

PROJECT SUBMITTAL



Tapper® *Screw Anchor*

Anchoring into Concrete and Masonry Substrates

Suitable for Solid and Hollow Base Materials

Available in Zinc Plated Carbon Steel, Perma-Seal Carbon Steel, Type 410 and Type 304 Stainless Steel

Hex Head and Phillips Flat Head Designs



Blue Perma-Seal Tapper



Zinc Plated Tapper

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APPROVALS AND LISTINGS

- ☐ International Code Council, Evaluation Service (ICC-ES) ER-5878
- ☐ Southern Building Code Conference International (SBCCI) #9944A
- ☐ City of Los Angeles (COLA) Research Report LARR – 25548
- ☐ Florida Building Code Approval – FL2209.9
- ☐ Miami-Dade County Notice of Acceptance (NOA) 03-0303.14

Tested to ASTM E488 and AC106 Criteria for Predrilled Fasteners (Screw Anchors)

PRODUCT SUBMITTAL / SUBSTITUTION REQUEST

TO:

PROJECT:

SPECIFIED ITEM:

Section

Page

Paragraph

Description

PRODUCT SUBMITTAL / SUBSTITUTION REQUESTED:

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 and brick 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.

For every project, it is important to consider several things before making a selection: The proper head style, the color or finish that is desired, and the required level of corrosion resistance. The Tapper screw anchor is available in carbon steel with a zinc plated finish, carbon steel with a Perma-Seal climate coating in several colors. Head styles include a slotted hex washer head, Phillips flat head, trim head and flange head.

GENERAL APPLICATIONS AND USES

Zinc Plated Tappers

- Metal Door Frames
- Interior Electrical Applications
- Thresholds
- Joint Flashings

Perma-Seal Tappers

- Window Installations
- Interior Hand Rails
- Storm Shutters
- Interior Lighting Fixtures

FEATURES AND BENEFITS

- Tested in accordance with ASTM E488 and AC106 criteria
- Available in several head styles
- Several colors and finishes to match application
- High-low thread design
- Does not exert expansion forces
- No hole spotting required
- Good corrosion protection with Perma-Seal coating

APPROVALS AND LISTINGS

Miami-Dade County Notice of Acceptance (NOA) 09-0714.04

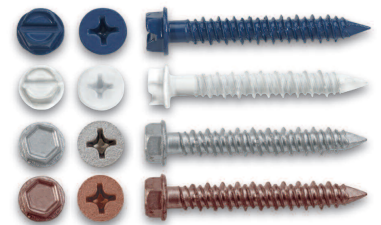
GUIDE SPECIFICATIONS

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.

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Zinc Plated Carbon Steel Tapper



Perma-Seal Coated Carbon Steel Tapper

ANCHOR MATERIALS

Zinc Plated Carbon Steel
Perma-Seal Carbon Steel

ANCHOR SIZE RANGE (TYP.)

3/16" diameter x 1-1/4" length to 4" Length
3/8" diameter x 6" length

SUITABLE BASE MATERIALS

Normal-Weight Concrete
Structural Lightweight Concrete
Grouted Concrete Masonry
Hollow Concrete Masonry
Solid Brick Masonry

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_{bit}</i> (in.)	5/32	3/16
Fixture Clearance Hole, <i>d_h</i> (in.)	1/4	5/16
Thread Size (UNC)	11-16	1/4-15
Head Height (in.)	7/64	9/64
Head Width (in.)	1/4	5/16
Washer O.D., <i>d_w</i> (in.)	11/32	13/32
Washer Thickness, (in.)	1/32	1/32
Hex Driver (in.)	1/4	5/16

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_{bit}</i> (in.)	5/32	3/16
Fixture Clearance Hole, <i>d_h</i> (in.)	1/4	5/16
Thread Size (UNC)	11-16	1/4-15
Phillips Head O.D., (in.)	3/8	1/2
Phillips Head Height, (in.)	9/64	3/16
Phillips Bit Size	2	3
Phillips Driver	#2	#3

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

3/8" Zinc Plated Carbon Steel Tapper

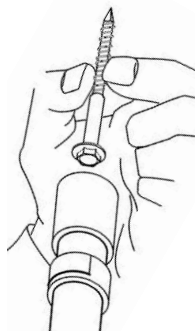
Dimension	Anchor Diameter, <i>d</i>	
	3/8" HEX	3/8" PFH
Tapper Drill Bit Size, <i>d_{bit}</i> (in.)	1/4	1/4
Fixture Clearance Hole, <i>d_h</i> (in.)	5/16	5/16
Thread Size (UNC)	5/16-18	5/16-18
Head Height (in.)	1/4	19/64
Head Width (in.)	3/8	3/4 O.D.
Washer O.D., <i>d_w</i> (in.)	39/64	N/A
Hex Driver (in.) / Phillips Driver	3/8	#3

Installation Procedure

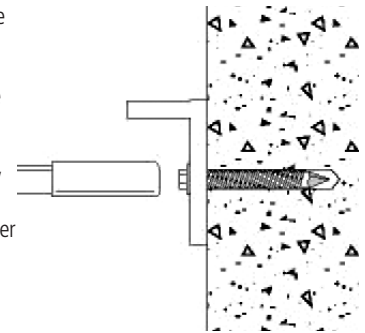
Using the proper diameter bit, drill a hole into the base material to a depth of at least 1/4" deeper than the embedment required. The Tapper drill bit must be used. Blow the hole clean of dust and other material.



