855	685	1,160	930	930	745	1,255	1,005
1/2	9/16	4 1/4	3 3/4	12	1,205	965	1,630	1,305	1,270	1,015	1,710	1,370
			12	12	1,460	1,170	1,980	1,585	1,485	1,190	2,020	1,615
5/8	3/4	5	3 3/4	12	1,385	1,110	1,880	1,505	1,270	1,015	1,710	1,370
			12	12	1,640	1,315	2,225	1,780	1,795	1,435	2,425	1,940
ANCHOR INSTALLED IN JOINT (See Figure 3)												
ROD DIA. (inch)	DRILL BIT DIAMETER (inch)	MINIMUM EMBED. (inches)	MIN. EDGE DISTANCE (inches)	MIN. END DISTANCE (inches)	TENSION LOAD (pounds)				SHEAR LOAD (pounds) ⁸			
					Fast Set		Standard Set		Fast Set		Standard Set	
					UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC	UBC SBC	IBC IRC
3/8	7/16	3 1/2	8	16	940	755	1,280	1,025	950	760	1,285	1,030
1/2	9/16	4 1/4	8	16	1,215	975	1,655	1,325	1,685	1,350	2,285	1,830
5/8	3/4	5	8	16	1,600	1,280	2,160	1,730	2,110	1,690	2,860	2,290
ANCHOR INSTALLED IN CELL OPENING (TOP OF WALL) FOR SILL PLATE AND OTHER ATTACHMENTS (See Figure 4)												
ROD DIA. (inch)	DRILL BIT DIAMETER (inch)	MINIMUM EMBED. (inches)	MIN. EDGE DISTANCE (inches)	MIN. END DISTANCE (inches)	TENSION LOAD (pounds)							
					Fast Set		Standard Set					
					UBC / SBC		IBC / IRC		UBC / SBC		IBC / IRC	
1/2	9/16	4 1/4	1 3/4	10 3/4	885		710		1,200		960	
5/8	3/4	5	1 3/4	10 3/4	1,030		825		1,390		1,115	
ROD DIA. (inch)	DRILL BIT DIAMETER (inch)	MINIMUM EMBED. (inches)	MIN. EDGE DISTANCE (inches)	MIN. END DISTANCE (inches)	SHEAR LOAD (pounds)							
					Parallel to the Edge				Towards the Edge			
					Fast Set		Standard Set		Fast Set		Standard Set	
1/2	9/16	4 1/4	1 3/4	10 3/4	600	480	810	650	235	190	315	255
5/8	3/4	5	1 3/4	10 3/4	600	480	810	650	290	235	400	320

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.48 N

¹ Tabulated load values are for anchors installed in minimum 8-inch wide, Type II, Grade N, lightweight, medium weight, or normal weight concrete masonry units conforming to UBC Standard 21-4 or ASTM C 90. Masonry prism compressive strength tested in accordance with ASTM E 447 (UBC Standard 21-17), must be at least 1500 psi at the time of anchor installation. The masonry units must be fully grouted with grout complying with UBC Section 2103.4 or IBC Section 2103.7. Mortar must be minimum Type N prepared in accordance with Section 2103.3 of the UBC and UBC Standard 21-15, or IBC Section 2103.7.

² Allowable loads for threaded rods to resist short-term loads such as earthquake or wind may be increased for the duration of the load in accordance with Section 4.1 of this report.

³ Allowable load must be the lesser of allowable bond strength or allowable steel strength as shown in Table 5. Allowable loads based on bond strength for the Fast Set Power-Fast epoxy adhesive are calculated using an applied safety factor of 6.67 for the IBC and IRC. For Standard Set Power-Fast epoxy adhesive the allowable loads based on bond strength are calculated using an applied safety factor of 5.0 for the IBC and IRC. The tabulated allowable loads for the Fast Set and Standard Set Power-Fast epoxy adhesive are increased by 25 percent for installations under the UBC and SBC.

⁴ Anchors must be installed in accordance with Section 4.2 and special inspection must be provided for installations in accordance with Section 4.3.

⁵ Allowable load values must be adjusted for increased base material temperatures in accordance with Figure 1.

⁶ Embedment depth is measured from the outside surface of the concrete masonry unit.

