# T308+™ *Adhesive Injection System*

ADHESIVES

## PRODUCT DESCRIPTION

The T308+ is a two component epoxy adhesive anchoring system. The system includes injection adhesive in plastic cartridges, mixing nozzles, dispensing tools and hole cleaning equipment. The T308+ is designed for bonding steel threaded rod into drilled holes in hardened concrete and solid and hollow masonry base materials.

## GENERAL APPLICATIONS AND USES

- Bonding steel threaded rod into hardened concrete and concrete masonry (CMU)
- Suitable to resist loads in uncracked concrete base materials for cases where anchor design theory and criteria applies
- Evaluated for installation into dry, clean holes only
- Can be installed in a wide range of base material temperatures

## FEATURES AND BENEFITS

+ Made in the USA
+ Cartridge design allows for multiple uses using extra mixing nozzles
+ Mixing nozzles proportion adhesive and provide simple delivery method into drilled holes
+ Evaluated and recognized for multiple embedments (see installation specifications)

## APPROVALS AND LISTINGS

International Code Council, Evaluation Service (ICC-ES) ESR-3066 for concrete
International Code Council, Evaluation Service (ICC-ES) ESR-3149 for Unreinforced Masonry (URM)
Conforms to requirements of ASTM C 881, Types I, II, IV & V, Grade 3, Class C (with exception of gel time)
Compliant with NSF/ANSI Standard 61 for drinking water system components – health effects; minimum requirements for materials in contact with potable water and water treatment
Department of Transportation listings (see www.powers.com or contact transportation agency)

## GUIDE SPECIFICATIONS

**CSI Divisions:** *03151–Concrete Anchoring, 04081-Masonry Anchorage, 05090-Metal Fastenings.*
Adhesive anchoring system shall be T308+ as supplied by Powers Fasteners, Inc. Brewster, NY
Anchors shall be installed in accordance with published instructions and requirements of the Authority Having Jurisdiction.

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**T308+ dual cartridge and mixing nozzle**

## PACKAGING

**Coaxial Cartridge**
8.5 fl. oz. (250ml)
**Dual (side-by-side) Cartridge**
14 fl. oz. (410 ml)
21.5 fl. oz. (630ml)
51 fl. oz. (1508 ml)

## STORAGE LIFE & CONDITIONS

Two years in a dry, dark environment with temperature ranging from 40ºF and 95ºF

## ANCHOR SIZE RANGE (TYP.)

3/8" to 7/8" diameter threaded rod

## SUITABLE BASE MATERIALS

Normal-weight concrete
Grouted concrete masonry
Hollow concrete masonry
Brick masonry (URM)

This Product Available In PDA

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

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## INSTALLATION SPECIFICATIONS (SOLID CONCRETE BASE MATERIALS)

### Installation Specifications for Steel Threaded Rod

| Dimension/Property | Notation | Units | Nominal Anchor Size | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3/8" | | 1/2" | | 5/8" | | 3/4" | | 7/8" | |
| Nominal anchor diameter | $d$ | in. (mm) | 0.375 (9.5) | | 0.500 (12.7) | | 0.625 (15.9) | | 0.750 (19.1) | | 0.875 (31.8) | |
| Nominal diameter of drilled hole | $d_o$ | in. | 7/16 ANSI | | 9/16 ANSI | | 3/4 ANSI | | 7/8 ANSI | | 1 ANSI | |
| Minimum embedment[1] | $h_{ef}$ | in. (mm) | 2 (50) | 3-3/8 (86) | 2-1/2 (62) | 4 (102) | 3-1/4 (83) | 5-5/8 (143) | 3-3/8 (86) | 6-3/4 (171) | 4 (102) | 7-7/8 (200) |
| Minimum concrete member thickness[1] | $h_{min}$ | in. (mm) | 4 (102) | 5 (127) | 5 (127) | 6 (153) | 6 (153) | 9 (229) | 7 (178) | 10-1/8 (257) | 8 (203) | 12 (305) |
| Minimum spacing distance[1] | $s_{min}$ | in. (mm) | 3 (76) | | 3-3/4 (95) | | 4-7/8 (124) | | 5 (127) | | 8 (203) | |
| Critical edge distance | $c_{ac}$ | in. (mm) | 4 (102) | 6-3/4 (171) | 5 (127) | 9-1/2 (241) | 6-1/2 (165) | 12 (305) | 6-3/4 (171) | 14-1/2 (368) | 8 (203) | 15-3/4 (400) |
| Maximum torque (only possible after curing) | $T_{max}$ | ft.-lbs. (N-m) | 14 (19) | | 25 (34) | | 70 (95) | | 120 (163) | | 140 (190) | |

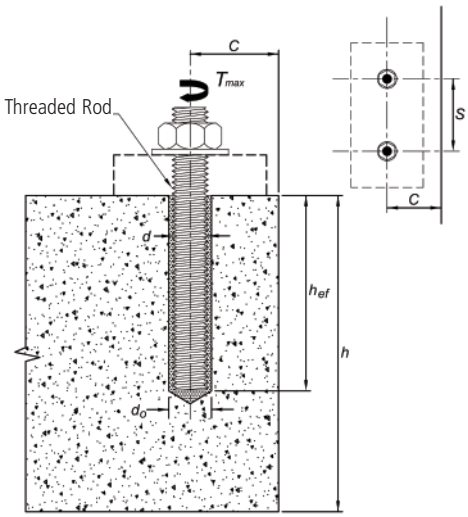
1. For use with the design provisions of ACI 318 Appendix D and ICC-ES AC308 Appendix A, Section 3.3.