Select the Tapper installation tool and drive socket to be used. Insert the head of the Tapper into the hex head socket or Phillips head driver. Set the drill motor to the "rotation only" mode.



Place the point of the Tapper through the fixture into the pre-drilled hole and drive the anchor in one steady continuous motion until it is fully seated at the proper embedment. The driver will automatically disengage from the head of the Tapper.



MATERIAL SPECIFICATIONS

Anchor Component	Perma-Seal Tapper	Zinc Plated*
Anchor Body	Case Hardened AISI 1022	Case Hardened AISI 1022
Coating/Plating/Finish	Perma-Seal Fluoropolymer	ASTM B 633, SC1, Type III (Fe/Zn5

*These hardened zinc plated carbon steel fasteners meet or exceed industry standards. They are not recommended for use in direct contact with aluminum when moisture may be present. Efforts to prevent corrosion due to dissimilar metal contact should be made.

PERFORMANCE DATA
Ultimate Load Capacities for Carbon Steel Tapper Screw Anchors in Normal-Weight Concrete¹

Anchor Diameter <i>d</i> in. (mm)	Anchor Material and Plating/ Coating	Min. Embed. Depth <i>h_v</i> in. (mm)	Minimum Concrete Compressive Strength (<i>f'_c</i>)							
			2,000 psi (13.8 MPa)		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		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)	Carbon Steel, Perma-Seal	1 (25.4)	160 (0.7)	700 (3.2)	260 (1.2)	700 (3.2)	360 (1.6)	700 (3.2)	360 (1.6)	700 (3.2)
		1 1/4 (31.8)	520 (2.3)	840 (3.8)	610 (2.7)	880 (4.0)	695 (3.1)	920 (4.1)	695 (3.1)	920 (4.1)
		1 3/8 (34.9)	700 (3.2)	910 (4.1)	780 (3.5)	900 (4.1)	855 (3.8)	920 (4.1)	855 (4.8)	920 (4.1)
		1 1/2 (38.1)	720 (3.2)	920 (4.1)	860 (3.9)	920 (4.1)	1,020 (4.6)	920 (4.1)	1,020 (4.6)	920 (4.1)
		1 3/4 (31.8)	1,000 (4.5)	940 (4.2)	1,120 (5.0)	940 (4.2)	1,260 (5.6)	940 (4.2)	1,260 (5.6)	940 (4.2)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 (25.4)	620 (2.8)	820 (3.7)	840 (3.8)	820 (3.7)	1,060 (4.8)	820 (3.7)	1,060 (4.8)	820 (3.7)
		1 1/4 (31.8)	810 (3.6)	1,130 (5.1)	1,080 (4.9)	1,275 (5.7)	1,345 (6.1)	1,420 (6.4)	1,345 (6.1)	1,420 (6.4)
		1 3/8 (34.9)	905 (4.1)	1,280 (5.8)	1,195 (5.4)	1,350 (6.1)	1,485 (6.7)	1,420 (6.4)	1,485 (6.7)	1,420 (6.4)
		1 1/2 (38.1)	1,000 (4.5)	1,420 (6.4)	1,300 (5.9)	1,420 (6.4)	1,620 (7.3)	1,420 (6.4)	1,620 (7.3)	1,420 (6.4)
		1 3/4 (44.5)	1,620 (7.3)	1,480 (6.7)	1,680 (7.6)	1,480 (6.7)	1,740 (7.8)	1,480 (6.7)	1,740 (7.8)	1,480 (6.7)
3/8 (9.5)	Carbon Steel, Zinc Plated	1 (25.4)	700 (3.2)	960 (4.3)	720 (3.2)	960 (4.3)	760 (3.4)	960 (4.3)	760 (3.4)	960 (4.3)
		1 1/4 (31.8)	905 (4.1)	1,475 (6.6)	1,030 (4.6)	1,715 (7.7)	1,150 (5.2)	1,950 (8.8)	1,150 (5.2)	1,950 (8.8)
		1 1/2 (38.1)	1,110 (5.0)	1,980 (8.9)	1,320 (5.9)	1,980 (8.9)	1,540 (6.9)	1,980 (8.9)	1,540 (6.9)	1,980 (8.9)
		1 3/4 (44.5)	1,360 (6.1)	2,320 (10.4)	1,660 (7.5)	2,320 (10.4)	1,960 (8.8)	2,320 (10.4)	1,960 (8.8)	2,320 (10.4)

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.

