GENERAL INFORMATION

POWER-STUD®+ SD4/SD6

Stainless Steel Wedge Expansion Anchors

PRODUCT DESCRIPTION

The Power-Stud+ SD4 and Power-Stud+ SD6 anchors are fully threaded, torque-controlled, stainless steel wedge expansion anchors which are designed for consistent performance in cracked and uncracked concrete. Suitable base materials include normal-weight, lightweight concrete, and grouted concrete masonry (CMU). The anchor is manufactured with a stainless steel body and expansion clip. Nuts and washers are included.

GENERAL APPLICATIONS AND USES

- Structural connections, i.e., beam and column anchorage
- Tension zone applications, i.e., safety-related attachments
- Equipment anchorage, angles, brackets and ledgers
- Utility supports and bracing attachments
- Barriers, guards and fencing
- Mezzanines, racking and railing
- Seismic and wind loading (SDC A - F)
- Facades, clips and mounts

FEATURES AND BENEFITS

+ Knurled mandrel provides consistent performance in cracked and uncracked concrete
+ Mandrel design helps prevent galling during installation and service life
+ Nominal drill bit size is the same as the anchor diameter
+ Anchor can be installed through standard clearance 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
+ Made in USA versions (MIUSA) available on request; see ordering information on page 12
+ MIUSA anchors can meet domestic content requirements (e.g. BAA, TAA, AIS) at time of publication; product certifications available by request (anchors@DEWALT.com)

APPROVALS AND LISTINGS

- International Code Council Evaluation Service (ICC-ES), ESR-2502 for cracked and uncracked concrete
- Code compliant with the 2021 IBC/IRC, 2018 IBC/IRC, 2015 IBC/IRC, and 2012 IBC/IRC
- Tested in accordance with ACI 355.2/ASTM E488 and ICC-ES AC193 for use in structural concrete under the design provisions of ACI 318 (-19 or -14) Chapter 17 or ACI 318 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)
- City of Los Angeles, LABC and LARC Supplement (within ESR-2502)
- Florida Building Code, FBC Supplement including HVHZ (within ESR-2502)

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-Stud+ SD4 and Power-Stud+ SD6 as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

SECTION CONTENTS

POWER-STUD+ S4/SD6
STAINLESS STEEL ASSEMBLY

THREAD VERSION

- UNC threaded stud

ANCHOR MATERIALS

- Stainless steel body and expansion clip, nut and washer

ANCHOR SIZE RANGE (TYP.)

- 1/4" through 3/4" diameters

SUITABLE BASE MATERIALS

- Normal-weight concrete
- Lightweight concrete
- Grouted Concrete Masonry (CMU)

TENSION ZONE CRACKED CONCRETE

SEISMIC REGION QUALIFICATION

CODE LISTED
ICC-ES ESR-2502
CONCRETE

DDA
DEWALT DESIGN ASSIST™

DUSTX+
ANCHOR INSTALLATION SYSTEM

ANCHORS MADE IN THE USA

See ORDERING INFORMATION page 12 for MIUSA Availability

MATERIAL SPECIFICATIONS

Anchor component	Specification	
	SD4	SD6
Anchor body	304 Stainless Steel	316 Stainless Steel
Washer	300 Series Stainless Steel	316 Stainless Steel
Hex Nut	316 Stainless Steel	
Expansion wedge (clip)	316 Stainless Steel	

INSTALLATION SPECIFICATIONS

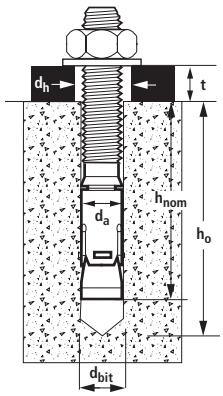
Installation Specifications Table for Power-Stud+ SD4 and Power-Stud+ SD6 in Concrete

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Diameter (inch)				
			1/4	3/8	1/2	5/8	3/4
Anchor outside diameter	d_a (d)	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Thread Size (UNC)	-	in.	1/4-20	3/8-16	1/2-13	5/8-11	3/4-10
Nominal drill bit diameter (ANSI)	d_{bit}	in.	1/4	3/8	1/2	5/8	3/4
Minimum diameter of hole clearance in fixture	d_h	in. (mm)	5/16 (7.9)	7/16 (11.1)	9/16 (14.3)	11/16 (17.5)	13/16 (20.6)
Minimum embedment depth	h_{nom}	in. (mm)	1-1/8 (29)	1-3/8 (41)	1-7/8 (48)	2-1/2 (64)	3-3/8 (86)
Minimum hole depth	h_o	in.	h_{nom} + 1/8			h_{nom} + 1/4	
Installation torque	T_{inst}	ft.-lbf. (N-m)	6 (8)	25 (34)	40 (54)	60 (81)	110 (149)
Torque wrench/socket size	-	in.	7/16	9/16	3/4	15/16	1-1/8
Nut height	-	in.	7/32	21/64	7/16	35/64	41/64
Washer O.D.	-	in.	5/8	13/16	1-1/16	1-5/16	1-15/32

See Strength Design Information for installation specifications in strict accordance with ICC-ES ESR-2502.

1. The minimum base material thickness should be $1.5h_{nom}$ or 3", whichever is greater.
2. See Performance Data tables for additional embedment depths.

Anchor Detail

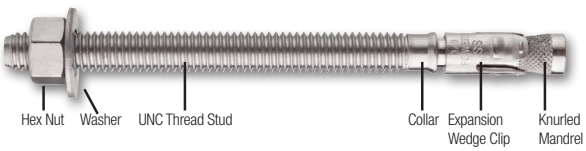


Head Marking

Legend

Letter Code	=	Length Identification Mark
'+' Symbol	=	Strength Design Compliant Anchor (see ordering information, symbol not on 1/4" diameter anchors)
Number Code	=	Stainless Steel Body Type (4 or 6)

Anchor Assembly



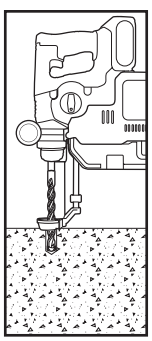
Length Identification

Mark	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	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"

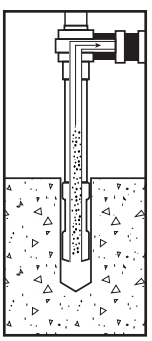
Length identification mark indicates overall length of anchor.

INSTALLATION INSTRUCTIONS

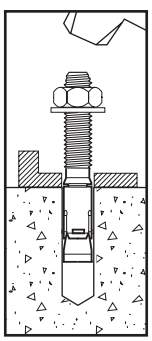
Installation Instructions for Power-Stud+ SD4 and Power-Stud+ SD6



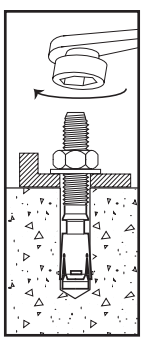
Step 1
Using the proper drill bit size, drill a hole into the base material to the required depth. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15.



