Post Tension Plugs
The New Standard

OVERVIEW

POWERFUL.
WATERPFOOF.
THE NEW STANDARD.

POST TENSION PLUG See Image 1

The Post Tension Plug is designed to create a 100% watertight line of defense at the tendon's stressing end. The PT Plug is made of high-strength, non-shrink, non-metallic grout (8000 PSI compressive strength at 28 days that complies with ASTM C-1107) and is precasted to fit into the tendon's stressing pocket after the pocket is abraded using the Post Tension Plug Reaming Tool. The Post Tension Plug's 1" of coverage ensures that the tendon is cut correctly and the grease cap is properly seated.

PLUG REAMING TOOL See Image 2

The Reaming tool's diamond plated teeth are designed to roughen the inside pocket, remove any grease coating, and create a uniform circumference that emulates the shape of the Post Tension Plug. When used properly, the combination of the reaming tool, Post Tension Plug, and a high-strength, two-part, non-sag epoxy creates a watertight seal that exceeds the capacities of traditional grouting in all measures.

Image 1

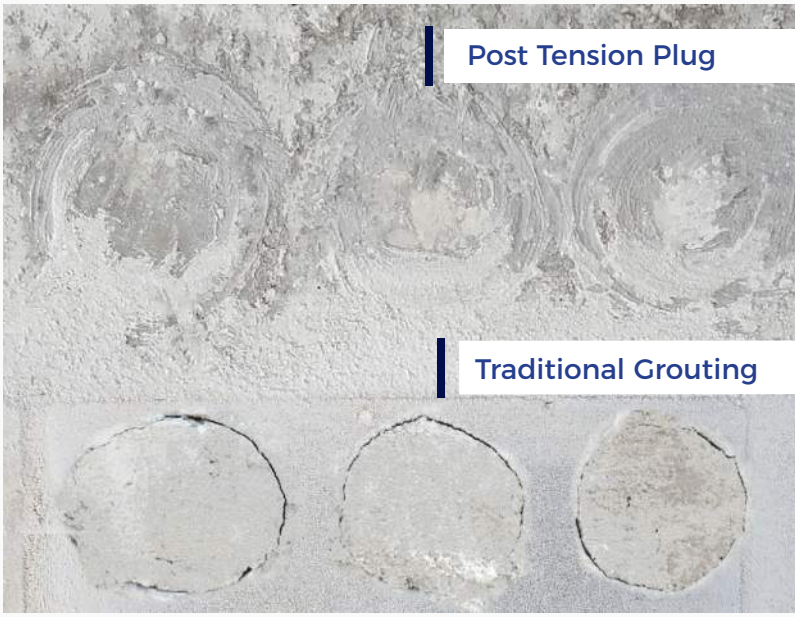
Image 2

APPLICATION

The Post Tension Plug is used at the stressing end of a Post Tension cable after the cables has been stressed, cut, and the grease cap has been applied.

ADVANTAGES

- 100% Watertight
- Mininmum coverage requirement is achieved
- Ensures cables are cut correctly
- Roughens surface for bonding purposes
- Decontaminates the pocket of grease and laitance
- Eliminates the chance of PT corrosion by rainfall
- Better defense against corrosion in all climates
- Zero Shrinkage
- Complies with ACI and PTI Standards below
- Fits flush to slab edge