PERFORMANCE DATA

Allowable Load Capacities for Carbon Steel Tapper Screw Anchors in Normal-Weight Concrete^{1,2}

Anchor Diameter <i>d</i> in. (mm)	Anchor Material and Plating/Coating	Min. Embed. Depth <i>h_v</i> in. (mm)	Minimum Concrete Compressive Strength (<i>f'_c</i>)							
			2,000 psi (13.8 MPa)		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		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)	Carbon Steel, Perma-Seal	1 (25.4)	40 (0.2)	175 (0.8)	65 (0.3)	175 (0.8)	90 (0.4)	175 (0.8)	90 (0.4)	175 (0.8)
		1 1/4 (31.8)	130 (0.6)	210 (0.9)	155 (0.7)	220 (1.0)	175 (0.8)	230 (1.0)	175 (0.8)	230 (1.0)
		1 3/8 (34.9)	175 (0.8)	230 (1.0)	195 (0.9)	225 (1.0)	215 (1.0)	230 (1.0)	215 (1.0)	230 (1.0)
		1 1/2 (38.1)	180 (0.8)	230 (1.0)	215 (1.0)	230 (1.0)	255 (1.1)	230 (1.0)	255 (1.1)	230 (1.0)
		1 3/4 (31.8)	250 (1.1)	235 (1.1)	280 (1.2)	235 (1.1)	315 (1.4)	235 (1.1)	315 (1.4)	235 (1.1)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 (25.4)	155 (0.7)	205 (0.9)	210 (0.9)	205 (0.9)	265 (1.2)	205 (0.9)	265 (1.2)	205 (0.9)
		1 1/4 (31.8)	205 (0.9)	285 (1.3)	270 (1.2)	320 (1.4)	335 (1.5)	355 (1.6)	335 (1.5)	355 (1.6)
		1 3/8 (34.9)	225 (1.0)	320 (1.4)	300 (1.4)	340 (1.5)	370 (1.7)	355 (1.6)	370 (1.7)	355 (1.6)
		1 1/2 (38.1)	250 (1.1)	355 (1.6)	325 (1.5)	355 (1.6)	405 (1.8)	355 (1.6)	405 (1.8)	355 (1.6)
		1 3/4 (44.5)	405 (1.8)	370 (1.7)	420 (1.9)	370 (1.7)	435 (2.0)	370 (1.7)	435 (2.0)	370 (1.7)
3/8 (9.5)	Carbon Steel, Zinc Plated	1 (25.4)	175 (0.8)	240 (1.1)	180 (0.8)	240 (1.1)	190 (0.9)	240 (1.1)	190 (0.9)	240 (1.1)
		1 1/4 (31.8)	225 (1.0)	370 (1.7)	260 (1.2)	430 (1.9)	290 (1.3)	490 (2.2)	290 (1.3)	490 (2.2)
		1 1/2 (38.1)	275 (1.2)	495 (2.2)	330 (1.5)	495 (2.2)	385 (1.7)	495 (2.2)	385 (1.7)	495 (2.2)
		1 3/4 (44.5)	340 (1.5)	580 (2.6)	415 (1.9)	580 (2.6)	490 (2.2)	580 (2.6)	490 (2.2)	580 (2.6)

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0.

2. Critical and minimum spacing and edge distances as well as reduction factors for intermediate spacing and edge distances are listed in the Design Criteria section.

PERFORMANCE DATA
Ultimate and Allowable Load Capacities for Tapper Screw Anchors in Structural Lightweight Concrete^{1,2,3}

Anchor Diameter <i>d</i> in. (mm)	Anchor Material and Plating/ Coating	Minimum Embed. Depth <i>h_v</i> in. (mm)	Tension, lbs (kN)						Shear, lbs (kN)	
			Minimum Concrete Compressive Strength (<i>f'_c</i>)							
			3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		5,000 psi (34.5 MPa)		<i>f'_c</i> ≥ 3,000 psi (20.7 MPa)	
			Ultimate Load	Allowable Load	Ultimate Load	Allowable Load	Ultimate Load	Allowable Load	Ultimate Load	Allowable Load
3/16 (4.8)	Carbon Steel, Perma-Seal	1 1/4 (31.8)	230 (1.0)	60 (0.3)	270 (1.2)	70 (0.3)	305 (1.4)	75 (0.3)	340 (1.5)	85 (0.4)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 1/4 (31.8)	270 (1.2)	70 (0.3)	300 (1.4)	75 (0.3)	325 (1.5)	80 (0.4)	450 (2.0)	115 (0.5)
3/8 (9.5)	Carbon Steel, Zinc-Plated	1 1/2 (38.1)	325 (1.5)	80 (0.4)	345 (1.6)	85 (0.4)	380 (1.7)	95 (0.4)	580 (2.6)	145 (0.7)

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0.

2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.

3. Critical and minimum spacing and edge distances as well as reduction factors for intermediate spacing and edge distances are listed in the Design Criteria section.

