ET *Epoxy-Tie® Anchoring Adhesive*

Epoxy Adhesives

ET Epoxy-Tie® 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 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; Florida FL 11506.2; 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 15 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 31–32

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 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 Epoxy-Tie® adhesive have been tested in accordance with ICC-ES's *Acceptance Criteria for Adhesive Anchors (AC58)* for the following:
- Seismic and wind Loading
- Long-term creep at elevated-temperature
- Static loading at elevated-temperature
- Damp holes
- Freeze-thaw conditions
- Critical and minimum edge distance and spacing

In addition, anchors installed with ET 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 our website or contact Simpson Strong-Tie and request Technical Bulletin T-SAS-CHEMRES08.

ET22

EMN22i

EDT22B

ET56

ET22

- IMPORTANT -
SEE Pages 31–32
FOR INSTALLATION
INSTRUCTIONS

ET Cartridge Systems

Model No.	Capacity ounces (cubic inches)	Cartridge Type	Carton Quantity	Dispensing Tool(s)	Mixing[4] Nozzle
ET22	22 (39.7)	side-by-side	10	EDT22B, EDT22AP, or EDT22CKT	EMN22i
ET56	56 (101.1)	side-by-side	6	EDT56AP	EMN22i or EMN50

1. Bulk containers also available, call Simpson Strong-Tie for details.
2. Cartridge and bulk estimation guides are available on pages 63–66.
3. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available on pages 87–92.
4. 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 Epoxy-Tie® adhesive from Simpson Strong-Tie, Pleasanton, CA. Anchors shall be installed per Simpson Strong-Tie instructions for ET Epoxy-Tie® adhesive.

ACCESSORIES: See pages 87–92 for information on dispensing tools, mixing nozzles and other accessories.

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 15 for more information.
2. Percent allowable load may be linearly interpolated for intermediate base material temperatures.
3. °C = (°F-32) / 1.8

Tension Loads for Threaded Rod Anchors in Normal-Weight Concrete

*See page 10 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 f'c ≥ 2000 psi (13.8 MPa) Concrete			Tension Load Based on Steel Strength		
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	A307 (SAE 1018) Allowable lbs. (kN)	A193 GR B7 (SAE 4140) Allowable lbs. (kN)	F593 (A304SS) Allowable lbs. (kN)
³⁄₈ (9.5)	¹⁄₂	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)
¹⁄₂ (12.7)	⁵⁄₈	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. Allowable loads may be increased by 33⅓ percent for short-term loading due to wind or seismic forces where permitted by code.
4. Refer to allowable load-adjustment factors for spacing and edge distance on pages 60 and 61.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. 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.
7. 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.

