3/8" diameter anchor data for CIP and CMU is bubbled for convenience

*CIP See Pages 2,3

*Grout-filled CMU See Pages 5,7

GENERAL INFORMATION

POWER-BOLT®

Heavy-Duty Sleeve Anchor

PRODUCT DESCRIPTION

The Power-Bolt anchor, is a heavy duty sleeve style, self-locking anchor which is vibration resistant and removable. It is available with a finished hex head or flat head with a hex key insert and can be used in concrete, block, brick, or stone.

Expansion occurs at two locations within the drilled hole. First, the cone is pulled into the large triple-tined expansion sleeve, developing a mid-level, compression force. Further turning causes the threaded bolt to advance into the threads of the expander cone, forcing its four sections outward. This action engages the base material deep in the anchor hole. The bolt and cone remain locked together which resists loosening under vibratory conditions.

The Power-Bolt is also designed to draw the fixture into full bearing against the base material through the action of its flexible compression ring. As the anchor is being tightened, the compression ring will crush if necessary to tightly secure the fixture against the face of the base material.

The internal bolt of the Power-Bolt is removable and reusable in the same anchor sleeve making it suitable for applications such as mounting machinery which may need to be removed for service and for temporary applications such as heavy duty form work.

GENERAL APPLICATIONS AND USES

- Column Base Plates and Mechanical Equipment
- Dock Bumpers and Support Ledgers
- Racking and Railing Attachments

FEATURE AND BENEFITS

+ High load capacity
+ Two-level expansion mechanism
+ Internal high strength bolt is removable and reusable
+ Compression zone in sleeve clamps fixture to the base material
+ Low profile finished head design

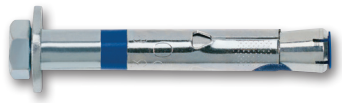
APPROVALS AND LISTINGS

- Tested in accordance with ASTM E488

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchors, 04 05 19.16 - Masonry Anchors, and 05 05 19 - Post-Installed Concrete Anchors. Expansion anchors shall be Power-Bolt as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

SECTION CONTENTS



HEX HEAD
POWER-BOLT ASSEMBLY

FLAT HEAD
POWER-BOLT ASSEMBLY

HEAD STYLES

- Finished Hex Head
- Flat Head

ANCHOR MATERIALS

- Type 304 Stainless Steel (Hex Head)
- Zinc Plated Carbon Steel (Flat Head)

ANCHOR SIZE RANGE (TYP.)

- 1/4" diameter through 5/8" diameter

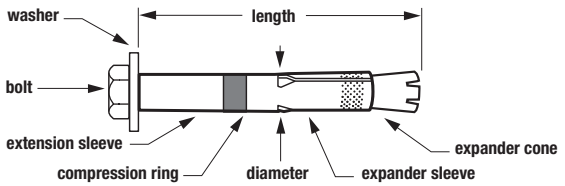
SUITABLE BASE MATERIALS

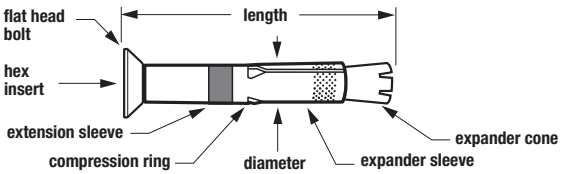
- Normal-weight concrete
- Lightweight concrete
- Grouted Concrete Masonry (CMU)
- Hollow CMU
- Brick Masonry
- Stone

MATERIAL SPECIFICATIONS

Anchor Component	Carbon Steel Flat Head	Stainless Steel Hex Head
Internal Bolt	SAE Grade 5	**Type 304 SS
Washer	Carbon Steel	Type 18-8 SS
Expander Sleeve	AISI 1010	Type 304 SS
Extension Sleeve	AISI 1010	Type 304 SS
Expander Cone	AISI 12L14	Type 303 SS
Compression Ring	Nylon	Nylon
Dust Cap	Nylon	Nylon
Zinc Plating	ASTM B 633, SC1, Type III (Fe/Zn 5) – Mild Service Condition	N/A

** Manufactured with a minimum yield strength of 65,000 psi. Stainless steel anchor components are passivated. The stainless steel expander cone is zinc plated.