Ultimate and Allowable Load Capacities for Tapper Screw Anchors Installed Through Metal Deck into Structural Lightweight Concrete^{1,2,3,4}

Anchor Diameter <i>d</i> in. (mm)	Anchor Material and Plating/Coating	Minimum Embedment Depth <i>h_v</i> in. (mm)	Lightweight Concrete over Minimum 20 Ga. Metal Deck <i>f'_c</i> ≥ 3,000 psi (20.7 MPa)			
			Minimum 1-3/4" Wide Deck			
			Ultimate Load		Allowable Load	
			Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	Carbon Steel, Perma-Seal	1 1/4 (31.8)	230 (1.0)	270 (1.2)	60 (0.3)	70 (0.3)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 1/4 (31.8)	270 (1.2)	300 (1.4)	70 (0.3)	75 (0.3)
3/8 (9.5)	Carbon Steel, Zinc-Plated	1 1/2 (38.1)	270 (1.2)	300 (1.4)	70 (0.3)	75 (0.3)

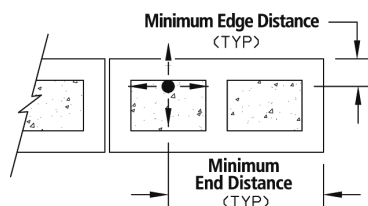
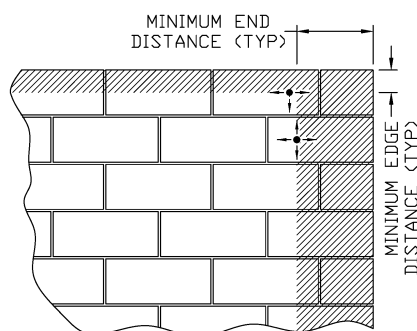
1. The tabulated values are for screw anchors installed in structural lightweight concrete having the designated compressive strength at the time of anchor installation.

2. The embedment depth is the distance from the concrete surface to the embedded end of the screw anchor. The minimum concrete thickness is 1-1/2 times the screw anchor embedment depth.

3. The tabulated values are applicable for screw anchors installed at a minimum spacing between screw anchors of 8 times the screw anchor diameter.

4. The tabulated values are applicable for screw anchors installed at a critical edge distance of 12 times the screw anchor diameter. The screw anchors may be reduced to a minimum edge distance of 5 times the screw diameter provided the allowable tension loads are reduced by 65 percent and the allowable shear loads are reduced by 40 percent. Linear interpolation for allowable loads may be used for intermediate edge distances.

PERFORMANCE DATA



1. Tabulated load values are for anchors installed in minimum Grade N, Type II, lightweight, medium-weight and normal-weight concrete masonry units conforming to ASTM C 90 that have reached the minimum designated ultimate compressive strength at the time of installation ($f'_m \geq 1,500$ psi). Mortar must be N, S or M.
2. Allowable load capacities listed are calculated using an applied safety factor of 5.0.
3. The tabulated values are applicable for screw anchors installed at a critical spacing between screw anchors of 16 times the screw anchor diameter. The screw anchors may be reduced to a minimum spacing distance of 8 times the screw diameter provided the allowable loads are reduced by 70 percent. Linear interpolation for allowable loads may be used for intermediate spacing distances.
4. The tabulated values are applicable for screw anchors installed at a minimum edge distance of 12 times the screw anchor diameter unless otherwise noted.
5. The tabulated values are applicable for installations into the face shell of the masonry member. The face shell thickness must be able to accommodate the specified embedment depth. Masonry cells may be grouted.

Allowable Load Capacities for Tapper Screw Anchors in Grout-Filled Concrete Masonry^{1,2,3,4}

Anchor Installed Through Face Shell or Cell Web ⁴				
Anchor Diameter d in. (mm)	Anchor Material and Plating/Coating	Minimum Embedment Depth h_v in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 1/2 (38.1)	370 (1.7)	320 (1.4)

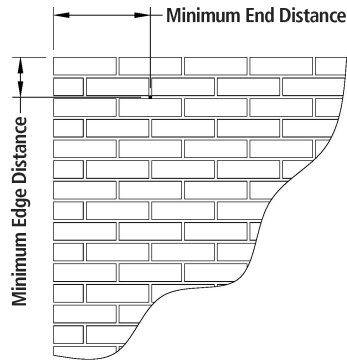
Anchor Installed in Cell Opening (Top of Wall) for Sill Plates and Other Attachments					
Anchor Diameter d in. (mm)	Anchor Material and Plating/Coating	Minimum Embed. Depth h_v in. (mm)	Minimum Edge Distance in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	Carbon Steel, Perma-Seal	2 (50.8)	1 3/4 (44.5)	280 (1.3)	225 (1.0)

Allowable Load Capacities for Tapper Screw Anchors in C-90 Hollow Block^{1,2,3,4,5}