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.



Step 3
Position the supplied washer on the anchor and thread on the supplied nut. If installing through a fixture, drive the anchor through the fixture into the hole. Be sure the anchor is driven to the minimum required embedment depth.



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

PERFORMANCE DATA (ASD)

Ultimate Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 in Normal-Weight Concrete[1,2]

Nominal Anchor Diameter in.	Minimum Embedment Depth h_{nom} in. (mm)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi (17.3 MPa)		f'c = 3,000 psi (20.7 MPa)		f'c = 4,000 psi (27.6 MPa)		f'c = 6,000 psi (41.4 MPa)		f'c = 8,000 psi (55.2 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)	Tension lbs (kN)	Shear lbs (kN)
1/4	1-1/8 (29)	1,095 (4.9)	2,135 (9.5)	1,200 (5.3)	2,135 (9.5)	1,390 (6.2)	2,135 (9.5)	1,455 (6.5)	2,135 (9.5)	1,680 (7.5)	2,135 (9.5)
	1-3/4 (44)	1,890 (8.4)	2,135 (9.5)	2,070 (9.2)	2,135 (9.5)	2,390 (10.6)	2,135 (9.5)	2,480 (11.0)	2,135 (9.5)	2,480 (11.0)	2,135 (9.5)
3/8	1-3/8 (41)	1,530 (6.8)	2,745 (12.2)	1,680 (7.5)	2,745 (12.2)	1,940 (8.6)	2,745 (12.2)	2,520 (11.2)	2,745 (12.2)	2,910 (12.9)	2,745 (12.2)
	1-7/8 (48)	2,790 (12.4)	2,745 (12.2)	3,060 (13.6)	2,745 (12.2)	3,530 (15.7)	2,745 (12.2)	4,195 (18.7)	2,745 (12.2)	4,840 (21.5)	2,745 (12.2)
	3 (76)	4,700 (20.9)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)
1/2	1-7/8 (48)	2,745 (12.2)	5,090 (22.6)	3,010 (13.4)	5,090 (22.6)	3,475 (15.5)	5,090 (22.6)	4,525 (20.1)	5,090 (22.6)	5,230 (23.3)	5,090 (22.6)
	2-3/8 (60)	5,370 (23.9)	5,090 (22.6)	5,880 (26.2)	5,090 (22.6)	6,790 (30.2)	5,090 (22.6)	6,790 (30.2)	5,090 (22.6)	7,845 (34.9)	5,090 (22.6)
	3-3/4 (95)	8,840 (39.3)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)
5/8	2-1/2 (64)	5,015 (22.3)	9,230 (41.1)	5,495 (24.4)	9,230 (41.1)	6,345 (28.2)	9,230 (41.1)	7,250 (32.2)	9,230 (41.1)	8,370 (37.2)	9,230 (41.1)
	3-1/4 (83)	6,760 (30.1)	9,230 (41.1)	7,405 (32.9)	9,230 (41.1)	8,560 (38.1)	9,230 (41.1)	9,615 (42.8)	9,230 (41.1)	11,105 (49.4)	9,230 (41.1)
	4-3/4 (121)	10,550 (46.9)	9,230 (41.1)	11,555 (51.4)	9,230 (41.1)	13,345 (59.4)	9,230 (41.1)	14,560 (64.8)	9,230 (41.1)	14,560 (64.8)	9,230 (41.1)
3/4	3-3/8 (86)	6,695 (29.8)	11,255 (50.1)	7,330 (32.6)	12,625 (56.2)	8,465 (37.7)	14,580 (64.9)	9,705 (43.2)	15,440 (68.7)	11,210 (49.9)	15,440 (68.7)
	4-1/2 (114)	10,800 (48.0)	15,440 (68.7)	11,830 (52.6)	15,440 (68.7)	13,575 (60.4)	15,440 (68.7)	17,110 (76.1)	15,440 (68.7)	19,760 (87.9)	15,440 (68.7)
	5-5/8 (143)	11,730 (52.2)	15,440 (68.7)	12,850 (57.2)	15,440 (68.7)	13,575 (60.4)	15,440 (68.7)	19,710 (87.7)	15,440 (68.7)	21,705 (96.5)	15,440 (68.7)

1. Tabulated load values are for 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 be reduced by a minimum safety factor of 4.0 or greater to determine allowable working loads.

Allowable Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 in Normal-Weight Concrete[1,2,3,4,5]

Nominal Anchor Diameter in.	Minimum Embedment Depth h_{nom} in. (mm)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi (17.3 MPa)		f'c = 3,000 psi (20.7 MPa)		f'c = 4,000 psi (27.6 MPa)		f'c = 6,000 psi (41.4 MPa)		f'c = 8,000 psi (55.2 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)	Tension lbs (kN)	Shear lbs (kN)
1/4	1-1/8 (28)	275 (1.2)	535 (2.4)	300 (1.3)	535 (2.4)	350 (1.6)	535 (2.4)	365 (1.6)	535 (2.4)	420 (1.9)	535 (2.4)
	1-3/4 (44)	475 (2.1)	535 (2.4)	520 (2.3)	535 (2.4)	600 (2.7)	535 (2.4)	620 (2.8)	535 (2.4)	620 (2.8)	535 (2.4)
3/8	1-3/8 (41)	385 (1.7)	685 (3.0)	420 (1.9)	685 (3.0)	485 (2.2)	685 (3.0)	630 (2.8)	685 (3.0)	730 (3.2)	685 (3.0)
	1-7/8 (60)	700 (3.1)	685 (3.0)	765 (3.4)	685 (3.0)	885 (3.9)	685 (3.0)	1,050 (4.7)	685 (3.0)	1,210 (5.4)	685 (3.0)
	3 (60)	1,175 (5.2)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)
1/2	1-7/8 (57)	685 (3.0)	1,275 (5.7)	755 (3.4)	1,275 (5.7)	870 (3.9)	1,275 (5.7)	1,130 (5.0)	1,275 (5.7)	1,310 (5.8)	1,275 (5.7)
	2-3/8 (64)	1,345 (6.0)	1,275 (5.7)	1,470 (6.5)	1,275 (5.7)	1,700 (7.6)	1,275 (5.7)	1,700 (7.6)	1,275 (5.7)	1,960 (8.7)	1,275 (5.7)
	3-3/4 (95)	2,210 (9.8)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)
5/8	2-1/2 (70)	1,255 (5.6)	2,310 (10.3)	1,375 (6.1)	2,310 (10.3)	1,585 (7.1)	2,310 (10.3)	1,815 (8.1)	2,310 (10.3)	2,095 (9.3)	2,310 (10.3)
	3-1/4 (86)	1,690 (7.5)	2,310 (10.3)	1,850 (8.2)	2,310 (10.3)	2,140 (9.5)	2,310 (10.3)	2,405 (10.7)	2,310 (10.3)	2,775 (12.3)	2,310 (10.3)
	4-3/4 (117)	2,640 (11.7)	2,310 (10.3)	2,890 (12.9)	2,310 (10.3)	3,335 (14.8)	2,310 (10.3)	3,640 (16.2)	2,310 (10.3)	3,640 (16.2)	2,310 (10.3)
3/4	3-3/8 (86)	1,675 (7.5)	2,815 (12.5)	1,835 (8.2)	3,155 (14.0)	2,115 (9.4)	3,645 (16.2)	2,425 (10.8)	3,860 (17.2)	2,805 (12.5)	3,860 (17.2)
	4-1/2 (114)	2,700 (12.0)	3,860 (17.2)	2,960 (13.2)	3,860 (17.2)	3,395 (15.1)	3,860 (17.2)	4,280 (19.0)	3,860 (17.2)	4,940 (22.0)	3,860 (17.2)
	5-5/8 (143)	2,935 (13.1)	3,860 (17.2)	3,215 (14.3)	3,860 (17.2)	3,395 (15.1)	3,860 (17.2)	4,930 (21.9)	3,860 (17.2)	5,425 (24.1)	3,860 (17.2)