⁷ Allowable shear loads for anchor installations into the face shell may be applied in any direction provided the anchor location is a minimum of 12 inches from the edge and end of a masonry wall. For anchor installations with an edge distance less than 12 inches the allowable shear loads may be applied in any direction except upward vertically.

⁸ Allowable shear loads for anchor installations into the joint may be applied in any direction provided the anchor location is a minimum of 16 inches from the edge and end of a masonry wall. For anchor installations with an edge distance less than 16 inches the allowable shear loads may be applied in any direction except upward vertically.

TABLE 18 – MANUFACTURER’S RECOMMENDED CURE TIME FOR POWER-FAST EPOXY ADHESIVE

BASE MATERIAL TEMPERATURE (°F)	MAXIMUM GEL TIME ¹ (minutes)		MINIMUM CURING TIME ² (hours)		FULL CURING TIME ³ (hours)	
	Fast Set	Standard Set	Fast Set	Standard Set	Fast Set	Standard 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	1½	4	16	24

For SI: $t^{\circ}\text{C} = \frac{5}{9}(t^{\circ}\text{F} - 32)$.

¹The gel time is the maximum time during which the epoxy can be dispensed before it begins to set.

²Anchors must not be disturbed before the minimum curing time occurs. When the minimum cure time is achieved, the fixture can be positioned.

³The full curing time is the minimum time required for the epoxy to achieve its load capacities.

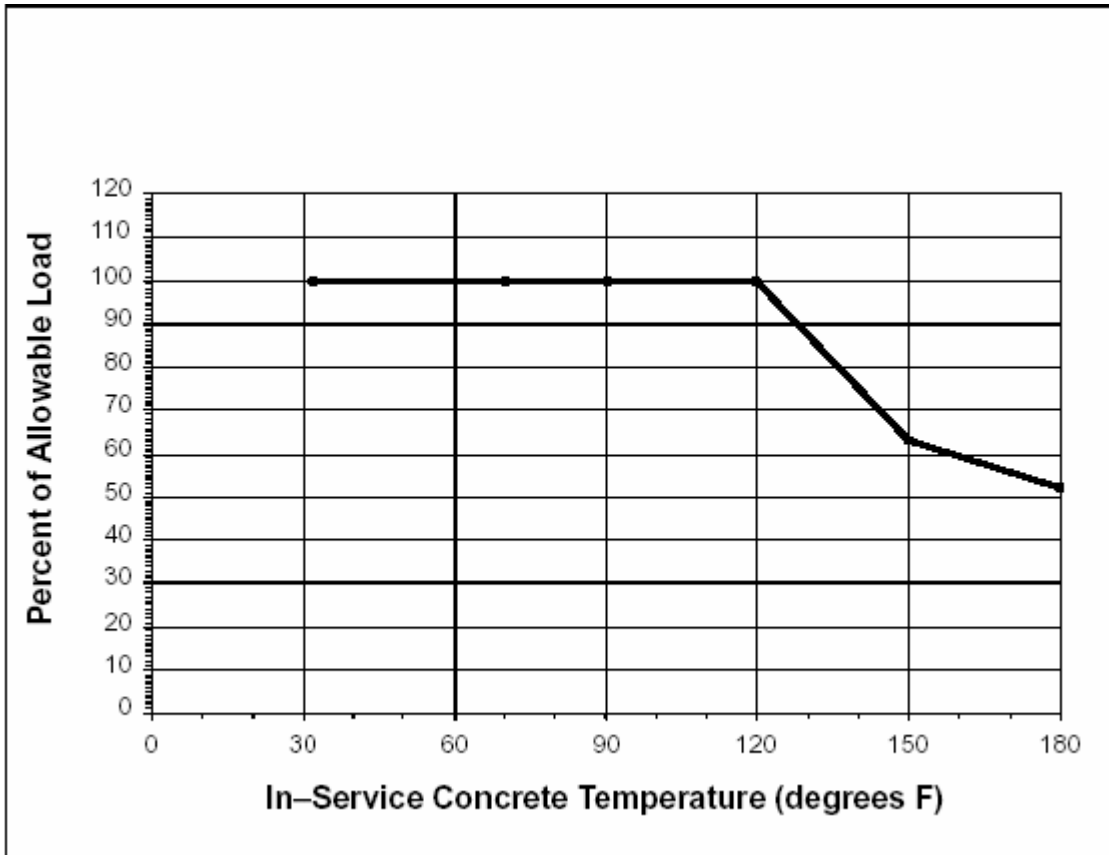
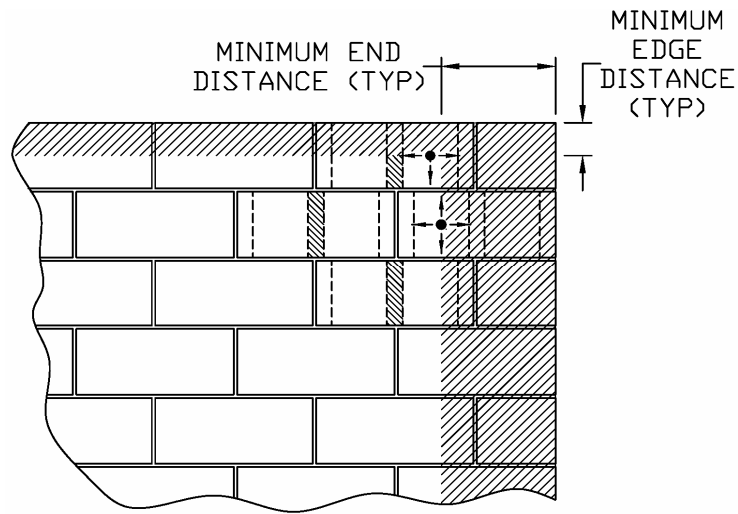
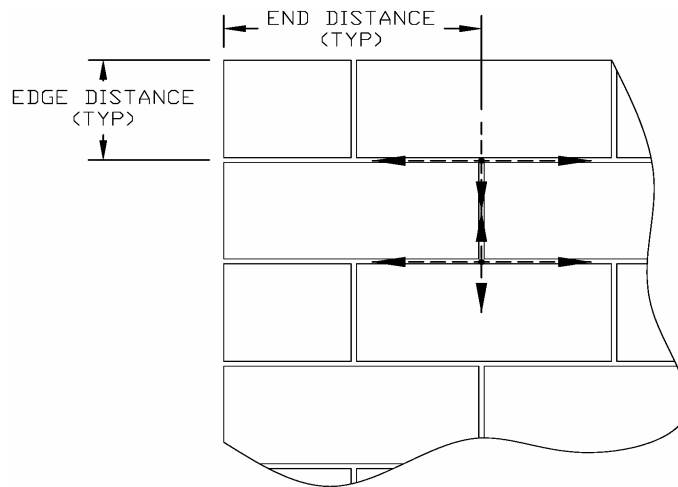