Anchor Diameter d in. (mm)	Anchor Material and Plating/Coating	Minimum Embedment Depth h_v in. (mm)	Lightweight, Medium & Normal Weight CMU	
			$f'_m \geq 2,000$ psi (13.8 MPa)	
			Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	Carbon Steel, Perma-Seal	1 (25.4)	90 (0.4)	185 (0.8)
		1 1/4 (31.8)	105 (0.5)	205 (0.9)
		1 3/8 (34.9)	120 (0.5)	245 (1.1)
		1 1/2 (38.1)	120 (0.5)	245 (1.1)
		1 3/4 (31.8)	120 (0.5)	245 (1.1)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 (25.4)	115 (0.5)	205 (0.9)
		1 1/4 (31.8)	175 (0.8)	255 (1.1)
		1 3/8 (34.9)	240 (1.1)	365 (1.6)
		1 1/2 (38.1)	240 (1.1)	365 (1.6)
		1 3/4 (44.5)	240 (1.1)	365 (1.6)
3/8 (9.5)	Carbon Steel, Zinc Plated	1 (25.4)	170 (0.8)	230 (1.0)
		1 1/4 (31.8)	205 (0.9)	255 (1.1)
		1 1/2 (38.1)	250 (1.1)	335 (1.5)
		1 3/4 (44.5)	295 (1.3)	365 (1.6)

PERFORMANCE DATA

**Allowable Load Capacities for Tapper Screw Anchors
in Brick Masonry^{1,2,3,4,5}**



1. Tabulated load values are for anchors installed in Grade SW multiple wythe, solid brick masonry conforming to ASTM C62.
2. Allowable load capacities are calculated using an applied safety factor of 5.0.
3. Linear interpolation may be used to determine allowable load capacities for intermediate embedments.
4. The tabulated values are for anchors installed at a minimum edge and end distance of 4 inches.
5. The tabulated values are for anchors installed at a minimum of 12 anchor diameters on center for 100 percent capacity. Spacing distances may be reduced to 6 anchor diameters on center provided the capacities are reduced by 50 percent. Linear interpolation may be used for intermediate spacing.

Anchor Diameter <i>d</i> in. (mm)	Anchor Material and Plating/Coating	Minimum Embedment Depth <i>h_v</i> in. (mm)	Brick Masonry	
			$f'_m \geq 1,300$ psi (9.0 MPa)	
			Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	Carbon Steel, Perma-Seal	1 (25.4)	125 (0.6)	195 (0.9)
		1 1/4 (31.8)	215 (1.0)	220 (1.0)
		1 3/8 (34.9)	230 (1.0)	230 (1.0)
		1 1/2 (38.1)	245 (1.1)	245 (1.1)
		1 3/4 (31.8)	265 (1.2)	270 (1.2)
1/4 (6.4)	Carbon Steel, Perma-Seal	1 (25.4)	190 (0.9)	345 (1.6)
		1 1/4 (31.8)	230 (1.0)	370 (1.7)
		1 3/8 (34.9)	250 (1.1)	375 (1.7)
		1 1/2 (38.1)	265 (1.2)	385 (1.7)
		1 3/4 (44.5)	285 (1.3)	425 (1.9)
3/8 (9.5)	Carbon Steel Zinc Plated	1 (25.4)	205 (0.9)	365 (1.6)
		1 1/4 (31.8)	275 (1.2)	470 (2.1)
		1 1/2 (38.1)	310 (1.4)	525 (2.4)
		1 3/4 (44.5)	330 (1.5)	550 (2.5)

DESIGN CRITERIA

Combined Loading

For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$\left(\frac{N_u}{N_n}\right)^{\frac{5}{3}} + \left(\frac{V_u}{V_n}\right)^{\frac{5}{3}} \leq 1$$

OR

$$\left(\frac{N_u}{N_n}\right) + \left(\frac{V_u}{V_n}\right) \leq 1$$

Where: N_u = Applied Service Tension Load
 N_n = Allowable Tension Load
 V_u = Applied Service Shear Load
 V_n = Allowable Shear Load

Load Adjustment Factors for Spacing and Edge Distances in Normal-Weight Concrete¹

Anchor Installed in Normal-Weight Concrete					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 12d$	$F_N = F_V = 1.0$	$s_{min} = 6d$	$F_N = F_V = 0.50$
Edge Distance (c)	Tension and Shear	$c_{cr} = 12d$	$F_N = F_V = 1.0$	$c_{min} = 6d$	$F_N = F_V = 0.50$

1. Load values, found in the Performance Tables, are multiplied by the reduction factors when spacing edge distances are less than critical distances. Linear interpolation is allowed for spacing and edge distances that fall between critical and minimum distances. When a group of anchors is affected by both reduced spacing and edge distance, the spacing and edge distance reduction factors must be combined (multiplied).