### Installation Specifications for Threaded Rod (Hollow Base Material)[1]

| Dimentions/property | Notation | Units | Nominal Size | |
|---|---|---|---|---|
| | | | 3/8" | 1/2" |
| Nominal threaded rod diameter | $d$ | in (mm) | 0.375 (9.5) | 0.500 (12.7) |
| Nominal stainless steel tube size | - | in. | 3/8 | 1/2 |
| Nominal diameter of drilled hole | $d_o$, ($d_{bit}$) | in | 1/2 ANSI | 5/8 ANSI |
| Maximum torque (only possible after full cure time of adhesive) | $T_{max}$ | ft.-lb. (N-m) | 10 (8) | 10 (8) |

1. For unreinforced masonry (URM) see page 12.

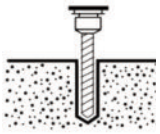
### Detail of Steel Hardware Elements used with Injection Adhesive System



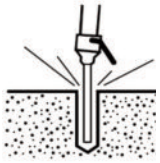

| Threaded Rod Material Properties | | | | |
|---|---|---|---|---|
| **Steel Description** (General) | **Steel Specification** (ASTM) | **Nomial Anchor Size** (inch) | **Minimum Yield Strength,** $f_y$ (ksi) | **Minimum Ultimate Strength,** $f_u$ (ksi) |
| Carbon rod | A36/F1554 Grade 36 | 3/8 through 7/8 | 36.0 | 58.0 |
| High strength carbon rod | A193, Grade B7 | 3/8 through 7/8 | 105.0 | 120.0 |
| Stainless rod (Alloy 304/316) | F593, (Condition CW) | 3/8 through 5/8 | 65.0 | 100.0 |
| | | 3/4 through 7/8 | 45.0 | 85.0 |
| Grade 60 reinforcing bar | A615, A706[1] A767 or A996 | 3/8 through 7/8 (#3 through #7) | 60.0 | 90.0 |

1. ASTM A706 reports a minimum ultimate strength of 80,000 PSI (80.0 ksi)

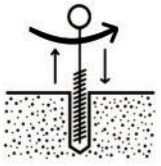
## INSTALLATION INSTRUCTIONS (SOLID BASE MATERIALS)



**Step 1 -** Drill hole in concrete using a rotary-percussion power drill (hammer drill) an ANSI standard carbide drill bit. Drill bit size should be 1/16" larger than the anchor rod for sizes up to 1/2" diameter; and 1/8" larger for anchor rods 5/8" through 7/8" diameter.

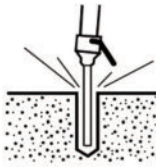


**Step 2:** Blow out hole using oil-free compressed air at a minimum of 70 psi with a nozzle. While blowing air, insert the nozzle into the hole until in contact with the bottom for not less than one second, and then withdraw. Repeat.



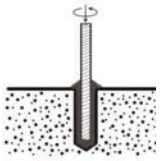
**Step 3:** Insert an appropriate size nylon cleaning brush into the hole with a thrusting, twisting motion. Once the brush is in contact with the bottom of the hole, turn the brush three revolution, and then quickly withdraw the brush with a vigorous, twisting pull.

**Step 4:** Repeat brushing of the hole.

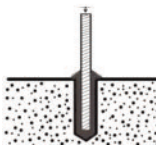


**Step 5:** Repeat blow out of hole with air as per item 2 above.

**Step 6:** Check cartridge for expiration date to confirm the material is within the expiration date and for any physical defects. Concrete temperature must be 50 °F minimum. Condition cartridge and contents to a temperature of 65 °F to 95 °F for easier dispensing. Insert the cartridge into the extrusion tool, and attach the supplied mixing nozzle to the cartridge. Prior to injection, dispense some mixed epoxy through the mixing nozzle and discard until the color of the extruded material becomes uniform. After uniform color is achieved, insert the end of the mixing nozzle into the borehole until it contacts the bottom. Then, dispense the adhesive while slowly withdrawing the nozzle until borehole is approximately 2/3 full, and then withdraw the mixing nozzle. Keep the nozzle attached on the partially used cartridges. A new mixing nozzle must be used if the gel time has been exceeded between injections.



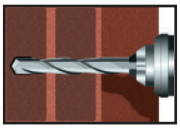
**Step 7:** Insert the clean and oil-free anchor rod into the adhesive in the hole with a counter-thread, turning motion until it contacts the bottom of the hole. Make sure the hole is completely filled with adhesive.



**Step 8:** Immediately adjust the alignment of the anchor in the hole. Check that the anchor remains fully in the hole. An air bubble in the hole could cause the anchor rod to rise after insertion. If this occurs, immediately turn the anchor with downward pressure to work the air out. Do not disturb the anchorage after the adhesive gel time. Do not torque or load the anchorage until the adhesive is fully cured.

# INSTALLATION INSTRUCTIONS (HOLLOW BASE MATERIAL)

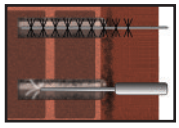
## DRILLING



**1** - Drill a hole into the base material with a rotary drill tool to the size and embedment for the required screen size. The tolerances of the drill bit used should meet the requirements of ANSI B212.15.