1. Tabulated load values are for anchors installed in uncracked 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.
3. Allowable load capacities must be multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.
4. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
5. For lightweight concrete multiply tabulated allowable load values by a reduction factor of 0.60.

Spacing Distance and Edge Distance Adjustment Factors for Normal Weight Concrete

Spacing Reduction Factors - Tension (F_{NS})

Diameter (in)		1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4	3/4
Nominal Embed. h_{nom} (in)		1-1/8	1-3/4	1-3/8	1-7/8	3	1-7/8	2-3/8	3-3/4	2-1/2	3-1/4	4-3/4	3-3/8	4-1/2	5-5/8
Minimum Spacing, s_{min} (in)		1-1/2	2	2-1/4	3	3	3	3	3	3-3/4	5	5	4-1/2	5	5
Spacing Distance (inches)	1-1/2	0.85	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.92	0.79	-	-	-	-	-	-	-	-	-	-	-	-
	2-1/4	0.95	0.81	0.91	-	-	-	-	-	-	-	-	-	-	-
	2-1/2	0.98	0.83	0.94	-	-	-	-	-	-	-	-	-	-	-
	2-3/4	1.00	0.85	0.97	-	-	-	-	-	-	-	-	-	-	-
	3	1.00	0.87	1.00	0.87	0.78	0.88	0.82	0.75	-	-	-	-	-	-
	3-1/2	1.00	0.91	1.00	0.91	0.80	0.92	0.85	0.77	-	-	-	-	-	-
	4	1.00	0.96	1.00	0.96	0.83	0.96	0.88	0.79	0.88	-	-	-	-	-
	4-1/2	1.00	1.00	1.00	1.00	0.85	1.00	0.91	0.80	0.91	-	-	0.85	-	-
	5	1.00	1.00	1.00	1.00	0.87	1.00	0.94	0.82	0.94	0.85	0.79	0.87	0.76	0.77
	5-1/2	1.00	1.00	1.00	1.00	0.89	1.00	0.97	0.84	0.97	0.87	0.80	0.89	0.78	0.78
	6	1.00	1.00	1.00	1.00	0.92	1.00	1.00	0.86	1.00	0.90	0.81	0.92	0.80	0.79
	6-1/2	1.00	1.00	1.00	1.00	0.94	1.00	1.00	0.87	1.00	0.92	0.83	0.94	0.82	0.80
	7	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.89	1.00	0.94	0.84	0.96	0.84	0.82
	7-1/2	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.91	1.00	0.97	0.85	0.98	0.86	0.83
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	0.99	0.87	1.00	0.87	0.84
	8-1/4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	0.88	1.00	0.88	0.85
	8-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	0.88	1.00	0.89	0.85
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.90	1.00	0.91	0.86
	9-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.91	1.00	0.93	0.88
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	1.00	0.95	0.89
	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.99	0.91
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.94
	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
	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	1.00	0.98
	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Spacing Reduction Factors - Shear (F_{VS})

Diameter (in)		1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4	3/4
Nominal Embed. h_{nom} (in)		1-1/8	1-3/4	1-3/8	1-7/8	3	1-7/8	2-3/8	3-3/4	2-1/2	3-1/4	4-3/4	3-3/8	4-1/2	5-5/8
Minimum Spacing, s_{min} (in)		1-1/2	2	2-1/4	3	3	3	3	3	3-3/4	5	5	4-1/2	5	5
Spacing Distance (inches)	1 1/2	0.91	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.95	0.87	-	-	-	-	-	-	-	-	-	-	-	-
	2 1/4	0.97	0.88	0.95	-	-	-	-	-	-	-	-	-	-	-
	2 1/2	0.99	0.90	0.97	-	-	-	-	-	-	-	-	-	-	-
	2 3/4	1.00	0.91	0.98	-	-	-	-	-	-	-	-	-	-	-
	3	1.00	0.92	1.00	0.92	0.88	0.93	0.89	0.86	-	-	-	-	-	-
	3 1/2	1.00	0.95	1.00	0.95	0.89	0.96	0.91	0.87	-	-	-	-	-	-
	4	1.00	0.97	1.00	0.97	0.90	0.98	0.93	0.88	0.93	-	-	-	-	-
	4 1/2	1.00	1.00	1.00	1.00	0.91	1.00	0.95	0.89	0.95	-	-	0.91	-	-
	5	1.00	1.00	1.00	1.00	0.93	1.00	0.96	0.90	0.97	0.91	0.88	0.93	0.84	0.87
	5 1/2	1.00	1.00	1.00	1.00	0.94	1.00	0.98	0.91	0.98	0.93	0.89	0.94	0.85	0.88
	6	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.92	1.00	0.94	0.89	0.95	0.86	0.88
	6 1/2	1.00	1.00	1.00	1.00	0.97	1.00	1.00	0.93	1.00	0.95	0.90	0.97	0.88	0.89
	7	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.94	1.00	0.97	0.91	0.98	0.89	0.90
	7 1/2	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.95	1.00	0.98	0.92	0.99	0.90	0.90
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	0.99	0.93	1.00	0.92	0.91
	8 1/4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93	1.00	0.92	0.91
	8 1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	0.93	1.00	0.93	0.92
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.94	1.00	0.94	0.92
	9 1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.95	1.00	0.95	0.93
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	0.97	0.94
	10 1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	0.98	0.94
	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	0.99	0.95
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.96
	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
	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	1.00	0.99
	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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