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TECHNICAL INFO

	POST TENSION PLUG	VS.	TRADITIONAL GROUTING
WATER PRESSURE TEST **PROCEDURE** Water pressure was applied to the back of failure (leakage or burst) occurred	**464 PSI**	—	5 PSI
SUBMERSION TEST **PROCEDURE** Testing subjects were submerged in 6” of water to test for water ingress. The subjects monitored periodically for leaks at thirtyseconds, two minutes, ten minutes minutes,one hour, four hours, and eight hour intervals.	**WATER ENTRY** **NO** ✓ **NO** ✓ **NO** ✓ **NO** ✓ **NO** ✓ **NO** ✓	30 SEC 2 MIN 10 MIN 1 HR 4 HR 8 HR	WATER ENTRY ⊘ YES ⊘ YES ⊘ YES ⊘ YES ⊘ YES ⊘ YES
LOAD TEST **PROCEDURE** Samples were subjected to a typical static test to examine the load strength of the Post Tension Plug and Grout.	**2,552.5 (LBS.)**	—	605 (lbs.)
RAIN SIMULATION TEST **PROCEDURE** Both samples were tested for water ingression through the process of a rain simulation. The test is complete when water enters either the traditional grouted sample or the Post Tension Plug. The samples were set horizontally to simulate a real slab edge. The test was set for a duration of a continuous eight hour rain.	After 8 hours of continuous rainfall water did not enter the PT cavity.	—	Water Entered The pocket after 1-2 hours of rainfall.

Testing Overview	WATER PRESSURE TEST	SUBMERSION TEST	LOAD TEST	RAIN SIMULATION
POST TENSION PLUG	✓	✓	✓	✓
TRADITIONAL GROUTING	⊘	⊘	⊘	⊘

The following tests were conducted at **APPLIED TECHNICAL SERVICES, INCOPRATED** and were determined at laboratory conditions.

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PACKAGING & YIELD

- Post Tension Plugs are packaged in 5 gallon buckets.
- One 5 gallon bucket will seal 75 tendon ends.

SPECIFICATIONS & COMPLIANCES

- Complies with preparation and minimum coverage requirements in ACI 301-10 Specifications for Structural Concrete.
- Complies with preparation and minimum coverage requirements in PTI M10.2-17, Specifications for Single Strand Tendons
- Post Tension Plugs are casted with a high-strength, non-shrink, non-metallic grout that complies with ASTM C-1107

DIRECTIONS FOR USE

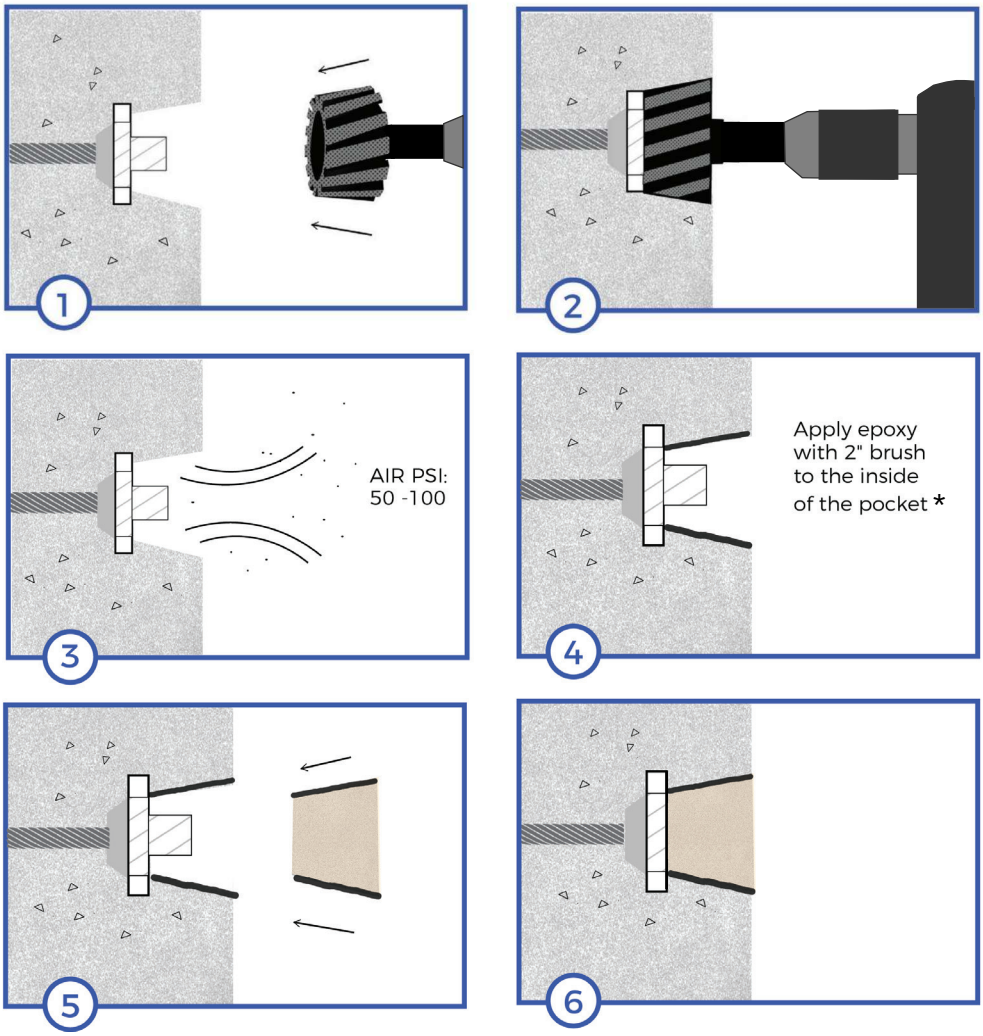
- Place the reaming tool on a right-angle drill and set to a speed that suits the user (600-1200 RPM).
- With the drill on, place the reaming tool into the stressing pocket until the tool is flush with the slab edge. This process shapes the pocket into a uniform profile that emulates the precast plug.
- After the pocket is reamed, use a hand blower or brush to clear the pocket of any dust left over from grinding the inside of the pocket.
- Lastly, apply epoxy onto the entire circumference of the Post Tension Plug and press the plug until flush with the slab edge.

