

# PRODUCT SUBMITTAL / SUBSTITUTION REQUEST

TO:

PROJECT:

SPECIFIED ITEM:

Section

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Description

## PRODUCT SUBMITTAL / SUBSTITUTION REQUESTED:

Tapper+ Screw Anchor in Uncracked Concrete by Powers Fasteners, Inc.

Code listed as given in ICC-ES ESR-3068 ([www.powers.com](http://www.powers.com))

*The attached submittal package includes the product description, specifications, drawings, and performance data for use in the evaluation of the request.*

## SUBMITTED BY:

Name:

Signature:

Company:

Address:

Date:

Telephone:

Fax:

## FOR USE BY THE ARCHITECT AND/OR ENGINEER

**Approved**     **Approved as Noted**     **Not Approved**

*(If not approved, please briefly explain why the product was not accepted.)*

By:

Date:

Remarks:

**Tapper+ Concrete Screw Anchor**

**PRODUCT DESCRIPTION**

The Tapper+ fastening system is a complete family of screw anchors for light to medium duty applications in concrete, masonry block, brick, and wood base materials. The Tapper+ is fast and easy to install and provides a neat, finished appearance. The Tapper+ screw anchor is engineered with matched tolerance drill bits and installation tools designed to meet the needs of the user and also provide optimum performance. The Tapper+ features a gimlet point for self-drilling into wood base materials without pre-drilling.

The Tapper+ screw anchor is available in carbon steel with a Perma-Seal climate coating in several colors. Head styles include a slotted hex washer head, Phillips flat head, trim Phillips flat head and Hex flange washer head.

**GENERAL APPLICATIONS AND USES**

**Perma-Seal Tappers+**

- Window installations
- Interior hand rails
- Metal door frames
- Joint flashing
- Storm shutters
- Interior lighting fixtures
- Thresholds
- Screened Enclosures

**FEATURES AND BENEFITS**

- + Available in several head styles
- + Several colors and finishes to match application
- + Removable (reusable in wood)
- + High-low thread design for greater stability and grip
- + Does not exert expansion forces
- + No hole spotting required
- + Good corrosion protection with Perma-Seal coating
- + Gimlet point for self drilling into wood base material

**APPROVALS**

International Code Council, Evaluation Service (ICC-ES), ESR-3068 for uncracked concrete. Code compliant with the 2009 IBC, 2009 IRC, 2006 IBC, 2006 IRC, 2003 IBC, 2003 IRC and 1997 UBC  
Compliant with the 2007 Florida building code (Building and Residential)  
Tested in accordance with ACI 355.2 and ICC-ES AC193 for use in structural concrete, ICC-ES AC106 for use in masonry, ICC-ES AC233 for use in wood, and ICC-ES AC257 for use in pressure treated lumber  
Evaluated and qualified by an accredited independent testing laboratory for reliability against brittle failure, e.g. hydrogen embrittlement  
Miami-Dade County Notice of Acceptance (NOA) 10-0505.05

**GUIDE SPECIFICATIONS**

**CSI Divisions: 03151-Concrete Anchoring, 04081-Masonry Anchorage and 05090-Metal Fastenings.** Concrete Screw Anchors shall be Tapper+ anchors as supplied by Powers Fasteners, Inc., Brewster, NY.

**MATERIAL SPECIFICATIONS**

Anchor Component	Perma-Seal Tapper
Anchor Body	Case hardened carbon steel
Coating/Plating/Finish	Perma-Seal coating (various colors)

**INSTALLATION SPECIFICATIONS**

**Perma-Seal Carbon Steel Hex Head Tapper+**

Dimension	Anchor Diameter, <i>d</i>	
	3/16"	1/4"
Tapper Drill Bit Size, <i>d<sub>bit</sub></i> (in.)	5/32	3/16
Fixture Clearance Hole, <i>d<sub>h</sub></i> (in.)	1/4	5/16
Head Height (in.)	7/64	9/64
Hex Head Wrench/Socket Size	1/4	5/16
Washer O.D., <i>d<sub>w</sub></i> (in.)	11/32	13/32
Washer Thickness, (in.)	1/32	1/32

1/4" flange hex head parts have a washer O.D. of 39/64".

**Perma-Seal Carbon Steel Flat Head Tapper+**

Dimension	Anchor Diameter, <i>d</i>	
	3/16"	1/4"
Tapper Drill Bit Size, <i>d<sub>bit</sub></i> (in.)	5/32	3/16
Fixture Clearance Hole, <i>d<sub>h</sub></i> (in.)	1/4	5/16
Phillips Head O.D., (in.)	3/8	1/2
Phillips Head Height, (in.)	9/64	3/16
Phillips Bit Size (No.)	2	3

1/4" trim flat head parts have a head height of 5/32" and a head width of 13/32".