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

## HOLE CLEANING ➔ BLOW 2x, BRUSH 2x, BLOW 2x



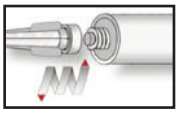
**2** - Blow out hole using oil-free compressed air at a minimum of 70 psi with a nozzle. While blowing air, insert the nozzle into the hole until in contact with the bottom for not less than one second, and then withdraw. Repeat.

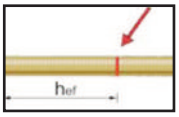
Insert an appropriate size nylon cleaning brush into the hole with a thrusting, twisting motion. Once the brush is in contact with the bottom of the hole, turn the brush three revolution, and then quickly withdraw the brush with a vigorous, twisting pull.

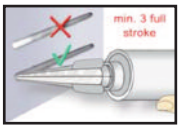
- Repeat brushing of the hole
- Repeat blow out of hole with compressed air as per above.

When finished the hole should be clean and free of dust, debris, ice, grease, oil or other foreign material.

## PREPARING






**3** - Check adhesive expiration date on cartridge label. Do not use expired product. Review Material Safety Data Sheet (MSDS) before use. Cartridge temperature must be between 40°F - 95°F (0°C - 35°C) when in use. Review gel (working) time and curing time table. Consideration should be given to the reduced gel (working) time of the adhesive in warm temperatures.

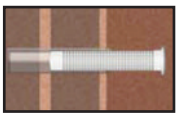
Attach a supplied mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. A new mixing nozzle must be used for every working interruption longer than the published working time (*see gel time and curing time table*) as well as for new cartridges.

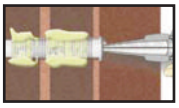
**4** - Prior to inserting the clean and oil free anchor rod. Verify anchor element is straight and free of surface damage.

**5** - For new cartridges and nozzles: Prior to dispensing into the drilled hole, squeeze out separately a minimum three full strokes of the mixed adhesive. Discard non-uniform adhesive until the mixed adhesive shows a consistent gray color.

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

## INSTALLATION





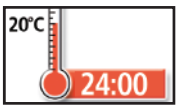
**6** - Insert a screen tube of suitable length into the cleaned anchor hole.

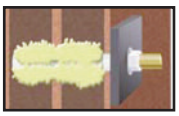
**7** - Fill the screen tube completely full with adhesive starting from the bottom or back of the tube. Slowly withdraw the mixing nozzle as the screen fills to avoid creating air pockets or voids. A plastic extension tube supplied by Powers Fasteners must be used with the mixing nozzle if the back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

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

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

## CURING AND FIXTURE



**9** - Allow the adhesive anchor to cure to the specified full curing time prior to applying any load.

Do not disturb, torque or load the anchor until it is fully cured (*see gel time and curing time table*).

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

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

ADHESIVES

## REFERENCE TABLES FOR INSTALLATION

| Gel (working) Time and Curing Table | | | |
|---|---|---|---|
| Temperature of base material | | Gel (working) time | Curing time |
| °F | °C | | |
| 50 | 10 | 35 minutes | 48 hours |
| 60 | 15 | 20 minutes | 36 hours |
| 70 | 20 | 10 minutes | 24 hours |
| 80 | 25 | 7 minutes | 24 hours |
| 90 | 32 | 5 minutes | 24 hours |
| 100 | 37 | 3 minutes | 12 hours |

| Hole Cleaning Equipment Selection Table for T308+ | | | |
|---|---|---|---|
| Threaded rod diameter (inch) | ANSI drill bit diameter (inch) | Nylon brush (Cat. #) | Nylon brush length (in.) |
| 3/8 | 7/16 | 07931 | 8-1/2 |
| 1/2 | 9/16 | 07932 | 8-1/2 |
| 5/8 | 3/4 | 07933 | 12 |
| 3/4 | 7/8 | 07933 | 13 |
| 7/8 | 1 | 07934 | 13 |
| Compressed air nozzle (all hole sizes) | | 08292 | 1 |

## PERFORMANCE DATA

### Tension Design Information for Steel Threaded Rod in Normal-Weight Concrete (For use with load combinations taken from ACI 318 Section 9.2)[1,2]