The Post Tension Plug's 1'' of coverage ensures that the tendon has been cut correctly and the grease cap has been properly seated.

The reaming tool is designed with a 1" recess so the user will never damaged the tendon end or grease cap.

Insert the reaming tool into the cavity until the top of the reaming tool is flush with the slab edge. This will remove 1/16" of the inside of the cavity and will create a clean & roughened surface that is most suitable for bonding. After the pocket has been roughened by the reaming tool, remove the dust with a blower or brush. Figure 1-3

Apply epoxy into the reamed out cavity with a 2" paintbrush. Next, apply additional epoxy to the Post Tension Plug and insert the plug until flush with slab edge. Spread with any excess epoxy around the circumference of the plug to create a 100% watertight line of the denfense. Figure 4-6



*Painting epoxy inside the pocket is only necessary for remediation projects, where the removal of the grout often causes large deformities inside the pockets.

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LIMITATIONS

Do not use in temperatures that exceed epoxy specifications

CLEAN UP

Clean mixing tools with towel and solvent mixture if necessary. Do not allow epoxy to harden on equipment.

WARRANTY

Post Tension Plugs L.L.C (PTP) warrants to the Buyer that this product is in good quality and conforms to the manufacturer's specifications. PTP shall not be liable for any injury, loss, cost of labor or consequential damages either directly, indirectly, or incidentally, arising out of the use or misuse of any product sold by PTP or another distributor. Post Tension Plugs takes no responsibility or liability for any damage due to poor installation. Damaged plugs may be replaced at no additional cost. Do not use plugs tht are damaged.

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Manufactured in the U.S.A by Post Tension Plugs L.L.C

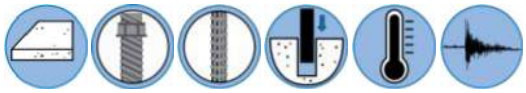
MADE IN THE USA

Miami, Fl 33129
(954)-270-7607

2018 MIP most innovative products AT WORLD OF CONCRETE

www.posttensionplugs.com

ULTRABOND® 2



Product Description

ULTRABOND® 2 is a two-component, 1:1 mix ratio, structural epoxy system that offers exceptional strength in anchoring and doweling applications and can be used in temperatures from 40 °F to 110 °F (4 °C to 43 °C). It has been tested in accordance with ASTM E488 and ASTM E1512 for its capability to resist static, dynamic, seismic and wind loads in uncracked concrete for both threaded rod and rebar.

