Atomic+ Undercut™ *Anchor*

PRODUCT DESCRIPTION

The Atomic+ Undercut anchor is designed for applications in cracked and uncracked concrete. The anchors are is available in standard ASTM A 36 steel, high strength ASTM A 193 Grade B7 high strength steel and Type 316 stainless steel designations.

The Type 316 stainless steel version can be considered for exterior use and industrial applications where a high level of corrosion resistance is required.

The Atomic+ Undercut anchor is installed into a pre-drilled hole which has been enlarged at the bottom in the shape of a reversed cone using the Powers Undercut drill bit. The result is an anchor which transfers load mainly through bearing, and unlike a typical expansion anchor is not dependent upon friction between the expansion sleeve and the concrete. Due to the use of a thick walled expansion sleeve, the load is distributed to a large area which can provide ductile behavior of the anchor even at relatively shallow embedments.

GENERAL APPLICATIONS AND USES

- Structural connections, i.e. beam and column anchorage
- Safety related attachments
- Tension zone applications, i.e. cable trays and strut, pipe supports, fire sprinkler
- Seismic and wind loading
- Heavy duty loading

FEATURES AND BENEFITS

+ Consistent performance in high and low strength concrete
+ Anchors available for standard installations and for through bolt applications where the fixture is already in place
+ Length ID code and identifying marking stamped on head of each anchor
+ Load transfers to concrete through bearing, not friction
+ Bearing load transfer allows for closer spacing and edge distances.
+ Can be designed for predictable ductile steel performance behaves like a cast in place bolt.
+ Undercut created in seconds with durable tool

APPROVALS AND LISTINGS

International Code Council, Evaluation Service (ICC-ES), ESR-3067
Code compliant with the 2009 IBC, 2009 IRC, 2006 IBC, 2006 IRC, 2003 IBC, and 2003 IRC
Tested in accordance with ACI 355.2 and ICC-ES AC193 for use in structural concrete under the design provisions of ACI 318 (Strength Design method using 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)

GUIDE SPECIFICATIONS

CSI Divisions: 03151-Concrete Anchoring and 05090 - Metal Fastening.
Undercut anchors shall be Atomic+ Undercut anchors as supplied by Powers Fasteners, Inc., Brewster, NY. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

MATERIAL SPECIFICATIONS

Anchor component	Anchor Designation		
	Standard ASTM A 36	High Strength ASTM A 193 Grade B7	Type 316 Stainless Steel
Threaded Rod	ASTM A 36	ASTM A 193 Grade B7	Type 316 Stainless Steel
Expansion Coupling	ASTM A 108 12L14	ASTM A 108 12L14	Type 316 Stainless Steel
Expansion/Spacer Sleeve	ASTM A 513 Type 5	ASTM A 513 Type 5	Type 316 Stainless Steel
Hex Nuts	Carbon Steel, ASTM A 563, Grade A		Type 316 Stainless Steel, ASTM A 563, Grade A
Washer	Carbon Steel, ASTM A 844; Meets dimensional requirments of ANSI B18. 2.22.2, Type A Plain		Type 316 Stainless Steel, ASTM F 844, meets dimensional requirements of ANSI B18,22.2, Type A
Plating	Zinc Plating according to ASTM B 633, SC1, Type III (Fe/Zn 5) Minimum plating requirement for Mild Service Condition		N/A

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Atomic+ Undercut Assembly

THREAD VERSION

UNC threaded stud

ANCHOR MATERIALS

Carbon Steel
High Strength Carbon Steel
Type 316 Stainless Steel

ANCHOR SIZE RANGE (TYP.)