| Dimension/Property | | Notation | Units | Nominal Anchor Size | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 3/8″ | | 1/2″ | | 5/8″ | | 3/4″ | | 7/8″ | |
| Anchor diameter | | $d$ | in. (mm) | 0.375 (9.5) | | 0.500 (12.7) | | 0.625 (15.9) | | 0.750 (19.1) | | 0.875 (22.2) | |
| ANSI Drill bit diameter | | $d_o$ | in. | 7/16″ | | 9/16″ | | 3/4″ | | 7/8″ | | 1″ | |
| Minimum embedment | | $h_{ef}$ | in. (mm) | 2 (50) | 3-3/8 (86) | 2-1/2 (62) | 4 (102) | 3-1/4 (83) | 5-5/8 (143) | 3-3/8 (86) | 6-3/4 (171) | 4 (102) | 7-7/8 (200) |
| Minimum concrete member thickness[2] | | $h_{min}$ | in. (mm) | 4 (102) | 5 (127) | 5 (127) | 6 (153) | 6 (153) | 9 (229) | 7 (178) | 10-1/8 (257) | 8 (203) | 7-7/8 (200) |
| Minimum spacing distance[2] | | $s_{min}$ | in. (mm) | 3 (76) | | 3-3/4 (95) | | 4-7/8 (124) | | 5 (127) | | 8 (203) | |
| Critical edge distance[2] | | $c_{ac}$ | in. (mm) | 4 (102) | 6-3/4 (171) | 5 (127) | 9-1/2 (241) | 6-1/2 (165) | 12 (305) | 6-3/4 (171) | 14-1/2 (368) | 8 (203) | 15-3/4 (400) |
| Minimum edge distance[2] | | $c_{min}$ | in. (mm) | 3 (76) | | 3-3/4 (95) | | 4-7/8 (124) | | 5 (127) | | 6 (153) | |
| Maximum torque[3] | | $T_{max}$ | in. (mm) | 14 (19) | | 25 (34) | | 73 (95) | | 119 (163) | | 144 (190) | |
| Effective tensile area | | $A_{se}$ | in.$^2$ | 0.0775 | | 0.1419 | | 0.2260 | | 0.3345 | | 0.4617 | |
| Anchor Steel Yield Strength | F1554 Grade 36 | $f_y$ | lb./in.$^2$ | 36,000 | | | | | | | | | |
| | A193 Grade B7 | | | 105,000 | | | | | | | | | |
| Anchor Steel Ultimate Strength | F1554 Grade 36 | $f_{ut}$ | lb./in.$^2$ | 58,000 | | | | | | | | | |
| | A193 Grade B7 | | | 125,000 | | | | | | | | | |
| Nominal Steel of Single Anchor Tension | F1554 Grade 36 | $N_{sa}$ | lbf | 4,495 | | 8,230 | | 13,110 | | 19.400 | | 26,780 | |
| | A193 Grade B7 | | | 9,685 | | 17,735 | | 28,250 | | 41,810 | | 57,710 | |
| Reduction factor for steel strength in tension | | - | | 0.75 | | | | | | | | | |
| Nominal Steel of Single Anchor Shear | F1554 Grade 36 | $V_{sa}$ | lbf | 2,695 | | 4,940 | | 7,860 | | 11,640 | | 16,070 | |
| | A193 Grade B7 | | | 4,845 | | 10,640 | | 16,950 | | 25,085 | | 34,625 | |
| Reduction factor for steel strength in shear | | - | - | 0.65 | | | | | | | | | |
| Effectiveness factor for uncracked concrete | | $k_{c,uncr}$ | - | 24 | | | | | | | | | |
| Strength reduction factor for tension, concrete failure modes, Condition B | | ø | - | 0.65 | | | | | | | | | |
| Strength reduction factor for shear, concrete failure modes, Condition B | | ø | - | 0.70 | | | | | | | | | |
| Anchor category, periodic inspection | | - | - | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Strength reduction factor for bond strength, dry concrete, periodic inspection | | $ø_d$ | - | 0.55 | 0.55 | 0.55 | 0.55 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| | | $k_d$ | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.7 | 0.7 |
| Anchor category, continuous inspection | | - | - | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| Strength reduction factor for bond strength, dry concrete, continuous inspection | | $ø_d$ | - | 0.65 | 0.65 | 0.65 | 0.65 | 0.55 | 0.55 | 0.55 | 0.55 | 0.45 | 0.45 |
| | | $k_d$ | - | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.7 | 0.7 |
| Characteristic bond strength, uncracked concrete, Temperature Range A | | $\tau_{k,uncr}$ | psi | 676 | | 681 | | 418 | | 523 | | 645 | |
| Characteristic bond strength, uncracked concrete, Temperature Range B | | $\tau_{k,uncr}$ | psi | 406 | | 409 | | 251 | | 314 | | 288 | |

1- The data presented is applicable to use with uncracked, normal-weight concrete having the compressive strength of between 2,500 to 8,500psi.
2- The T308+ is recognized for applications in dry concrete, non-acidic environment, minmum base material temperature of 50°F, and in holes drilled with a carbide drill bit used with a hammer drill.
3- Characteristic bond strength is dependent on temperature:
Temperature Range A: Maximum short term temperature = 110°F and maximum long term temperature = 75°F
Temperature Range A: Maximum short term temperature = 162°F and maximum long term temperature = 110°F
Short term elevated concrete temperatures are those that occur over brief intervals, such as due to diurnal cycling, and long term concrete temperatures are roughly constant over significant periods of time.
4- For short term loads such as due to wind, and for Temperature Range B only, the listed bond strength may be increased 40 percent.
5- The T308+ anchor system is suitable for installation in vertical down or horizontal installation applications.

## Factored Design Strength ($ØN_n$ and $ØV_n$) in Accordance with ACI 318 Appendix D and ICC-ES AC308 Annex A:

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - $c_{a1}$ is greater than or equal to the critical edge distance, $c_{ac}$.
   - $c_{a2}$ is greater than or equal to 1.5 times $c_{a1}$.
2. Calculations were performed according to ACI 318-05 Appendix D and ICC-ES AC308 Annex A, Section 3.3. The load level corresponding to the failure mode is listed (e.g. For *tension*: steel, concrete breakout or bond strength; For *shear:* steel, concrete breakout or pryout strength). The lowest load level controls.
3. Strength reduction factors (Ø) for steel strength and concrete breakout strength were based on ACI 318 Section 9.2 for load combinations. Condition B was assumed.
4. Strength reduction factors (Ø) for bond strength were determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information supplement and ESR-3066 *(Notes continued on next page).*

### Tension Design Strength for T308+ Installed into Uncracked Concrete in Dry Hole Conition for Temperature Range A (Continuous Inspection)