Diameter (in)		1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4	3/4
Nominal Embed. h_{nom} (in)		1-1/8	1-3/4	1-3/8	1-7/8	3	1-7/8	2-3/8	3-3/4	2-1/2	3-1/4	4-3/4	3-3/8	4-1/2	5-5/8
Min. Edge Distance, c_{min} (in)		2	1-3/4	3-	3	3	4	3	4	5	4-1/2	5	6	5	6
Edge Distance (inches)	1-3/4	-	0.35	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.57	0.40	-	-	-	-	-	-	-	-	-	-	-	-
	2-1/4	0.64	0.45	-	-	-	-	-	-	-	-	-	-	-	-
	2-1/2	0.71	0.50	-	-	-	-	-	-	-	-	-	-	-	-
	2-3/4	0.79	0.55	-	-	-	-	-	-	-	-	-	-	-	-
	3	0.86	0.60	0.75	0.60	0.29	-	0.40	-	-	-	-	-	-	-
	3-1/2	1.00	0.70	0.88	0.70	0.33	-	0.47	-	-	-	-	-	-	-
	4	1.00	0.80	1.00	0.80	0.38	0.67	0.53	0.30	-	-	-	-	-	-
	4-1/2	1.00	0.90	1.00	0.90	0.43	0.75	0.60	0.33	-	0.47	-	-	-	-
	5	1.00	1.00	1.00	1.00	0.48	0.83	0.67	0.37	0.63	0.53	0.29	-	0.56	-
	5-1/2	1.00	1.00	1.00	1.00	0.52	0.92	0.73	0.41	0.69	0.58	0.32	-	0.61	-
	6	1.00	1.00	1.00	1.00	0.57	1.00	0.80	0.44	0.75	0.63	0.35	0.57	0.67	0.31
	6-1/2	1.00	1.00	1.00	1.00	0.62	1.00	0.87	0.48	0.81	0.68	0.38	0.62	0.72	0.33
	7	1.00	1.00	1.00	1.00	0.67	1.00	0.93	0.52	0.88	0.74	0.41	0.67	0.78	0.36
	7-1/2	1.00	1.00	1.00	1.00	0.71	1.00	1.00	0.56	0.94	0.79	0.44	0.71	0.83	0.38
	8	1.00	1.00	1.00	1.00	0.76	1.00	1.00	0.59	1.00	0.84	0.47	0.76	0.89	0.41
	8-1/2	1.00	1.00	1.00	1.00	0.81	1.00	1.00	0.63	1.00	0.89	0.50	0.81	0.94	0.44
	9	1.00	1.00	1.00	1.00	0.86	1.00	1.00	0.67	1.00	0.95	0.53	0.86	1.00	0.46
	9-1/2	1.00	1.00	1.00	1.00	0.90	1.00	1.00	0.70	1.00	1.00	0.56	0.90	1.00	0.49
	10	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.74	1.00	1.00	0.59	0.95	1.00	0.51
	10-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78	1.00	1.00	0.62	1.00	1.00	0.54
	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.81	1.00	1.00	0.65	1.00	1.00	0.56
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	1.00	1.00	0.71	1.00	1.00	0.62
	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.76	1.00	1.00	0.67
	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82	1.00	1.00	0.72
	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	0.77
	16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	0.82
	17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87
	18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
	19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97
	19-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Edge Distance Reduction Factors - Shear (F_{VC})

Diameter (in)		1/4	1/4	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4	3/4
Nominal Embed. h_{nom} (in)		1-1/8	1-3/4	1-3/8	1-7/8	3	1-7/8	2-3/8	3-3/4	2-1/2	3-1/4	4-3/4	3-3/8	4-1/2	5-5/8
Min. Edge Distance, c_{min} (in)		2	1-3/4	3-	3	3	4	3	4	5	4-1/2	5	6	5	6
Edge Distance (inches)	1-3/4	-	0.39	-	-	-	-	-	-	-	-	-	-	-	-
	2	0.76	0.44	-	-	-	-	-	-	-	-	-	-	-	-
	2-1/4	0.86	0.50	-	-	-	-	-	-	-	-	-	-	-	-
	2-1/2	0.95	0.56	-	-	-	-	-	-	-	-	-	-	-	-
	2-3/4	1.00	0.61	-	-	-	-	-	-	-	-	-	-	-	-
	3	1.00	0.67	1.00	0.67	0.38	-	0.50	-	-	-	-	-	-	-
	3-1/2	1.00	0.78	1.00	0.78	0.44	-	0.58	-	-	-	-	-	-	-
	4	1.00	0.89	1.00	0.89	0.51	0.89	0.67	0.40	-	-	-	-	-	-
	4-1/2	1.00	1.00	1.00	1.00	0.57	1.00	0.75	0.44	-	0.55	-	-	-	-
	5	1.00	1.00	1.00	1.00	0.63	1.00	0.83	0.49	0.83	0.61	0.39	-	0.44	-
	5-1/2	1.00	1.00	1.00	1.00	0.70	1.00	0.92	0.54	0.92	0.67	0.43	-	0.49	-
	6	1.00	1.00	1.00	1.00	0.76	1.00	1.00	0.59	1.00	0.73	0.47	0.76	0.53	0.41
	6-1/2	1.00	1.00	1.00	1.00	0.83	1.00	1.00	0.64	1.00	0.79	0.51	0.83	0.58	0.44
	7	1.00	1.00	1.00	1.00	0.89	1.00	1.00	0.69	1.00	0.85	0.55	0.89	0.62	0.48
	7-1/2	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.74	1.00	0.91	0.59	0.95	0.67	0.51
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	1.00	0.97	0.63	1.00	0.71	0.55
	8-1/4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.81	1.00	1.00	0.65	1.00	0.73	0.56
	8-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.84	1.00	1.00	0.67	1.00	0.76	0.58
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	1.00	1.00	0.71	1.00	0.80	0.62
	9-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	0.75	1.00	0.84	0.65
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.78	1.00	0.89	0.68
	10-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82	1.00	0.93	0.72
	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	1.00	0.98	0.75
	11-1/4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	0.77
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	1.00	1.00	0.82
	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89
	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	1.00	0.96
	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Ultimate Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 installed into the Face of Grout Filled Concrete Masonry[1,2]

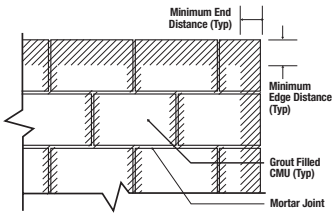
Nominal Anchor Diameter in.	Installation Torque, T_{inst} ft-lbf (N-m)	Minimum Embedment h_{nom} in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Ultimate Tension Load lb (kN)	Direction of Shear Loading	Ultimate Shear Load lb (kN)
1/2	25 (34)	2-3/8 (60)	3 (76)	3 (76)	1,695 (7.5)	Any	2,080 (9.3)
			12 (305)	12 (305)	2,425 (10.8)	Any	4,905 (21.8)
		3-5/8 (92)	12 (305)	12 (305)	7,305 (32.5)	Any	9,315 (41.4)
5/8	40 (54)	3-1/4 (83)	12 (305)	12 (305)	5,565 (24.8)	Any	7,944 (35.3)

1. Tabulated load values are for anchors installed in minimum 8 inch wide, minimum Grade N, Type II, normal-weight concrete masonry units conforming to ASTM C90. Mortar must be Type N, S or M. Masonry 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 5.0 or greater to determine allowable working loads.

