ET-HP™ (formerly ET) *Anchoring Adhesive*

ET-HP™ is a two-component, high solids, epoxy-based system for use as a high-strength, non-shrink anchor grouting material. Resin and hardener are dispensed and mixed simultaneously through the mixing nozzle. ET-HP meets the ASTM C-881 specifications for Type I, II, IV and V, Grade 3, Classes B and C, except gel time.

USES:
- Threaded rod anchoring
- Rebar doweling
- Bonding hardened concrete to hardened concrete
- Pick-proof sealant around doors, windows and fixtures
- Paste-over for crack injection

CODES: ICC-ES ER-4945 (URM); City of L.A. RR25185, RR25120; Multiple DOT Listings.

⚠ The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

APPLICATION: Surfaces to receive epoxy must be clean. For installations in or through standing water, see page 225 for details. The base material temperature must be 40°F or above at the time of installation. For best results, material should be 70°F - 80°F at the time of application. Cartridges should not be immersed in water to facilitate warming. To warm cold material, the cartridges should be stored in a warm, uniformly heated area or storage container for a sufficient time to allow epoxy to warm completely. Mixed material in nozzle can harden in 5–7 minutes at a temperature of 40°F or above.

INSTALLATION: See pages 70–71

SHELF LIFE: 24 months from date of manufacture in unopened container

STORAGE CONDITIONS: For best results store between 45°F - 90°F. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

COLOR: Resin – white, hardener – black. When properly mixed, ET-HP adhesive will be a uniform medium gray color.

CLEAN UP: Uncured material — Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN. Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material: Chip or grind off surface.

TEST CRITERIA: Anchors installed with ET-HP™ adhesive have been tested in accordance with ICC-ES's *Acceptance Criteria for Adhesive Anchors in Masonry Elements* (AC58) and *Adhesive Anchors in Concrete Elements* (AC308).

In addition, anchors installed with ET-HP adhesive have been tested in accordance with ICC-ES's Acceptance Criteria for Unreinforced Masonry Anchors (AC60).

PROPERTY	TEST METHOD	RESULTS
Consistency (77˚F)	ASTM C 881	Non-sag/thixotropic paste
Heat deflection	ASTM D 648	168°F (76°C)
Bond strength (moist cure)	ASTM C 882	2,030 psi (2 days) 4,240 psi (14 days)
Water absorption	ASTM D 570	0.19% (24 hours)
Compressive yield strength	ASTM D 695	9,174 psi (24 hours) 13,390 psi (7 days)
Compressive modulus	ASTM D 695	658,200 psi (7 days)
Gel time (77°F)	ASTM C 881	10 min. – 60 gram mass 30 min – Thin film

CHEMICAL RESISTANCE Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones. For more detailed information, visit www.strongtie.com.

ET-HP22

ET-HP56

EMN22i

EDT22S

ET-HP Cartridge Systems

Model No.	Capacity ounces (cubic inches)	Cartridge Type	Carton Quantity	Dispensing Tool(s)	Mixing4 Nozzle
ET-HP22	22 (39.7)	side-by-side	10	EDT22S,EDTA22P or EDTA22CKT	EMN22i
ET-HP56	56 (101.1)	side-by-side	6	EDTA56P	EMN22i or EMN50

1. Cartridge and bulk estimation guides are available on pages 48–51.
2. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available on pages 72–77.
3. Use only appropriate Simpson Strong-Tie® mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

SUGGESTED SPECIFICATIONS: Anchoring adhesive shall be a two-component high solids epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through a static-mixing nozzle supplied by the manufacturer. Epoxy shall meet the minimum requirements of ASTM C-881 specification for Type I, II, IV, and V, Grade 3, Class B and C, except gel time, and must develop a minimum 13,390 psi compressive yield strength after 7 day cure. Epoxy must have a heat deflection temperature of a minimum 168°F (76°C). Adhesive shall be ET-HP™ adhesive from Simpson Strong-Tie, Pleasanton, CA. Anchors shall be installed per Simpson Strong-Tie instructions for ET-HP™ adhesive.

ACCESSORIES: See pages 72–77 for information on dispensing tools, mixing nozzles and other accessories.

IMPORTANT – See Pages 70–71 for Installation Instructions

ET-HP™ (formerly ET) *Anchoring Adhesive*

Cure Schedule

Base Material Temperature		Cure Time
°F	°C	
40	4	72 hrs.
60	16	24 hrs.
80	27	24 hrs.
100	38	12 hrs.

In-Service Temperature Sensitivity

Base Material Temperature		Percent Allowable Load
°F	°C	
40	4	100%
70	21	100%
110	43	100%
135	57	85%
150	66	69%
180	82	58%

1. Refer to temperature-sensitivity chart for allowable bond strength reduction for temperature. See page 225 for more information.
2. Percent allowable load may be linearly interpolated for intermediate base material temperatures.
3. °C = (°F-32) / 1.8

ET-HP Epoxy Anchor Installation Information and Additional Data for Threaded Rod and Rebar in Normal-Weight Concrete[1]

Characteristic		Symbol	Units	Nominal Anchor Diameter (in.) / Rebar Size						
				⅜ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1¼ / #10
Installation Information										
Drill Bit Diameter		d_{hole}	in.	½	⅝	¾	⅞	1	1⅛	1⅜
Maximum Tightening Torque		T_{inst}	ft-lb	10	20	30	45	60	80	125
Permitted Embedment Depth Range[2]	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
	Maximum	h_{ef}	in.	4½	6	7½	9	10½	12	15
Minimum Concrete Thickness		h_{min}	in.	$h_{ef} + 5d_o$						
Critical Edge Distance		c_{ac}	in.	$2.75 \times h_{ef}$						
Minimum Edge Distance		c_{min}	in.	1¾						2¾
Minimum Anchor Spacing		s_{min}	in.	3						6

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308.
2. Minimum and maximum embedment depths are are listed in accordance with ICC-ES AC308 requirements.