**Maximum long term temperature = 75°F (24°C), Maximum short term temperature = 110°F (43°C)**

| Nominal Anchor Size (in.) | Embedment Depth $h_{ef}$ in. | Min. Concrete Compressive Strength, $f'_c$ (psi) | Steel Threaded Rod | |
|---|---|---|---|---|
| | | 2,500 to 8,000 | F1554 Grade 36 | A193 Grade B7 |
| | | $ØN_a$ Tension (lbs.) | $ØN_{sa}$ | $ØN_{sa}$ |
| 3/8 | 2 | 1,035 | 3,395 | 7,315 |
| | 3-3/8 | 1,745 | | |
| 1/2 | 2-1/2 | 1,740 | 6,175 | 13,315 |
| | 3-1/4 | 2,260 | | |
| | 4 | 2,780 | | |
| 5/8 | 3-1/4 | 1,465 | 9,830 | 21,190 |
| | 4-1/2 | 2,030 | | |
| | 5-5/8 | 2,540 | | |
| 3/4 | 3-3/8 | 2,285 | 14,575 | 31,405 |
| | 5-1/4 | 3,555 | | |
| | 6-3/4 | 4,575 | | |
| 7/8 | 4 | 2,870 | 20,095 | 43,315 |
| | 6 | 4,305 | | |
| | 7-7/8 | 5,655 | | |

### Shear Design Strength for T308+ Installed into Uncracked Concrete in Dry Hole Condition for Temperature Range A

**Maximum long term temperature = 75°F (24°C), Maximum short term temperature = 110°F (43°C)**

| Nominal Anchor Size (in.) | Embed. Depth $h_{ef}$ in. | Min. Concrete Compressive Strength, $f'_c$ (psi) | | | | | Steel Threaded Rod | |
|---|---|---|---|---|---|---|---|---|
| | | 2,500 | 3,000 | 4,000 | 6,000 | 8,000 | F1554 Grade 36 | A193 Grade B7 |
| | | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{sa}$ | $ØV_{sa}$ |
| 3/8 | 2 | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 | 1,765 | 3,805 |
| | 3-3/8 | 2,775 | 3,020 | 3,490 | 3,765 | 3,765 | | |
| 1/2 | 2-1/2 | 2,495 | 2,730 | 3,155 | 3,745 | 3,745 | 3,210 | 6,925 |
| | 4 | 4,530 | 4,965 | 5,735 | 5,990 | 5,990 | | |
| 5/8 | 3-1/4 | 3,735 | 3,735 | 3,735 | 3,735 | 3,735 | 5,110 | 11,020 |
| | 5-5/8 | 6,465 | 6,465 | 6,465 | 6,465 | 6,465 | | |
| 3/4 | 3-3/8 | 4,865 | 5,330 | 5,825 | 5,825 | 5,825 | 7,580 | 16,330 |
| | 6-3/4 | 11,575 | 11,645 | 11,645 | 11,645 | 11,645 | | |
| 7/8 | 4 | 4,920 | 5,390 | 6,225 | 7,620 | 8,800 | 10,450 | 22,525 |
| | 7-7/8 | 15,440 | 16,915 | 19,530 | 19,550 | 19,550 | | |

**Legend** Concrete Breakout | Bond Strength/Pryout Strength | Steel Strength

## Factored Design Strength ($ØN_n$ and $ØV_n$) in Accordance with ACI 318 Appendix D and ICC-ES AC308 Annex A:

*(Continued)*

5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. For seismic design requirements, please see ACI 318-05 Appendix D and ICC-ES AC308 Annex A, Section 3.3.
6. Special inspection must be performed where required by code or the Authority Having Jurisdiction (AHJ) See ICC-ESR-3066.
7. Tabular values are not permitted for anchors subjected to tension resulting from sustained loading. Please see ICC-ES AC308 Annex A, Section 3.3 for the supplemental design requirement for this loading condition.
8. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-05 Appendix D.
9. Interpolation is not permitted to be used with the tabular values. For other design conditions, including seismic, please see ACI 318-05 Appendix D and ICC-ES AC308 Annex A, Section 3.3.
10. Long term concrete temperatures are roughly constant over significant periods of time. Short-term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.



### Tension Design Strength for T308+ Installed into Uncracked Concrete in Dry Hole Condition for Temperature Range B (Continuous Inspection)

**Maximum long term temperature = 110°F (43°C), Maximum short term temperature = 162°F (72°C)**

| Nominal Anchor Size (in.) | Embedment Depth $h_{ef}$ in. | Min. Concrete Compressive Strength, $f'_c$ (psi) | Steel Threaded Rod | |
|---|---|---|---|---|
| | | 2,500 to 8,000 | F1554 Grade 36 | A193 Grade B7 |
| | | $ØN_a$ Tension (lbs.) | $ØN_{sa}$ | $ØN_{sa}$ |
| 3/8 | 2 | 620 | 3,395 | 7,315 |
| | 3-3/8 | 1,050 | | |
| 1/2 | 2-1/2 | 1,045 | 6,175 | 13,315 |
| | 3-1/4 | 1,360 | | |
| | 4 | 1,670 | | |
| 5/8 | 3-1/4 | 880 | 9,830 | 21,190 |
| | 4-1/2 | 1,220 | | |
| | 5-5/8 | 1,525 | | |
| 3/4 | 3-3/8 | 1,375 | 14,575 | 31,405 |
| | 5-1/4 | 2,135 | | |
| | 6-3/4 | 2,745 | | |
| 7/8 | 4 | 1,730 | 20,095 | 43,315 |
| | 6 | 2,590 | | |
| | 7-7/8 | 3,400 | | |