General Uses & Applications

- Anchoring threaded rod into uncracked concrete
- Short and long term tensile anchoring, including wind, seismic and shear forces in accordance with allowable stress design (ASD)
- Grouting dowel bars and tie bars for full depth concrete pavement repairs

Advantages & Features

- Extended working time
- Moisture insensitive allowing installation and curing in damp environments
- In-service temperature range between 35 °F (2 °C) and 180 °F (82 °C)
- Withstands freeze-thaw conditions
- Little or no odor
- High modulus

Availability: Adhesives Technology Corp. (ATC) products are available through select distributors providing you with all your construction needs. Please contact ATC for a distributor near you or visit our website at www.atcepoxy.com to search by zip code.

STANDARDS & APPROVALS

Multiple DOT Listings

(See ATC website for current list of Department of Transportation approvals throughout the United States)

Color & Ratio: Part A (Resin): White, Part B (Hardener): Black, Mixed: Concrete Gray, Mix Ratio: 1:1 by volume.

Storage & Shelf Life: 28 months when stored in unopened containers in dry conditions. Store between 40 °F (4 °C) and 95 °F (35 °C).

Installation & Estimation: See Manufacturer's Printed Installation Instructions (MPII) available within this Technical Data Sheet (TDS). Due to occasional updates and revisions, always verify that you are using the most current version of the MPII. In order to achieve maximum results, proper installation is imperative. An estimating guide for product usage can be can be found at www.atcepoxy.com.

Clean Up: Always wear appropriate protective equipment such as safety glasses and gloves. Clean uncured materials from tools and equipment with mild solvent. Cured material can only be removed mechanically.

Limitations & Warnings:

- Do not thin with solvents, as this may affect cure
- For anchoring applications, concrete should be a minimum of 21 days old prior to anchor installation
- Not recommended for any application where there may be a sustained tensile load, including overhead applications
- Performance characteristics, such as seismic and long term load resistance, were tested in accordance with ASTM E488-96 (2003) & E1512-01 (2015) provisions and not that of ACI 355.4, and are therefore not applicable in the concrete tension zone - always consult with a design professional prior to use to ensure product applicability

Safety: Please refer to the Safety Data Sheet (SDS) for ULTRABOND 2 published on our website or call ATC for more information at 1-800-892-1880.

Specification: Anchoring adhesive shall be a two component, 1:1 ratio, high viscosity, solvent free epoxy system supplied in pre-measured containers. Epoxy must have a compressive yield strength of 10,688 psi (73.7 MPa) at 75 °F after a 7 day cure. Shelf life must be a minimum of 28 months. Adhesive shall be ULTRABOND 2 from Adhesives Technology Corp., Pompano Beach, Florida. Anchors shall be installed per the Manufacturer's Printed Installation Instructions (MPII) for ULTRABOND 2 anchoring epoxy.

ORDERING INFORMATION

A22-2N

TM22HD

TABLE 1: ULTRABOND 2 Adhesive, Dispensing Tools and Mixing Nozzles

Package Size	21.2 oz. (627 ml) Cartridge
Part #	A22-2N
Manual Dispensing Tool	TM22HD
Pneumatic Dispensing Tool	TA22HD-A
Case Qty.	12
Pallet Qty.	576
Pallet Weight (lbs.)	1,578
Recommended Mixing Nozzle	T3438C[1]