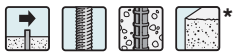
ET-HP Epoxy Anchor Tension Strength Design Data for Threaded Rod and Rebar in Normal-Weight Concrete[1,11]

* See page 13 for an explanation of the load table icons

Characteristic		Symbol	Units	Nominal Anchor Diameter (in.)						
				⅜ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1¼ / #10
Steel Strength in Tension										
Threaded Rod	Minimum Tensile Stress Area	A_{se}	in²	0.078	0.142	0.226	0.334	0.462	0.606	0.969
	Tension Resistance of Steel - ASTM A193, Grade B7	N_{sa}	lb.	9,750	17,750	28,250	41,750	57,750	75,750	121,125
	- ASTM F1554, Grade 36			4,525	8,235	13,110	19,370	26,795	35,150	56,200
	- Type 410 Stainless (ASTM A193, Grade B6)			8,580	15,620	24,860	36,740	50,820	66,660	106,590
	- Type 304 and 316 Stainless (ASTM A193, Grade B8 and B8M)			4,445	8,095	12,880	19,040	26,335	34,540	55,235
	Strength Reduction Factor - Steel Failure	ϕ	—	0.75[8]						
Rebar	Minimum Tensile Stress Area	A_{se}	in²	0.11	0.20	0.31	0.44	0.60	0.79	1.23
	Tension Resistance of Steel – Rebar (ASTM A615, Grade 60)	N_{sa}	lb.	9,900	18,000	27,900	39,600	54,000	71,100	110,700
	Strength Reduction Factor – Steel Failure	ϕ	—	0.65[8]						
Concrete Breakout Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)										
Effectiveness Factor - Uncracked Concrete		k_{uncr}	—	24						
Strength Reduction Factor - Breakout Failure		ϕ	—	0.65[10]						
Bond Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)										
Temp. Range 1 for Uncracked Concrete[2,4,5]	Characteristic Bond Strength[7]	$\tau_{k,uncr}$	psi	1,590	1,535	1,485	1,435	1,380	1,330	1,225
Temp. Range 2 for Uncracked Concrete[3,4,5]	Characteristic Bond Strength[6,7]	$\tau_{k,uncr}$	psi	435	420	405	395	380	365	335
Bond Strength in Tension – Bond Strength Reduction Factors for Periodic or Continuous Special Inspection										
Strength Reduction Factor - Dry Concrete		ϕ_{dry}	—	0.65[9]						
Strength Reduction Factor - Water-saturated Concrete		ϕ_{sat}	—	0.45[9]						

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. Temperature Range 1: Maximum short-term temperature of 110°F (43°C). Maximum long-term temperature of 75°F (24°C).
3. Temperature Range 2: Maximum short-term temperature of 150°F (66°C). Maximum long-term temperature of 110°F (43°C).
4. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
5. Long-term concrete temperature are constant temperatures over a significant time period.
6. For anchors that only resist wind or seismic loads, bond strengths may be multiplied by 2.25.
7. For anchors installed in overhead and subjected to tension resulting from sustained loading, multiply the value calculated for N_a according to ICC-ES AC308 by 0.75.
8. The value of ϕ applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
9. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
10. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition A are met, refer to Section D.4.4 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
11. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.

ET-HP™ Epoxy Anchor Shear Strength Design Data for Threaded Rod and Rebar in Normal-Weight Concrete[1,5]



* See page 13 for an explanation of the load table icons

Characteristic		Symbol	Units	Nominal Anchor Diameter (in.) / Rebar Size						
				⅜ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1¼ / #10
Steel Strength in Shear										
Threaded Rod	Minimum Shear Stress Area	*Ase*	in²	0.078	0.142	0.226	0.334	0.462	0.606	0.969
	Shear Resistance of Steel - ASTM A193, Grade B7	V_{sa}	lb.	4,875	10,650	16,950	25,050	34,650	45,450	72,675
	- ASTM F1554, Grade 36			2,260	4,940	7,865	11,625	16,080	21,090	33,720
	- Type 410 Stainless (ASTM A193, Grade B6)			4,290	9,370	14,910	22,040	30,490	40,000	63,955
	- Type 304 and 316 Stainless (ASTM A193, Grade B8 and B8M)			2,225	4,855	7,730	11,420	15,800	20,725	33,140
	Strength Reduction Factor - Steel Failure	ϕ	—	0.65[2]						
Rebar	Minimum Shear Stress Area	A_{se}	in²	0.11	0.20	0.31	0.44	0.60	0.79	1.23
	Shear Resistance of Steel – Rebar (ASTM A615, Grade 60)	V_{sa}	lb.	4,950	10,800	16,740	23,760	32,400	42,660	66,420
	Strength Reduction Factor – Steel Failure	ϕ	—	0.60[2]						
Concrete Breakout Strength in Shear										
Outside Diameter of Anchor		*do*	in.	0.375	0.500	0.625	0.750	0.875	1.000	1.250
Load Bearing Length of Anchor in Shear		ℓ_e	in.	h_{ef}						
Strength Reduction Factor – Breakout Failure		ϕ	—	0.70[3]						
Concrete Pryout Strength in Shear										
Coefficient for Pryout Strength		k_{cp}	—	2.0						
Strength Reduction Factor – Pryout Failure		ϕ	—	0.70[4]						

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. The value of ϕ applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
3. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition A are met, refer to Section D.4.4 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
4. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
5. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.

Tension Loads for Threaded Rod Anchors in Normal-Weight Concrete

* See page 13 for an explanation of the load table icons

Rod Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Edge Dist. in. (mm)	Critical Spacing Dist. in. (mm)	Tension Load Based on Bond Strength			Tension Load Based on Steel Strength		
					$f'_c \geq 2000$ psi (13.8 MPa) Concrete			F1554 Grade 36	A193 GR B7	F593 304SS
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)
⅜ (9.5)	½	3½ (89)	5¼ (133)	14 (356)	8,777 (39.0)	324 (1.4)	2,195 (9.8)	2,105 (9.4)	4,535 (20.2)	3,630 (16.1)
½ (12.7)	⅝	4¼ (108)	6⅜ (162)	17 (432)	15,368 (68.4)	605 (2.7)	3,840 (17.1)	3,750 (16.7)	8,080 (35.9)	6,470 (28.8)
⅝ (15.9)	¾	5 (127)	7½ (191)	20 (508)	22,877 (101.8)	718 (3.2)	5,720 (25.4)	5,875 (26.1)	12,660 (56.3)	10,120 (45.0)
¾ (19.1)	⅞	6¾ (171)	10⅛ (257)	27 (686)	35,459 (157.7)	4,940 (22.0)	8,865 (39.4)	8,460 (37.6)	18,230 (81.1)	12,400 (55.2)
⅞ (22.2)	1	7¾ (197)	11⅝ (295)	31 (787)	43,596 (193.9)	1,130 (5.0)	10,900 (48.5)	11,500 (51.2)	24,785 (110.2)	16,860 (75.0)
1 (25.4)	1⅛	9 (229)	13½ (343)	36 (914)	47,333 (210.5)	1,243 (5.5)	11,835 (52.6)	15,025 (66.8)	32,380 (144.0)	22,020 (97.9)
1⅛ (28.6)	1¼	10⅛ (257)	15¼ (387)	40½ (1029)	61,840 (275.1)	—	15,460 (68.8)	19,025 (84.6)	41,000 (182.4)	27,880 (124.0)
1¼ (31.8)	1⅜	11¼ (286)	16⅞ (429)	45 (1143)	78,748 (350.3)	4,738 (21.1)	19,685 (87.6)	23,490 (104.5)	50,620 (225.2)	34,420 (153.1)

