PRODUCT DESCRIPTION

The Power-Bolt+ anchor is a torque controlled, heavy duty sleeve style anchor which is designed for consistent performance in cracked and uncracked concrete. Suitable base materials include normal-weight concrete and sand-lightweight concrete. The anchor is manufactured with a zinc plated carbon steel bolt, sleeve, cone and expansion clip. The Power-Bolt+ has a low profile finished hex head.

GENERAL APPLICATIONS AND USES

- · Structural connections, i.e., beam and column anchorage
- · Safety-related attachments and tension zone applications
- Interior applications / low level corrosion environment
- Heavy duty applications

FEATURES AND BENEFITS

- + Consistent performance in high and low strength concrete
- + Nominal drill bit size is the same as the anchor diameter
- + Anchor can be installed through standard fixture holes
- + Length ID code and identifying marking stamped on head of each anchor
- + Anchor design allows for follow-up expansion after setting under tensile loading
- + High shear load capacity

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3260 for cracked and uncracked concrete - 1/2", 5/8" and 3/4" diameters
- Code compliant with 2015 IBC, 2015 IRC, 2012 IBC, 2012 IRC, 2009 IBC, and 2009 IRC
- Tested in accordance with ACI 355.2 and ICC-ES AC193 (including ASTM E 488) for use in structural concrete under the design provisions of ACI 318-14 Chapter 17 or ACI 318-11/08 (Appendix D)
- Evaluated and qualified by an accredited independent testing laboratory for recognition in cracked and uncracked concrete including seismic and wind loading (Category 1 anchors): 1/2", 5/8" and 3/4" diameters

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchoring 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.

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POWER-BOLT+ ASSEMBLY

HEAD STYLES

• Finished Hex Head

ANCHOR MATERIALS

 Zinc plated carbon steel bolt, washer, cone, sleeve, and expansion clip; assembled with a plastic compression ring and retainer nut

ANCHOR SIZE RANGE (TYP.)

• 1/4" diameter through 3/4" diameter

SUITABLE BASE MATERIALS

- Normal-weight concrete
- Sand-lightweight concrete









leavy Duty Sleeve Anchor

POWER-BO

GENERAL INFORMATION



INSTALLATION INSTRUCTIONS

Installation Instructions for Power-Bolt+ Anchor





Step 2 Remove dust and debris from the hole during dri (e.g. dust extractor, holl bit) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling Ensure the cone is snuc and uniformly under the expansion wedge (clip) the clin fingers overland

the hole during drilling dust extractor, hollow r following drilling suction, forced air) tract loose particles tract loose particles ted by drilling.. re the cone is snug uniformly under the nsion wedge (clip) with ip fingers overlapping ichor cone, prior tallation using the ntion nut (see photo below).



Step 3 Drive anchor through the fixture into the hole. Be sure the anchor is driven to the minimum required embedment depth, hnom



Step 4 Tighten the anchor with a torque wrench by applying the required installation torque, T_{inst}.

Power-Bolt+ Anchor Assembly

Head Marking



'PB+' Symbol = Power-Bolt+ Strength Design Compliant (see ordering information)

Letter Code = Length Identification Mark



Length Identification

Mark	A	В	C	D	E	F	G	H	I	J	K	L	М	N	0	Р	Q	R
From	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"	8-1/2"	9"	9-1/2"	10"
Up to but not including	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"	8-1/2"	9"	9-1/2"	10"	11"
Length ident	ification m	ark indicat	es overall	and identification mark indicator querell longth of groups														

INSTALLATION SPECIFICATIONS

Power-Bolt+ Anchor Installation Specifications

Anchor Property/Setting	Notation	Unite	\frown	Nominal	Anchor Diam	eter (in.)	
Information	Notation	Units	1/4	3/8	1/2	5/8	3/4
Anchor outside diameter	d	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Internal Bolt Diameter (UNC)	-	in. (mm)	#8 (4)	1/4 6.4)	3/8 (9.5)	7/16 (11.1)	9/16 (14.3)
Nominal drill bit diameter	d _{bit}	in. (mm)	1/4 ANSI	3/8 ANSI	1/2 ANSI	5/8 ANSI	3/4 ANSI
Minimum diameter of hole clearance in fixture	dh	in. (mm)	5/16 (8)	//16 (11)	9/16 (14)	11/16 (17)	13/16 (21)
Minimum nominal embedment depth	h _{nom}	in. (mm)	1-1/4 (32)	4-5/8 (41)	2-1/2 (64)	2-3/4 (70)	3 (76.2)
Minimum hole depth	h₀	in. (mm)	1-1/2 (38)	-7/8 (48)	3 (76)	3-1/4 (83)	3-5/8 (92)
Minimum member thickness	hmin	in. (mm)	3-1/2 (89)	4-1/2 (114)	5 (127)	6-1/2 (165)	7 (178)
Minimum edge distance	Cmin	in. (mm)	1-3/4 (44)	2-3/4 (70)	3-1/4 (83)	4-1/2 (114)	6 (152)
Minimum spacing distance	Smin	in. (mm)	2 (51)	3-1/2 (89)	4-1/2 (114)	6 (152)	6 (152)
Installation torque	Tinst	ftlbf. (N-m)	4 (5)	20 (27)	40 (54)	60 (81)	110 (149)
Torque wrench/socket size	-	in.	3/8	1/2	5/8	3/4	15/16
Bolt Head Height	-	in. (mm)	1/8 (3)	13/64 (5)	9/32 (7)	5/16 (8)	3/8 (10)