### Shear Design Strength for T308+ Installed into Uncracked Concrete in Dry Hole Condition for Temperature Range B

**Maximum long term temperature = 75°F (24°C), Maximum short term temperature = 162°F (72°C)**

| Nominal Anchor Size (in.) | Embed. Depth $h_{ef}$ in. | Min. Concrete Compressive Strength, $f'_c$ (psi) | | | | | Steel Threaded Rod | |
|---|---|---|---|---|---|---|---|---|
| | | 2,500 | 3,000 | 4,000 | 6,000 | 8,000 | F1554 Grade 36 | A193 Grade B7 |
| | | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{cb}$ or $ØV_{cp}$ Shear (lbs.) | $ØV_{sa}$ | $ØV_{sa}$ |
| 3/8 | 2 | 670 | 670 | 670 | 670 | 670 | 1,765 | 3,805 |
| | 3-3/8 | 2,260 | 2,260 | 2,260 | 2,260 | 2,260 | | |
| 1/2 | 2-1/2 | 2,250 | 2,250 | 2,250 | 2,250 | 2,250 | 3,210 | 6,925 |
| | 4 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | | |
| 5/8 | 3-1/4 | 2,240 | 2,240 | 2,240 | 2,240 | 2,240 | 5,110 | 11,020 |
| | 5-5/8 | 3,880 | 3,880 | 3,880 | 3,880 | 3,880 | | |
| 3/4 | 3-3/8 | 3,495 | 3,495 | 3,495 | 3,495 | 3,495 | 7,580 | 16,330 |
| | 6-3/4 | 6,990 | 6,990 | 6,990 | 6,990 | 6,990 | | |
| 7/8 | 4 | 4,920 | 5,390 | 5,975 | 5,975 | 5,975 | 10,450 | 22,525 |
| | 7-7/8 | 11,760 | 11,760 | 11,760 | 11,760 | 11,760 | | |

**Legend** Concrete Breakout; Bond Strength/Pryout Strength; Steel Strength

## Ultimate Load Capacities for T308+ Installed with ASTM A 193 Grade B7 Steel Threaded Rod into Normal-Weight Concrete[1,2,3,4] (based on bond strength/concrete capacity)

| Rod Diameter $d_{bit}$ in. | Drill Diameter $d_{bit}$ in. | Minimum Embedment Depth in. | Minimum Concrete Compressive Strength ($f'_c$) | |
|---|---|---|---|---|
| | | | 2,500 psi | 4,000 psi |
| | | | Tension lbs. | |
| 3/8 | 7/16 | 2 | 3,830 | 4,060 |
| | | 2-1/2 | 5,605 | 6,065 |
| | | 3 | 7,380 | 8,075 |
| | | 3-3/8 | 8,710 | 9,580 |
| 1/2 | 9/16 | 2-1/2 | 6,470 | 6,890 |
| | | 3 | 9,090 | 9,735 |
| | | 3-1/2 | 11,710 | 12,575 |
| | | 4 | 14,330 | 15,420 |
| 5/8 | 3/4 | 3-1/4 | 8,190 | 8,810 |
| | | 4 | 13,510 | 14,495 |
| | | 4-1/2 | 17,060 | 18,285 |
| | | 5-5/8 | 25,040 | 26,810 |
| 3/4 | 7/8 | 3-3/8 | 9,480 | 10,160 |
| | | 4-1/2 | 16,300 | 17,035 |
| | | 6 | 25,395 | 26,205 |
| | | 6-3/4 | 29,940 | 30,790 |
| 7/8 | 1 | 4 | 13,560 | 14,600 |
| | | 5 | 17,490 | 18,695 |
| | | 6 | 21,420 | 22,785 |
| | | 7-7/8 | 28,790 | 30,460 |

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
2. Allowable bond strength/concrete capacity must be checked against allowable steel strength to determine the controlling allowable load. Shear capacity is controlled by allowable steel strengths for the given conditions.
3. The tabulated data is applicable to single anchors at critical edge distance in uncracked concrete, normal-weight concrete having a compressive strength as listed. Values are for dry concrete in holes drilled with a hammer drill and an ANSI carbide drill bit. Application is limited to vertical down or horizontal installation direction. Minimum base material temperature shall be 50°F and may not exceed 110°F.
4. Linear interpolation may be used to determine ultimate loads for intermediate compressive strengths.

## Ultimate Load Capacities for T308+ Installed with ASTM A 193 Grade B7 Steel Threaded Rod Into Normal-Weight Concrete with an 1-3/4" Edge (Based on bond strength/concrete capacity)

| Rod Diameter d in. | Drill Diameter $d_{bit}$ in. | Minimum Embedment Depth in. | Minimum Edge Distance in. | Minimum Concrete Compressive Strength, $f'_c$ |
|---|---|---|---|---|
| | | | | 3,000 psi |
| | | | | Tension lbs. |
| 5/8 | 3/4 | 8 | 1-3/4 | 19,525 |

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
2. .The tabulated data is applicable to single anchors at critical spacing in uncracked, normal-weight concrete having compressing strength as listed.
3. Values are for dry concrete in holes drilled with a hammer drill and an ANSI carbide drill bit.
4. Application is limited to vertical down or horizontal installation direction.
5. Minimum base material temperature shall be 50°F and may not exceed 110°F.

c

### Ultimate Load Capacities for Steel Threaded Rod Installed with T308+ into the Block Face of Grout-Filled Concrete Masonry Walls[1,2]