INSTALLATION SPECIFICATIONS

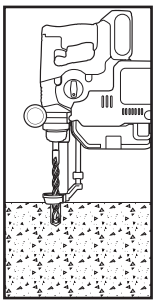
Carbon Steel Flat Head Power-Bolt (80°– 82° head)

Dimension	Anchor Diameter, d		
	3/8"	1/2"	5/8"
ANSI Drill Bit Size, d_{bit} (in.)	3/8	1/2	5/8
Fixture Clearance Hole, d_h (in.)	7/16	9/16	11/16
Internal Bolt Size (UNC)	5/16-18	3/8-16	1/2-13
Head Height (in.)	15/64	1/4	21/64
Head Diameter, d_{hd} (in.)	3/4	7/8	1-1/8
Allen Wrench Size (in.)	7/32	5/16	3/8
Max Bolt Torque, T_{max} (ft-lbs)	25	45	100

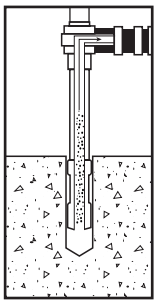
Stainless Steel Hex Head Power-Bolt

Dimension	Anchor Diameter, d		
	1/4"	3/8"	1/2"
ANSI Drill Bit Size, d_{bit} (in.)	1/4	3/8	1/2
Fixture Clearance Hole, d_h (in.)	5/16	7/16	9/16
Internal Bolt Size (UNC)	10-24	5/16-18	3/8-16
Head Height (in.)	7/64	13/64	15/64
Washer O.D., d_w (in.)	1/2	13/16	1
Wrench Size (in.)	5/16	1/2	9/16
Max Bolt Torque, T_{max} (ft-lbs)	3	12	25

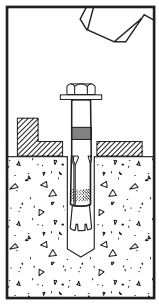
Installation Procedure



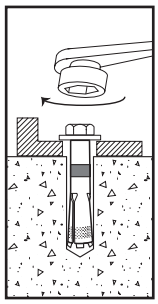
Using the proper diameter bit, drill a hole into the base material to a depth of at least 1/2" or one anchor diameter deeper than the embedment required. The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15.



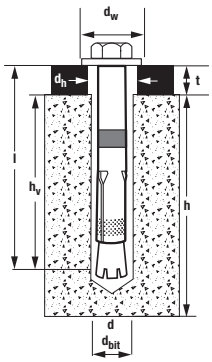
Step 2
Remove dust and debris from the hole during drilling (e.g. dust extractor, hollow bit) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling. Do not modify the anchor or advance the bolt in the anchor assembly prior to installation.

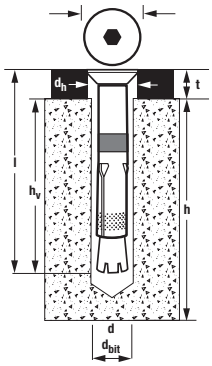


Step 3
Drive the anchor through the fixture into the anchor hole until the bolt head is firmly seated against the fixture. Be sure the anchor is driven to the required embedment depth.



Step 4
Tighten the anchor by turning the head 3 to 4 turns past finger tight.





Nomenclature
- d = Diameter of anchor
- d_{bit} = Diameter of drill bit
- d_h = Diameter of fixture clearance hole
- d_{hd} = Flat head diameter
- d_w = Diameter of washer
- h = Base material thickness. The minimum value of h should be 1.5h_v or 3" whichever is greater
- h_v = Minimum embedment depth
- l = Overall length of anchor
- t = Fixture thickness

Length Identification

Mark	♦	■	A	B	C	D	E	F	G	H	I
From	1/2"	1"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"
Up to but not including	1"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"

PERFORMANCE DATA

Ultimate Load Capacities for Carbon and Stainless Steel Power-Bolt in Normal-Weight Concrete[1,2]

Anchor Diameter d in.	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength (f'c)							
		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)
1/4	1-1/4 (31.8)	945 (4.2)	1655 (7.4)	1105 (4.9)	1680 (7.5)	1265 (5.6)	1705 (7.6)	1330 (5.9)	1705 (7.6)
	1-3/4 (44.5)	1120 (5.0)	1655 (7.4)	1240 (5.5)	1845 (8.2)	1360 (6.0)	2030 (9.0)	1490 (6.6)	2030 (9.0)
	2-1/2 (63.5)	1505 (6.7)	1655 (7.4)	1550 (6.9)	2185 (9.7)	1600 (7.1)	2710 (12.1)	1680 (7.5)	2710 (12.1)
3/8	2 (50.8)	3,500 (15.8)	3,985 (17.9)	4,045 (18.2)	5,205 (23.4)	4,585 (20.6)	6,425 (28.9)	5,915 (26.6)	7,440 (33.5)
	2-1/2 (63.5)	3,800 (17.1)	4,380 (19.7)	4,330 (19.5)	5,770 (26.0)	4,855 (21.8)	7,160 (32.2)	6,665 (30.0)	7,960 (35.8)
	3-1/2 (88.9)	4,395 (19.8)	4,980 (22.4)	5,195 (23.4)	6,815 (30.7)	5,995 (27.0)	8,650 (38.9)	7,150 (32.2)	8,650 (38.9)
1/2	2-1/2 (63.5)	4,900 (22.1)	6,840 (30.8)	5,710 (25.7)	7,535 (33.9)	6,520 (29.3)	8,225 (37.0)	7,320 (32.9)	8,225 (37.0)
	3-1/2 (88.9)	6,140 (27.6)	8,540 (38.4)	7,590 (34.2)	9,200 (41.4)	9,040 (40.7)	9,860 (44.4)	9,890 (44.5)	10,780 (48.5)
	5 (127.0)	7,260 (32.7)	10,140 (45.6)	8,480 (38.2)	11,230 (50.5)	9,700 (43.7)	12,320 (55.4)	10,935 (49.2)	12,315 (55.4)
5/8	2-3/4 (69.9)	5,360 (24.1)	7,970 (35.9)	6,535 (29.4)	9,970 (44.9)	7,705 (34.7)	11,970 (53.9)	8,490 (38.2)	11,970 (53.9)
	4 (101.6)	6,460 (29.1)	10,860 (48.9)	8,210 (36.9)	12,710 (57.2)	9,960 (44.8)	14,560 (65.5)	13,110 (59.0)	15,900 (71.6)