POWER-BOLT®+ Heavy Duty Sleeve Anchor

ECHANICAL ANCHORS

- REV. C

REFERENCE PERFORMANCE DATA

Ultimate Load Capacities for Power-Bolt+ in Normal-Weight Concrete^{1,2}

Nominal	Minimum		Minimum Concrete Compressive Strength											
Anchor Diameter	Embed.	f'c = 2,500 p	si (17.3 MPa)	f'c = 3,000 p	si (20.7 MPa)	f ⁱ c = 4,000 p	si (27.6 MPa)	f'c = 6,000 p	si (41.4 MPa)	f ⁱ c = 8,000 p	si (55.2 MPa)			
d	in. (mm)	Tension Hss. (KN)	Shear Ibs (kN)	Tension	Shear Kos. (kili)	Tension Ups. (kN)	Shear Hys. (KN)	Tension Ibs (kN)	Shear bs (kN)	Tension kbs. (kN)	Shear U bs. (IcN)			
1/4	1-1/4	1,245	1,670	1,260	1,670	1,290	1,670	1,345	1,670	1,397	1,670			
	(32)	(5.5)	(7.4)	(5.6)	(7.4)	(5.7)	(7.4)	(6.0)	(7.4)	(6.2)	(7.4)			
1/4	1-3/4	1,740	1,670	1,905	1,670	1,945	1,670	1,945	1,670	1,945	1,670			
	(44)	(7.7)	(7.4)	(8.5)	(7.4)	(8.7)	(7.4)	(8.7)	(7.4)	(8.7)	(7.4)			
LL.	15/8	1,420	2,430	1,555	3460	1,795	2,460	2,105	2,470	2 430	2810			
3/8	2	2,740	3,990	3,000	3,990	3,465	3,990	4,140	3,990	4,425	3,990			
	(51)	(12.2)	(17.7)	(13.3)	(17.7)	(15.4)	(17.7)	(18.4)	(17.7)	(19.7)	(17.7)			
	2-3/4	4,130	3,990	4,425	3,990	4,425	3,990	4,425	3,990	4,425	3,990			
	(70)	(18.4)	(17.7)	(19.7)	(17.7)	(19.7)	(17.7)	(19.7)	(17.7)	(19.7)	(17.7)			
	2-1/2	3,880	7,420	4,250	8,030	4,905	8,030	5,150	8,030	5,518	8,030			
	(64)	(17.3)	(33.0)	(18.9)	(35.7)	(21.8)	(35.7)	(22.9)	(35.7)	(24.5)	(35.7)			
1/2	3	5,190	8,030	5,685	8,030	6,560	8,030	7,985	8,030	9,065	8,030			
	(76)	(23.1)	(35.7)	(25.3)	(35.7)	(29.2)	(35.7)	(35.5)	(35.7)	(40.3)	(35.7)			
	3-1/4	7,120	8,030	7,660	8,030	8,645	8,030	9,400	8,030	10,835	8,030			
	(83)	(31.7)	(35.7)	(34.1)	(35.7)	(38.5)	(35.7)	(41.8)	(35.7)	(48.2)	(35.7)			
	2-3/4	4,745	9,975	5,195	10,930	6,000	12,620	6,845	13,155	7,200	13,155			
	(70)	(21.1)	(44.4)	(23.1)	(48.6)	(26.7)	(56.1)	(30.4)	(58.5)	(32.0)	(58.5)			
5/8	3-1/2	6,995	9,975	7,660	10,930	8,845	12,620	11,325	13,155	12,900	13,155			
	(89)	(31.1)	(44.4)	(34.1)	(48.6)	(39.3)	(56.1)	(50.4)	(58.5)	(57.4)	(58.5)			
	3-3/4	8,710	12,015	9,545	14,320	11,020	16,535	12,820	18,250	14,800	18,250			
	(95)	(38.7)	(53.4)	(42.5)	(63.7)	(49.0)	(73.6)	(57.0)	(81.2)	(65.8)	(81.2)			
	3	5,655	10,950	6,195	11,995	7,155	13,850	8,385	18,510	9,685	21,370			
	(76)	(25.2)	(48.7)	(27.6)	(53.4)	(31.8)	(61.6)	(37.3)	(82.3)	(43.1)	(95.1)			
3/4	4-3/8	10,870	18,635	11,910	20,415	13,750	23,575	14,705	23,575	16,975	23,575			
	(111)	(48.4)	(82.9)	(53.0)	(90.8)	(61.2)	(104.9)	(65.4)	(104.9)	(75.5)	(104.9)			
	7	18,145	24,290	19,880	24,290	22,955	24,290	28,445	24,290	29,863	24,290			
	(178)	(80.7)	(108.0)	(88.4)	(108.0)	(102.1)	(108.0)	(126.5)	(108.0)	(132.8)	(108.0)			

POWER-BOL

Heavy Duty Sleeve Anchor

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ANCHORS

HANICAL

1. The tabulated load values are applicable to single anchors installed in uncracked concrete with no edge or spacing considerations. Concrete compressive strength must be at the specified minimum at the time of installation.