1. Allowable load must the lesser of the bond or steel strength.
2. The allowable loads listed under allowable bond are based on a safety factor of 4.0.
3. Refer to allowable load-adjustment factors for spacing and edge distance on pages 44 and 45.
4. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
5. Anchors are permitted to be used within fire-resistive construction, provided the anchors resist wind or seismic loads only. For use in fire-resistive construction, the anchors can also be permitted to be used to resist gravity loads, provided special consideration has been given to fire-exposure conditions.
6. Anchors are not permitted to resist tension forces in overhead or wall installations unless proper consideration is given to fire-exposure and elevated-temperature conditions.

ET-HP™ (formerly ET) *Anchoring Adhesive*

Shear Loads for Threaded Rod Anchors in Normal-Weight Concrete

*See page 13 for an explanation of the load table icons

Rod Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Edge Dist. in. (mm)	Critical Spacing Dist. in. (mm)	Shear Load Based on Concrete Edge Distance			Shear Load Based on Steel Strength		
					$f'_c \geq 2000$ psi (13.8 MPa) Concrete			F1554 Grade 36	A193 GR B7	F593 304SS
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)
3/8 (9.5)	1/2	3 1/2 (89)	5 1/4 (133)	5 1/4 (133)	7,615 (33.9)	591 (2.6)	1,905 (8.5)	1,085 (4.8)	2,340 (10.4)	1,870 (8.3)
1/2 (12.7)	5/8	4 1/4 (108)	6 3/8 (162)	6 3/8 (162)	11,273 (50.1)	1,502 (6.7)	2,820 (12.5)	1,930 (8.6)	4,160 (18.5)	3,330 (14.8)
5/8 (15.9)	3/4	5 (127)	7 1/2 (191)	7 1/2 (191)	19,559 (87.0)	1,289 (5.7)	4,890 (21.8)	3,025 (13.5)	6,520 (29.0)	5,220 (23.2)
3/4 (19.1)	7/8	6 3/4 (171)	10 1/8 (257)	10 1/8 (257)	27,696 (123.2)	2,263 (10.1)	6,925 (30.8)	4,360 (19.4)	9,390 (41.8)	6,385 (28.4)
7/8 (22.2)	1	7 3/4 (197)	11 5/8 (295)	11 5/8 (295)	—	—	6,925 (30.8)	5,925 (26.4)	12,770 (56.8)	8,685 (38.6)
1 (25.4)	1 1/8	9 (229)	13 1/2 (343)	13 1/2 (343)	53,960 (240.0)	3,821 (17.0)	13,490 (60.0)	7,740 (34.4)	16,680 (74.2)	11,345 (50.5)
1 1/8 (28.6)	1 1/4	10 1/8 (257)	15 1/4 (387)	15 1/4 (387)	59,280 (263.7)	—	14,820 (65.9)	9,800 (43.6)	21,125 (94.0)	14,365 (63.9)
1 1/4 (31.8)	1 3/8	11 1/4 (286)	16 7/8 (429)	16 7/8 (429)	64,572 (287.2)	3,503 (15.6)	16,145 (71.8)	12,100 (53.8)	26,075 (116.0)	17,730 (78.9)

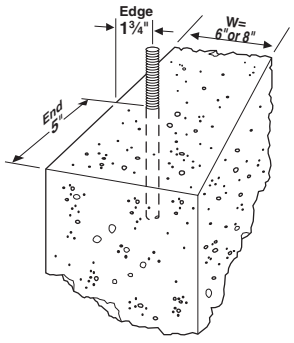
1. Allowable load must be the lesser of the load based on concrete edge distance or steel strength.
2. The allowable loads based on concrete edge distance are based on a safety factor of 4.0.
3. Refer to allowable load-adjustment factors for spacing and edge distance on pages 45 and 46.
4. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
5. Anchors are permitted to be used within fire-resistive construction, provided the anchors resist wind or seismic loads only. For use in fire-resistive construction, the anchors can also be permitted to be used to resist gravity loads, provided special consideration has been given to fire-exposure conditions.

Tension Loads for Threaded Rod Anchors in Normal-Weight Concrete Stemwall

*See page 13 for an explanation of the load table icons

Rod Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Stemwall Width in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	Tension Load Based on Bond Strength			Tension Load Based on Steel Strength
						$f'_c \geq 2000$ psi (13.8 MPa) Concrete			F1554 Grade 36
						Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)
5/8 (15.9)	3/4	9 1/2 (241.3)	6 (152.4)	1 3/4 (44.5)	5 (127.0)	10,720 (47.7)	1,559 (6.9)	2,680 (11.9)	5,875 (26.1)
5/8 (15.9)	3/4	12 (304.8)	6 (152.4)	1 3/4 (44.5)	5 (127.0)	16,150 (71.8)	260 (1.2)	4,040 (18.0)	5,875 (26.1)
7/8 (22.2)	1	12 1/2 (317.5)	8 (203.2)	1 3/4 (44.5)	5 (127.0)	17,000 (75.6)	303 (1.3)	4,250 (18.9)	11,500 (51.2)
7/8 (22.2)	1	15 1/2 (393.7)	8 (203.2)	1 3/4 (44.5)	5 (127.0)	23,340 (103.8)	762 (3.4)	5,835 (26.0)	11,500 (51.2)

1. Allowable load must be the lesser of the bond or steel strength.
2. The allowable loads listed under allowable bond are based on a safety factor of 4.0.
3. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
4. Anchors are permitted to be used within fire-resistive construction, provided the anchors resist wind or seismic loads only. For use in fire-resistive construction, the anchors can also be permitted to be used to resist gravity loads, provided special consideration has been given to fire-exposure conditions.