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. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Carbon and Stainless Steel Power-Bolt in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in.	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength (f'c)							
		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)
1/4	1-1/4 (31.8)	235 (1.0)	415 (1.8)	275 (1.2)	420 (1.9)	315 (1.4)	425 (1.9)	335 (1.5)	425 (1.9)
	1-3/4 (44.5)	280 (1.2)	415 (1.8)	310 (1.4)	460 (2.0)	340 (1.5)	510 (2.3)	375 (1.7)	510 (2.3)
	2-1/2 (63.5)	375 (1.7)	415 (1.8)	390 (1.7)	545 (2.4)	400 (1.8)	680 (3.0)	420 (1.9)	680 (3.0)
3/8	2 (50.8)	875 (3.9)	995 (4.5)	1,010 (4.5)	1,300 (5.9)	1,145 (5.2)	1,605 (7.2)	1,480 (6.7)	1,860 (8.4)
	2-1/2 (63.5)	950 (4.3)	1,095 (4.9)	1,080 (4.9)	1,445 (6.5)	1,215 (5.5)	1,790 (8.1)	1,665 (7.5)	1,990 (9.0)
	3-1/2 (88.9)	1,100 (5.0)	1,245 (5.6)	1,300 (5.9)	1,705 (7.7)	1,500 (6.8)	2,165 (9.7)	1,790 (8.1)	2,165 (9.7)
1/2	2-1/2 (63.5)	1,225 (5.5)	1,710 (7.7)	1,430 (6.4)	1,885 (8.5)	1,630 (7.3)	2,055 (9.2)	1,830 (8.2)	2,055 (9.2)
	3-1/2 (88.9)	1,535 (6.9)	2,135 (9.6)	1,900 (8.6)	2,300 (10.4)	2,260 (10.2)	2,465 (11.1)	2,470 (11.1)	2,695 (12.1)
	5 (127.0)	1,815 (8.2)	2,535 (11.4)	2,120 (9.5)	2,810 (12.6)	2,425 (10.9)	3,080 (13.9)	2,735 (12.3)	3,080 (13.9)
5/8	2-3/4 (69.9)	1,340 (6.0)	1,995 (9.0)	1,635 (7.4)	2,495 (11.2)	1,925 (8.7)	2,995 (13.5)	2,125 (9.6)	2,995 (13.5)
	4 (101.6)	1,615 (7.3)	2,715 (12.2)	2,055 (9.2)	3,180 (14.3)	2,490 (11.2)	3,640 (16.4)	3,275 (14.7)	3,975 (17.9)

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 upon the application such as life safety or overhead.
2. Allowable load capacities are multiplied by reduction when anchor spacing or edge distances are less than critical distances.
3. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.

Ultimate and Allowable Load Capacities for Carbon and Stainless Steel Power-Bolt in Lightweight Concrete[1,2,3]

Anchor Diameter d in.	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength (f´c)							
		3,000 psi (20.7 MPa)				5,000 psi (34.5 MPa)			
		Ultimate Load		Allowable Load		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	1-1/4 (31.8)	1,000 (4.5)	1,520 (6.8)	250 (1.1)	380 (1.7)	1,320 (5.9)	1,520 (6.8)	330 (1.5)	380 (1.7)
	2 (50.8)	1,510 (6.8)	1,540 (6.9)	380 (1.7)	385 (1.7)	-	-	-	-
3/8	2 (50.8)	2,160 (9.7)	2,780 (12.5)	540 (2.4)	695 (3.1)	3,240 (14.6)	2,780 (12.5)	810 (3.6)	695 (3.1)
	3-1/2 (88.9)	4,200 (18.9)	4,980 (22.4)	1,050 (4.7)	1,245 (5.6)	-	-	-	-
1/2	2-1/2 (63.5)	3,680 (16.6)	4,615 (20.8)	920 (4.1)	1,155 (5.2)	4,920 (22.1)	4,615 (20.8)	1,230 (5.5)	1,155 (5.2)
	5 (127.0)	5,540 (24.9)	8,730 (39.3)	1,385 (6.2)	2,185 (9.8)	-	-	-	-
5/8	2-3/4 (69.9)	3,120 (14.0)	6,840 (30.8)	780 (3.5)	1,710 (7.7)	5,240 (23.6)	6,840 (30.8)	1,310 (5.9)	1,710 (7.7)