2. Ultimate load capacities must reduced by a minimum safety factor of 4.0 or greater to determine allowable working loads.

Allowable Load Capacities for Power-Bolt+ in Normal-Weight Concrete^{1,2,3}

	Nominal	Minimum	Minimum Concrete Compressive Strength										
	Anchor Diameter	Embed. Denth	f'c = 2,500 p	si (17.3 MPa)	f'c = 3,000 p	si (20.7 MPa)	f ⁱ c = 4,000 ps	si (27.6 MPa)	f'c = 6,000 p	si (41.4 MPa)	f ⁱ c = 8,000 p	si (55.2 MPa)	
		in. (mm)	Tension Nrs. (NN)	Shear	Tension Ibs (kN)	Shear (Ibs. (KN)	Tension Vos. (KN)	Shear Nos. (NN)	Tension Ibs. (RN)	Shear Ibs (kN)	Tension Ibs.(kN)	Shear Mos. (KN)	
-		1-1/4 (32)	310 (1.4)	420 (1.9)	315 (1.4)	420 (1.9)	325 (1,4)	420 (1.9)	335 (1,5)	420 (1.9)	350 (1.6)	420 (1.9)	
-	1/4	1-3/4 (44)	435	420	475	420	485	420	485	420	485	420	
Ч	\mathcal{T}	1/8	Lak L		1200	15		teres	52	620	(Z.Z)		
		(41)	(1.6)	(2.7)	(1.7)	(2.7)	(2.0)	(2.7)	(2.3)	(2.8)	(2.7)	(3.1)	
	3/8	(51)	(3.0)	(4.4)	(3.3)	(4.4)	(3.8)	(4.4)	(4.6)	(4.4)	(4.9)	(4.4)	
		2-3/4 (70)	1,035 (4.6)	1,000 (4.4)	1,105 (4.9)	1,000 (4.4)	1,105 (4.9)	1,000 (4.4)	1,105 (4.9)	1,000 (4.4)	1,105 (4.9)	1,000 (4.4)	
		2-1/2 (64)	970 (4.3)	1,855 (8.3)	1,065 (4.7)	2,010 (8.9)	1,225 (5.4)	2,010 (8.9)	1,290 (5.7)	2,010 (8.9)	1,380 (6.1)	2,010 (8.9)	
	1/2	3 (76)	1,300 (5.8)	2,010 (8.9)	1,420 (6.3)	2,010 (8.9)	1,640 (7.3)	2,010 (8.9)	1,995 (8.9)	2,010 (8.9)	2,265 (10.1)	2,010 (8.9)	
		3-1/4 (83)	1,780 (7.9)	2,010 (8.9)	1,915 (8.5)	2,010 (8.9)	2,160 (9.6)	2,010 (8.9)	2,350 (10.5)	2,010 (8.9)	2,710 (12.1)	2,010 (8.9)	
		2-3/4 (70)	1,185 (5.3)	2,495 (11.1)	1,300 (5.8)	2,735 (12.2)	1,500 (6.7)	3,155 (14.0)	1,710 (7.6)	3,290 (14.6)	1,800 (8.0)	3,290 (14.6)	
	5/8	3-1/2 (89)	1,750 (7.8)	2,495 (11.1)	1,915 (8.5)	2,735 (12.2)	2,210 (9.8)	3,155 (14.0)	2,830 (12.6)	3,290 (14.6)	3,225 (14.3)	3,290 (14.6)	
		3-3/4 (95)	2,180 (9.7)	3,005 (13.4)	2,385 (10.6)	3,580 (15.9)	2,755 (12.3)	4,135 (18.4)	3,205 (14.3)	4,565 (20.3)	3,700 (16.5)	4,565 (20.3)	
		3 (76)	1,415 (6.3)	2,740 (12.2)	1,550 (6.9)	3,000 (13.3)	1,790 (8.0)	3,465 (15.4)	2,095 (9.3)	4,630 (20.6)	2,420 (10.8)	5,345 (23.8)	
	3/4	4-3/8 (111)	2,720 (12.1)	4,660 (20.7)	2,980 (13.3)	5,105 (22.7)	3,440 (15.3)	5,895 (26.2)	3,675 (16.3)	5,895 (26.2)	4,245 (18.9)	5,895 (26.2)	
		7 (178)	4,535 (20.2)	6,075 (27.0)	4,970 (22.1)	6,075 (27.0)	5,740 (25.5)	6,075 (27.0)	7,110 (31.6)	6,075 (27.0)	7,465 (33.2)	6,075 (27.0)	

safety or overhead.

2. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.

3. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

No Mi

ALLOWABLE STRESS DESIGN (ASD) DESIGN CRITERIA



DEWALT

ANCHORS & FASTENERS

Spacing Reduction Factors - Tension (F_{NS}) Diameter (in) 1/4 3/8 1/2

minal Embedment hnom (in) 1-1/4 2 2-1/2 2-3/4 3 nimum Spacing Smin (in) 2 3-1/2 4-1/2 6 5 2 0.78 - - - -
nimum Spacing smin (in) 2 3-1/2 4-1/2 6 5 2 0.78 -
2 0.78 7
2-1/2 0.82 🗸
3 > 0.87
3-1/2 0.91 0.80
4 (0.96) 0.83
4-1/2 1.00 70.86 0.83
5 > 1.00 <0.85 - 0.77
5-1/2 1.00 0.92 0.88 - 0.79
6 🜔 1.00 🕽 0.95 0.91 0.85 0.81
6-1/2 1.00 0.93 0.87 0.83
P 7 7 1.00 1.00 0.96 0.90 0.85
2 7-1/2 1.00 √1.00 0.98 0.92 0.87
8 1.00 1.00 0.95 0.89
8-1/2 1.00 1.00 1.00 0.97 0.92
9 (1.00 1.00 1.00 0.94
9-1/2 1.00 1.00 1.00 0.96
10 > 1.00 <1.00 1.00 0.98
10-1/2 1.00 1.00 1.00 1.00 1.00

Diameter (in)	7	1/4	<mark>~</mark> 3/8	1/2	5/8	3/4
Nominal Embedmen	it hnom (in)	1-1/4	2	2-1/2	2-3/4	3
Minimum Edge Distar	1Ce Cmin (in)	1-3/4	2-3/4	3-1/4	4-1/2	6
	1-3/4	0.39)-	-	-	-
	2	0.44)-	-	-	-
	2-1/2	0.56	14-	-	-	-
	3	0.67	.46	-	-	-
(inches)	3-1/4	0.72	.50	0.41	-	-
	3-1/2	0.78	0.54	0.44	-	-
	4	0.89	0.62	0.50	-	-
ance	4-1/2	1.00	1 .69	0.56	0.75	-
Dist	5	1.00	.77	0.63	0.83	-
dge	5-1/2	1.00	.85	0.69	0.92	-
ü	6	1.00	0.92	0.75	1.00	0.75
	6-1/2	1.00	1.00	0.81	1.00	0.81
	7	1.00	. 00	0.88	1.00	0.88
	7-1/2	1.00	▲.00	0.94	1.00	0.94
	8	1.00	1.00	1.00	1.00	1.00
	(× ×				

Edge Distance Reduction Factors - Tension (F_{NC})

Spacing Reduction Factors - Shear (Fvs)

Diameter (in)	1/4	3/8	1/2	5/8	3/4
Nominal Embedme	ent hnom (in)	1-1/4	2	2-1/2	2-3/4	3
Minimum Spacin	Minimum Spacing smin (in)			4-1/2	6	5
	2	0.86	K-	-	-	-
	2-1/2	0.89	К -	-	-	-
	3	0.92	J-	-	-	-
	3-1/2	0.94	0.88	-	-	-
	4	0.97	0.90	-	-	-
-	4-1/2	1.00	0.91	0.89	-	-
ches	5	1.00	0.93	0.91	-	0.84
(inc	5-1/2	1.00	0.95	0.93	-	0.86
ance	6	1.00	0.97	0.94	0.89	0.87
Dist	6-1/2	1.00	0.99	0.96	0.91	0.88
ing	7 🜔	1.00	1.00	0.97	0.93	0.90
Spac	7-1/2	1.00	1.00	0.99	0.94	0.91
0,	8	1.00	1.00	1.00	0.96	0.93
	8-1/2	1.00	1.00	1.00	0.98	0.94
	9 🔾	1.00	00.	1.00	1.00	0.96
	9-1/2	1.00	1 .00	1.00	1.00	0.97
	10	1.00	1.00	1.00	1.00	0.99
	10-1/2	1.00	1.00	1.00	1.00	1.00
		J)			

Edge Distance Reduction Factors - Shear (Fvc)