3/8" diameter through 3/4" diameter

SUITABLE BASE MATERIALS

Normal-weight concrete
Structural sand-lightweight concrete

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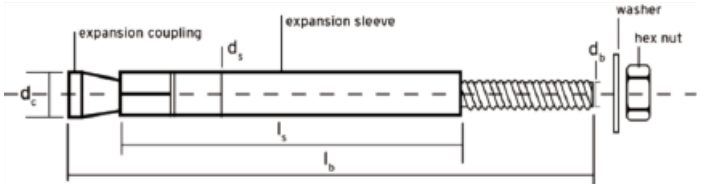
ANCHOR SPECIFICATIONS

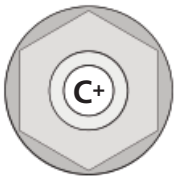
Dimensional Characteristics Table for Atomic+ Undercut

Anchor Designation	Anchor Type	Anchor Rod ASTM Designation	Rod Diameter, d_b (inch)	Anchor Length, l_b (inches)	Sleeve Length, l_s (inches)	Sleeve Diameter, d_s (inch)	Expansion Coupling Diameter d_c (inch)	Max. Fixture Thickness, t (inches)
03100SD	Standard	A 36	3/8	5 1/2	2 3/4	5/8	5/8	1 3/4
03102SD	Through bolt (TB)	A 36	3/8	5 1/2	4 1/2	5/8	5/8	1 3/4
03600SD	Standard	Type 316 SS	3/8	5 1/2	2 3/4	5/8	5/8	1 3/4
03602SD	Through bolt (TB)	Type 316 SS	3/8	5 1/2	4 1/2	5/8	5/8	1 3/4
03104SD	Standard	A 193, Grade B7	3/8	6 3/4	4	5/8	5/8	1 3/4
03106SD	Through bolt (TB)	A 193, Grade B7	3/8	6 3/4	5 3/4	5/8	5/8	1 3/4
03108SD	Standard	A 36	1/2	7	4	3/4	3/4	1 3/4
03110SD	Through bolt (TB)	A 36	1/2	7	5 3/4	3/4	3/4	1 3/4
03608SD	Standard	Type 316 SS	1/2	7	4	3/4	3/4	1 3/4
03610SD	Through bolt (TB)	Type 316 SS	1/2	7	5 3/4	3/4	3/4	1 3/4
03112SD	Standard	A 193, Grade B7	1/2	8	5	3/4	3/4	1 3/4
03114SD	Through bolt (TB)	A 193, Grade B7	1/2	8	6 3/4	3/4	3/4	1 3/4
03116SD	Standard	A 193, Grade B7	1/2	9 3/4	6 3/4	3/4	3/4	1 3/4
03118SD	Through bolt (TB)	A 193, Grade B7	1/2	9 3/4	8 1/2	3/4	3/4	1 3/4
03120SD	Standard	A 36	5/8	7 3/4	4 1/2	1	1	1 3/4
03122SD	Through bolt (TB)	A 36	5/8	7 3/4	6 1/4	1	1	1 3/4
03620SD	Standard	Type 316 SS	5/8	7 3/4	4 1/2	1	1	1 3/4
03622SD	Through bolt (TB)	Type 316 SS	5/8	7 3/4	6 1/4	1	1	1 3/4
03124SD	Standard	A 193, Grade B7	5/8	10 3/4	7 1/2	1	1	1 3/4
03126SD	Through bolt (TB)	A 193, Grade B7	5/8	10 3/4	9 1/4	1	1	1 3/4
03128SD	Standard	A 193, Grade B7	5/8	12 1/4	9	1	1	1 3/4
03130SD	Through bolt (TB)	A 193, Grade B7	5/8	12 1/4	10 3/4	1	1	1 3/4
03132SD	Standard	A 36	3/4	8 5/8	5	1 1/8	1 1/8	1 3/4
03134SD	Through bolt (TB)	A 36	3/4	8 5/8	6 3/4	1 1/8	1 1/8	1 3/4
03632SD	Standard	Type 316 SS	3/4	8 5/8	5	1 1/8	1 1/8	1 3/4
03634SD	Through bolt (TB)	Type 316 SS	3/4	8 5/8	6 3/4	1 1/8	1 1/8	1 3/4
03136SD	Standard	A 193, Grade B7	3/4	13 5/8	10	1 1/8	1 1/8	1 3/4
03138SD	Through bolt (TB)	A 193, Grade B7	3/4	13 5/8	11 3/4	1 1/8	1 1/8	1 3/4