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Perma-Seal Coated Carbon Steel Tapper+

**ANCHOR MATERIALS**

Carbon Steel with Perma-Seal Coating

**ANCHOR SIZE RANGE (TYP.)**

3/16" diameter x 1-1/4" length to  
1/4" diameter x 6" length

**SUITABLE BASE MATERIALS**

- Normal-weight Concrete
- Structural Lightweight Concrete
- Grouted Concrete Masonry (CMU)
- Hollow Concrete Masonry (Lightweight & Normal weight)
- Solid Brick Masonry
- Wood

This Product Available In

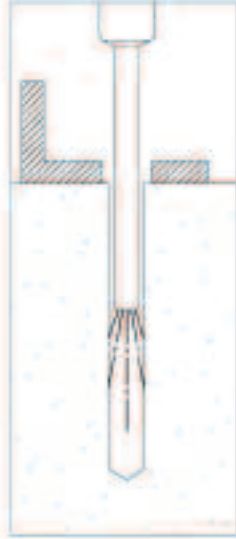


**Powers Design Assist**  
Real Time Anchor Design Software  
[www.powersdesignassist.com](http://www.powersdesignassist.com)

**Installation Procedure**



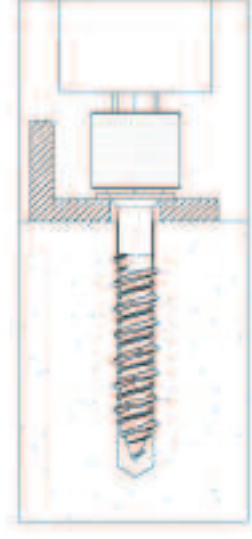
1.) Using the proper Tapper+ drill bit size, drill a hole into the base material to the required depth. The tolerances of the Tapper+ bit used must meet the requirements of the published range in Table 1.



2.) Remove dust and debris from hole using a hand pump, compressed air or a vacuum to remove loose particles left from drilling.



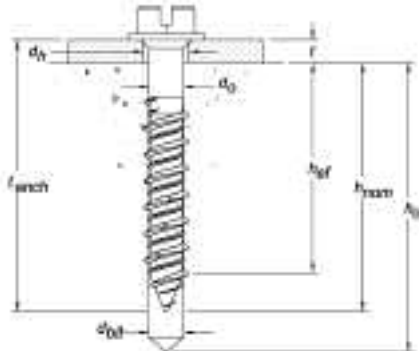
3.) Attach a Tapper 1000 installation socket tool for the selected anchor size to a percussion drill and set the drill to rotary only mode. Mount the screw anchor head into the socket. For flat head versions a phillips bit tip must be used with the socket tool.



4.) Place the point of the Tapper+ anchor through the fixture into the predrilled hole and drive the anchor until it is fully seated at the proper embedment. The socket tool will automatically disengage from the head of the Tapper+.

Note: Step #1 and #2 not applicable for wood base materials, drill bit not applicable for wood base materials.

**Tapper+ Anchor Detail**



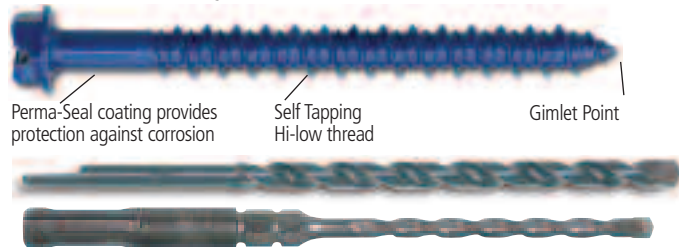
(Slotted hex head version pictured, flat head length measured from bottom of head to tip of anchor)

**Head Marking**



**Legend**  
'P' Marking = Powers Tapper +  
'+' Symbol = Strength Design Compliant Anchor Length Identification Mark

**Matched Tolerance System**



Designed and tested as a system for consistency and reliability

**Tapper+ Length Code Identification System**

Length ID marking on head		□	A	B	C	D	E	F	G	H	I	J
Overall anchor length $l_{\text{anchor}}$ (inches)	From	1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6
	Up to but not including	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2