Allowable Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 installed into the Face of Grout Filled Concrete Masonry[1,2,3,4,5]

Nominal Anchor Diameter in.	Installation Torque, T_{inst} ft-lbf (N-m)	Minimum Embedment h_{nom} in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Allowable Tension Load lb (kN)	Direction of Shear Loading	Allowable Shear Load lb (kN)
1/2	25 (34)	2-3/8 (60)	3 (76)	3 (76)	340 (1.5)	Any	415 (1.8)
			12 (305)	12 (305)	485 (2.2)	Any	980 (4.4)
		3-5/8 (92)	12 (305)	12 (305)	1,460 (6.5)	Any	1,865 (8.3)
5/8	40 (54)	3-1/4 (83)	12 (305)	12 (305)	1,115 (5.0)	Any	1,590 (7.1)

1. Tabulated load values are for anchors installed in minimum 8 inch wide, minimum Grade N, Type II, normal-weight concrete masonry units conforming to ASTM C90. Mortar must be Type N, S or M. Masonry compressive strength must be at the specified minimum at the time of installation.
2. Allowable load capacities listed are calculated using an applied safety factor of 5.0. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety.
3. The tabulated values are applicable for anchors installed in grouted masonry wall faces at a critical spacing distance, s_{cr}, between anchors of 16 times the anchor diameter. The spacing distance between two anchors may be reduced to a minimum distance, s_{min}, of 8 times the anchor diameter provided the allowable tension loads are multiplied a reduction factor of 0.80 and allowable shear loads are multiplied by a reduction factor of 0.90. Linear interpolation for calculation of allowable loads may be used for intermediate anchor spacing distances.
4. Anchors may be installed in the grouted cells and in cell webs and bed joints not closer than 1-3/8" from head joints. The minimum edge and end distances must also be maintained.
5. Allowable tension values for anchors installed into bed joints of grouted masonry wall faces with a minimum of 12" edge and end distance may be increased by 20 percent for the 1/2-inch diameter and 10 percent for the 5/8-inch diameter.



Wall Face
Permissible Anchor Locations
(Un-hatched Area)

STRENGTH DESIGN INFORMATION

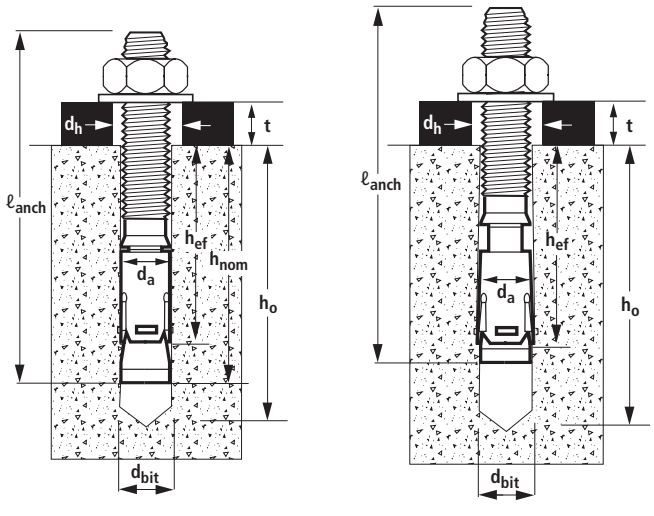
Installation Table for Power-Stud+ SD4 and Power-Stud+ SD6[1,4]

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Diameter									
			1/4	3/8		1/2		5/8		3/4		
Anchor outside diameter	d_a	in. (mm)	0.250 (6.4)	0.375 (9.5)		0.500 (12.7)		0.625 (15.9)		0.750 (19.1)		
Thread Size (UNC)	-	in.	1/4-20	3/8-16		1/2-13		5/8-11		3/4-10		
Minimum diameter of hole clearance in fixture	d_h	in. (mm)	5/16 (7.9)	7/16 (11.1)		9/16 (14.3)		11/16 (17.5)		13/16 (20.6)		
Nominal drill bit diameter (ANSI)	d_{bit}	in.	1/4	3/8		1/2		5/8		3/4		
Minimum nominal embedment depth[2]	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)		2-1/2 (64)		3-1/4 (83)		4-1/2 (114)		
Effective embedment	h_{ef}	in. (mm)	1.50 (38)	1.50 (38)		2.00 (51)		2.75 (70)		3-3/4 (95)		
Minimum hole depth	h_o	in. (mm)	1-7/8 (48)	2 (51)		2-5/8 (67)		3-1/2 (89)		4-3/4 (121)		
Minimum member thickness	h_{min}	in. (mm)	3-1/4 (83)	3-1/4 (83)	4 (102)	4 (102)		5 (127)		6 (152)		
Minimum overall anchor length[3]	ℓ_{anch}	in.	2-1/4	2-3/4		3-3/4		4-1/2		5-1/2		
Minimum edge distance	c_{min}	in. (mm)	1-3/4 (44)	3 (76)	3-1/2 (89)	6 (152)	3 (76)	4-1/2 (114)	8-1/2 (216)	5 (127)	9 (229)	
Minimum spacing distance	s_{min}	in. (mm)	2 (51)	5-1/2 (140)	3 (76)	3 (76)	6 (152)	8-1/2 (216)	5 (127)	9 (229)	5 (127)	
Installation torque	T_{inst}	ft.-lbf. (N-m)	6 (8)	25 (34)		40 (54)		60 (81)		110 (149)		
Torque wrench/socket size	-	in.	7/16	9/16		3/4		15/16		1-1/8		
Nut height	-	in.	7/32	21/64		7/16		35/64		41/64		
Washer O.D.	-	in.	5/8	13/16		1-1/16		1-5/16		1-15/16		

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 (-19 or -14) Chapter 17 or ACI 318-11 Appendix D, as applicable.
2. The embedment depth, h_{nom}, is measured from the outside surface of the concrete member to the embedded end of the anchor prior to tightening.
3. The listed minimum overall anchor length is based on anchor sizes commercially available at the time of publication compared with the requirements to achieve the minimum nominal embedment depth and possible fixture attachment.
4. The anchors may be installed in the topside of concrete-filled steel deck floor and roof assemblies in accordance with the following: the 1/4-inch diameter anchors must be installed in uncracked normal-weight or sand-lightweight concrete; 3/8-inch to 3/4-inch diameter anchors must be installed in cracked and uncracked normal-weight or sand-lightweight concrete over steel deck having a minimum specified compressive strength, f'c, of 3,000 psi (20.7 MPa) provided the concrete thickness above the upper flute meets the minimum thickness specified in this table.