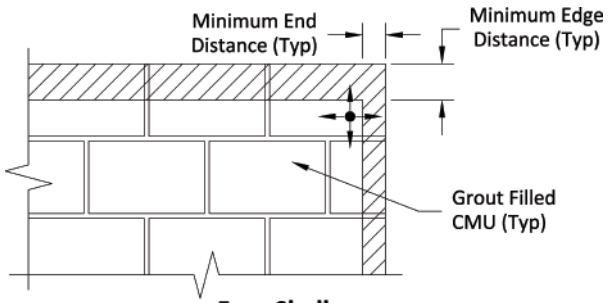
| Rod Diameter d in. (mm) | Drill Diameter $d_{bit}$ in. | Minimum Embedment Depth in. (mm) | Minimum Edge Distance in. (mm) | Minimum End Distance in. (mm) | Ultimate Load [3] | | Allowable Load | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) |
| 1/2 (12.7) | 9/16 | 4 (101.6) | 3-3/4 (95.2) | 4 (101.6) | 3,525 (15.6) | 2,950 (13.0) | 705 (3.1) | 590 (2.6) |
| 5/8 (15.9) | 3/4 | 5 (127) | 3-3/4 (95.2) | 4 (101.6) | 5,150 (22.8) | 2,950 (13.0) | 1,030 (4.5) | 590 (2.6) |

1. Tabulated load values are for anchors installed in minimum 8" wide, minimum Grade N, Type II, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90 that have reached a designated minimum compressive strength at the time of installation ($f'_m \geq 1{,}500$ psi). Mortar must be type N, S or M.
2. Anchor installations are limited to one per masonry cell. Shear loads may be applied in any direction.
3. The values listed are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.

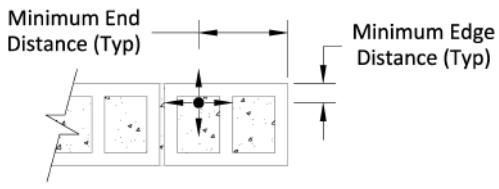
### Ultimate Load Capacities for Steel Threaded Rod Installed with T308+ into the Top of Grout-Filled Concrete Masonry Walls[1,2]

| Rod Diameter d in. (mm) | Drill Diameter $d_{bit}$ in. | Minimum Embedment Depth in. (mm) | Minimum Edge Distance in. (mm) | Minimum End Distance in. (mm) | Ultimate Load [3] | | Allowable Load | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) |
| 1/2 (12.7) | 9/16 | 4 (101.6) | 1-3/4 (44.5) | 4 (101.6) | 3,525 (15.6) | 1,400 (6.2) | 705 (3.1) | 280 (1.2) |
| 5/8 (15.9) | 3/4 | 5 (127) | 1-3/4 (44.5) | 4 (101.6) | 5,150 (22.8) | 1,400 (6.2) | 1,030 (4.5) | 280 (1.2) |

1. Tabulated load values are for anchors installed in minimum 8" wide, Grade N, Type II, lightweight, medium-weight or normal-weight masonry units conforming to ASTM C 90 that have reached a designated ultimate compressive strength at the time of installation ($f'm \geq 1{,}500$ psi). Mortar must be type N, S or M.
2. Anchor installations are limited to one per masonry cell. Shear loads may be applied in any direction.
3. The values listed are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.




**Face Shell**
**Permissible Anchor Locations**
(Un-hatched Area / Through Face Shell)

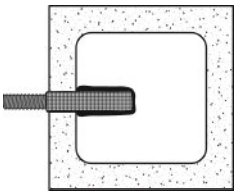



**Top of Wall**

## Capacities for Steel Threaded Rod Installed with T308+ Into Hollow Concrete Masonry Walls with Stainless Steel Screen Tubes[1,3,4]

| Rod Diameter *d* in. (mm) | Drill Diameter $d_{bit}$ (in.) | Screen Tube Length in. (mm) | Minimum End Distance in. (mm) | Minimum Edge Distance in. (mm) | Ultimate Load[2] | | Allowable Load | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) |
| 3/8 (9.5) | 1/2 | 3-1/2 (88.9) | 3-3/4 (95.2) | 3-3/4 (95.2) | 1,400 (6.2) | 1,725 (7.6) | 280 (1.2) | 345 (1.5) |
| 1/2 (12.7) | 5/8 | 3-1/2 (88.9) | 3-3/4 (95.2) | 3-3/4 (95.2) | 1,500 (6.6) | 1,725 (7.6) | 300 (1.3) | 345 (1.5) |

1. Tabulated load values are for anchors installed in minimum Type II, Grade N, lightweight concrete masonry units conforming to ASTM C90.
2. The values listed are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
3. Anchor installations are limited to one per masonry cell. Shear loads may be applied in any direction.
4. The consistency of hollow concrete block masonry base materials can vary greatly. Consideration of job site testing should be given to verify conformance of base materials and anchor performance in actual conditions.