Atomic+ Undercut Anchor Detail



Head Marking



Legend

Letter Code = Length Identification Mark

'+' Symbol = Strength Design Compliant Anchor (see ordering information)

Length Identification

Mark	A	B	C	D	E	F
From	1-1/2″	2″	2-1/2″	3″	3-1/2″	4″
Up to but not including	2″	2-1/2″	3″	3-1/2″	4″	4-1/2″

Mark	G	H	I	J	K	L
From	4-1/2″	5″	5-1/2″	6″	6-1/2″	7″
Up to but not including	5″	5-1/2″	6″	6-1/2″	7″	7-1/2″

Mark	M	N	O	P	Q	R	S	T
From	7-1/2″	8″	8-1/2″	9″	9-1/2″	10″	11″	12″
Up to but not including	8″	8-1/2″	9″	9-1/2″	10″	11″	12″	13″

Length identification mark indicates overall length of anchor.

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INSTALLATION SPECIFICATIONS

Installation Specifications for Atomic+ Undercut Anchors

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Diameter									
			3/8 inch		1/2 inch			5/8 inch			3/4 inch	
Outside anchor diameter	d_a [d_o][3]	in. (mm)	0.625 (15.9)		0.750 (19.1)			1.000 (25.4)			1.125 (28.6)	
Minimum diameter of hole clearance in fixture[2]	d_h	in. (mm)	7/16 (11.1)		9/16 (14.3)			11/16 (17.5)			13/16 (20.6	
Minimum nominal embedment depth	h_{nom}	in. (mm)	3-1/8 (79)	4-3/8 (111)	4-1/4 (108)	5-1/4 (133)	7 (178)	5 (127)	8 (203)	9-1/2 (241)	5-7/8 (149)	10-7/8 (276)
Effective embedment	h_{ef}	in. (mm)	2-3/4 (68)	4 (102)	4 (102)	5 (127)	6-3/4 (171)	4-1/2 (114)	7-1/2 (190)	9 (229)	5 (127)	10 (254)
Minimum hole depth[1]	h_o	in. (mm)	3-1/8 (79)	4-3/8 (111)	4-1/4 (108)	5-1/4 (133)	7 (178)	5 (127)	8 (204)	9-1/2 (241)	5-7/8 (149)	10-7/8 (276)
Minimum concrete member thickness	h_{min}	in. (mm)	5-1/2 (140)	8 (204)	8 (204)	10 (254)	13-1/2 (343)	9 (229)	15 (381)	18 (457)	10 (254)	20 (508)
	for $c_{ac} \geq$	in. (mm)	4-1/8 (105)	6 (152)	6 (152)	7-1/2 (190)	10-1/8 (257)	6-3/4 (171)	11-1/4 (256)	13-1/2 (343)	7-1/2 (190)	15 (381)
	h_{min}	in. (mm)	4-3/8 (111)	6 (152)	6 (152)	7-1/2 (190)	10-1/8 (257)	6-3/4 (171)	11-1/4 (256)	13-1/2 (343)	7-1/2 (190)	15 (381)
	for $c_{ac} \geq$	in. (mm)	5-1/2 (140)	10-1/4 (260)	9-1/4 (235)	13 (330)	20-1/4 (514)	9-1/2 (241)	21 (533)	27 (686)	10-1/2 (267)	30 (762)
Minimum edge distance	c_{min}	in. (mm)	2-1/4 (57)	3-1/4 (82)	3-1/4 (82)	4 (102)	5-3/8 (86)	3-5/8 (92)	6 (152)	7-1/4 (184)	4 (102)	8 (204)
Minimum spacing distance	s_{min}	in. (mm)	2-3/4 (70)	4 (102)	4 (102)	5 (127)	6-3/4 (171)	4-1/2 (114)	7-1/2 (190)	9 (229)	5 (127)	10 (254)
Maximum thickness of fixture	t	in. (mm)	1-3/4 (44)		1-3/4 (44)			1-3/4 (44)			1-3/4 (44)	
Maximum torque	T_{inst}	ft.-lbf.	26		44			60			133	
Torque wrench / socket size	-	in.	9/16		3/4			15/16			1-1/8	
Nut Height	-	in.	21/64		7/16			35/64			41/64	
Stop Drill Bit												
Nominal stop drill bit diameter	d_{bit}	in.	5/8 ANSI		3/4 ANSI			1 ANSI			1-1/8 ANSI	
Stop drill bit for anchor installation	-	-	3220SD	3221SD	3222SD	3223SD	3224SD	3225SD	3226SD	3227SD	3228SD	3229SD
Drilled hole depth of stop bit[1]	-	-	3-1/8	4-3/8	4-1/4	5-1/4	7	5	8	9-1/2	5-7/8	10-7/8
Stop drill bit shank type	-	-	SDS		SDS			SDS-Max			SDS-Max	
Undercut Drill Bit												
Nominal undercut drill bit diameter	d_{uc}	in.	5/8		3/4			1			1-1/8	
Undercut drill bit designation	-	-	3200SD		3201SD			3202SD			3203SD	
Maximum depth of hole for undercut drill bit	-	in. (mm)	9 (229)		10-1/4 (260)			12-1/4 (311)			13-1/2 (343)	
Undercut drill bit shank type	-	-	SDS		SDS			SDS-Max			SDS-Max	
Required impact drill energy	-	ft.-lbf.	1.6		2.5			3.2			4.0	
Setting Sleeve												
Recommended setting sleeve	-	-	3210SD		3211SD			3212SD			3213SD	