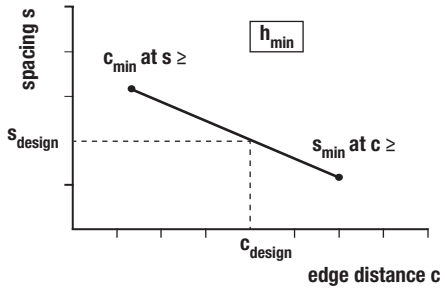
Power-Stud+ SD4 and Power-Stud+ SD6 Anchor Detail



BEFORE AFTER

Application of Installation Torque

Interpolation of Minimum Edge Distance and Anchor Spacing



This interpolation applies to the cases when two sets of minimum edge distances, c_{min}, and minimum spacing distances, s_{min}, are given for a selected anchor diameter effective embedment depth, h_{ef}, and corresponding minimum member thickness, h_{min}.

Tension Design Information for Power-Stud+ SD4 and Power-Stud+ SD6 Anchors in Concrete[1,8]

CODE LISTED
ICC-ES ESR-2502

Design Characteristic		Notation	Units	Nominal Anchor Diameter				
				1/4	3/8	1/2	5/8	3/4
Anchor category		1,2 or 3	-	1	1	1	1	1
Nominal embedment depth		h_{nom}	in.	1-3/4	1-7/8	2-3/8	3-1/4	4-1/2
Effective embedment		h_{ef}	in. (mm)	1.50 (38)	1.50 (38)	2.00 (51)	2.75 (70)	3.75 (95)
STEEL STRENGTH IN TENSION (ACI 318-19 17.6.1, ACI 318-14 17.4.1 or ACI 318-11 D.5.1)								
Minimum specified yield strength (neck		f_y	psi (N/mm^2)	60,000 (414)	60,000 (414)	60,000 (414)	60,000 (414)	60,000 (414)
Minimum specified ultimate tensile strength (neck)		f_{uta}	psi (N/mm^2)	90,000 (621)	90,000 (621)	90,000 (621)	90,000 (621)	90,000 (621)
Effective tensile stress area (neck)		$A_{se,N}$	in^2 (mm^2)	0.0249 (16.1)	0.0530 (34.2)	0.1020 (65.8)	0.1630 (105.2)	0.2380 (151)
Steel strength in tension		N_{sa}	lb (kN)	2,240 (10.0)	4,780 (21.3)	9,160 (40.8)	14,635 (65.1)	21,380 (95.1)
Reduction factor for steel strength[2,3]		ϕ	-	0.75				
CONCRETE BREAKOUT STRENGTH IN TENSION (ACI 318-19 17.6.2, ACI 318-14 17.4.2 or ACI 318-11 D.5.2)[8]								
Effectiveness factor for uncracked concrete		k_{uncr}	-	24	24	24	24	24
Effectiveness factor for cracked concrete		k_{cr}	-	Not Applicable	17	21	21	21
Modification factor for cracked and uncracked concrete		$\psi_{c,N}$	-	1.0 See Note 5	1.0 See Note 5	1.0 See Note 5	1.0 See Note 5	1.0 See Note 5
Critical edge distance (uncracked concrete only)		c_{ac}	in. (mm)	5 (127)	5 (127)	7-1/2 (191)	9-1/2 (241)	9 (229)
Reduction factor for concrete breakout strength[4]		ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION (ACI 318-19 17.6.3, ACI 318-14 17.4.3 or ACI 318-11 D.5.3)[8]								
Characteristic pullout strength, uncracked concrete (2,500 psi)[5]		$N_{p,uncr}$	lb (kN)	1,510 (6.7)	See Note 7	See Note 7	See Note 7	8,520 (37.8)
Characteristic pullout strength, cracked concrete (2,500 psi)[5]		$N_{p,cr}$	lb (kN)	Not Applicable	1,645 (7.3)	See Note 7	See Note 7	See Note 7
Reduction factor for pullout strength[3]		ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION FOR SEISMIC APPLICATIONS (ACI 318-19 17.10.3, ACI 318-14 17.2.3.3 or ACI 318-11 D.3.3.3)[8]								
Characteristic pullout strength, seismic (2,500 psi)[6,9]		$N_{p,eq}$	lb (kN)	Not Applicable	1,645 (7.3)	See Note 7	See Note 7	See Note 7
Reduction factor for pullout strength[4]		ϕ	-	0.65 (Condition B)				
Mean axial stiffnes values for service load range[10]	Uncracked concrete	β	lbf/in (kN/mm)	171,400 (30,060)	490,000 (86,000)	459,000 (80,500)	234,000 (41,000)	395,000 (69,300)
	Cracked concrete	β	lbf/in (kN/mm)	Not Applicable	228,000 (40,000)	392,000 (68,800)	193,000 (33,800)	76,600 (13,400)

For SI: 1 inch = 25.4 mm; 1 ft-lbf = 1.356 N-m; 1 ksi = 6.894 N/mm^2; 1 lb = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318 (-19 or -14) Chapter 17 or ACI 318-11 Appendix D, as applicable; for anchors resisting seismic load combinations the additional requirements of ACI 318-19 17.10, ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable, shall apply.
2. The tabulated value of ϕ for steel strength applies when the load combinations of Section 1605.2 of the IBC, ACI 318 (-19 or -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.4.4.
3. The anchors are ductile steel elements as defined in ACI 318 (-19 or -14) 2.3 or ACI 318-11 D.1, as applicable.
4. The tabulated value of ϕ for concrete breakout strength and pullout strength applies when both the load combinations of Section 1605.2 of the IBC, ACI 318 (-19 or -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC, ACI 318 (-19 or -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, for Condition A are satisfied, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-11 D.4.4.
5. For all design cases $\psi_{c,N}$ =1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.
6. For all design cases $\psi_{c,P}$ =1.0. For concrete compressive strength greater than 2,500 psi, N_{pn} = (pullout strength value from table)*(specified concrete compressive strength/2,500)$^{0.5}$.
7. Pullout strength does not control design of indicated anchors. Do not calculate pullout strength for indicated anchor size and embedment.
8. 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 $\sqrt{f'c}$ affecting N_n and V_n. λ shall be determined in accordance with the corresponding version of ACI 318.
9. Tabulated values for characteristic pullout strength in tension are for seismic applications and are based on test results per ACI 355.2, Section 9.5.
10. Actual stiffness of the mean value varies depending on concrete strength, loading and geometry of application.