## PERFORMANCE DATA

### Allowable Bond Strength Capacities for Threaded Rods and Reinforcing Bars for T308+ Epoxy Installed in Unreinforced Masonry[1,2]

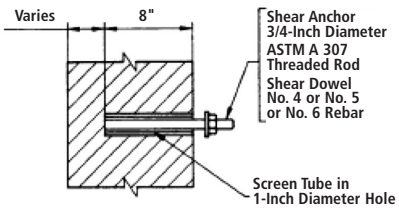



Figure 1

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

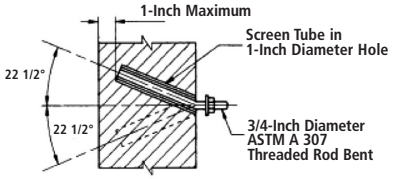



Figure 2

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

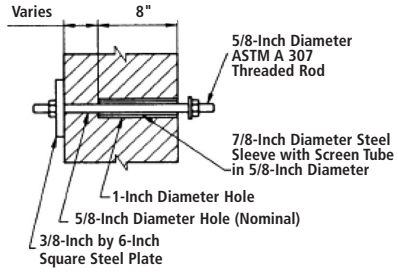



Figure 3

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

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

### Spacing and Edge Distance Requirements for T308+ Epoxy Adhesive Installed in Unreinforced Masonry

| Anchor Description | Minimum Vertical Spacing in. | Minimum Horizontal Spacing in. | Minimum Edge Distance in. |
|---|---|---|---|
| Shear Anchor Configuration A – (See Figure 1) | 18 | 18 | 24 |
| 22-1/2° Combination Anchor Configuration B – (See Figure 2) | 18 | 24 | 16 |
| Through-bolt Anchor Configuration C – (See Figure 3) | 18 | 18 | 24 |

## ORDERING INFORMATION

### T308+ Cartridges

| Cat No. | Description | Std. Carton | Pallet |
|---|---|---|---|
| 8558SD | T308+ 8.5 fl. oz. Quik-Shot Cartridge (15.3 in³) | 12 | 432 |
| 8503SD | T308+ 14 fl. oz. Side by Side Cartridge (25.0 in³) | 12 | 960 |
| 8523SD | T308+ 21.5 fl. oz. Side by Side Cartridge (38.5 in³) | 12 | 432 |
| 8536SD | T308+ 51 fl. oz. Side by Side Cartridge (92.0 in³) | 8 | 216 |

One T308+ mixing nozzle is packaged with each cartridge.
T308+ mixing nozzles must be used to ensure complete and proper mixing of the adhesive.

### Cartridge System Mixing Nozzles

| Cat No. | Description | Std. Pack/Box | Std. Carton |
|---|---|---|---|
| 07908 | Extra mixing nozzle for T308+ (with a 9" extension) | 2 | 24 |
| 07919 | Extra mixing nozzle for T308+ (bulk quantity) | - | 400 |
| 08921 | Extra turbo nozzle for T308+ (51oz.) | 2 | 12 |

### Dispensing Tools for Injection Adhesive

| Cat No. | Description | Std. Box | Std. Carton |
|---|---|---|---|
| 08409 | 21.5 fl. oz. Standard metal manual tool | 1 | 10 |
| 08437 | 10 fl. oz. Heavy duty metal caulking gun (Quik-Shot) | 1 | 12 |
| 08479 | 10 fl. oz. High performance caulking gun (Quik-Shot) | 1 | 10 |
| 08415 | 14 fl. oz. High performance manual tool | 1 | 10 |
| 08416 | 14 fl. oz. Standard metal manual tooll | 1 | 10 |
| 08421 | 21.5 fl. oz. High performance manual tool | 1 | 10 |
| 08442 | 21.5 fl. oz. Battery powered tool (cordless) | 1 | - |
| 08438 | 51 fl. oz. High performance pnuematic tool | 1 | - |

### T308+ Epoxy Adhesive Anchor System Components

## ORDERING INFORMATION (Continued)

### Nylon Brushes for Hole Cleaning

| Cat No. | Description | Brush Length | Std. Carton |
|---|---|---|---|
| 07931 | 1/2″ diameter nylon brush | 8-1/2″ | 1 |
| 07932 | 3/4″ diameter nylon brush | 8-1/2″ | 1 |
| 07933 | 1″ diameter nylon brush | 12″ | 1 |
| 07934 | 1-1/4″ diameter nylon brush | 13″ | 1 |
| 08292 | Air compressor nozzle with extension | - | 1 |

### Plastic Screen Tubes

| Cat. No. | Description | Drill Diameter | Standard Carton |
|---|---|---|---|
| 08310 | 3/8″ x 3-1/2″ Plastic Screen | 1/2″ | 25 |
| 08311 | 3/8″ x 6″ Plastic Screen | 1/2″ | 25 |
| 08313 | 3/8″ x 8″ Plastic Screen | 1/2″ | 25 |
| 08315 | 1/2″ x 3-1/2″ Plastic Screen | 3/4″ | 25 |
| 08317 | 1/2″ x 6″ Plastic Screen | 3/4″ | 25 |

### Stainless Steel Screen Tubes

| Cat. No. | Description | Drill Diameter | Standard Carton |
|---|---|---|---|
| 07961 | 3/8" x 3 1/2" Screen Tube* | 1/2" | 25 |
| 07962 | 3/8" x 6" Screen Tube* | 1/2" | 25 |
| 07963 | 3/8" x 8" Screen Tube* | 1/2" | 25 |
| 07964 | 3/8" x 10" Screen Tube* | 1/2" | 25 |
| 07959 | 3/8" x 12" Screen Tube* | 1/2" | 25 |
| 07965 | 1/2" x 3 1/2" Screen Tube | 5/8" | 25 |
| 07966 | 1/2" x 6" Screen Tube | 5/8" | 25 |
| 07967 | 1/2" x 8" Screen Tube* | 5/8" | 25 |
| 07968 | 1/2" x 10" Screen Tube* | 5/8" | 25 |

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