Epoxy Adhesives

Shear Loads for Threaded Rod Anchors in Normal-Weight Concrete

*See page 10 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 ≥ 2000 psi (13.8 MPa) Concrete			A307 (SAE 1018)	A193 GR B7 (SAE 4140)	F593 (A304SS)
					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)	5¼ (133)	7,615 (33.9)	591 (2.6)	1,905 (8.5)	1,085 (4.8)	2,340 (10.4)	1,870 (8.3)
½ (12.7)	⅝	4¼ (108)	6⅜ (162)	6⅜ (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)
⅝ (15.9)	¾	5 (127)	7½ (191)	7½ (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)
¾ (19.1)	⅞	6¾ (171)	10⅛ (257)	10⅛ (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)
⅞ (22.2)	1	7¾ (197)	11⅝ (295)	11⅝ (295)	•	•	6,925 (30.8)	5,925 (26.4)	12,770 (56.8)	8,685 (38.6)
1 (25.4)	1⅛	9 (229)	13½ (343)	13½ (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)
1⅛ (28.6)	1¼	10⅛ (257)	15¼ (387)	15¼ (387)	59,280 (263.7)	•	14,820 (65.9)	9,800 (43.6)	21,125 (94.0)	14,365 (63.9)
1¼ (31.8)	1⅜	11¼ (286)	16⅞ (429)	16⅞ (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. Allowable loads may be increased by 33⅓ percent for short-term loading due to wind or seismic forces where permitted by code.
4. Refer to allowable load-adjustment factors for spacing and edge distance on pages 60 and 61.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. 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 10 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 ≥ 2000 psi (13.8 MPa) Concrete			A307 (SAE 1018)
						Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allowable lbs. (kN)	Allowable lbs. (kN)
⅝ (15.9)	¾	9½ (241.3)	6 (152.4)	1¾ (44.5)	5 (127.0)	10,720 (47.7)	1,559 (6.9)	2,680 (11.9)	5,875 (26.1)
⅝ (15.9)	¾	12 (304.8)	6 (152.4)	1¾ (44.5)	5 (127.0)	16,150 (71.8)	260 (1.2)	4,040 (18.0)	5,875 (26.1)
⅞ (22.2)	1	12½ (317.5)	8 (203.2)	1¾ (44.5)	5 (127.0)	17,000 (75.6)	303 (1.3)	4,250 (18.9)	11,500 (51.2)
⅞ (22.2)	1	15½ (393.7)	8 (203.2)	1¾ (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. Allowable loads may be increased by 33⅓ percent for short-term loading due to wind or seismic forces where permitted by code.
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.
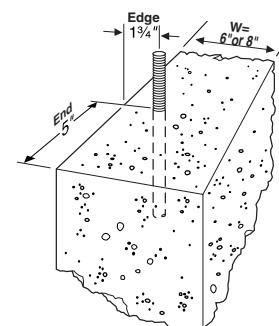
*See page 10 for an explanation of the load table icons

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

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Epoxy Adhesives

Tension Loads for Rebar Dowels in Normal-Weight Concrete

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 ≥ 2000 psi (13.8 MPa) Concrete			f'c ≥ 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	4¼ (108)	6⅜ (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)	7½ (191)	20 (508)	25,427 (113.1)	1,899 (8.4)	6,355 (28.3)	•	•	6,355 (28.3)	7,440 (33.1)
		9⅜ (238)	14⅛ (359)	37½ (953)	•	•	•	29,510 (131.3)	2,270 (10.1)	7,375 (32.8)	
#6 (19.1)	7⁄8	6¾ (171)	10⅛ (257)	27 (686)	41,812 (186.0)	595 (2.6)	10,455 (46.5)	•	•	10,455 (46.5)	10,560 (47.0)
		11¼ (286)	16⅞ (429)	45 (1143)	•	•	•	44,210 (196.7)	1,227 (5.5)	11,050 (49.2)	
#7 (22.2)	1	7¾ (197)	11⅝ (295)	31 (787)	50,241 (223.5)	2,995 (13.3)	12,560 (55.9)	•	•	12,560 (55.9)	14,400 (64.1)
		13⅛ (333)	19¾ (502)	52½ (1334)	•	•	•	59,325 (263.9)	3,444 (15.3)	14,830 (66.0)	
#8 (25.4)	1⅛	9 (229)	13½ (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)	22½ (572)	60 (1524)	•	•	•	85,970 (382.4)	17,965 (79.9)	21,490 (95.6)	
#9 (28.6)	1¼	9 (229)	13½ (343)	36 (914)	•	•	15,035 (66.9)	•	•	15,035 (66.9)	24,000 (106.8)
		13 (330)	19½ (495)	52 (1321)	•	•	•	•	•	21,310 (94.8)	
		16⅞ (429)	25⅜ (645)	67½ (1715)	•	•	•	110,370 (491.0)	4,768 (21.2)	27,590 (122.7)	
#10 (31.8)	1½	11¼ (286)	16⅞ (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)	22½ (572)	60 (1524)	•	•	•	•	•	23,960 (106.6)	
		18¾ (476)	28⅛ (714)	75 (1905)	•	•	•	120,976 (538.1)	6,706 (29.8)	30,245 (134.5)	
#11 (34.9)	1⅝	12⅜ (314)	18½ (473)	49½ (1257)	78,422 (348.8)	4,603 (20.5)	19,605 (87.2)	•	•	19,605 (87.2)	37,440 (166.5)
		16½ (419)	24¾ (629)	66 (1676)	•	•	•	•	•	28,605 (127.2)	
		20⅝ (524)	31 (787)	82½ (2096)	•	•	•	150,415 (669.1)	8,287 (36.9)	37,605 (167.3)	
#14 (44.5)	2	15¾ (400)	23⅝ (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. Allowable loads may be increased by 33⅓ percent for short-term loading due to wind or seismic forces for only the shallowest embedment depths listed where permitted by code.
4. Refer to allowable load-adjustment factors for spacing and edge distance on pages 60 and 61.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. 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.
7. 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.