1. For projects with hole diameters greater than 3/4 in. the T3412CT can be used on A22-2N cartridge.

TA22HD-A

T3438C

HBHT HBEXT

HB100

TABLE 2: Wire Brushes, Handles and Adapters

Part #	Threaded Rod Diameter in.	Rebar Diameter	Nominal Brush Diameter in.	Minimum Brush Diameter in.	Qty.
HB038	3/8	#3	5/8	0.563	1
HB012	1/2	#4	3/4	0.675	1
HB058	5/8	#5	1	0.900	1
HB034	3/4	#6	1 1/4	1.125	1
HB078	7/8	#7	1 1/2	1.350	1
HB100	1	#8	1 5/8	1.463	1
HB125	1 1/4	----	1 3/4	1.575	1
HBHT	Steel brush 12" usable extension with T-Handle (manual)				1
HBEXT	Steel brush 12" usable extension with SDS + drill adaptor				1

MATERIAL SPECIFICATION

TABLE 3: ULTRABOND 2 performance to **ASTM C881-14**[1]

Property	Cure Time	ASTM Standard	Units	Sample Conditioning Temperature Class C 75 °F (24) °C
Gel Time - 60 Gram Mass	----	C881	min	12
Compressive Yield Strength	7 day	D695	psi (MPa)	10,688 (73.7)
Tensile Strength		D638	psi (MPa)	545 (3.8)
Tensile Elongation			%	6.0
Consistency or Viscosity	----	C881	----	Non-sag

1. Results based on testing conducted on a representative lot(s) of product. Average results will vary according to the tolerances of the given property.

TABLE 4: ULTRABOND 2 **CURE SCHEDULE**[1,2,3]

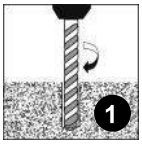
Base Material Temperature °F (°C)	Working Time	Full Cure Time
40 (4)	60 min	72 hr
75 (24)	28 min	48 hr
110 (43)	12 min	24 hr

1. Working and full cure times are approximate, may be linearly interpolated between listed temperatures and are based on cartridge/nozzle system performance.
2. Application Temperature: Substrate and ambient air temperature should be from 40 °F - 110 °F (4 °C - 43 °C).
3. When ambient or base material temperature falls below 70 °F (21 °C), condition the adhesive to 70 °F - 75 °F (21 °C - 24 °C) prior to use.

Revision 8.0

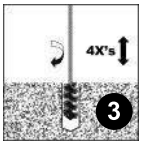
INSTALLATION INSTRUCTIONS (MPII)

Drilling and Cleaning



Using a rotary hammer drill, and a bit which conforms to ANSI B212.15 and is the appropriate size for the anchor diameter to be installed, drill the hole to the specified embedment depth. **CAUTION:** Always wear appropriate personal protection equipment (PPE) for eyes, ears & skin and avoid inhalation of dust during the drilling and cleaning process. Refer to the Safety Data Sheet (SDS) for details prior to proceeding.

NOTE: Remove any standing water from hole prior to beginning the cleaning process. If removal of standing water is not possible, please contact ATC for application specific installation instructions. Using oil free compressed air with a minimum pressure of 80 psi (5.5 bar), insert the air wand to the bottom of the drilled hole and blow out the debris with an up/down motion for a minimum of 4 seconds/cycles (4X).



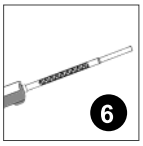
Select the correct wire brush size for the drilled hole diameter (see Table 2), making sure that the brush is long enough to reach the bottom of the drilled hole. Reaching the bottom of the hole, brush in an up/down and twisting motion for 4 cycles (4X). **CAUTION:** The brush should contact the walls of the hole. If it does not, the brush is either too worn or small and should be replaced with a new brush of the correct diameter.

Blow the hole out once more to remove brush debris using oil free compressed air with a minimum pressure of 80 psi (5.5 bar). Insert the air wand to the bottom of the drilled hole and blow out the debris with an up/down motion for a minimum of 4 seconds/cycles (4X). Visually inspect the hole to confirm it is clean.