Edge and end distances for threaded rod in concrete foundation stemwall corner installation

Tension Loads for Rebar Dowels in Normal-Weight Concrete

* See page 13 for an explanation of the load table icons

Rebar Size No. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Edge Dist. in. (mm)	Critical Spacing Dist. in. (mm)	Tension Load Based on Bond Strength						Tension Load Based on Steel Strength
					$f'_c \geq 2000$ psi (13.8 MPa) Concrete			$f'_c \geq 4000$ psi (27.6 MPa) Concrete			ASTM A615 Grade 60 Rebar
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)
#4 (12.7)	5/8	4 1/4 (108)	6 3/8 (162)	17 (432)	17,596 (78.3)	533 (2.4)	4,400 (19.6)	—	—	4,400 (19.6)	4,800 (21.4)
		6 (152)	9 (229)	24 (610)	—	—	—	20,250 (90.1)	263 (1.2)	5,060 (22.5)	
#5 (15.9)	3/4	5 (127)	7 1/2 (191)	20 (508)	25,427 (113.1)	1,899 (8.4)	6,355 (28.3)	—	—	6,355 (28.3)	7,440 (33.1)
		9 3/8 (238)	14 1/8 (359)	37 1/2 (953)	—	—	—	29,510 (131.3)	2,270 (10.1)	7,375 (32.8)	
#6 (19.1)	7/8	6 3/4 (171)	10 1/8 (257)	27 (686)	41,812 (186.0)	595 (2.6)	10,455 (46.5)	—	—	10,455 (46.5)	10,560 (47.0)
		11 1/4 (286)	16 7/8 (429)	45 (1143)	—	—	—	44,210 (196.7)	1,227 (5.5)	11,050 (49.2)	
#7 (22.2)	1	7 3/4 (197)	11 5/8 (295)	31 (787)	50,241 (223.5)	2,995 (13.3)	12,560 (55.9)	—	—	12,560 (55.9)	14,400 (64.1)
		13 1/8 (333)	19 3/4 (502)	52 1/2 (1334)	—	—	—	59,325 (263.9)	3,444 (15.3)	14,830 (66.0)	
#8 (25.4)	1 1/8	9 (229)	13 1/2 (343)	36 (914)	60,145 (267.5)	5,493 (24.4)	15,035 (66.9)	—	—	15,035 (66.9)	18,960 (84.3)
		12 (305)	18 (457)	48 (1219)	—	—	—	—	—	18,260 (81.2)	
		15 (381)	22 1/2 (572)	60 (1524)	—	—	—	85,970 (382.4)	17,965 (79.9)	21,490 (95.6)	
#9 (28.6)	1 1/4	9 (229)	13 1/2 (343)	36 (914)	—	—	15,035 (66.9)	—	—	15,035 (66.9)	24,000 (106.8)
		13 (330)	19 1/2 (495)	52 (1321)	—	—	—	—	—	21,310 (94.8)	
		16 7/8 (429)	25 3/8 (645)	67 1/2 (1715)	—	—	—	110,370 (491.0)	4,768 (21.2)	27,590 (122.7)	
#10 (31.8)	1 1/2	11 1/4 (286)	16 7/8 (429)	45 (1143)	70,685 (314.4)	1,112 (4.9)	17,670 (78.6)	—	—	17,670 (78.6)	30,480 (135.6)
		15 (381)	22 1/2 (572)	60 (1524)	—	—	—	—	—	23,960 (106.6)	
		18 3/4 (476)	28 1/8 (714)	75 (1905)	—	—	—	120,976 (538.1)	6,706 (29.8)	30,245 (134.5)	
#11 (34.9)	1 5/8	12 3/8 (314)	18 5/8 (473)	49 1/2 (1257)	78,422 (348.8)	4,603 (20.5)	19,605 (87.2)	—	—	19,605 (87.2)	37,440 (166.5)
		16 1/2 (419)	24 3/4 (629)	66 (1676)	—	—	—	—	—	28,605 (127.2)	
		20 5/8 (524)	31 (787)	82 1/2 (2096)	—	—	—	150,415 (669.1)	8,287 (36.9)	37,605 (167.3)	
#14 (44.5)	2	15 3/4 (400)	23 5/8 (600)	63 (1600)	91,518 (407.1)	3,797 (16.9)	22,880 (101.8)	—	—	22,880 (101.8)	54,000 (240.2)

1. Allowable load must be the lesser of the bond or steel strength.
2. The allowable loads listed under allowable bond are based on a safety factor of 4.0.
3. Refer to allowable load-adjustment factors for spacing and edge distance on pages 45 and 46.
4. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
5. Anchors are permitted to be used within fire-resistive construction, provided the anchors resist wind or seismic loads only. For use in fire-resistive construction, the anchors can also be permitted to be used to resist gravity loads, provided special consideration has been given to fire-exposure conditions.
6. Anchors are not permitted to resist tension forces in overhead or wall installations unless proper consideration is given to fire-exposure and elevated-temperature conditions.

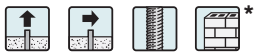
Shear Loads for Rebar Dowels in Normal-Weight Concrete

* See page 13 for an explanation of the load table icons

Rebar Size No. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Edge Dist. in. (mm)	Critical Spacing Dist. in. (mm)	Shear Load Based on Concrete Edge Distance, $f'_c \geq 2500$ psi (17.2 MPa) Concrete			Shear Load Based on Steel Strength, ASTM A615 Grade 60 Rebar
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allow. lbs. (kN)	Allowable lbs. (kN)
#4 (12.7)	5/8	4 1/4 (108)	8 (203)	6 3/8 (162)	13,564 (60.3)	971 (4.3)	3,390 (15.1)	3,060 (13.6)
#5 (15.9)	3/4	5 (127)	10 (254)	7 1/2 (191)	20,914 (93.0)	3,034 (13.5)	5,230 (23.3)	4,740 (21.1)
#6 (19.1)	7/8	6 3/4 (171)	12 (305)	10 1/8 (257)	30,148 (134.1)	1,322 (5.9)	7,535 (33.5)	6,730 (29.9)
#7 (22.2)	1	7 3/4 (197)	14 (356)	11 5/8 (295)	39,838 (177.2)	1,854 (8.2)	9,960 (44.3)	9,180 (40.8)
#8 (25.4)	1 1/8	9 (229)	16 (406)	13 1/2 (343)	53,090 (236.2)	3,562 (15.8)	13,270 (59.0)	12,085 (53.8)
#9 (28.7)	1 1/4	10 1/8 (257)	18 (457)	15 1/4 (387)	63,818 (148.7)	3,671 (16.3)	15,955 (71.0)	15,300 (68.1)
#10 (32.3)	1 1/2	11 1/4 (286)	20 (508)	16 7/8 (429)	82,782 (368.2)	2,245 (10.0)	20,695 (92.1)	19,430 (86.4)
#11 (35.8)	1 5/8	12 3/8 (314)	22 (559)	18 5/8 (473)	96,056 (427.3)	3,671 (16.3)	24,015 (106.8)	23,865 (106.2)
#14 (43.0)	2	12 3/8 (314)	22 (559)	18 5/8 (473)	—	—	24,015 (106.8)	34,425 (153.1)

1. Allowable load must be the lesser of the load based on concrete edge distance or steel strength.
2. The allowable loads based on concrete edge distance are based on a safety factor of 4.0.
3. Refer to allowable load-adjustment factors for spacing and edge distance on pages 45 and 46.
4. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
5. Anchors are permitted to be used within fire-resistive construction, provided the anchors resist wind or seismic loads only. For use in fire-resistive construction, the anchors can also be permitted to be used to resist gravity loads, provided special consideration has been given to fire-exposure conditions.