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

1. For through bolt applications the actual hole depth is given by the minimum hole depth plus the maximum thickness of fixture less the thickness of the actual part(s) being fastened to the base material ($h_{o,act} = h_o + t - t_{pl}$).
2. For through bolt applications the minimum diameter of hole clearance in fixture is 1/16-inch larger than the nominal outside anchor diameter.
3. The notation in brackets is for the 2006 IBC.

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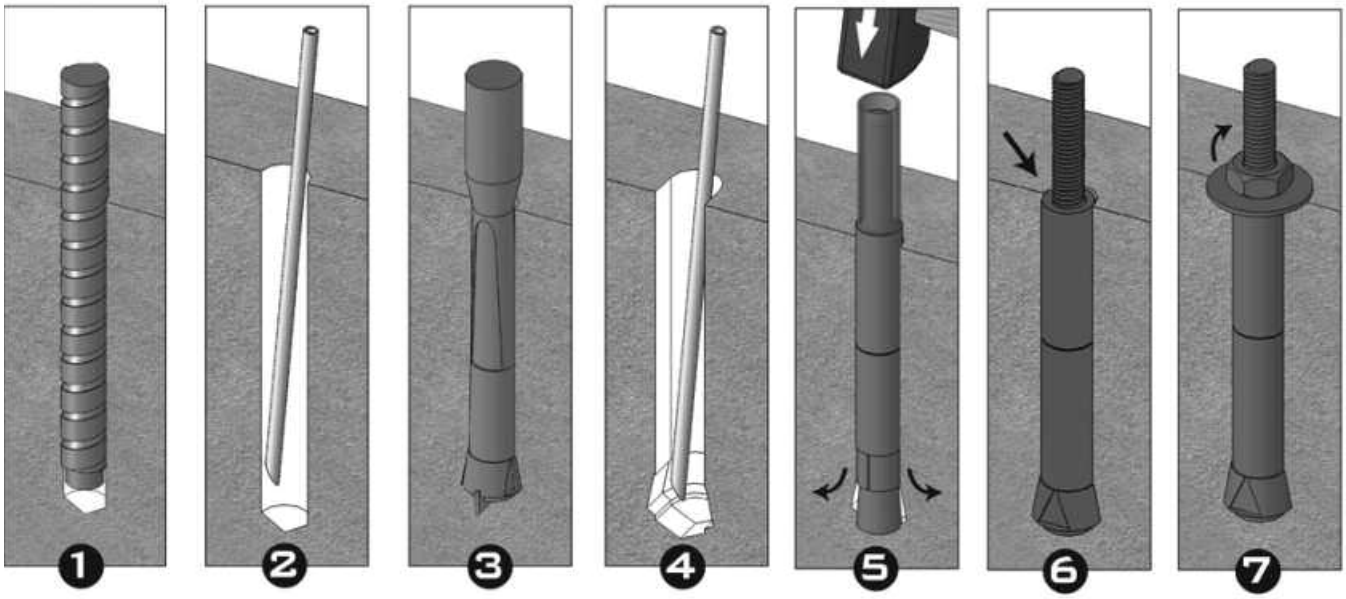
INSTALLATION INSTRUCTIONS