**INSTALLATION SPECIFICATIONS**
**Installation Table for Tapper+ in Concrete (Design Provisions of ACI 318 Appendix D)**


Anchor Property/Setting Information	Notation	Units	Nominal Anchor Size (in.)	
			3/16	1/4
Nominal outside anchor diameter	$d_a [d_o]^1$	in. (mm)	0.145 (3.7)	0.185 (4.7)
Nominal drill bit diameter	$d_{bit}$	in. (mm)	3/16 Tapper+ bit	1/4 Tapper+ bit
Tapper+ bit tolerance range	-	in.	0.170 to 0.176	0.202 to 0.207
Minimum nominal embedment depth	$h_{nom}$	in. (mm)	1-3/4 (44.4)	1-3/4 (44.4)
Effective embedment	$h_{ef}$	in. (mm)	1.23 (31.2)	1.23 (31.2)
Minimum hole depth	$h_o$	in. (mm)	2 (50.8)	2 (50.8)
Minimum concrete member thickness	$h_{min}$	in. (mm)	3-1/4 (82.5)	3-1/4 (82.5)
Minimum edge distance	$c_{min}$	in. (mm)	1-3/4 (44.4)	1-3/4 (44.4)
Minimum spacing distance	$s_{min}$	in. (mm)	1 (25.4)	2 (50.8)
Critical edge distance	$c_{ac}$	in. (mm)	3 (76.2)	3 (76.2)

**Installation Table for Tapper+ in Masonry**

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Size (in.)	
			3/16	1/4
Nominal outside anchor diameter	$d$	in. (mm)	0.145 (3.7)	0.185 (4.7)
Nominal drill bit diameter	$d_{bit}$	in. (mm)	3/16 Tapper+ bit	1/4 Tapper+ bit
Tapper+ bit tolerance range	-	in.	0.170 to 0.176	0.202 to 0.207
Minimum nominal embedment depth	$h_v$	in. (mm)	1-1/2 (38.1)	1-1/2 (38.1)
Minimum hole depth	$h_o$	in. (mm)	2 (50.8)	2 (50.8)

**Installation Table for Tapper+ in Wood**

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Size (in.)	
			3/16	1/4
Nominal outside anchor diameter	$d_o$	in. (mm)	0.145 (3.7)	0.185 (4.7)
Nominal drill bit diameter	$d_{bit}$	in. (mm)	Pre-drilling is not required for Tapper+ into wood	

1. Notation in parenthesis is for the 2006 IBC.

**STRENGTH DESIGN PERFORMANCE DATA**

**TENSION DESIGN INFORMATION FOR TAPPER+ ANCHOR IN CONCRETE**  
(For use with load combinations taken from ACI 318, Section 9.2)<sup>1,2,3,4,5,6,7,8,9</sup>



Design Characteristic	Notation	Units	Nominal Anchor Size (Inch)	
			3/16	1/4
Anchor category	1,2 or 3	-	1	1
Nominal embedment depth	$h_{nom}$	in. (mm)	1-3/4 (4.4)	1-3/4 (4.4)
<b>STEEL STRENGTH IN TENSION<sup>4</sup></b>				
Minimum specified ultimate tensile strength (neck)	$f_{uta}^8$	ksi (N/mm <sup>2</sup> )	100 (689)	100 (689)
Effective tensile stress area (neck)	$A_{se,N}$ ( $A_{se}$ ) <sup>9</sup>	in <sup>2</sup> (mm <sup>2</sup> )	0.0162 (10.4)	0.0268 (17.3)
Steel strength in tension	$N_{sa}^8$	lb (kN)	1,620 (7.2)	2,680 (12.0)
Reduction factor for steel strength <sup>3</sup>	$\phi$	-	0.65	
<b>CONCRETE BREAKOUT STRENGTH IN TENSION<sup>7</sup></b>				
Effective embedment	$h_{ef}$	in. (mm)	1.23 (31.2)	1.23 (31.2)
Effectiveness factor for concrete breakout	$k_{uncr}$	-	24	24
Modification factor for cracked and uncracked concrete <sup>5</sup>	$\Psi_{c,N}^9$	-	1.0 See note 5	1.0 See note 5
Critical edge distance	$c_{ac}$	in. (mm)	3.0 (76.2)	3.0 (76.2)
Reduction factor for concrete breakout strength <sup>3</sup>	$\phi$	-	0.65 (Condition B)	
<b>PULLOUT STRENGTH IN TENSION<sup>7</sup></b>				
Characteristic pullout strength, uncracked concrete (2,500 psi) <sup>6</sup>	$N_{p,uncr}$	lb (kN)	635 (2.8)	940 (4.2)
Reduction factor for pullout strength <sup>3</sup>	$\phi$	-	0.65 (Condition B)	

For SI: 1 inch = 25.4 mm, 1 ksi = 6.895 N/mm<sup>2</sup>, 1 lbf = 0.0044 kN.