Shear Design Information for Power-Stud+ SD4 and Power-Stud+ SD6 Anchors in Concrete[1,7]

CODE LISTED
ICC-ES ESR-2502

Design Characteristic	Notation	Units	Nominal Anchor Diameter				
			1/4	3/8	1/2	5/8	3/4
Anchor category	1, 2 or 3	-	1	1	1	1	1
Nominal embedment depth	h_{nom}	in.	1-3/4	1-7/8	2-3/8	3-1/4	4-1/2
Effective embedment	h_{ef}	in. (mm)	1.50 (38)	1.50 (38)	2.00 (51)	2.75 (70)	3.75 (95)
STEEL STRENGTH IN SHEAR (ACI 318-19 17.7.1, ACI 318-14 17.5.1 or ACI 318-11 D.6.1)[4]							
Minimum specified yield strength (threads)	f_y	ksi (N/mm^2)	60 (414)	60 (414)	60 (414)	60 (414)	60 (414)
Minimum specified ultimate strength (threads)	f_{uta}	ksi (N/mm^2)	90 (621)	90 (621)	90 (621)	90 (621)	90 (621)
Effective tensile stress area (threads)	$A_{se, v}$ [A_{se}][8]	in^2 (mm^2)	0.0318 (20.5)	0.078 (50.3)	0.142 (91.6)	0.226 (145.8)	0.334 (212)
Steel strength in shear[6]	V_{sa}	lb (kN)	1,115 (5.0)	1,470 (6.6)	3,170 (14.3)	7,455 (33.6)	11,955 (53.2)
Reduction factor for steel strength[2,3]	ϕ	-	0.65				
STEEL STRENGTH IN SHEAR FOR SEISMIC APPLICATIONS (ACI 318-19 17.10.1, ACI 318-14 17.2.3.3 or ACI 318-11 D.3.3.3)							
Steel strength in shear, seismic[8]	$V_{sa,eq}$	lb (kN)	Not Applicable	1,305 (5.9)	2,765 (12.3)	5,240 (23.3)	7,745 (34.5)
Reduction factor for steel strength in shear for seismic[2]	ϕ	-	0.65				
CONCRETE BREAKOUT STRENGTH IN SHEAR (ACI 318-19 17.7.2, ACI 318-14 17.5.2 or ACI 318-11 D.6.2)							
Load bearing length of anchor	ℓ_e	in. (mm)	1.50 (38.1)	1.50 (38.1)	2.00 (50.8)	2.75 (69.9)	3.75 (95)
Nominal anchor diameter	d_a	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Reduction factor for concrete breakout[4]	ϕ	-	0.70 (Condition B)				
CONCRETE PRYOUT STRENGTH IN SHEAR (ACI 318-19 17.7.3, ACI 318-14 17.2.3.3 or ACI 318-11 D.6.3)							
Coefficient for pryout strength	k_{cp}	-	1.0	1.0	1.0	2.0	2.0
Reduction factor for pryout strength[5]	ϕ	-	0.70 (Condition B)				

For SI: 1 inch = 25.4 mm; 1 ft-lbf = 1.356 N-m; 1 ksi = 6.894 N/mm^2; 1 lb = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318 (-19 or -14) Chapter or ACI 318-11 Appendix D, as applicable; for anchors resisting seismic load combinations the additional requirements of ACI 318-19 17.10, ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable, shall apply.
2. The tabulated value of ϕ for steel strength applies when the load combinations of Section 1605.2 of the IBC, ACI 318 (-19 or -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.4.4.
3. The anchors are ductile steel elements as defined in ACI 318 (-19 or -14) 2.3 or ACI 318-11 D.1, as applicable.
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 (-19 or -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, 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 318-19 17.5.3, ACI 318-14 14.3.3 or ACI 318-11 D.4.3, for Condition A are satisfied, the appropriate value of ϕ for concrete breakout strength must be determined in accordance with ACI 318-19 17.5.3, 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. The tabulated value of for pryout strength applies if the load combinations of Section 1605.2 of the IBC, ACI 318 (-19 or -14) 5.3 or ACI 318-11 Section 9.2 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, Condition B.
6. Tabulated values for steel strength in shear must be used for design.
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 $\sqrt{f'c}$ affecting N_n and V_n. 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 are based on test results per ACI 355.2, Section 9.6.

DESIGN STRENGTH TABLES (SD)

Tension and Shear Design Strengths Installed in Cracked Concrete[1,2,3,4,5,6,7,8]

Nominal Anchor Diameter (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi		f'c = 3,000 psi		f'c = 4,000 psi		f'c = 6,000 psi		f'c = 8,000 psi	
		ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)
3/8	1-7/8	1,015	955	1,110	955	1,285	955	1,570	955	1,815	955
1/2	2-1/2	1,930	2,060	2,115	2,060	2,440	2,060	2,990	2,060	3,455	2,060
5/8	3-1/4	3,110	4,520	3,410	4,845	3,935	4,845	4,820	4,845	5,570	4,845
3/4	4-1/2	4,955	5,270	5,430	5,770	6,270	6,665	7,680	7,770	8,865	7,770

- Anchor Pullout/Pryout Strength Controls; - Concrete Breakout Strength Controls; - Steel Strength Controls

Tension and Shear Design Strengths Installed in Uncracked Concrete[1,2,3,4,5,6,7]

Nominal Anchor Diameter (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi		f'c = 3,000 psi		f'c = 4,000 psi		f'c = 6,000 psi		f'c = 8,000 psi	
		ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{sa}, ϕN_{cb} or ϕN_{cp} Tension (lbs.)	ϕV_{sa}, ϕV_{cb} or ϕV_{cp} Shear (lbs.)
1/4	1-3/4	980	725	1,075	725	1,240	725	1,520	725	1,680	725
3/8	1-7/8	1,435	955	1,570	955	1,815	955	2,220	955	2,565	955
1/2	2-1/2	2,205	2,060	2,415	2,060	2,790	2,060	3,420	2,060	3,945	2,060
5/8	3-1/4	3,555	4,845	3,895	4,845	4,500	4,845	5,510	4,845	6,365	4,845
3/4	4-1/2	5,540	7,375	6,065	7,770	7,005	7,770	8,580	7,770	9,905	7,770

- Anchor Pullout/Pryout Strength Controls; - Concrete Breakout Strength Controls; - Steel Strength 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 (-19 or -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, h_{ef}, 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 (-19 or -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 (-19 or -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 (-19 or -14) Chapter 17. For other design conditions including seismic considerations please see ACI 318 (-19 or -14) Chapter 17.

7- The tabulated design strengths may be converted to allowable stress design values. Divide by conversion factor calculated as a weighted average of the load factors for the controlling load combination.

8- For seismic design of anchors installed in regions designated as Seismic Design Categories C, D, E or F and in accordance with ACI 318, the tabulated tension design strengths in cracked concrete for concrete breakout and pullout strength must be multiplied by a factor of 0.75.