*See page 10 for an explanation of the load table icons

Epoxy Adhesives

Shear Loads for Rebar Dowels in Normal-Weight Concrete

**See page 10 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			Shear Load Based on Steel Strength
					f'c ≥ 2500 psi (17.2 MPa) Concrete			ASTM A615 Grade 60 Rebar
					Ultimate lbs. (kN)	Std. Dev. lbs. (kN)	Allow. lbs. (kN)	Allowable lbs. (kN)
#4 (12.7)	5/8	4¼ (108)	8 (203)	6⅜ (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)	7½ (191)	20,914 (93.0)	3,034 (13.5)	5,230 (23.3)	4,740 (21.1)
#6 (19.1)	7/8	6¾ (171)	12 (305)	10⅛ (257)	30,148 (134.1)	1,322 (5.9)	7,535 (33.5)	6,730 (29.9)
#7 (22.2)	1	7¾ (197)	14 (356)	11⅝ (295)	39,838 (177.2)	1,854 (8.2)	9,960 (44.3)	9,180 (40.8)
#8 (25.4)	1⅛	9 (229)	16 (406)	13½ (343)	53,090 (236.2)	3,562 (15.8)	13,270 (59.0)	12,085 (53.8)
#9 (28.7)	1¼	10⅛ (257)	18 (457)	15¼ (387)	63,818 (148.7)	3,671 (16.3)	15,955 (71.0)	15,300 (68.1)
#10 (32.3)	1½	11¼ (286)	20 (508)	16⅞ (429)	82,782 (368.2)	2,245 (10.0)	20,695 (92.1)	19,430 (86.4)
#11 (35.8)	1⅝	12⅜ (314)	22 (559)	18⅝ (473)	96,056 (427.3)	3,671 (16.3)	24,015 (106.8)	23,865 (106.2)
#14 (43.0)	2	12⅜ (314)	22 (559)	18⅝ (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. Allowable loads must be decreased by 12 percent for short-term loading due to wind or seismic forces.
4. Refer to allowable load-adjustment factors for spacing and edge distance on pages 60 and 61.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. 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	3½ (89)	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)
½ (12.7)	9/16	4¼ (108)	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	4¾ (121)	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)
3/4 (19.1)	7/8	6 (152)	4 (102)	4⅝ (117)	24 (610)	4,905 (21.8)	980 (4.4)	4,766 (21.2)	955 (4.2)
		6¾ (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	3½ (89)	8 (203)	8 (203)	14 (356)	7,646 (34.0)	1,530 (6.8)	5,507 (24.5)	1,100 (4.9)
½ (12.7)	9/16	4¼ (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	4¾ (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	6¾ (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)	4⅝ (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)	4⅝ (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 A 307 minimum.
2. Values for 6 and 8-inch wide CMU Grade N, Type II concrete masonry units conforming to UBC Standard 21-4 or ASTM C90. The masonry units must be fully grouted with grout complying with UBC Section 2103.4, or IBC Section 2103.12. Mortar is prepared in accordance with Section 2103.3 of the UBC and UBC Standard 21-15, or IBC Section 2103.8. The minimum specified compressive strength of masonry, f'm, at 28 days is 1,500 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. For installations under the UBC use a safety factor of 4.0 (multiply the tabulated allowable loads by 1.25).
7. Anchors must be spaced a minimum distance of four times the anchor embedment.
8. For embedment depths of 6¾", 8-inch-wide normal-weight grout-filled CMU block must be used.