Diameter (in)	1/4	3/8	1/2	5/8	3/4
Nominal Embedme	nt hnom (in)	1-1/4	2	2-1/2	2-3/4	3
Minimum Edge Dista	nce cmin (in)	1-3/4	2-3/4	3-1/4	4-1/2	6
	1-3/4	0.39	-	-	-	-
	2	0.44) - (-	-	-
	2-1/2	0.56) -	-	-	-
	3	0.67	0.44	-	-	-
	3-1/4	0.72	0.48	0.41	-	-
	3-1/2	0.78	0.52	0.44	-	-
	4	0.89	0.59	0.51	-	-
inches)	4-1/2	1.00	0.67	0.57	0.50	-
	5	1.00	0.74	0.63	0.56	-
) eo	5-1/2	1.00 🚽	0.81	0.70	0.61	-
istan	6	1.00	0.89	0.76	0.67	0.57
je Di	6-1/2	1.00	0.96	0.83	0.72	0.62
Edi	7	1.00	1.00	0.89	0.78	0.67
	7-1/2	1.00	1.00	0.95	0.83	0.71
	8	1.00	1.00	1.00	0.89	0.76
	8-1/2	1.00 🗸	1.00	1.00	0.94	0.81
	9	1.00	1.00	1.00	1.00	0.86
	9-1/2	1.00	1.00	1.00	1.00	0.90
	10	1.00	1.00	1.00	1.00	0.95
	10-1/2	1.00	1.00	1.00	1.00	1.00
		\mathcal{L}				

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8 (203) 5 (127)

STRENGTH DESIGN INFORMATION

CODE LISTED ICC-ES ESR-3260	\mathbf{O}
	ABLE

Power-Bolt+ Anchor Installat	tion Specif	ications ¹			CODE LISTED ICC-ES ESR-3260
Angles Branch (Catting Information	Netekien	Unite		Norminal Anchor Diameter	(in.)
Anchor Property/Setting Information	Notation	Units	1/2	5/8	3/4
Anchor outside diameter	da	in. (mm)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Internal bolt diameter (UNC)	-	in. (mm)	3/8 (9.5)	7/16 (11.1)	9/16 (14.3)
Minimum diameter of hole clearance in fixture	dh	in. (mm)	9/16 (14.3)	11/16 (17.5)	13/16 (21.6)
Nominal drill bit diameter	Сbit	in.	1/2 ANSI	5/8 ANSI	3/4 ANSI
Minimum nominal embedment depth	hnom	in. (mm)	3-1/4 (83)	3-3/4 (95)	4-3/8 (111)
Effective embedment	h _{ef}	in. (mm)	2-5/8 (67)	3 (76)	3-1/2 (89)
Minimum hole depth	h _{hole}	in. (mm)	3-3/4 (95)	4-1/4 (108)	5 (127)
Minimum member thickness	h _{min}	in. (mm)	5 (127)	6-1/2 (165)	7 (178)
Minimum overall anchor length ²	lanch	in. (mm)	3-1/2 (89)	4 (102)	5-1/4 (133)
Minimum edge distance	Cmin	in. (mm)	3-1/4 (83)	4-1/2 (114)	6 (152)
Minimum spacing distance	Smin	in. (mm)	4-1/2 (114)	6 (152)	6 (152)
Critical edge distance	Cac	in. (mm)	8 (203)	6 (152)	8 (203)
Installation torque	T _{inst}	ftlbf. (N-m)	40 (54)	60 (81)	110 (149)
Bolt Head Height	-	in. (mm)	9/32 (7.1)	5/16 (7.9)	3/8 (9.6)
Torque wrench/socket size	-	in.	5/8	3/4	15/16

ANCHORS

NICAL

For SI:1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

2. The listed minimum overall anchor length is based on anchor sizes available at the time of publication compared with the requirements for the minimum nominal embedment depth and

fixture attachment.

Power-Bolt+ Anchor Detail



Tension Design information for Power-Bolt+ Anchor in Concrete

(for use with load combinations taken form ACI 318-14.

Section 5.3 or ACI 318-11, Section 9.2)^{1,2}



CODE LISTED

ICC-ES ESR-3260

ECHANICAL ANCHORS

POWER-BOLT®+

			Nominal Anchor Diameter				
Design Characteristic	Notation	Units	1/2	5/8	3/4		
Anchor category	1,2 or 3	-	1	1	1		
Nominal embedment depth	hnom	in. (mm)	3-1/4 (83)	3-3/4 (95)	4-3/8 (111)		
	STEEL S	TRENGTH IN T	ENSION ⁴				
Minimum specified yield strength	fy	ksi (N/mm²)	130 (896)	130 (896)	130 (896)		
Minimum specified ultimate tensile strength ⁸	futa	ksi (N/mm²)	150 (1,034)	150 (1,034)	150 (1,034)		
Effective tensile stress area (threads)	Ase, N	in² (mm²)	0.0775 (50)	0.1063 (68.6)	0.1820 (117.4)		
Steel strength in tension	Nsa	lb (kN)	9,685 (43.1)	13,285 (59.1)	27,300 (121.4)		
Reduction factor for steel strength ³	φ	-	0.75 0.65				
CO	NCRETE BREA	KOUT STREN	GTH IN TENSION ⁷				
Effective embedment	h _{ef}	in. (mm)	2.625 (67)	3.000 (76)	3.500 (89)		
Effectiveness factor for uncracked concrete	kucr	-	27 (11.3)	27 (11.3)	24 (10.0)		
Effectiveness factor for cracked concrete	k _{cr}	-	17 (7.1)	17 (7.1)	17 (7.1)		
Modification factor for cracked and uncracked concrete ⁵	$\psi_{ ext{c,N}}$	-	1.0	1.0	1.0		
Critical edge distance (uncracked concrete)	Cac	in. (mm)	8 (203)	6 (152)	8 (203)		
Reduction factor for concrete breakout strength ⁴	φ	-	0.65 (Condition B)				
PULLOUT ST	RENGTH IN T	ENSION (NON-	-SEISMIC APPLICATIONS) ⁷				
Characteristic pullout strength, uncracked concrete (2,500 psi)	N _{p,uncr}	lb (kN)	Not Applicable ⁶	Not Applicable6	Not Applicable		
		lh					