ORDERING INFORMATION

Power-Stud+ SD4 (Type 304 Stainless Steel Body) and Power-Stud+ SD6 (Type 316 Stainless Steel Body)

Cat. No.				Anchor Size	Approx. Thread Length	Pack Qty.	Ctn. Qty.	Suggested ANSI Carbide Drill Bit Cat. No.				
Type 304 SS		Type 316 SS										
Standard	USA	Standard	USA					Full Head SDS-Plus	SDS-Plus	SDS-Max	Hollow Bit SDS-Plus	Hollow Bit SDS-Max
7300SD4-PWR	-	7600SD6-PWR	-	1/4" x 1-3/4"	3/4"	100	600	DW5517	DW5416	-	-	-
7302SD4-PWR	-	7602SD6-PWR	-	1/4" x 2-1/4"	1-1/4"	100	600	DW5517	DW5417	-	-	-
7304SD4-PWR	7304SD4USA-PWR	7604SD6-PWR	7604SD6USA-PWR	1/4" x 3-1/4"	2-1/4"	100	600	DW5517	DW5417	-	-	-
-	7310SD4USA-PWR	7610SD6-PWR	7610SD6USA-PWR	3/8" x 2-1/4"	7/8"	50	300	DW5527	DW5427	-	-	-
-	7312SD4USA-PWR	7612SD6-PWR	7612SD6USA-PWR	3/8" x 2-3/4"	1-3/8"	50	300	DW5527	DW5427	-	-	-
7313SD4-PWR	7313SD4USA-PWR	7613SD6-PWR	7613SD6USA-PWR	3/8" x 3"	1-5/8"	50	300	DW5527	DW5427	-		
-	7314SD4USA-PWR	7614SD6-PWR	7614SD6USA-PWR	3/8" x 3-1/2"	2-1/8"	50	300	DW5527	DW5427	-	-	-
7315SD4-PWR	7315SD4USA-PWR	7615SD6-PWR	7615SD6USA-PWR	3/8" x 3-3/4"	2-3/8"	50	300	DW5527	DW5427	-	-	-
7316SD4-PWR	7316SD4USA-PWR	7616SD6-PWR	7616SD6USA-PWR	3/8" x 5"	3-5/8"	50	300	DW55300	DW5429	-	-	-
-	7317SD4USA-PWR	7617SD6-PWR	7617SD6USA-PWR	3/8" x 7"	5-5/8"	50	200	DW55300	DW5429	-	-	-
-	7320SD4USA-PWR	7620SD6-PWR	7620SD6USA-PWR	1/2" x 2-3/4"	1"	50	200	DW5537	DW5437	DW5803	DWA54012	-
7322SD4-PWR	7322SD4USA-PWR	7622SD6-PWR	7622SD6USA-PWR	1/2" x 3-3/4"	2"	50	200	DW5537	DW5437	DW5803	DWA54012	-
7323SD4-PWR	7323SD4USA-PWR	7623SD6-PWR	7623SD6USA-PWR	1/2" x 4-1/2"	2-3/4"	50	200	DW5539	DW5438	DW5803	DWA54012	-
7324SD4-PWR	7324SD4USA-PWR	7624SD6-PWR	7624SD6USA-PWR	1/2" x 5-1/2"	3-3/4"	50	150	DW5539	DW5438	DW5803	DWA54012	-
7326SD4-PWR	7326SD4USA-PWR	7626SD6-PWR	7626SD6USA-PWR	1/2" x 7"	5-1/4"	25	100	DW5539	DW5438	DW5803	DWA54012	-
-	7330SD4USA-PWR	7630SD6-PWR	7630SD6USA-PWR	5/8" x 3-1/2"	1-1/2"	25	100	-	DW5446	DW5806	DWA54058	DWA58058
-	7332SD4USA-PWR	7632SD6-PWR	7632SD6USA-PWR	5/8" x 4-1/2"	2-1/2"	25	100	-	DW5446	DW5806	DWA54058	DWA58058
7333SD4-PWR	7333SD4USA-PWR	7633SD6-PWR	7633SD6USA-PWR	5/8" x 5"	3"	25	100	-	DW5446	DW5806	DWA54058	DWA58058
7334SD4-PWR	7334SD4USA-PWR	7634SD6-PWR	7634SD6USA-PWR	5/8" x 6"	4"	25	75	-	DW5446	DW5806	DWA54058	DWA58058
-	7336SD4USA-PWR	7636SD6-PWR	7636SD6USA-PWR	5/8" x 7"	5"	25	75	-	DW5447	DW5806	DWA54058	DWA58058
7338SD4-PWR	7338SD4USA-PWR	7638SD6-PWR	7638SD6USA-PWR	5/8" x 8-1/2"	6-1/2"	25	50	-	DW5447	DW5809	DWA54058	DWA58058
-	7340SD4USA-PWR	7640SD6-PWR	7640SD6USA-PWR	3/4" X 4-1/4"	1-7/8"	20	60	-	DW5453	DW5810	DWA54034	DWA58034
-	7341SD4USA-PWR	7641SD6-PWR	7641SD6USA-PWR	3/4" X 4-3/4"	2-3/8"	20	60	-	DW5453	DW5810	DWA54034	DWA58034
7342SD4-PWR	7342SD4USA-PWR	7642SD6-PWR	7642SD6USA-PWR	3/4" X 5-1/2"	3-1/8"	20	60	-	DW5453	DW5810	DWA54034	DWA58034
-	7344SD4USA-PWR	7644SD6-PWR	7644SD6USA-PWR	3/4" X 6-1/4"	3-7/8"	20	60	-	DW5455	DW5810	DWA54034	DWA58034
-	7346SD4USA-PWR	7646SD6-PWR	7646SD6USA-PWR	3/4" X 7"	4-5/8"	20	60	-	DW5455	DW5810	DWA54034	DWA58034
7348SD4-PWR	7348SD4USA-PWR	7648SD6-PWR	7648SD6USA-PWR	3/4" X 8-1/2"	6-1/8"	10	40	-	DW5455	DW5812	DWA54034	DWA58034
-	7349SD4USA-PWR	7649SD6-PWR	-	3/4" x 10"	7-5/8"	10	40	-	DW5455	DW5812	DWA54034	DWA58034

Domestically manufactured (Made in USA) Power-Stud+ SD4 and Power-Stud+ SD6 anchors are made to order. Contact DEWALT for additional details and certifications, as applicable.

The published size includes the diameter and the overall length of the anchor. Allow for fixture thickness (as applicable) plus one anchor diameter for the nut and washer when selecting a length.

All anchors are packaged with nuts and washers.

Shaded catalog numbers denote sizes which are less than the minimum standard anchor length for strength design. Anchors not long enough to meet the minimum nominal embedments published for strength design are outside the scope of ICC-ES ESR-2502.

Hollow drill bits must be used with a dust extraction vacuum (DWV010, DWV012, DWV015, DCV585).