NOTE: If installation will be delayed for any reason, cover cleaned holes to prevent contamination.

Cartridge Preparation

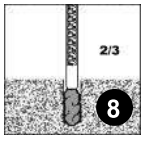
CAUTION: Check the expiration date on the cartridge to ensure it is not expired. **Do not use expired product!** Remove the protective cap from the adhesive cartridge and insert the cartridge into the recommended dispensing tool. Before attaching mixing nozzle, balance the cartridge by dispensing a small amount of material until both components are flowing evenly. For a cleaner environment, hand mix the two components and let cure prior to disposal in accordance with local regulations.



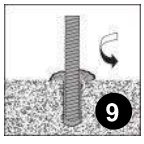
Only after the cartridge has been balanced, screw on the proper ATC mixing nozzle to the cartridge (see Table 1). Do not modify mixing nozzle and confirm that internal mixing element is in place prior to dispensing adhesive. Take note of the air and base material temperatures and review the working/full cure time chart (see Table 4) prior to starting the injection process.

Dispense the initial amount of material from the mixing nozzle onto a disposable surface until the product is a uniform gray color with no streaks, as adhesive must be properly mixed in order to perform as published. Dispose of the initial amount of adhesive according to local regulations prior to injection into the drill hole. **CAUTION:** When changing cartridges, never re-use nozzles. A new nozzle should be used with each new cartridge and steps 5-7 should be repeated accordingly.

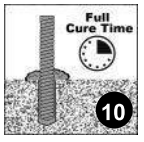
Installation and Curing (Vertical Down and Horizontal)



NOTE: The engineering drawings must be followed. For any applications not covered by this document, or if there are any installation questions, please contact Adhesives Technology Corp. Insert the mixing nozzle to the bottom of the hole and fill from the bottom to the top approximately two-thirds full, being careful not to withdraw the nozzle too quickly as this may trap air in the adhesive. **NOTE:** When using a pneumatic dispensing tool, ensure that pressure is set at 90 psi (6.2 bar) maximum.



Prior to inserting the threaded rod or rebar into the hole, make sure it is clean and free of oil and dirt and that the necessary embedment depth is marked on the anchor element. Insert the anchor element into the hole while turning 1 - 2 rotations prior to the anchor reaching the bottom of the hole. Excess adhesive should be visible on all sides of the fully installed anchor. For horizontal installations, wedges should be used to center and support the anchor while the adhesive is curing. **CAUTION:** Use extra care with deep embedment or high temperature installations to ensure that the working time has not elapsed prior to the anchor being fully installed.



Do not disturb, torque or apply any load to the installed anchor until the specified full cure time has passed. The amount of time needed to reach full cure is base material temperature and moisture dependent - refer to Table 4 for appropriate full cure time.

TABLE 5: ULTRABOND 2 **IN-SERVICE CHART**[1]

Base Material Temperature °F (°C)	Allowable Load Capacity Reduction Factor
35 (2)	1.00
70 (21)	1.00
110 (43)	1.00
135 (57)	0.79
150 (66)	0.79
180 (82)	0.65

1. Reduction factors may be linearly interpolated between listed temperatures.

TABLE 6: ULTRABOND 2 ultimate and allowable **TENSION** loads for **THREADED ROD** in normal-weight concrete[1,2]