		()					
Characteristic pullout strength, cracked concrete (2,500 psi)	N _{p,cr}	lb (kN)	Not Applicable ⁶ Not Applicable ⁶ Not Applica				
Reduction factor for pullout strength	ϕ	-	0.65 (Condition B)				
PULLOUT S	RENGTH IN T	ENSION FOR	SEISMIC APPLICATIONS ⁷				
Characteristic pullout strength, seismic (2,500 psi)	N _{p,eq}	lb (kN)	Not Applicable6	Not Applicable6	Not Applicable6		
Reduction factor for pullout strength	ϕ	-		0.65 (Condition B)			

For SI: 1 inch = 25.4 mm; 1 ksi = 6.894 N/mm²; 1 lbf = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable; for anchors resisting seismic load combinations the additional requirements of ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable, shall apply.

2. Installation must comply with the manufacturer's published installation instructions.

3. The tabulated value of ϕ for steel strength applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ for steel strength must be determined in accordance with ACI 318-11 D.4.3. The anchors are ductile steel elements as defined in ACI 318-14 2.3 or ACI 318-11 D.1, as applicable, except for the 3/4-inch-diameter, which is considered a brittle steel element for the purposes of design.

4. The tabulated value of ϕ for concrete breakout strength applies when both the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3,, as applicable, for Condition A are satisfied, the appropriate value of ϕ for concrete breakout strength must be determined in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ for concrete breakout strength must be determined in accordance with ACI 318-11 D.4.4.

5. For all design cases use $\Psi_{cN} = 1.0$. The appropriate effectiveness factor for cracked concrete (ker) or uncracked concrete (kurer) must be used.

6. Pullout strength does not control design.

7. Anchors are permitted to be used in lightweight concrete provided the modification factor λ_a equal to 0.8 λ is applied to all values of $\sqrt{f'c}$ affecting N_n and V_n. λ shall be determined in accordance with the corresponding version of ACI 318.

8. In accordance with ACI 318-14 17.4.1.2 and Eq. 17.4.1.2 or ACI 318-11 D.5.1.2 and Eq. D-2, as applicable, the nominal steel strength in tension is calculated using a limited value of futa Of 125 ksi

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- REV. C

Mean Axial Stiffness Values, β, for Power-Bolt+ Anchors in Normal-Weight Concrete

Concrete State	Ilnito	Nominal Anchor Diameter						
Concrete State	Units	1/2 inch	5/8 inch	3/4 inch				
Uncracked concrete	10 ³ lbf/in. (kN/mm)	366 (63)	871 (150)	256 (44)				
Cracked concrete	10 ³ lbf/in. (kN/mm)	64 (11)	94 (16)	27 (5)				

1. Mean values shown; actual stiffness varies considerably depending on concrete strength, loading and geometry of application.

Shear Design information for Power-Bolt+ Anchor in Concrete (For use with load combinations taken from ACI 318-14, Section 5.3 or ACI 318-11. Section 9.2)¹²



Decime Observatoriatio	Notation	Unite	Nominal Anchor Diameter					
Design characteristic	Notation	Units	1/2	5/8	3/4			
Anchor category	1, 2 or 3	-	1	1	1			
Nominal embedment depth	hnom	in. (mm)	3-1/4 (83)	3-3/4 (95)	4-3/8 (111)			
	STEE	L STRENGTH	IN SHEAR					
Minimum specified yield strength	fy	ksi (N/mm²)	130 (896)	130 (896)	130 (896)			
Minimum specified ultimate strength	f _{uta}	ksi (N/mm²)	150 (1,034)	150 (1,034)	150 (1,034)			
Effective shear stress area	A _{se,v}	in² (mm²)	0.1069 (69.0)	0.1452 (93.7)	0.2410 (153)			
Steel strength in shear ⁶	V _{sa}	lb (kN)	6,005 (26.7)	13,415 (59.7)	14,820 (65.9)			
Reduction factor for steel strength ³	ϕ	-	0.	0.60				
CONCRETE BREAKOUT STRENGTH IN SHEAR								
Load bearing length of anchor	le	in (mm)	1.00 (25)	1.25 (32)	1.50 (51)			
Nominal anchor diameter	da	in (mm)	0.500 (12.7)	0.625 (15.9)	0.750 (19.05)			
Reduction factor for concrete breakout4	φ	-	0.70 (Condition B)					
	PRYOL	JT STRENGTH	IN SHEAR ⁷					
Coefficient for pryout strength (1.0 for $h_{ef} < 2.5$ in., 2.0 for $h_{ef} \ge 2.5$ in.)	k _{cp}	-	2.0	2.0	2.0			
Effective embedment	h _{ef}	in (mm)	2.625 (675)	3.000 (76)	3.500 (89)			
Reduction factor for pryout strength ⁵ ϕ - 0.70 (Condition B)								
STEEL	STRENGTH I	N SHEAR FOR	SEISMIC APPLICATIONS					
Steel strength in shear, seismic [®]	Vsa, eq	lb (kN)	4,565 (20.3)	7,425 (33.0)	14,820 (65.9)			
Reduction factor for steel strength in shear for seismic ³	φ	-	0.65 0.60					