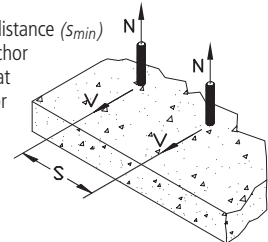
Load Adjustment Factors for Normal-Weight Concrete

Spacing, Tension (F_N) & Shear (F_V)			
Dia. (in.)	3/16	1/4	3/8
s_{cr} (in.)	2 1/4	3	4 1/2
s_{min} (in.)	1 1/8	1 1/2	2 1/4
Spacing, s (in.)	1 1/8	0.50	
	1 1/2	0.67	
	2	0.89	
	2 1/4	1.00	
	2 1/2		0.50
	3		0.56
	3 1/2		0.67
	4		0.78
	4 1/2		0.89
			1.00

Edge Distance, Tension (F_N) & Shear (F_V)			
Dia. (in.)	3/16	1/4	3/8
c_{cr} (in.)	2 1/4	3	4 1/2
c_{min} (in.)	1 1/8	1 1/2	2 1/4
Spacing, s (in.)	1 1/8	0.50	
	1 1/2	0.67	
	2	0.89	
	2 1/4	1.00	
	2 1/2		0.50
	3		0.56
	3 1/2		0.67
	4		0.78
	4 1/2		0.89
			1.00

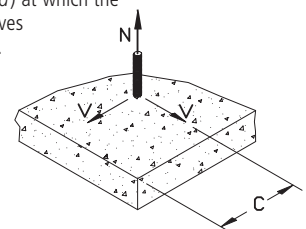
Notes: For anchors loaded in tension and shear, the critical edge distance (s_{cr}) is equal to 12 anchor diameters ($12d$) at which the anchor achieves 100% of load.

Minimum edge distance (s_{min}) is equal to 6 anchor diameters ($6d$) at which the anchor achieves 50% of load.



Notes: For anchors loaded in tension and shear, the critical edge distance (c_{cr}) is equal to 12 anchor diameters ($12d$) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 6 anchor diameters ($6d$) at which the anchor achieves 50% of load.



ORDERING INFORMATION

Hex head Tapper anchors are measured from below the washer while flat head Tapper anchors are measured end to end. To select the proper minimum anchor length, determine the embedment depth required to obtain the desired load capacity. Then add the thickness of the fixture, including any spacers or shims, to the embedment depth.

Do not select a length that will result in an embedment into the base material which is greater than 1 3/4" to 2".

Most concrete screw anchors cannot be properly driven to a depth of more than 2", especially in denser base materials.

Blue Perma-Seal Tapper, Slotted Hex Head & Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
2700	2740	3/16" x 1 1/4"	100	500	3/4	2781	2793
2702	2742	3/16" x 1 3/4"	100	500	1	2781	2793
2704	2744	3/16" x 2 1/4"	100	500	1 1/4	2782	2793
2706	2746	3/16" x 2 3/4"	100	500	1 1/2	2782	2793
2708	2748	3/16" x 3 1/4"	100	500	1 3/4	2783	2794
2710	2750	3/16" x 3 3/4"	100	500	2 1/4	2783	2794
2712	2752	3/16" x 4"	100	500	2 1/2	2783	2794
2720	2760	1/4" x 1 1/4"	100	500	1 1/2	2785	2796
2722	2762	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
2724	2764	1/4" x 2 1/4"	100	500	2	2786	2796
2726	2766	1/4" x 2 3/4"	100	500	2 3/4	2786	2796
2728	2768	1/4" x 3 1/4"	100	500	3 1/4	2787	2797
2730	2770	1/4" x 3 3/4"	100	500	3 3/4	2787	2797
2732	2772	1/4" x 4"	100	100	4 1/2	2787	2797
—	2774	1/4" x 5"	100	100	4 1/2	2788	—
—	2776	1/4" x 6"	100	100	5 1/2	2789	—

One drill bit is packaged in each box of tappers.



Blue Perma-Seal Tapper (Master Packaging)

Catalog Number		Size	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH				Straight	SDS HEX
9462	9476	3/16" x 1 1/4"	2,000	3/4	2781	2793
9463	9477	3/16" x 1 3/4"	2,000	1	2781	2793
9464	9478	3/16" x 2 1/4"	2,000	1 1/4	2782	2793
9465	9479	3/16" x 2 3/4"	2,000	1 1/2	2782	2793
9466	9480	3/16" x 3 1/4"	1,000	1 3/4	2783	2794
9467	9481	3/16" x 3 3/4"	1,000	2 1/4	2783	2794
9468	9482	3/16" x 4"	1,000	2 1/2	2783	2794
9469	9483	1/4" x 1 1/4"	2,000	1 1/2	2785	2796
9470	9484	1/4" x 1 3/4"	2,000	1 3/4	2785	2796
9471	9485	1/4" x 2 1/4"	1,000	2	2786	2796
9472	9486	1/4" x 2 3/4"	1,000	2 3/4	2786	2796
9473	9487	1/4" x 3 1/4"	1,000	3 1/4	2787	2797
9474	9488	1/4" x 3 3/4"	1,000	3 3/4	2787	2797
9475	9489	1/4" x 4"	1,000	4 1/2	2787	2797
—	9490	1/4" x 5"	1,000	4 1/2	2788	—
—	9491	1/4" x 6"	500	5 1/2	2789	—