Threaded Rod Diameter in.	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Tension Load Based on Bond Strength/Concrete Capacity				Allowable Tension Load Based on Steel Strength[3]		
			$f'_c \geq 2{,}000$ psi (20.7 MPa)[4]		$f'_c \geq 4{,}000$ psi (27.6 MPa)[4]		ASTM F1554 Grade 36 lbs. (kN)	ASTM A193 Grade B7 lbs. (kN)	ASTM F593 304/316 SS lbs. (kN)
			Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)			
3/8	7/16	3 1/2 (89)	8,637 (38.4)	2,159 (9.6)	8,637 (38.4)	2,159 (9.6)	2,114 (9.4)	4,556 (20.3)	3,645 (16.2)
1/2	9/16	4 1/2 (114)	17,076 (76.0)	4,269 (19.0)	17,953 (79.9)	4,488 (20.0)	3,758 (16.7)	8,099 (36.0)	6,480 (28.8)
5/8	3/4	5 5/8 (143)	23,865 (106.2)	5,966 (26.5)	28,356 (126.1)	7,089 (31.5)	5,872 (26.1)	12,655 (56.3)	10,124 (45.0)
3/4	7/8	6 3/4 (171)	31,371 (139.5)	7,843 (34.9)	38,709 (172.2)	9,677 (43.0)	8,456 (37.6)	18,224 (81.1)	12,392 (55.1)
7/8	1	7 7/8 (200)	39,532 (175.8)	9,883 (44.0)	48,410 (215.3)	12,103 (53.8)	11,509 (51.2)	24,804 (110.3)	16,867 (75.0)
1	1 1/8	9 (229)	48,299 (214.8)	12,075 (53.7)	60,648 (269.8)	15,162 (67.4)	15,033 (66.9)	32,398 (144.1)	22,030 (98.0)
1 1/4	1 3/8	11.25 (286)	67,500 (300.3)	16,875 (75.1)	90,626 (403.1)	22,657 (100.8)	23,488 (104.5)	50,621 (225.2)	34,423 (153.1)

1. Allowable bond strength/concrete capacity was calculated using a safety factor of 4.0.
2. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable tension value for design.
3. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Tensile = $0.33*F_u*A_{nom}$.
4. Linear interpolation may be used for intermediate concrete compressive strengths.

TECHNICAL DATA

ASD Allowable Stress Design

TABLE 7: ULTRABOND 2 ultimate and allowable **SHEAR** loads for **THREADED ROD** in normal-weight concrete[1,2]

Threaded Rod Diameter in.	Nominal Drill Bit Diameter in.	Embedment Depth in. (mm)	Shear Load Based on Bond Strength/Concrete Capacity		Allowable Shear Load Based on Steel Strength[3]		
			$f'_c \geq 2{,}000$ psi (20.7 MPa)[4]		ASTM F1554 Grade 36 lbs. (kN)	ASTM A193 Grade B7 lbs. (kN)	ASTM F593 304/316 SS lbs. (kN)
			Ultimate lbs. (kN)	Allowable lbs. (kN)			
1/2	9/16	4 1/2 (114)	13,090 (58.2)	3,273 (14.6)	1,936 (8.6)	4,172 (18.6)	3,338 (14.8)
5/8	3/4	5 5/8 (143)	20,892 (92.9)	5,223 (23.2)	3,025 (13.5)	6,519 (29.0)	5,216 (23.2)
3/4	7/8	6 3/4 (171)	31,721 (141.1)	7,930 (35.3)	4,356 (19.4)	9,388 (41.8)	6,384 (28.4)
7/8	1	7 7/8 (200)	36,577 (162.7)	9,144 (40.7)	5,929 (26.4)	12,778 (56.8)	8,689 (38.7)
1	1 1/8	9 (229)	53,165 (236.5)	13,291 (59.1)	7,744 (34.4)	16,690 (74.2)	11,349 (50.5)
1 1/4	1 3/8	11 1/4 (286)	83,052 (369.4)	20,763 (92.4)	12,100 (53.8)	26,078 (116.0)	17,733 (78.9)

1. Allowable bond strength/concrete capacity was calculated using a safety factor of 4.0.
2. The lower value of either the allowable bond strength/concrete capacity or steel strength should be used as the allowable shear value for design.
3. Allowable steel strengths calculated in accordance with AISC Manual of Steel Construction: Shear = $0.17*F_u*A_{nom}$.