- The data in this table is intended to be used with the design provisions of ACI 318 Appendix D.
- Installation must comply with published instructions and details.
- All values of  $\phi$  were determined from the load combinations of UBC Section 1605.2.1, UBC Section 1612.2.1, or ACI 318 Section 9.2. If the load combinations of UBC Section 1902.2 or ACI 318 Appendix C are used, the appropriate value of  $\phi$  must be determined in accordance with ACI 318 D.4.5. For reinforcement that meets ACI 318 Appendix D requirements for Condition A, see ACI 318 D. 4.4 for the appropriate  $\phi$  factor.
- The Tapper+ anchor is considered a brittle steel element as defined by ACI 318 D.1. Tabulated values for steel strength in tension must be used for design.
- For all design cases use  $\Psi_{c,N} = 1.0$ . The appropriate effectiveness factor for uncracked concrete ( $k_{uncr}$ ) must be used.
- For all design cases use  $\Psi_{c,P} = 1.0$ . For calculation of  $N_{p,n}$ , see Section 4.1.3 of this report.
- Anchors are permitted to be used in structural sand-lightweight concrete in accordance with Section 4.1.10 of this report. Provided the modification factor  $\lambda$  for concrete breakout strength is taken as 0.6. In addition, the pullout strength,  $N_{p,uncr}$  must be multiplied by 0.6, as applicable. For ACI 318-05, the values  $N_b$  and  $N_{p,uncr}$  must be multiplied by 0.6, in lieu of ACI 318 D.3.4
- For 2003 IBC,  $f_{uta}$  replaces  $f_{ut}$ ,  $N_{sa}$  replaces  $N_s$ , and  $\Psi_{c,N}$  replaces  $\Psi_3$ .
- The notation in parenthesis is for the 2006 IBC.

**PERFORMANCE DATA**
**SHEAR DESIGN INFORMATION FOR TAPPER+ ANCHOR IN CONCRETE**  
**(For use with load combinations taken from ACI 318, Section 9.2)<sup>1,2,3,4,5,6,7,8</sup>**


Design Characteristic	Notation	Units	Nominal Anchor Diameter	
			3/16"	1/4"
Anchor category	1, 2 or 3	-	1	1
Nominal embedment depth	$h_{nom}$	in.	1-3/4	1-3/4
<b>STEEL STRENGTH IN SHEAR<sup>4</sup></b>				
Steel strength in shear <sup>5</sup>	$V_{sa}$	lb (kN)	810 (3.6)	1,180 (5.3)
Reduction factor for steel strength <sup>3</sup>	$\phi$	-	0.60	
<b>CONCRETE BREAKOUT STRENGTH IN SHEAR<sup>6</sup></b>				
Load bearing length of anchor ( $h_{ef}$ or $8d_o$ , whichever is less)	$\ell_e$	in. (mm)	1.23 (32)	1.23 (32)
Nominal anchor diameter	$d_a$ ( $d_o$ )	in. (mm)	0.145 (3.7)	0.185 (4.7)
Reduction factor for concrete breakout <sup>3</sup>	$\phi$	-	0.70 (Condition B)	
<b>PRYOUT STRENGTH IN SHEAR<sup>6</sup></b>				
Coefficient for pryout strength (1.0 for $h_{ef} < 2.5$ in., 2.0 for $h_{ef} \geq 2.5$ in.)	$k_{cp}$	-	1.0	1.0
Effective embedment	$h_{ef}$	in. (mm)	1.23 (31.2)	1.23 (31.2)
Reduction factor for pryout strength <sup>3</sup>	$\phi$	-	0.70 (Condition B)	

For SI: 1 inch = 25.4 mm, 1 lbf = 0.0044 kN.

- The data in this table is intended to be used with the design provisions of ACI 318 Appendix D.
- Installation must comply with published instructions and details.
- All values of  $\phi$  were determined from the load combinations of UBC Section 1605.2.1, UBC Section 1612.2.1, or ACI 318 Section 9.2. If the load combinations of UBC Section 1902.2 or ACI 318 Appendix C are used, the appropriate value of  $\phi$  must be determined in accordance with ACI 318 D.4.5. For reinforcement that meets ACI 318 Appendix D requirements for Condition A, see ACI 318 D.4.4 for the appropriate  $\phi$  factor.
- The Tapper+ anchor is considered a brittle steel element as defined by ACI 318 D.1.
- Tabulated values for steel strength in shear must be used for design.
- Anchors are permitted to be used in structural sand-lightweight concrete, for ACI 318-05, the values  $V_b$  must be multiplied by 0.60, in lieu of ACI 318 D.3.4.
- For 2003 IBC,  $V_{sa}$  replaces  $V_s$ ; and  $\ell_e$  replaces  $\ell$ .
- The notation in parenthesis is for the 2006 IBC.