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

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)	⅝	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)	⅞	3 (76.2)	4 (101.6)	4⅝ (117.5)	•	280 (1.2)	•	265 (1.2)

1. Threaded rods must comply with ASTM A 307 minimum.
2. Values for 6 and 8-inch wide CMU Grade N, Type II concrete masonry units conforming to UBC Standard 21-4 or ASTM C90. Mortar is prepared in accordance with Section 2103.3 of theUBC and UBC Standard 21-15, or IBC Section 2103.8. The minimumspecified compressive strength of masonry, f´m, at 28 days is 1,500 psi.
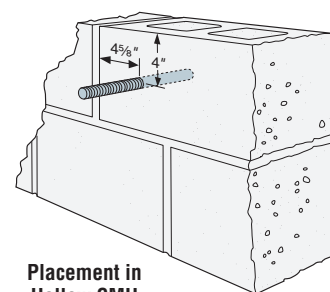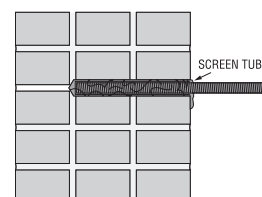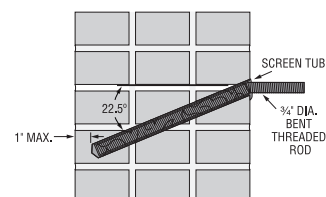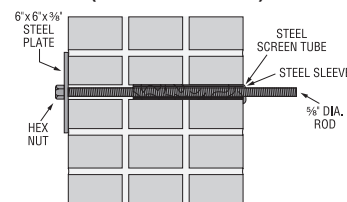3. Embedment depth is measured from the outside face of the concrete masonry unit for installations through a face shell.
4. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
5. Refer to in-service temperature sensitivity chart for allowable load adjustment for temperature.
6. The tabulated allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC. For installations under the UBC use a safety factor of 4.0 (multiply the tabulated allowable loads by 1.25).
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.

*See page 10 for explanation of the load table icons

Figure 1

Placement in Hollow CMU

Configuration A (Shear)

SCREEN TUBE

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 A 307 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 A 307 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.

*See page 10 for explanation of the load table icons

Configuration B (Tension & Shear)

SCREEN TUBE
22.5°
¾" DIA. BENT THREADED ROD
1" MAX.

Configuration C (Tension & Shear)

6"x 6"x ⅜" STEEL PLATE
STEEL SCREEN TUBE
STEEL SLEEVE
HEX NUT
⅝" DIA. ROD

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.

SIMPSON Strong-Tie ANCHOR SYSTEMS

Epoxy Adhesives

Load-Adjustment Factors for ET Epoxy-Tie® 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 (C_{act}) at which the anchor is to be installed.
5. The load-adjustment factor (f_c) 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 10 for an explanation of the load table icons

Edge Dist. C_{act} (in.)	3/8	1/2		5/8		3/4		7/8		1				1⅛	1¼				
Dia.	3/8	1/2		5/8		3/4		7/8		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	12⅝	20⅝	15¾
C_{cr}	5¼	6⅜	9	7½	14⅛	10⅛	16¾	11⅝	19¾	13½	22½	13½	25⅝	15¼	16⅞	28⅛	18⅝	31	23⅜
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.)	3/8	1/2		5/8		3/4		7/8		1			1⅛	1¼			
Dia.	3/8	1/2		5/8		3/4		7/8		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. $f_c = f_{cmin} + [(1 - f_{cmin})(C_{act} - C_{min}) / (C_{cr} - C_{min})]$.

SIMPSON Strong-Tie ANCHOR SYSTEMS

Load-Adjustment Factors for ET Epoxy-Tie® 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 (S_{act}) at which the anchor is to be installed.
5. The load-adjustment factor (f_s) 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 10 for an explanation of the load table icons

S_{act} (in.)	Dia. 3/8	1/2		5/8		3/4		7/8		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	10⅜	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 10 for an explanation of the load table icons

S_{act} (in.)	Dia. 3/8	1/2	5/8	3/4	7/8	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. $f_s = f_{smin} + [(1 - f_{smin})(S_{act} - S_{min}) / (S_{cr} - S_{min})]$.