1. Tabulated load values are for anchors installed in sand-lightweight concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. 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 upon the application such as life safety or overhead.
3. Linear interpolation may be used to determine ultimate and allowable loads for intermediate embedments and compressive strengths.

Ultimate and Allowable Load Capacities for Carbon and Stainless Steel Power-Bolt Installed Through Steel Deck into Lightweight Concrete[1,2,3,4]

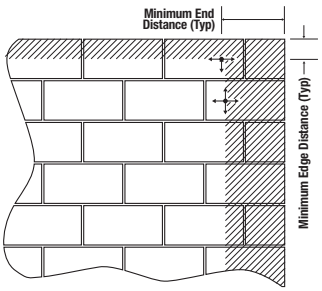
Anchor Diameter d in.	Minimum Embedment Depth h_v in. (mm)	Lightweight Concrete over minimum 20 Gage Metal Deck, f´c ≥ 3,000 (20.7 MPa)							
		Minimum 1-1/2" Wide Deck				Minimum 4-1/2" Wide Deck			
		Ultimate Load		Allowable Load		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	1-1/4 (31.8)	720 (3.2)	2,360 (10.6)	180 (0.8)	590 (2.7)	920 (4.1)	2,360 (10.6)	230 (1.0)	590 (2.7)
3/8	2 (50.8)	720 (3.2)	2,740 (12.3)	180 (0.8)	685 (3.1)	1,840 (8.3)	2,740 (12.3)	460 (2.1)	685 (3.1)
1/2	2-1/2 (63.5)	1,640 (7.4)	2,740 (12.3)	410 (1.8)	685 (3.1)	2,000 (9.0)	4,400 (19.8)	500 (2.3)	1,100 (5.0)
5/8	2-3/4 (88.9)	-	-	-	-	2,000 (9.0)	4,440 (20.0)	500 (2.3)	1,110 (5.0)

1. Tabulated load values are for anchors installed in sand-lightweight concrete over steel deck. Concrete compressive strength must be at the specified minimum at the time of installation.
2. 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 upon the application such as life safety or overhead.
3. Tabulated load values are for anchors installed in the center of the flute. Spacing distances shall be in accordance with the spacing table for lightweight concrete.
4. Anchors are permitted to be installed in the lower or upper flute of the steel deck provided the proper installation procedures are maintained.

Ultimate and Allowable Load Capacities for Power-Bolt in Grout-Filled Concrete Masonry[1,2,3,4]

Anchor Diameter d in.	Minimum Embed. Depth h_v in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	f´m ≥ 1,500 psi (10.4 MPa)			
				Ultimate Load		Allowable Load	
				Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	1-1/8 (28.6)	3-3/4 (95.3)	3-3/4 (95.3)	1,215 (5.5)	1,185 (5.3)	245 (1.1)	235 (1.1)
	2-1/2 (63.5)	5-1/4 (133.4)	3-3/4 (95.3)	1,760 (7.9)	1,185 (5.3)	350 (1.6)	235 (1.1)
3/8	2 (50.8)	5-5/8 (142.9)	5-5/8 (142.9)	1,985 (8.9)	3,065 (13.8)	395 (1.8)	615 (2.8)
	3-1/2 (88.9)	7-7/8 (200.0)	5-5/8 (142.9)	2,120 (9.5)	3,065 (13.8)	425 (1.9)	615 (2.8)
1/2	2-1/2 (63.5)	7-1/2 (190.5)	7-1/2 (190.5)	2,435 (11.0)	5,650 (25.4)	485 (2.2)	1,130 (5.1)
	4 (101.6)	10-1/2 (266.7)	7-1/2 (190.5)	2,690 (12.1)	5,650 (25.4)	540 (2.4)	1,130 (5.1)
5/8	2-3/4 (69.9)	9-3/8 (238.1)	9-3/8 (238.1)	2,560 (11.5)	9,000 (40.5)	510 (2.3)	1,800 (8.1)
	5 (127.0)	13-1/8 (333.4)	9-3/8 (238.1)	2,975 (13.4)	9,000 (40.5)	595 (2.7)	1,800 (8.1)