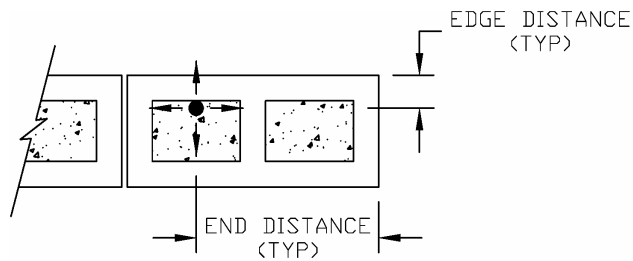
FIGURE 1—ALLOWABLE LOAD BOND STRENGTH REDUCTION BASED ON IN-SERVICE TEMPERATURE FOR THE POWER-FAST EPOXY ADHESIVE



**FIGURE 2 – ANCHOR INSTALLED IN THE FACE SHELL
(ANCHOR INSTALLATION IS RESTRICTED TO NON-SHADED AREAS)
(ALLOWABLE SHEAR LOAD DIRECTION SHOWN BY ARROWS)**



**FIGURE 3 – ANCHOR INSTALLED IN THE JOINT
(ALLOWABLE SHEAR LOAD DIRECTION SHOWN BY ARROWS)**



**FIGURE 4 – ANCHOR INSTALLED IN THE CELL OPENING
(ALLOWABLE SHEAR LOAD DIRECTION SHOWN BY ARROWS)**