For SI: 1 inch = 25.4 mm; 1 ksi = 6.894 N/mm²; 1 lbf = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable; for anchors resisting seismic load combinations the additional requirements of ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable, shall apply.

2. Installation must comply with the manufacturer's published installation instructions.

3. The tabulated value of ϕ for steel strength applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ for steel strength must be determined in accordance with ACI 318-11 D.4.3. The anchors are ductile steel elements as defined in ACI 318-14 2.3 or ACI 318-11 D.1, as applicable, except for the 3/4-inch-diameter which is considered a brittle steel element for the purposes of design.

4. The tabulated value of \$\phi\$ for concrete breakout strength applies when both the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 9.2, as applicable, are used and the requirements of ACI 318-11 D.4.3, as applicable, for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for Condition A are satisfied, the appropriate value of \$\phi\$ for concrete breakout strength must be determined in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of \$\phi\$ for concrete breakout strength must be determined in accordance with ACI 318-11 D.4.4.

5. The tabulated value of for pryout strength applies if the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ for pryout strength must be determined in accordance with ACI 318-11 D.4.4, for condition B.

6. Tabulated values for steel strength in shear must be used for design. The tabulated values for the shear stress area are listed conservatively and the results for the steel strength will be more conservative when using ACI 318-14 Eq. 17.5.1.2b or ACI 318-11 Eq. D-29, as applicable.

7. Anchors are permitted to be used in lightweight concrete provided the modification factor λ_a equal to 0.8λ is applied to all values of \sqrt{fc} affecting N_a and V_a. λ shall be determined in accordance with the corresponding version of ACI 318.

8. Tabulated values for steel strength in shear are for seismic applications and based on test results in accordance with ACI 355.2, Section 9.6.



STRENGTH DESIGN PERFORMANCE DATA

Factored design strength DNn and DVn Calculated in accordance with ACI 318-14 Chapter 17 Tested to the International Building Code



Tension and Shear Design Strengths for Power-Bolt+ in Cracked Concrete^{1,2,3,4,5,6}

			Minimum Concrete Compressive Strength										
Nominal Anchor	Nominal Embed.	f'c = 2,	500 psi	f'c = 3,	f'c = 3,000 psi		f'c = 4,000 psi		f'c = 6,000 psi		f'c = 8,000 psi		
Diameter (in.)	h (in.)	ØNn Tension (lbs.)	ØVn Shear (lbs.)	ØNn Tension (lbs.)	∕∕⊉Vn Shear (lbs.)	Φ Nn Tension (lbs.)	∕∕⊉Vn Shear (lbs.)	ØNn Tension (lbs.)	ØVn Shear (lbs.)	ØNn Tension (lbs.)	Φ Vn Shear (lbs.)		
1/2	3-1/4	2,350	2,905	2,575	3,185	2,970	3,675	3,640	3,905	4,205	3,905		
5/8	3-3/4	2,870	2,780	3,145	3,045	3,630	3,515	4,450	4,305	5,135	4,970		
3/4	4-3/8	3,620	4,210	3,965	4,615	4,575	5,330	5,605	6,525	6,470	7,535		
- Concrete	Breakout Strend	ith Controls 🔲 -	Steel Strength C	ontrols									

Tension and Shear Design Strengths for Power-Bolt+ in Uncracked Concrete^{1,2,3,4,5,6}