Tension and Shear Loads for Threaded Rod Anchors in 6 and 8-inch Normal-Weight Grout-Filled CMU



Rod Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth[8] in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	Min. Spacing Dist. in. (mm)	6 and 8-inch Grout-Filled CMU Allowable Loads Based on CMU Strength, Tension		Shear	
						Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
Anchor Installed in Face Shell (See Figure 1)									
3/8 (9.5)	7/16	3 1/2 (89)	12 (305)	4 (102)	14 (356)	6,489 (28.9)	1,300 (5.8)	5,231 (23.3)	1,045 (4.6)
			12 (305)	12 (305)	14 (356)	7,247 (32.2)	1,450 (6.4)	6,738 (30.0)	1,350 (6.0)
1/2 (12.7)	9/16	4 1/4 (108)	12 (305)	4 (102)	17 (432)	8,646 (38.5)	1,730 (7.7)	5,705 (25.4)	1,140 (5.1)
			12 (305)	12 (305)	17 (432)	8,975 (39.9)	1,795 (8.0)	10,879 (48.4)	2,175 (9.7)
5/8 (15.9)	3/4	4 3/4 (121)	12 (305)	4 (102)	19 (483)	10,213 (45.4)	2,045 (9.1)	5,973 (26.6)	1,195 (5.3)
			12 (305)	12 (305)	19 (483)	11,290 (50.2)	2,260 (10.1)	13,027 (57.9)	2,605 (11.6)
		6 (152)	4 (102)	4 5/8 (117)	24 (610)	4,905 (21.8)	980 (4.4)	4,766 (21.2)	955 (4.2)
3/4 (19.1)	7/8	6 3/4 (171)	12 (305)	4 (102)	27 (686)	11,976 (53.3)	2,395 (10.7)	—	—
			12 (305)	12 (305)	27 (686)	—	—	19,141 (85.1)	3,830 (17.0)
Anchor Installed in Mortar "T" Joint (See Figure 2)									
3/8 (9.5)	7/16	3 1/2 (89)	8 (203)	8 (203)	14 (356)	7,646 (34.0)	1,530 (6.8)	5,507 (24.5)	1,100 (4.9)
1/2 (12.7)	9/16	4 1/4 (108)	8 (203)	8 (203)	17 (432)	9,529 (42.4)	1,905 (8.5)	8,003 (35.6)	1,600 (7.1)
5/8 (15.9)	3/4	4 3/4 (121)	8 (203)	8 (203)	19 (483)	9,955 (44.3)	1,990 (8.9)	9,529 (42.4)	1,905 (8.5)
3/4 (19.1)	7/8	6 3/4 (171)	16 (406)	8 (203)	27 (686)	—	—	7,238 (32.2)	1,450 (6.4)
Anchor Installed in Cell Opening (Top of Wall) (See Figure 3)									
5/8 (15.9)	3/4	6 (152)	4 (102)	4 5/8 (117)	24 (610)	6,721 (29.9)	1,345 (6.0)	4,833 (21.5)	965 (4.3)
3/4 (19.1)	7/8	6 (152)	4 (102)	4 5/8 (117)	24 (610)	—	1,345 (6.0)	—	965 (4.3)

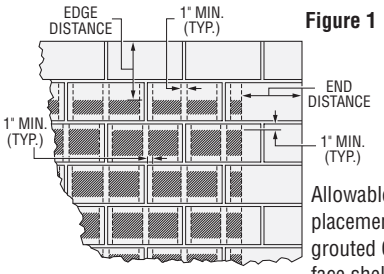


Figure 1

Allowable anchor placement in grouted CMU face shell

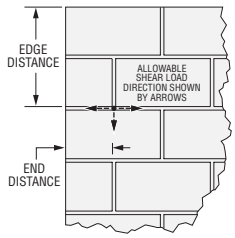


Figure 2

Anchor placement in grouted CMU mortar "T" joint

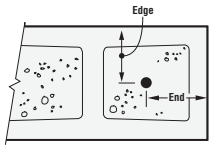


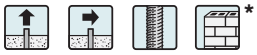
Figure 3

Anchor installed in cell opening (top of wall)

1. Threaded rods must comply with ASTM F1554 Grade 36 minimum.
2. Values for 6- and 8-inch wide concrete masonry units (CMU) with a minimum specified compressive strength of masonry, f'_m, at 28 days is 1500 psi.
3. Embedment depth is measured from the outside face of the concrete masonry unit for installations through a face shell.
4. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. The tabulated allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC.
7. Anchors must be spaced a minimum distance of four times the anchor embedment.
8. For embedment depths of 6 3/4", 8-inch-wide normal-weight grout-filled CMU block must be used.

ET-HP™ (formerly ET) *Anchoring Adhesive*

Tension and Shear Loads for Threaded Rod Anchors in Lightweight, Medium-Weight and Normal-Weight Hollow CMU

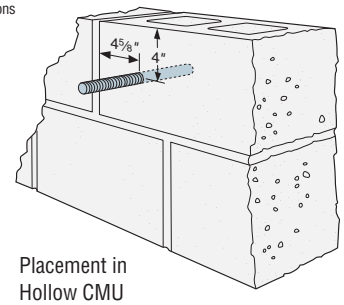


* See page 13 for an explanation of the load table icons

Rod Dia. in. (mm)	Drill Bit Dia. (in.)	Embed. Depth in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	6 and 8-inch Hollow CMU Allowable Loads Based on CMU Strength			
					Tension		Shear	
					Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
Anchor Installed in Face Shell w/ETS Screen Tube (See Figure 1)								
½ (12.7)	11/16	3 (76.2)	4 (101.6)	4⅝ (117.5)	1,400 (6.2)	280 (1.2)	1,326 (5.9)	265 (1.2)
¾ (19.1)	1	3 (76.2)	4 (101.6)	4⅝ (117.5)	—	280 (1.2)	—	265 (1.2)

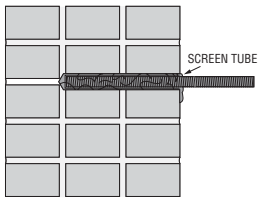
1. Threaded rods must comply with ASTM F1554 Grade 36 minimum.
2. Values for 6- and 8-inch wide concrete masonry units (CMU) with a minimum specified compressive strength of masonry, f'_m, at 28 days is 1500 psi.
3. Embedment depth is measured from the outside face of the concrete masonry unit for installations through a face shell.
4. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. The tabulated allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC.
7. Anchors must be spaced a minimum distance of four times the anchor embedment.
8. Set drill to rotation-only mode when drilling into hollow CMU.