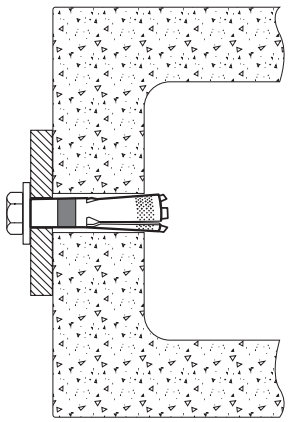
1. Tabulated load values are for carbon steel and stainless steel anchors installed in minimum 6-inch wide, minimum Grade N, Type II, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry cells may be grouted. Masonry compressive strength must be at the specified minimum at the time of installation (f'm ≥ 1,500 psi).
2. Allowable load capacities listed are calculated using and 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. Linear interpolation may be used to determine ultimate and allowable loads for intermediate embedment depths.
4. 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.



Ultimate and Allowable Load Capacities for Power-Bolt in Hollow Concrete Masonry[1,2,3,4,5]

Anchor Diameter d in.	Minimum Embed. Depth h_v in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	f´m ≥ 1,500 psi (10.4 MPa)			
				Ultimate Load		Allowable Load	
				Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	7/8 (22.2)	3-3/4 (95.3)	3-3/4 (95.3)	600 (2.7)	765 (3.4)	120 (0.5)	155 (0.7)
	1-1/4 (31.8)	3-3/4 (95.3)	8 (203.2)	825 (3.7)	1,055 (4.8)	165 (0.7)	210 (0.9)
	1-1/2 (38.1)	3-3/4 (95.3)	12 (304.8)	1,130 (5.1)	1,230 (5.5)	225 (1.0)	245 (1.1)
3/8	1-1/4 (31.8)	12 (304.8)	8 (203.2)	1,360 (6.1)	2,150 (9.7)	270 (1.2)	430 (1.9)
	1-1/2 (38.1)	12 (304.8)	12 (304.8)	1,470 (6.6)	2,600 (11.7)	295 (1.3)	520 (2.3)
1/2	1-1/4 (31.8)	12 (304.8)	8 (203.2)	2,560 (11.5)	2,150 (9.7)	590 (2.4)	430 (1.9)
	1-1/2 (38.1)	12 (304.8)	12 (304.8)	2,560 (11.5)	3,385 (15.2)	510 (2.3)	675 (3.0)

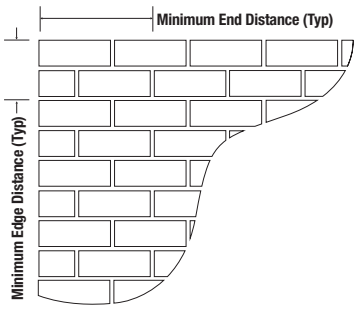
1. Tabulated load values are for carbon steel and stainless steel anchors installed in minimum 6-inch wide, minimum Grade N, Type II, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry cells may be grouted. Masonry compressive strength must be at the specified minimum at the time of installation (f'm ≥ 1,500 psi).
2. Allowable load capacities listed are calculated using and 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. Linear interpolation may be used to determine ultimate and allowable loads for intermediate embedment depths.
4. The tabulated values are for anchors installed at a minimum of 16 anchor diameters on center for 100 percent capacity. Spacing distances may be reduced to 8 anchor diameters on center provided the capacities are reduced by 50 percent. Linear interpolation may be used for intermediate spacing.
5. A suitable anchor length must be selected which included consideration of fixture to engage the base material at the minimum embedment depth when anchoring into hollow concrete masonry.
(e.g. attachment thickness + embedment + one half inch = suitable anchor length)



Ultimate and Allowable Load Capacities for Power-Bolt in Clay Brick Masonry[1,2,3]

Anchor Dia. d in.	Min. Embed. Depth h_v in. (mm)	Min. Edge Distance	Min. End Distance	Min. Spacing Distance	Structural Brick Masonry f'm ≥ 1,500 psi (10.4 MPa)			
					Ultimate Load		Allowable Load	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	7/8 (22.2)	8 (203.2)	4 (101.6)	6 (152.4)	1,090 (4.9)	1,160 (5.2)	220 (1.0)	230 (1.0)
	1-1/2 (38.1)				1,455 (6.6)	1,265 (5.7)	290 (1.3)	255 (1.1)
3/8	2 (50.8)	12 (304.8)	6 (152.4)	8 (203.2)	2,015 (9.1)	3,655 (16.5)	405 (1.8)	730 (3.3)
1/2	2-1/2 (63.5)		8 (203.2)	10 (254.0)	3,110 (14.0)	4,585 (20.6)	620 (2.8)	915 (4.1)
5/8	2-3/4 (69.9)	16 (406.4)	10 (254.0)	12 (304.8)	4,535 (20.4)	5,470 (24.6)	905 (4.1)	1,095 (4.9)

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 ≥ 1,500 psi).
2. Allowable load capacities listed are calculated using and 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. Spacing between anchors may be reduced to half the listed distances provided the capacities are reduced by 50 percent. Linear interpolation may be used for intermediate spacing.



DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

Combined Loading

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

$$\left(\frac{Nu}{Nn}\right) + \left(\frac{Vu}{Vn}\right) \leq 1$$

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[1]

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	$s_{cr} = 2.0h_v$	$FN_s = FV_s = 1.0$	$s_{min} = h_v$	$FN_s = FV_s = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 12d$	$FN_c = 1.0$	$c_{min} = 5d$	$FN_c = 0.70$
	Shear	$c_{cr} = 12d$	$FV_c = 1.0$	$c_{min} = 5d$	$FV_c = 0.35$

Anchor Installed in Structural Lightweight 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	$s_{cr} = 2.0h_v$	$FN_s = FV_s = 1.0$	$s_{min} = h_v$	$FN_s = FV_s = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 12d$	$FN_c = 1.0$	$c_{min} = 5d$	$FN_c = 0.80$
	Shear	$c_{cr} = 12d$	$FV_c = 1.0$	$c_{min} = 5d$	$FV_c = 0.40$

1. Allowable load values found in the performance data tables are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances. Linear interpolation is allowed for intermediate anchor spacing and edge distances between critical and minimum distances. When an anchor is affected by both reduced spacing and edge distance, the spacing and edge reduction factors must be combined (multiplied). Multiple reduction factors for anchor spacing and edge distance may be required depending on the anchor group configuration.

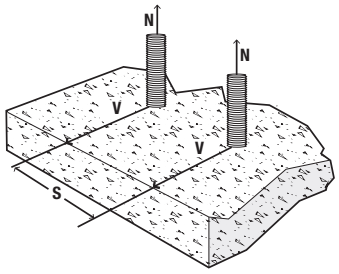
Load Adjustment Factors for Normal-Weight Concrete

Spacing, Tension (F_{NS}) & Shear (F_{VS})

Dia. (in.)		1/4			3/8			1/2			5/8		
h_v (in.)		1-1/4	1-3/4	2-1/2	2	2-1/2	3-1/2	2-1/2	3-1/2	5	2-3/4	4	6
s_{cr} (in.)		2-1/2	3-1/2	5	4	5	7	5	7	10	5-1/2	8	12
s_{min} (in.)		1-1/4	1-3/4	2-1/2	2	2-1/2	3-1/2	2-1/2	3-1/2	5	2-3/4	4	6
Spacing, s (inches)	1-1/4	0.50	-	-	-	-	-	-	-	-	-	-	-
	1-3/4	0.70	0.50	-	-	-	-	-	-	-	-		-
	2	0.80	0.57	-	0.50	-	-	-	-	-	-	-	-
	2-1/2	1.00	0.71	0.50	0.63	0.50	-	0.50	-	-	-	-	-
	2-3/4	1.00	0.79	0.55	0.69	0.55	-	0.55	-	-	0.50	-	-
	3	1.00	0.86	0.60	0.75	0.60	-	0.60	-	-	0.55	-	-
	3-1/2	1.00	1.00	0.70	0.88	0.70	0.50	0.70	0.50	-	0.64	-	-
	4	1.00	1.00	0.80	1.00	0.80	0.57	0.80	0.57	-	0.73	0.50	-
	4-1/2	1.00	1.00	0.90	1.00	0.90	0.64	0.90	0.64	-	0.82	0.56	-
	5	1.00	1.00	1.00	1.00	1.00	0.71	1.00	0.71	0.50	0.91	0.63	-
	5-1/2	1.00	1.00	1.00	1.00	1.00	0.79	1.00	0.79	0.55	1.00	0.69	-
	6	1.00	1.00	1.00	1.00	1.00	0.86	1.00	0.86	0.60	1.00	0.75	0.50
	7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.70	1.00	0.88	0.58
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.67
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	0.75
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension and shear, the critical spacing (s_{cr}) is equal to 2 embedment depths ($2h_v$) at which the anchor achieves 100% of load.

Minimum spacing (s_{min}) is equal to 1 embedment depth (h_v) at which the anchor achieves 50% of load.