			Minimum Concrete Compressive Strength, f'c (psi)											
Nominal Anchor	Nominal Embed.	f'c = 2,	500 psi	f'c = 3,	f'c = 3,000 psi		f'c = 3,000 psi f'c = 4,00		000 psi	0 psi f²c = 6,000 psi			f'c = 8,000 psi	
Diameter (in.)	h (in.)	ØNn Tension (Ibs.)	ØVn Shear (lbs.)	ØNn Tension (Ibs.)	ØVn Shear (Ibs.)	DNn Tension (lbs.)	ØVn Shear (Ibs.)	$\mathcal{D}_{\mathrm{Nn}}$ Tension (lbs.)	ØVn Shear (Ibs.)	ØNn Tension (Ibs.)	Φ Vn Shear (lbs.)			
1/2	3-1/4	3,730	3,905	4,090	3,905	4,720	3,905	5,780	3,905	6,675	3,905			
5/8	3-3/4	4,560	3,890	4,995	4,260	5,770	4,920	7,065	6,025	8,155	6,960			
3/4	4-3/8	5,105	5,895	5,595	6,460	6,460	7,460	7,910	8,690	9,135	8,690			
🔲 - Concrete F	Breakout Stren	ath Controls	- Steel Strenath (Controls										

1- Tabular values are provided for illustration and are applicable for single anchors installed in normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:

- C_{a1} is greater than or equal to the critical edge distance, C_{ac} (table values based on $C_{a1} = C_{ac}$).

- c_{a2} is greater than or equal to 1.5 times c_{a1} .

2- Calculations were performed according to ACI 318-14- Chapter 17. The load level corresponding to the controlling failure mode is listed. (e.g. For tension: steel, concrete breakout and pullout; For shear: steel, concrete breakout and pryout). Furthermore, the capacities for concrete breakout strength in tension and pryout strength in shear are calculated using the effective embedment values, her, for the selected anchors as noted in the design information tables. Please also reference the installation specifications for more information.

- 3- Strength reduction factors (ø) were based on ACI 318-14 Section 5.3 for load combinations. Condition B is assumed.
- 4- Tabular values are permitted for static loads only, seismic loading is not considered with these tables.
- 5- For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14- Chapter 17.
- 6- Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318-14- Chapter 17. For other design conditions including seismic considerations please see ACI 318-14- Chapter 17.



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ORDERING INFORMATION

Power-Bolt+ (Carbon Steel Finished Hex Head)

	Maximum Bay Cartan Suggested ANSI Carbid							arbide Drill Bit Cat. No.			
Cat. No.	Anchor Size	Fixture Thickness	Qty.	Qty.	Full Head SDS-Plus	SDS-Plus	SDS-Max	Hollow Bit SDS-Plus	Hollow Bit SDS-Max		
6902SD	1/4" X 1-3/4"	1/2"	100	600	-	-	-	-	-		
6906SD	1/4" X 3"	1-3/4"	100	600	-	-	-	-	-		
6911SD	3/8" x 1-7/8"	1/4"	50	300	DW5527	DW5427	-	-	-		
6910SD	3/8" X 2-1/4"	1/4"	50	300	DW5527	DW5427	-	-	-		
6913SD	3/8" X 3"	1"	50	300	DW5527	DW5427	-	-	-		
6914SD	3/8" X 3-1/2"	1-1/2"	50	300	DW5527	DW5427	-	-	-		
6916SD	3/8" X 4"	2"	50	300	DW5527	DW5427	-	-	-		
6930SD	1/2" x 2-3/4"	1/4"	50	200	DW5537	DW5429	DW5803	DWA54012	-		
6932SD	1/2" x 3-1/2"	1/4"	50	200	DW5537	DW5429	DW5803	DWA54012	-		
6934SD	1/2" x 4-3/4"	1-1/2"	25	150	DW5537	DW5429	DW5803	DWA54012	-		
6936SD	1/2" x 5-3/4"	2-1/2"	25	150	DW5537	DW5429	DW5803	DWA54012	-		
6940SD	5/8" x 3"	1/4"	20	120	-	DW5446	DW5806	DWA54058	DWA54058		
6942SD	5/8" x 4"	1/4"	15	90	-	DW5446	DW5806	DWA54058	DWA54058		
6944SD	5/8" x 5"	1-1/4"	15	90	-	DW5446	DW5806	DWA54058	DWA58058		
6945SD	5/8" x 6"	2-1/4"	15	90	-	DW5446	DW5806	DWA54058	DWA58058		
6947SD	5/8" x 8-1/2"	4-3/4"	10	40	-	DW5447	DW5809	DWA54058	DWA58058		
6950SD	3/4" x 3-1/4"	1/4"	15	90	-	DW5453	DW5809	DWA54034	DWA54034		
6952SD	3/4" x 4-1/2"	1-1/2"	10	60	-	DW5453	DW5809	DWA54034	DWA54034		
6954SD	3/4" x 5-1/4"	7/8"	10	60	-	DW5453	DW5809	DWA54034	DWA54034		
6956SD	3/4" x 7-1/4"	2-7/8"	10	40	-	DW5453	DW5809	DWA54034	DWA54034		
6957SD	3/4" x 8-1/4"	3-7/8"	10	40	-	DW5455	DW5809	DWA54034	DWA54034		

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

The published size includes the diameter and the length which is measured from below the washer to the end of the anchor.

A manual hand pump is available (Cat. No. 08280)

Hollow drill bits must be used with a dust extraction vacuum (Cat. No. DW012)