Figure 1

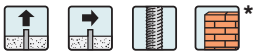


Placement in Hollow CMU

Configuration A (Shear)



Tension and Shear Loads for Installations in Unreinforced Brick Masonry Walls Minimum URM Wall Thickness is 13" (3 wythes thick)

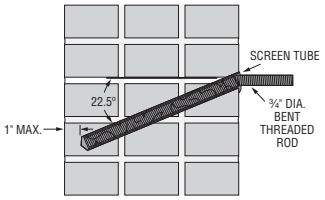


*

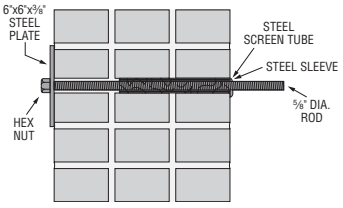
Rod Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Min. Edge/End Dist. in. (mm)	Min. Vertical Spacing Dist. in. (mm)	Min. Horiz. Spacing Dist. in. (mm)	Tension Load Based on URM Strength	Shear Load Based on URM Strength
						Minimum Net Mortar Strength = 50 psi	Minimum Net Mortar Strength = 50 psi
						Allowable lbs. (kN)	Allowable lbs. (kN)
Configuration A (Simpson ETS or ETSP Screen Tube Required)							
¾ (19.1)	1	8 (203)	24 (610)	18 (457)	18 (457)	—	1,000 (4.4)
Configuration B (Simpson ETS or ETSP Screen Tube Required)							
¾ (19.1)	1	13 (330)	16 (406)	18 (457)	24 (610)	1,200 (5.3)	1,000 (4.4)
Configuration C (Simpson ETS Screen Tube and AST Steel Sleeve Required)							
⅝ (15.9)	1	**	24 (610)	18 (457)	18 (457)	1,200 (5.3)	750 (3.3)

1. Threaded rods must comply with ASTM F1554 Grade 36 minimum.
2. All holes are drilled with a 1" diameter carbide-tipped drill bit with the drill set in the rotation-only mode.
3. The unreinforced brick walls must have a minimum thickness of 13 inches (three wythes of brick).
4. The allowable load is applicable only where in-place shear tests indicate minimum net mortar strength of 50 psi.
5. The allowable load for Configuration B and C anchors subjected to a combined tension and shear load is determined by assuming a straight-line relationship between allowable tension and shear.
6. The anchors installed in unreinforced brick walls are limited to resisting seismic or wind forces only.
7. Configuration A has a straight threaded rod or rebar embedded 8 inches into the wall with a 31/32" diameter by 8-inch long screen tube (part # ETS758 or ETS758P). This configuration is designed to resist shear loads only.
8. Configuration B has a ¾" threaded rod bent and installed at a 22.5-degree angle and installed 13 inches into the wall, to within 1-inch (maximum) of the exterior wall surface. This configuration is designed to resist tension and shear loads. The pre-bent threaded rod is installed with a 31/32" diameter by 13-inch long screen tube (part # ETS7513 or ETS7513P).
9. Configuration C is designed to resist tension and shear forces. It consists of a ⅝" diameter, ASTM F1554 Grade 36 threaded rod and an 8" long sleeve (part # AST800) and a 31/32" diameter by 8-inch long screen tube (part # ETS758). The steel sleeve has a plastic plug in one end. A 6" by 6" by ⅜" thick ASTM A 36 steel plate is located on the back face of the wall.
10. Special inspection requirements are determined by local jurisdiction and must be confirmed by the local building official.
11. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.

Configuration B (Tension & Shear)



Configuration C (Tension & Shear)



Installation Instructions for Configuration C:

1. Drill hole perpendicular to the wall to a depth of 8" with a 1" diameter carbide-tipped drill bit (rotation only mode).
2. Clean hole with oil-free compressed air and a nylon brush.
3. Fill 8" steel screen tube with mixed adhesive and insert into hole.
4. Insert steel sleeve slowly into screen tube (adhesive will displace).
5. Allow adhesive to cure (see cure schedule).
6. Drill through plastic plug in (inside) end of steel sleeve with ⅝" bit.
7. Drill completely through the wall with ⅝" carbide tipped concrete drill bit (rotation mode only).
8. Insert ⅝" rod through hole and attach metal plate and nut.

Load-Adjustment Factors for ET-HP™ Adhesive in Normal-Weight Concrete: Edge Distance, Tension and Shear Loads

How to use these charts:

1. The following tables are for reduced edge distance.
2. Locate the anchor size to be used for either a tension and/or shear load application.
3. Locate the embedment (E) at which the anchor is to be installed.
4. Locate the edge distance (Cact) at which the anchor is to be installed.
5. The load-adjustment factor (fc) is the intersection of the row and column.
6. Multiply the allowable load by the applicable load-adjustment factor.
7. Reduction factors for multiple edges are multiplied together.
8. Adjustment factors do not apply to allowable steel strength values.
9. Adjustment factors are to be applied to allowable tension load based on bond strength values or allowable Shear Load Based on Concrete Edge Distance values only.