**PERFORMANCE DATA**



**Ultimate Load Capacities for Tapper+ in Normal-Weight Concrete<sup>1,2</sup>**

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Minimum Concrete Compressive Strength							
		f' <sub>c</sub> = 2,500 psi (17.3 MPa)		f' <sub>c</sub> = 3,000 psi (20.7 MPa)		f' <sub>c</sub> = 4,000 psi (27.6 MPa)		f' <sub>c</sub> = 6,000 psi (41.4 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	1 3/4 (44.4)	1,240 (5.5)	985 (4.4)	1,310 (5.8)	985 (4.4)	1,430 (6.4)	985 (4.4)	1,615 (7.2)	985 (4.4)
1/4 (6.3)	1 3/4 (44.4)	1,855 (8.3)	1,500 (6.7)	1,995 (8.9)	1,500 (6.7)	2,235 (10.0)	1,500 (6.7)	2,630 (11.7)	1,500 (6.7)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load.

**Allowable Load Capacities for Tapper+ in Normal-Weight Concrete<sup>1,2,3</sup>**

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Minimum Concrete Compressive Strength							
		f' <sub>c</sub> = 2,500 psi (17.3 MPa)		f' <sub>c</sub> = 3,000 psi (20.7 MPa)		f' <sub>c</sub> = 4,000 psi (27.6 MPa)		f' <sub>c</sub> = 6,000 psi (41.4 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	1 3/4 (44.4)	310 (1.4)	245 (1.1)	325 (1.4)	245 (1.1)	360 (1.6)	245 (1.1)	400 (1.8)	245 (1.1)
1/4 (6.3)	1 3/4 (44.4)	460 (2.0)	375 (1.7)	495 (2.2)	375 (1.7)	555 (2.5)	375 (1.7)	655 (2.9)	375 (1.7)

1. Allowable load capacities listed are calculated using and applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
3. Allowable load capacities are multiplied by load adjustment factors found when anchor spacing or edge distances are less than critical distances.

**Load Adjustment Factors for Normal Weight Concrete**

Edge Distance, Tension (F <sub>N</sub> )			
	Dia	3/16	1/4
	c <sub>cr</sub>	3	3
	c <sub>min</sub>	1	1
Edge Distance, c (inches)	1	0.73	0.56
	1.25	0.76	0.62
	1.5	0.79	0.67
	1.75	0.83	0.73
	2	0.86	0.78
	2.25	0.90	0.84
	2.5	0.93	0.89
	2.75	0.97	0.95
	3	1.00	1.00

Spacing Distance, Tension (F <sub>N</sub> )			
	Dia	3/16	1/4
	s <sub>cr</sub>	3.75	3.75
	s <sub>min</sub>	1	2
Spacing Distance, s (inches)	1	0.76	-
	1.25	0.78	-
	1.5	0.81	-
	1.75	0.83	-
	2	0.85	0.72
	2.25	0.87	0.76
	2.5	0.89	0.80
	2.75	0.91	0.84
	3	0.94	0.88
	3.25	0.96	0.92
	3.5	0.98	0.96

Edge Distance, Shear (F <sub>V</sub> )			
	Dia	3/16	1/4
	c <sub>cr</sub>	3	3
	c <sub>min</sub>	1	1
Edge Distance, c (inches)	1	0.58	0.35
	1.25	0.63	0.43
	1.5	0.68	0.51
	1.75	0.74	0.59
	2	0.79	0.67
	2.25	0.84	0.76
	2.5	0.89	0.84
	2.75	0.95	0.92
	3	1.00	1.00

Spacing Distance, Shear (F <sub>V</sub> )			
	Dia	3/16	1/4
	s <sub>cr</sub>	3.75	3.75
	s <sub>min</sub>	1	2
Spacing Distance, s (inches)	1	0.70	-
	1.25	0.73	-
	1.5	0.76	-
	1.75	0.78	-
	2	0.81	0.95
	2.25	0.84	0.95
	2.5	0.87	0.96
	2.75	0.89	0.97
	3	0.92	0.98
	3.25	0.95	0.98
	3.5	0.97	0.99


**PERFORMANCE DATA**
**Ultimate and Allowable Load Capacities for Tapper+ Anchors Installed into the Face of Hollow Concrete Masonry<sup>1,2,3</sup>**

Anchor Diameter <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	ASTM C-90 Block Type	Ultimate Loads		Allowable Loads	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	1 (25.4)	2 (50.8)	2 (50.8)	Light Weight <sup>4</sup>	340 (1.5)	460 (2.1)	65 (0.3)	90 (0.4)
	1-1/4 (31.8)			Normal Weight <sup>5</sup>	575 (2.6)	700 (3.1)	115 (0.5)	140 (0.6)
1/4 (6.4)	1 (25.4)	2 (50.8)	2 (50.8)	Light Weight <sup>4</sup>	495 (2.2)	530 (2.4)	100 (0.4)	90 (0.4)
	1-1/4 (31.8)			Normal Weight <sup>6</sup>	950 (4.2)	740 (3.3)	190 (0.8)	150 (0.7)