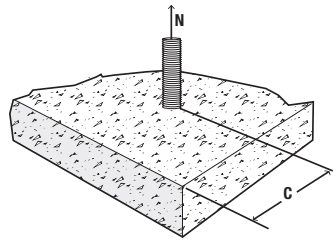


Edge Distance, Tension (F_{NC})

Dia. (in.)		1/4	3/8	1/2	5/8
c_{cr} (in.)		3	4-1/2	6	7-1/2
c_{min} (in.)		1-1/4	1-7/8	2-1/2	3-1/8
Edge Distance, c (inches)	1-1/4	0.70	-	-	-
	1-5/8	0.76	-	-	-
	1-7/8	0.81	0.70	-	-
	2	0.83	0.71	-	-
	2-1/2	0.91	0.77	0.70	-
	3	1.00	0.83	0.74	-
	3-1/8	1.00	0.84	0.75	0.70
	3-3/4	1.00	0.91	0.81	0.74
	4	1.00	0.94	0.83	0.76
	4-1/2	1.00	1.00	0.87	0.79
	5	1.00	1.00	0.91	0.83
	6	1.00	1.00	1.00	0.90
	6-1/4	1.00	1.00	1.00	0.91
	7	1.00	1.00	1.00	0.97
	7-1/2	1.00	1.00	1.00	1.00
	8	1.00	1.00	1.00	1.00
	9	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension, 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 5 anchor diameters (5d) at which the anchor achieves 70% of load.

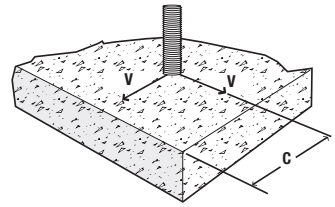


Edge Distance, Shear (F_{VC})

Dia. (in.)		1/4	3/8	1/2	5/8
c_{cr} (in.)		3	4-1/2	6	7-1/2
c_{min} (in.)		1-1/4	1-7/8	2-1/2	3-1/8
Edge Distance, c (inches)	1-1/4	0.35	-	-	-
	1-5/8	0.49	-	-	-
	1-7/8	0.58	0.35	-	-
	2	0.63	0.38	-	-
	2-1/2	0.81	0.50	0.35	-
	3	1.00	0.63	0.44	-
	3-1/8	1.00	0.66	0.47	0.35
	3-3/4	1.00	0.81	0.58	0.44
	4	1.00	0.88	0.63	0.48
	4-1/2	1.00	1.00	0.72	0.55
	5	1.00	1.00	0.81	0.63
	6	1.00	1.00	1.00	0.78
	6-1/4	1.00	1.00	1.00	0.81
	7	1.00	1.00	1.00	0.93
	7-1/2	1.00	1.00	1.00	1.00
	8	1.00	1.00	1.00	1.00
	9	1.00	1.00	1.00	1.00

Notes: For anchors loaded in 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 5 anchor diameters (5d) at which the anchor achieves 35% of load.

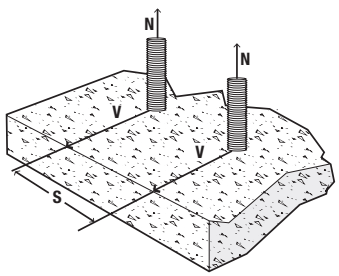


Load Adjustment Factors for Lightweight Concrete

Spacing, Tension (F_{NS}) & Shear (F_{VS})													
Dia. (in.)		1/4			3/8			1/2			5/8		
h_v (in.)		1-1/4	1-3/4	2-1/2	2	2-1/2	3-1/2	2-1/2	3-1/2	5	2-3/4	4	6
s_{cr} (in.)		2-1/2	3-1/2	5	4	5	7	5	7	10	5-1/2	8	12
s_{min} (in.)		1-1/4	1-3/4	2-1/2	2	2-1/2	3-1/2	2-1/2	3-1/2	5	2-3/4	4	6
Spacing, s (inches)	1-1/4	0.50	-	-	-	-	-	-	-	-	-	-	-
	1-3/4	0.70	0.50	-	-	-	-	-	-	-	-	-	-
	2	0.80	0.57	-	0.50	-	-	-	-	-	-	-	-
	2-1/2	1.00	0.71	0.50	0.63	0.50	-	0.50	-	-	-	-	-
	2-3/4	1.00	0.79	0.55	0.69	0.55	-	0.55	-	-	0.50	-	-
	3	1.00	0.86	0.60	0.75	0.60	-	0.60	-	-	0.55	-	-
	3-1/2	1.00	1.00	0.70	0.88	0.70	0.50	0.70	0.50	-	0.64	-	-
	4	1.00	1.00	0.80	1.00	0.80	0.57	0.80	0.57	-	0.73	0.50	-
	4-1/2	1.00	1.00	0.90	1.00	0.90	0.64	0.90	0.64	-	0.82	0.56	-
	5	1.00	1.00	1.00	1.00	1.00	0.71	1.00	0.71	0.50	0.91	0.63	-
	5-1/2	1.00	1.00	1.00	1.00	1.00	0.79	1.00	0.79	0.55	1.00	0.69	-
	6	1.00	1.00	1.00	1.00	1.00	0.86	1.00	0.86	0.60	1.00	0.75	0.50
	7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.70	1.00	0.88	0.58
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	0.67
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	0.75
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension and shear, the critical spacing (s_{cr}) is equal to 2 embedment depths ($2h_v$) at which the anchor achieves 100% of load.