Edge Distance Tension (f_c)

* See page 13 for an explanation of the load table icons

Edge Dist. C_{act} (in.)	Dia.	⅜	½		⅝		¾		⅞		1				1⅛	1¼				
	Rebar		#4		#5		#6		#7		#8		#9			#10		#11		#14
	E	3½	4¼	6	5	9⅜	6¾	11¼	7¾	13⅛	9	15	9	16⅞	10⅛	11¼	18¾	12⅜	20⅝	15¾
	C_{cr}	5¼	6⅜	9	7½	14⅛	10⅛	16⅞	11⅝	19¾	13½	22½	13½	25⅜	15¼	16⅞	28⅛	18⅝	31	23⅝
	C_{min}	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	2¾	2¾	2¾	2¾	2¾	2¾	2¾	2¾
	f_{cmin}	**0.50**	**0.50**	**0.59**	**0.50**	**0.64**	**0.50**	**0.57**	**0.50**	**0.52**	**0.50**	**0.47**	**0.50**	**0.47**	**0.58**	**0.58**	**0.51**	**0.58**	**0.51**	**0.58**
1¾		0.50	0.50	0.59	0.50	0.64	0.50	0.57	0.50	0.52	0.50	0.47								
2¾		0.64	0.61	0.65	0.59	0.67	0.56	0.60	0.55	0.55	0.54	0.50	0.50	0.47	0.58	0.58	0.51	0.58	0.51	0.58
3		0.68	0.64	0.66	0.61	0.68	0.57	0.61	0.56	0.55	0.55	0.50	0.51	0.48	0.59	0.59	0.51	0.59	0.51	0.59
4		0.82	0.74	0.72	0.70	0.71	0.63	0.63	0.61	0.58	0.60	0.53	0.56	0.50	0.62	0.62	0.53	0.61	0.53	0.61
5		0.96	0.85	0.77	0.78	0.73	0.69	0.66	0.66	0.61	0.64	0.55	0.60	0.52	0.66	0.65	0.55	0.64	0.55	0.63
6		1.00	0.96	0.83	0.87	0.76	0.75	0.69	0.72	0.63	0.68	0.58	0.65	0.55	0.69	0.68	0.57	0.67	0.57	0.65
7			1.00	0.89	0.96	0.79	0.81	0.72	0.77	0.66	0.72	0.60	0.70	0.57	0.72	0.71	0.59	0.69	0.58	0.67
8				0.94	1.00	0.82	0.87	0.75	0.82	0.69	0.77	0.63	0.74	0.59	0.76	0.74	0.61	0.72	0.60	0.69
9				1.00		0.85	0.93	0.78	0.87	0.71	0.81	0.66	0.79	0.62	0.79	0.77	0.63	0.75	0.62	0.71
10						0.88	0.99	0.80	0.92	0.74	0.85	0.68	0.84	0.64	0.82	0.80	0.65	0.77	0.64	0.73
12						0.94	1.00	0.86	1.00	0.79	0.94	0.73	0.93	0.69	0.89	0.86	0.69	0.82	0.67	0.77
14						1.00		0.92		0.85	1.00	0.78	1.00	0.73	0.96	0.91	0.73	0.88	0.71	0.81
16								0.98		0.90		0.83		0.78	1.00	0.97	0.77	0.93	0.74	0.85
18								1.00		0.95		0.89		0.83		1.00	0.80	0.98	0.77	0.89
20										1.00		0.94		0.87			0.84	1.00	0.81	0.93
22												0.99		0.92			0.88		0.84	0.97
24												1.00		0.97			0.92		0.88	1.00
26														1.00			0.96		0.91	
28																	1.00		0.95	
30																			0.98	
32																			1.00	

See notes below.

Edge Distance Shear (f_c)

Edge Dist. C_{act} (in.)	Dia.	⅜	½		⅝		¾		⅞		1				1⅛	1¼			
	Rebar			#4		#5		#6		#7		#8	#9				#10	#11	#14
	E	3½	4¼	4¼	5	5	6¾	6¾	7¾	7¾	9	9	10⅛	10⅛	11¼	11¼	12⅜	12⅜	
	C_{cr}	5¼	6⅜	8	7½	10	10⅛	12	11⅝	14	13½	16	18	15¼	16⅞	20	22	22	
	C_{min}	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	2¾	2¾	2¾	2¾	2¾	2¾	
	f_{cmin}	**0.29**	**0.20**	**0.16**	**0.13**	**0.10**	**0.13**	**0.10**	**0.13**	**0.09**	**0.08**	**0.08**	**0.08**	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	
1¾		0.29	0.20	0.16	0.13	0.10	0.13	0.10	0.13	0.09	0.08	0.08							
2¾		0.49	0.37	0.29	0.28	0.21	0.23	0.19	0.22	0.16	0.16	0.14	0.08	0.14	0.14	0.14	0.14	0.14	
3		0.54	0.42	0.33	0.32	0.24	0.26	0.21	0.24	0.18	0.18	0.16	0.10	0.16	0.16	0.15	0.15	0.15	
4		0.75	0.59	0.46	0.47	0.35	0.36	0.30	0.33	0.26	0.26	0.23	0.16	0.23	0.22	0.20	0.20	0.20	
5		0.95	0.76	0.60	0.62	0.45	0.47	0.39	0.42	0.33	0.33	0.29	0.22	0.29	0.28	0.25	0.24	0.24	
6		1.00	0.94	0.73	0.77	0.56	0.57	0.47	0.50	0.41	0.41	0.35	0.28	0.36	0.34	0.30	0.29	0.29	
7			1.00	0.87	0.92	0.67	0.68	0.56	0.59	0.48	0.49	0.42	0.34	0.43	0.40	0.35	0.33	0.33	
8				1.00	1.00	0.78	0.78	0.65	0.68	0.55	0.57	0.48	0.40	0.50	0.46	0.40	0.37	0.37	
9						0.89	0.88	0.74	0.77	0.63	0.65	0.55	0.46	0.57	0.52	0.45	0.42	0.42	
10						1.00	0.99	0.82	0.86	0.70	0.73	0.61	0.52	0.64	0.58	0.50	0.46	0.46	
11							1.00	0.91	0.94	0.78	0.80	0.68	0.58	0.71	0.64	0.55	0.51	0.51	
12								1.00	1.00	0.85	0.88	0.74	0.64	0.78	0.70	0.60	0.55	0.55	
13										0.93	0.96	0.81	0.70	0.85	0.76	0.65	0.60	0.60	
14										1.00	1.00	0.87	0.76	0.91	0.82	0.70	0.64	0.64	
15												0.94	0.82	0.98	0.89	0.75	0.69	0.69	
16												1.00	0.88	1.00	0.95	0.80	0.73	0.73	
18													1.00		1.00	0.90	0.82	0.82	
20																1.00	0.91	0.91	
22																	1.00	1.00	

1. E = Embedment depth (inches).
2. C_{act} = actual edge distance at which anchor is installed (inches).
3. C_{cr} = critical edge distance for 100% load (inches).
4. C_{min} = minimum edge distance for reduced load (inches).
5. f_c = adjustment factor for allowable load at actual edge distance.
6. f_{ccr} = adjustment factor for allowable load at critical edge distance. f_{ccr} is always = 1.00.
7. f_{cmin} = adjustment factor for allowable load at minimum edge distance.
8. $f_c = f_{cmin} + [(1 - f_{cmin}) (C_{act} - C_{min}) / (C_{cr} - C_{min})]$.