ORDERING INFORMATION

White Perma-Seal Tapper, Slotted Hex Head & Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
2400	2440	3/16" x 1 1/4"	100	500	3/4	2781	2793
2402	2442	3/16" x 1 3/4"	100	500	1	2781	2793
2404	2444	3/16" x 2 1/4"	100	500	1 1/4	2782	2793
2406	2446	3/16" x 2 3/4"	100	500	1 1/2	2782	2793
2408	2448	3/16" x 3 1/4"	100	500	1 3/4	2783	2794
2410	2450	3/16" x 3 3/4"	100	500	2 1/4	2783	2794
2412	2449	3/16" x 4"	100	500	2 1/2	2783	2794
2420	2460	1/4" x 1 1/4"	100	500	1 1/2	2785	2796
2422	2462	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
2424	2464	1/4" x 2 1/4"	100	500	2	2786	2796
2426	2466	1/4" x 2 3/4"	100	500	2 3/4	2786	2796
2428	2468	1/4" x 3 1/4"	100	500	3 1/4	2787	2797
2430	2470	1/4" x 3 3/4"	100	500	3 3/4	2787	2797
2435	2472	1/4" x 4"	100	500	4 1/2	2787	2797

One drill bit is packaged in each box of tappers.

White Perma-Seal Tapper (Master Packaging)

Catalog Number		Size	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH				Straight	SDS HEX
—	9191	3/16" x 1 1/4"	2,000	3/4	2781	2793
—	9192	3/16" x 1 3/4"	2,000	1	2781	2793
—	9193	3/16" x 2 1/4"	2,000	1 1/4	2782	2793
—	9194	3/16" x 2 3/4"	2,000	1 1/2	2782	2793
—	9195	3/16" x 3 1/4"	1,000	1 3/4	2783	2794
—	9196	3/16" x 3 3/4"	1,000	2 1/4	2783	2794
—	9197	3/16" x 4"	1,000	2 1/2	2783	2794
9923	9951	1/4" x 1 1/4"	2,000	1 1/2	2785	2796
9924	9952	1/4" x 1 3/4"	2,000	1 3/4	2785	2796
9925	9953	1/4" x 2 1/4"	1,000	2	2786	2796
9926	9954	1/4" x 2 3/4"	1,000	2 3/4	2786	2796
9927	9955	1/4" x 3 1/4"	1,000	3 1/4	2787	2797
9928	9956	1/4" x 3 3/4"	1,000	3 3/4	2787	2797
9929	9957	1/4" x 4"	1,000	4 1/2	2787	2797
—	9958	1/4" x 5"	1,000	4 1/2	2788	—
—	9959	1/4" x 6"	500	5 1/2	2789	—

White Perma-Seal Tapper, Flange Hex Head & Trim Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
8706	8710	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
8707	8711	1/4" x 2 1/4"	100	500	2	2786	2796
8708	8712	1/4" x 2 3/4"	100	500	2 3/4	2786	2796
8709	8713	1/4" x 3 1/4"	100	500	3 1/4	2787	2797
—	8714	1/4" x 3 3/4"	100	500	3 3/4	2787	2797

One drill bit is packaged in each box of tappers.



ORDERING INFORMATION

Zinc Plated Carbon Steel Tapper, Hex Head & Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
5804	—	3/8" x 2"	100	500	5 1/4	5860	5866
5806	5852	3/8" x 3"	100	500	8 1/4	5860	5866
5808	5854	3/8" x 4"	100	500	11 1/2	5861	5868
—	5856	3/8" x 5"	100	500	13	5862	5868
—	5858	3/8" x 6"	100	500	15 1/2	5863	5868

* 3/8" Hex Head. One drill bit is packaged in each box of tappers.

Silver Perma-Seal Tapper, Hex Head & Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
—	—	3/16" x 1 1/4"	100	500	3/4	2781	2793
—	—	3/16" x 1 3/4"	100	500	1	2781	2793
—	—	3/16" x 2 1/4"	100	500	1 1/4	2782	2793
—	—	3/16" x 2 3/4"	100	500	1 1/2	2782	2793
—	—	3/16" x 3 1/4"	100	500	1 3/4	2783	2794
—	—	3/16" x 3 3/4"	100	500	2 1/4	2783	2794
—	—	3/16" x 4"	100	500	2 1/2	2783	2794
2486	2506	1/4" x 1 1/4"	100	500	1 1/2	2785	2796
2488	2507	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
2490	2508	1/4" x 2 1/4"	100	500	2	2786	2796
2492	2509	1/4" x 2 3/4"	100	500	2 3/4	2786	2796
2494	2510	1/4" x 3 1/4"	100	500	3 1/4	2787	2797
2495	2511	1/4" x 3 3/4"	100	500	3 3/4	2787	2797
2496	2512	1/4" x 4"	100	500	4 1/2	2787	2797

One drill bit is packaged in each box of tappers.