1. Tabulated load values are for anchors installed in minimum 8" wide, Grade N, Type II, light-weight or normal weight concrete masonry units conforming to ASTM C 90 that have reached the minimum designated ultimate compressive strength at the time of installation ( $f_m \geq 1,700$  psi). Cells may be grouted.
2. Allowable load capacities listed are calculated using an applied safety factor of 5.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
3. Allowable shear loads into the face shell of a masonry wall may be applied in any direction.
4. The tabulated values for the 3/16-inch and 1/4-inch diameter Tapper+ in light-weight block are applicable for anchors installed at a critical spacing between anchors of 16 times the anchor diameter. The anchors may be reduced to a minimum spacing distance of 8 times the anchor diameter provided the allowable tension loads are reduced by 12 percent. Allowable shear loads do not need to be reduced.
5. The tabulated values for the 3/16-inch diameter Tapper+ in normal weight block are applicable for anchors installed at a critical spacing between anchors of 8 times the anchor diameter.
6. The tabulated values for the 1/4-inch Tapper+ in normal weight block are applicable for anchors installed at a critical spacing between anchors of 16 times the anchor diameter. The anchors may be reduced to a minimum spacing distance of 8 times the anchor diameter provided the allowable tension loads are reduced by 20 percent. Allowable shear loads do not need to be reduced.

**Allowable Load Capacities for Tapper+ Anchors Installed in Clay Brick Masonry<sup>1,2,3,4</sup>**

Anchor Diameter <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Installation Location	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	1-1/2 (38.1)	1-3/4 (44.5)	1-3/4 (44.5)	Face	380 (1.7)	165 (0.7)
3/16 (4.8)	1-1/2 (38.1)	1-3/4 (44.5)	1-3/4 (44.5)	Mortar Joint	300 (1.3)	190 (0.8)
1/4 (6.4)	1-1/2 (38.1)	1-3/4 (44.5)	1-3/4 (44.5)	Face	605 (2.7)	270 (1.2)
1/4 (6.4)	1-1/2 (38.1)	1-3/4 (44.5)	1-3/4 (44.5)	Mortar Joint	200 (0.9)	155 (0.7)

1. Tabulated load values are for anchors installed in multiple wythe, minimum Grade SW, solid clay brick masonry walls conforming to ASTM C 62. Mortar must be minimum Type N. Masonry compressive strength must be at the specified minimum at the time of installation ( $F_m \geq 1,500$  psi).
2. Allowable load capacities listed are calculated using an applied safety factor of 5.0. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.
3. Allowable shear loads into the face or mortar joint of the brick masonry wall may be applied in any direction.
4. The tabulated values are applicable for anchors installed at a critical spacing between anchors of 12 times the anchor diameter.

**Average Withdrawal Capacity and Average Bending Yield Moment of Tapper+ in Wood<sup>1</sup>**

Anchor Diameter <i>d</i> in. (mm)	Minimum Embed. <i>h<sub>v</sub></i> in. (mm)	Minimum Edge Distance in. (mm)	Withdrawal Capacity <sup>1</sup> lbs. (kN)	Bending Yield Moment psi (MPa)
3/16 (4.8)	1 (25.4)	1-3/4 (44.5)	540 (2.4)	67,000 (464)
3/16 (4.8)	1-1/2 (38.1)	1-3/4 (44.5)	820 (3.7)	67,000 (464)
1/4 (6.4)	1 (25.4)	1-3/4 (44.5)	680 (3.0)	107,000 (740)
1/4 (6.4)	1-1/2 (38.1)	1-3/4 (44.5)	1,050 (4.7)	107,000 (740)

1. Tests in Douglas-Fir Larch with Specific Gravity of 0.42; screw oriented tangential to wood grain.

**ORDERING INFORMATION**

(HWH)



(PFH)



Carbide Drill Bits for Perma-Seal TAPPER+ - Straight Shank

Cat. No.	Size	Usable Length	Std. Tube	Wt./ 10
2781SD	5/32" x 3-1/2"	2	10	1/4
2782SD	5/32" x 4-1/2"	3	10	1/4
2783SD	5/32" x 5-1/2"	4	10	1/4
2785SD	3/16" x 3-1/2"	2	10	1/4
2786SD	3/16" x 4-1/2"	3	10	1/4
2787SD	3/16" x 5-1/2"	4	10	1/2
2788SD	3/16" x 6-1/2"	5	10	1/2
2789SD	3/16" x 7-1/2"	6	10	1/2