Load-Adjustment Factors for ET-HP™ Adhesive in Normal-Weight Concrete: Spacing, Tension and Shear Loads

How to use these charts:

1. The following tables are for reduced spacing.
2. Locate the anchor size to be used for either a tension and/or shear load application.
3. Locate the embedment (E) at which the anchor is to be installed.
4. Locate the spacing (Sact) at which the anchor is to be installed.
5. The load-adjustment factor (fs) is the intersection of the row and column.
6. Multiply the allowable load by the applicable load-adjustment factor.
7. Reduction factors for multiple spacings are multiplied together.
8. Adjustment factors do not apply to allowable steel strength values.
9. Adjustment factors are to be applied to allowable Tension Load Based on Bond Strength values or allowable Shear Load Based on Concrete Edge Distance values only.

Spacing Tension (f_s)

* See page 13 for an explanation of the load table icons

S_{act} (in.)	Dia.	⅜	½		⅝		¾		⅞		1				1⅛	1¼				
	Rebar		#4		#5		#6		#7		#8		#9			#10		#11		#14
	E	3½	4¼	6	5	9⅜	6¾	11¼	7¾	13⅛	9	15	9	16⅞	10⅛	11¼	18¾	12⅜	20⅝	15¾
	S_{cr}	14	17	24	20	37½	27	45	31	52½	36	60	36	67½	40½	45	75	49½	82½	63
	S_{min}	1¾	2⅛	3	2½	4¾	3⅜	5⅝	3⅞	6⅝	4½	7½	4½	8½	5⅛	5⅝	9⅜	6¼	10⅜	7⅞
	f_{smin}	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
1¾		0.89																		
2		0.89																		
4		0.91	0.90	0.90	0.90		0.89		0.89											
6		0.93	0.92	0.91	0.91	0.89	0.90	0.89	0.90		0.90		0.90		0.89	0.89				
8		0.95	0.93	0.92	0.92	0.90	0.91	0.90	0.91	0.89	0.90	0.89	0.90		0.90	0.90		0.89		0.89
10		0.96	0.95	0.93	0.94	0.91	0.92	0.90	0.91	0.90	0.91	0.90	0.91	0.89	0.91	0.90	0.89	0.90		0.89
12		0.98	0.96	0.94	0.95	0.91	0.93	0.91	0.92	0.90	0.92	0.90	0.92	0.90	0.91	0.91	0.89	0.90	0.89	0.90
14		1.00	0.98	0.95	0.96	0.92	0.94	0.91	0.93	0.91	0.92	0.90	0.92	0.90	0.92	0.91	0.90	0.91	0.90	0.90
16			0.99	0.96	0.97	0.93	0.95	0.92	0.94	0.91	0.93	0.91	0.93	0.90	0.92	0.92	0.90	0.91	0.90	0.91
18			1.00	0.97	0.99	0.93	0.96	0.92	0.95	0.92	0.94	0.91	0.94	0.91	0.93	0.92	0.90	0.92	0.90	0.91
20				0.98	1.00	0.94	0.97	0.93	0.96	0.92	0.94	0.92	0.94	0.91	0.94	0.93	0.91	0.92	0.90	0.91
24				1.00		0.95	0.99	0.94	0.97	0.93	0.96	0.92	0.96	0.92	0.95	0.94	0.91	0.94	0.91	0.92
28						0.97	1.00	0.95	0.99	0.94	0.97	0.93	0.97	0.93	0.96	0.95	0.92	0.95	0.92	0.93
32						0.98		0.96	1.00	0.95	0.99	0.94	0.99	0.93	0.97	0.96	0.93	0.96	0.92	0.94
36						0.99		0.97		0.96	1.00	0.95	1.00	0.94	0.99	0.97	0.93	0.97	0.93	0.95
40						1.00		0.99		0.97		0.96		0.95	1.00	0.99	0.94	0.98	0.94	0.95
45								1.00		0.98		0.97		0.96		1.00	0.95	0.99	0.94	0.96
50										0.99		0.98		0.97			0.96	1.00	0.95	0.97
55										1.00		0.99		0.98			0.97		0.96	0.98
60												1.00		0.99			0.97		0.97	0.99
65														1.00			0.98		0.97	1.00
70																	0.99		0.98	
75																	1.00		0.99	
82½																			1.00	

See Notes Below

Spacing Shear (f_s)

* See page 13 for an explanation of the load table icons

S_{act} (in.)	Dia.	⅜	½	⅝	¾	⅞	1	1⅛	1¼		
	Rebar		#4	#5	#6	#7	#8	#9	#10	#11	#14
	E	3½	4¼	5	6¾	7¾	9	10⅛	11¼	12⅜	12⅜
	S_{cr}	5¼	6⅜	7½	10⅛	11⅝	13½	15¼	16⅞	18⅝	18⅝
	S_{min}	1¾	2⅛	2½	3⅜	3⅞	4½	5⅛	5⅝	6¼	6¼
	f_{smin}	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
1¾		0.83									
2		0.84									
3		0.89	0.87	0.85							
4		0.94	0.91	0.88	0.85	0.83					
5		0.99	0.95	0.92	0.87	0.85	0.84				
6		1.00	0.99	0.95	0.90	0.88	0.86	0.84	0.84		
7			1.00	0.98	0.92	0.90	0.88	0.86	0.85	0.84	0.84
8				1.00	0.95	0.92	0.90	0.88	0.87	0.85	0.85
9					0.97	0.94	0.92	0.90	0.88	0.87	0.87
10					1.00	0.96	0.93	0.91	0.90	0.88	0.88
12						1.00	0.97	0.95	0.93	0.91	0.91
14							1.00	0.98	0.96	0.94	0.94
16								1.00	0.99	0.96	0.96
18									1.00	0.99	0.99
20										1.00	1.00

1. E = Embedment depth (inches).
2. S_{act} = actual spacing distance at which anchors are installed (inches).
3. S_{cr} = critical spacing distance for 100% load (inches).
4. S_{min} = minimum spacing distance for reduced load (inches).
5. f_s = adjustment factor for allowable load at actual spacing distance.
6. f_{scr} = adjustment factor for allowable load at critical spacing distance. f_{scr} is always = 1.00.
7. f_{smin} = adjustment factor for allowable load at minimum spacing distance.
8. $f_s = f_{smin} + [(1 - f_{smin}) (S_{act} - S_{min}) / (S_{cr} - S_{min})]$.