Silver Perma-Seal Tapper (Master Packaging)

Catalog Number		Size	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH				Straight	SDS HEX
—	8757	3/16" x 1 1/4"	2,000	3/4	2781	2793
—	8758	3/16" x 1 3/4"	2,000	1	2781	2793
—	8759	3/16" x 2 1/4"	2,000	1 1/4	2782	2793
—	8760	3/16" x 2 3/4"	2,000	1 1/2	2782	2793
—	8761	3/16" x 3 1/4"	1,000	1 3/4	2783	2794
—	8762	3/16" x 3 3/4"	1,000	2 1/4	2783	2794
—	8763	3/16" x 4"	1,000	2 1/2	2783	2794
8750	8764	1/4" x 1 1/4"	2,000	1 1/2	2785	2796
8751	8765	1/4" x 1 3/4"	2,000	1 3/4	2785	2796
8752	8766	1/4" x 2 1/4"	1,000	2	2786	2796
8753	8767	1/4" x 2 3/4"	1,000	2 3/4	2786	2796
8754	8768	1/4" x 3 1/4"	1,000	3 1/4	2787	2797
8755	8769	1/4" x 3 3/4"	1,000	3 3/4	2787	2797
8756	8770	1/4" x 4"	1,000	4 1/2	2787	2797

Silver Perma-Seal Tapper, Flange Hex Head & Trim Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
8715*	8719	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
8716*	8720	1/4" x 2 1/4"	100	500	2	2786	2796
8717*	8721	1/4" x 2 3/4"	100	500	2 3/4	2786	2796
8718*	8722	1/4" x 3 1/4"	100	500	3 1/4	2787	2797
—	8723	1/4" x 3 3/4"	100	500	3 3/4	2787	2797

One drill bit is packaged in each box of tappers.

*Discontinued once current stock is depleted.

Bronze Perma-Seal Tapper, Flange Hex Head & Trim Flat Head

Catalog Number		Size	Standard Box	Standard Carton	Wt./ 100	Drill Bit Reference	
HEX	PFH					Straight	SDS HEX
9977	9975	1/4" x 1 3/4"	100	500	1 3/4	2785	2796
9978	9976	1/4" x 2 1/4"	100	500	2	2786	2796

One drill bit is packaged in each box of tappers.



ORDERING INFORMATION

Carbide Drill Bits for Perma-Seal & 1/4" Zinc Plated & 410 Stainless Steel Tapper

(Do not use with 3/8" Zinc Plated Tapper)

Straight Shank

Catalog Number	Size	Drill Bit Range	Usable Length	Standard Tube	Wt./ 10
2781	5/32" x 3 1/2"	0.168" – 0.175"	2"	10	1/4
2782	5/32" x 4 1/2"		3"	10	1/4
2783	5/32" x 5 1/2"		4"	10	1/4
2785	3/16" x 3 1/2"	0.202" – 0.204"	2"	10	1/4
2786	3/16" x 4 1/2"		3"	10	1/4
2787	3/16" x 5 1/2"		4"	10	1/2
2788	3/16" x 6 1/2"		5"	10	1/2
2789	3/16" x 7 1/2"		6"	10	1/2



Hex Shank SDS-Plus

Catalog Number	Size	Drill Bit Range	Usable Length	Standard Tube	Wt./ 10
2793	5/32" x 5"	0.168" – 0.175"	3"	1	1
2794	5/32" x 7"		5"	1	1
2796	3/16" x 5"	0.202" – 0.204"	3"	1	1
2797	3/16" x 7"		5"	1	1



Carbide Drill Bits for 3/8" Tapper

Straight Shank

Catalog Number	Size	Drill Bit Range	Usable Length	Standard Tube	Wt./ 10
5861	1/4" x 5 1/2"	0.260" – 0.268"	4"	5	1/2
5863	1/4" x 7 1/2"		6"	5	3/4



Hex Shank SDS-Plus

Catalog Number	Size	Drill Bit Range	Usable Length	Standard Tube	Wt./ 10
5866	1/4" x 6"	0.260" – 0.268"	4"	1	1 1/2



ORDERING INFORMATION

Installation Tools for 3/16" and 1/4" Tapper

Catalog Number	Description	Max. Screw Length	Max. Bit Length	Standard Box	Wt./ Each
2791	Tapper 1000 Tool Kit	4"	5 1/2"	1	3/4
2795	1000 SDS Extension (8")	6"	7 1/2"	1	1/2



Installation Tools for 3/8" Tapper

Catalog Number	Description	Max. Screw Length	Max. Bit Length	Standard Box	Wt./ Each
5865	Tapper 3000 Tool Kit	4"	5 1/2"	1	3/4
5867	3000 Extension (8")	6"	7 1/2"	1	1/2