Carbide Drill Bits for Perma-Seal TAPPER+ - Hex Shank SDS-Plus

Cat. No.	Size	Usable Length	Std. Tube	Wt./ 10
2793	5/32" x 5"	3	1	1
2794	5/32" x 7"	5	1	1
2796	3/16" x 5"	3	1	1
2797	3/16" x 7"	5	1	1

BLUE PERMA-SEAL TAPPER - STANDARD PACK*				
Cat No.		Screw Size	Quantities	
HWH	PFH		Box	Carton
2700SD	2740SD	3/16" x 1-1/4"	100	500
2702SD	2742SD	3/16" x 1-3/4"	100	500
2704SD	2744SD	3/16" x 2-1/4"	100	500
2706SD	2746SD	3/16" x 2-3/4"	100	500
2708SD	2748SD	3/16" x 3-1/4"	100	500
2710SD	2750SD	3/16" x 3-3/4"	100	500
2712SD	2752SD	3/16" x 4"	100	500
2720SD	2760SD	1/4" x 1-1/4"	100	500
2722SD	2762SD	1/4" x 1-3/4"	100	500
2724SD	2764SD	1/4" x 2-1/4"	100	500
2726SD	2766SD	1/4" x 2-3/4"	100	500
2728SD	2768SD	1/4" x 3-1/4"	100	500
2730SD	2770SD	1/4" x 3-3/4"	100	500
2732SD	2772SD	1/4" x 4"	100	500
2734SD	2774SD	1/4" x 5"	100	100
2736SD	2776SD	1/4" x 6"	100	100

BLUE PERMA-SEAL TAPPER - MASTER PACK**					
Cat No.		Screw Size	Quantities	Drill Bit References	
HWH	PFH			Straight	SDS Hex
9462SD	9476SD	3/16" x 1-1/4"	2000	2781	2793
9463SD	9477SD	3/16" x 1-3/4"	2000	2781	2793
9464SD	9478SD	3/16" x 2-1/4"	2000	2782	2793
9465SD	9479SD	3/16" x 2-3/4"	2000	2782	2793
9466SD	9480SD	3/16" x 3-1/4"	1000	2783	2794
9467SD	9481SD	3/16" x 3-3/4"	1000	2783	2794
9468SD	9482SD	3/16" x 4"	1000	2783	2794
9469SD	9483SD	1/4" x 1-1/4"	2000	2785	2796
9470SD	9484SD	1/4" x 1-3/4"	2000	2785	2796
9471SD	9485SD	1/4" x 2-1/4"	1000	2786	2796
9472SD	9486SD	1/4" x 2-3/4"	1000	2786	2796
9473SD	9487SD	1/4" x 3-1/4"	1000	2787	2797
9474SD	9488SD	1/4" x 3-3/4"	1000	2787	2797
9475SD	9489SD	1/4" x 4"	1000	2787	2797
	9490SD	1/4" x 5"	1000	2788	2797
	9491SD	1/4" x 6"	1000	2789	2797

**ACCESSORIES**



Installation Tools for 3/16" and 1/4" TAPPER+

Cat. No.	Description	Max Screw Length	Max Bit Length	Std. Box	Wt./ Each
2791	* Combo TAPPER 1000 Tool	4"	5-1/2"	1	3/4
2795	1000 SDS Extension (8")	6"	7-1/2"	1	1/2

\* This tool cannot be used with SDS Drill Bits or PFH screws.

HWH = Hex Washer Head (slotted) ; PFH = Phillips Flat Head ; TFH = Trim Flat Head ; FHH = Flange Hex Head.

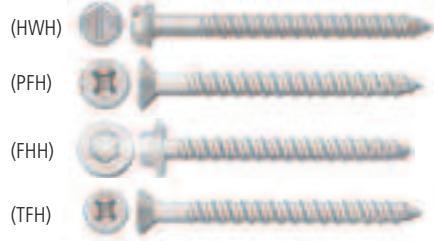
Tapper+ parts have an "SD" designation added to the catalog number.

\* - One Tapper+ drill bit included in each standard box.

\*\* - Drill bit not included with master pack.

Shaded catalog numbers denote sizes which are less than the minimum standard anchor length for strength design.