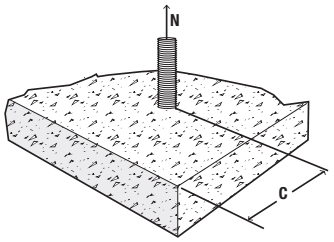
Minimum spacing (s_{min}) is equal to 1 embedment depth (h_v) at which the anchor achieves 50% of load.



Edge Distance, Tension (F_{NC})					
Dia. (in.)		1/4	3/8	1/2	5/8
c_{cr} (in.)		3	4-1/2	6	7-1/2
c_{min} (in.)		1-1/4	1-7/8	2-1/2	3-1/8
Edge Distance, c (inches)	1-1/4	0.80	-	-	-
	1-5/8	0.84	-	-	-
	1-7/8	0.87	0.80	-	-
	2	0.89	0.81	-	-
	2-1/2	0.94	0.85	0.80	-
	3	1.00	0.89	0.83	-
	3-1/8	1.00	0.90	0.84	0.80
	3-3/4	1.00	0.94	0.87	0.83
	4	1.00	0.96	0.89	0.84
	4-1/2	1.00	1.00	0.91	0.86
	5	1.00	1.00	0.94	0.89
	6	1.00	1.00	1.00	0.93
	6-1/4	1.00	1.00	1.00	0.94
	7	1.00	1.00	1.00	0.98
	7-1/2	1.00	1.00	1.00	1.00
	8	1.00	1.00	1.00	1.00
	9	1.00	1.00	1.00	1.00

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

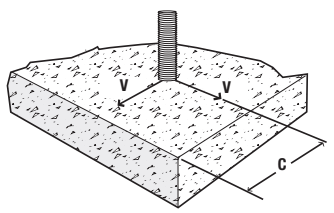
Minimum edge distance (c_{min}) is equal to 5 anchor diameters (5d) at which the anchor achieves 80% of load.



Edge Distance, Shear (F_{VC})					
Dia. (in.)		1/4	3/8	1/2	5/8
c_{cr} (in.)		3	4-1/2	6	7-1/2
c_{min} (in.)		1-1/4	1-7/8	2-1/2	3-1/8
Edge Distance, c (inches)	1-1/4	0.40	-	-	-
	1-5/8	0.53	-	-	-
	1-7/8	0.61	0.40	-	-
	2	0.66	0.43	-	-
	2-1/2	0.83	0.54	0.40	-
	3	1.00	0.66	0.49	-
	3-1/8	1.00	0.69	0.51	0.40
	3-3/4	1.00	0.83	0.61	0.49
	4	1.00	0.89	0.66	0.52
	4-1/2	1.00	1.00	0.74	0.59
	5	1.00	1.00	0.83	0.66
	6	1.00	1.00	1.00	0.79
	6-1/4	1.00	1.00	1.00	0.83
	7	1.00	1.00	1.00	0.93
	7-1/2	1.00	1.00	1.00	1.00
	8	1.00	1.00	1.00	1.00
	9	1.00	1.00	1.00	1.00

Notes: For anchors loaded in 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 5 anchor diameters (5d) at which the anchor achieves 40% of load.



ORDERING INFORMATION

Stainless Steel Hex Head Power-Bolt

Cat.No.	Anchor Size	Drill Dia.	Min. Embed.	Std. Box	Std. Carton	Wt./100
5902	1/4" x 1-3/4"	1/4"	1-1/4"	100	600	3
5906	1/4" x 3"	1/4"	1-1/4"	100	600	5
5910	3/8" x 2-1/4"	3/8"	2"	50	300	10
5914	3/8" x 3-1/2"	3/8"	2"	50	300	12
5916	3/8" x 4"	3/8"	2"	50	300	14
5930	1/2" x 2-3/4"	1/2"	2-1/2"	50	200	16
5934	1/2" x 4-3/4"	1/2"	2-1/2"	25	150	26

The published length is measured from below the washer to the end of the anchor.

Carbon Steel Flat Head Power-Bolt

Cat.No.	Anchor Size	Drill Dia.	Min. Embed.	Std. Box	Std. Carton	Wt./100
6981	3/8" x 3-3/4"	3/8"	2"	50	300	14
6982	3/8" x 5"	3/8"	2"	50	300	17
6983	3/8" x 6"	3/8"	2"	50	300	20
6984	1/2" x 5"	1/2"	2-1/2"	25	150	26
6987	5/8" x 5-1/2"	5/8"	2-3/4"	15	90	57

The published length is the overall length of the anchor.
The flat head Power-Bolt anchor has a hex key insert formed in the head of the bolt.
Each box contains an Allen wrench which matches the insert size.