**ORDERING INFORMATION**



WHITE PERMA-SEAL TAPPER+ - STANDARD PACK*						
Cat No.				Screw Size	Quantities	
HWH	PFH	FHH	TFH		Box	Carton
2400SD	2440SD			3/16" x 1-1/4"	100	500
2402SD	2442SD			3/16" x 1-3/4"	100	500
2404SD	2444SD			3/16" x 2-1/4"	100	500
2406SD	2446SD			3/16" x 2-3/4"	100	500
2408SD	2448SD			3/16" x 3-1/4"	100	500
2410SD	2450SD			3/16" x 3-3/4"	100	500
2412SD	2449SD			3/16" x 4"	100	500
2420SD	2460SD			1/4" x 1-1/4"	100	500
2422SD	2462SD	8706SD	8710SD	1/4" x 1-3/4"	100	500
2424SD	2464SD	8707SD	8711SD	1/4" x 2-1/4"	100	500
2426SD	2466SD	8708SD	8712SD	1/4" x 2-3/4"	100	500
2428SD	2468SD	8709SD	8713SD	1/4" x 3-1/4"	100	500
2430SD	2470SD		8714SD	1/4" x 3-3/4"	100	500
2435SD	2472SD			1/4" x 4"	100	500

SILVER PERMA-SEAL TAPPER - STANDARD PACK*						
Cat No.				Screw Size	Quantities	
HWH	PFH	FHH	TFH		Box	Carton
	2498SD			3/16" x 1-1/4"	100	500
	2500SD			3/16" x 1-3/4"	100	500
	2501SD			3/16" x 2-1/4"	100	500
	2502SD			3/16" x 2-3/4"	100	500
	2503SD			3/16" x 3-1/4"	100	500
	2504SD			3/16" x 3-3/4"	100	500
	2505SD			3/16" x 4"	100	500
2486SD	2506SD			1/4" x 1-1/4"	100	500
2488SD	2507SD	8715SD	8719SD	1/4" x 1-3/4"	100	500
2490SD	2508SD	8716SD	8720SD	1/4" x 2-1/4"	100	500
2492SD	2509SD	8717SD	8721SD	1/4" x 2-3/4"	100	500
2494SD	2510SD	8718SD	8722SD	1/4" x 3-1/4"	100	500
2495SD	2511SD		8723SD	1/4" x 3-3/4"	100	500
2496SD	2512SD			1/4" x 4"	100	500

WHITE PERMA-SEAL TAPPER+ - MASTER PACK**					
Cat No.		Screw Size	Quantities	Drill Bit References	
HWH	PFH			Straight	SDS Hex
	9191SD	3/16" x 1-1/4"	2000	2781	2793
	9192SD	3/16" x 1-3/4"	2000	2781	2793
	9193SD	3/16" x 2-1/4"	2000	2782	2793
	9194SD	3/16" x 2-3/4"	2000	2782	2793
	9195SD	3/16" x 3-1/4"	1000	2783	2794
	9196SD	3/16" x 3-3/4"	1000	2783	2794
	9197SD	3/16" x 4"	1000	2783	2794
9923SD	9951SD	1/4" x 1-1/4"	2000	2785	2796
9924SD	9952SD	1/4" x 1-3/4"	2000	2785	2796
9925SD	9953SD	1/4" x 2-1/4"	1000	2786	2796
9926SD	9954SD	1/4" x 2-3/4"	1000	2786	2796
9927SD	9955SD	1/4" x 3-1/4"	1000	2787	2797
9928SD	9956SD	1/4" x 3-3/4"	1000	2787	2797
9929SD	9957SD	1/4" x 4"	1000	2787	2797

SILVER PERMA-SEAL TAPPER - MASTER PACK**					
Cat No.		Screw Size	Quantities	Drill Bit References	
HWH	PFH			Straight	SDS Hex
	8757SD	3/16" x 1-1/4"	2000	2781	2793
	8758SD	3/16" x 1-3/4"	2000	2781	2793
	8759SD	3/16" x 2-1/4"	2000	2782	2793
	8760SD	3/16" x 2-3/4"	2000	2782	2793
	8761SD	3/16" x 3-1/4"	1000	2783	2794
	8762SD	3/16" x 3-3/4"	1000	2783	2794
	8763SD	3/16" x 4"	1000	2783	2794
8750SD	8764SD	1/4" x 1-1/4"	2000	2785	2796
8751SD	8765SD	1/4" x 1-3/4"	2000	2785	2796
8752SD	8766SD	1/4" x 2-1/4"	1000	2786	2796
8753SD	8767SD	1/4" x 2-3/4"	1000	2786	2796
8754SD	8768SD	1/4" x 3-1/4"	1000	2787	2797
8755SD	8769SD	1/4" x 3-3/4"	1000	2787	2797
8756SD	8770SD	1/4" x 4"	1000	2787	2797



BRONZE PERMA-SEAL TAPPER - STANDARD PACK*				
Cat No.		Screw Size	Quantities	
PFH	FHH		Box	Carton
9975SD	9977SD	1/4" x 1-3/4"	100	500
9976SD	9978SD	1/4" x 2-1/4"	100	500

Shaded catalog numbers denote sizes which are less than the minimum standard anchor length for strength design.  
Flange Hex Head parts are not included in the scope of ESR-3068