Installation Instructions for Atomic+ Undercut Anchors



1.) *Drill the hole to proper depth and diameter per specifications using rotohammer and stop drill.*

2.) *Clean the hole using a blow-out bulb or compressed air.*

3.) *Insert the undercut bit and start the rotohammer. Undercutting is complete when the stopper sleeve is fully compressed (gap closed)*

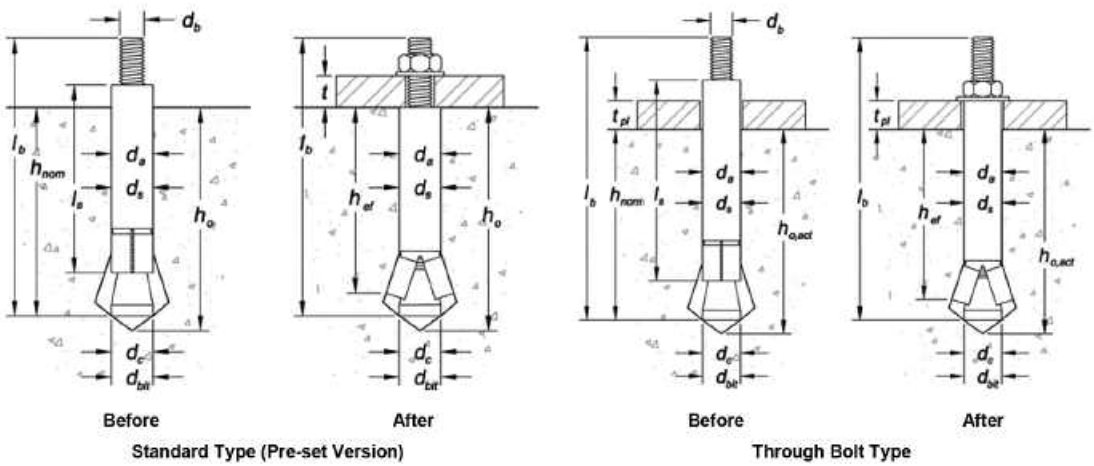
4.) *Clean the hole using a blow-out bulb or compressed air.*

5.) *Insert anchor into hole. Place setting sleeve over anchor and drive the expansion sleeve over the expansin coupling.*

6.) *Verify that the setting mark is visible on the theaded rod above the sleeve.*

7.) *Apply proper torque.*

Atomic+ Undercut Anchor Detail (before and after application of setting sleeve and attachment)



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PERFORMANCE DATA

Tension and Shear Design Information For Atomic+ Undercut Anchor in Concrete (For use with load combinations taken from ACI 318 Section 9.2)[1,2,3]

Anchor Property / Setting Information	Notation	Units	Nominal Anchor Diameter									
			3/8 inch		1/2 inch			5/8 inch			3/4 inch	
Anchor category	1,2 or 3	-	1									
Outside anchor diameter	d_a [d_o][9]	in. (mm)	0.625 (15.9)		0.750 (19.1)			1.000 (25.4)			1.125 (28.6)	
Effective embedment	h_{ef}	in. (mm)	2-3/4 (68)	4 (102)	4 (102)	5 (127)	6-3/4 (171)	4-1/2 (114)	7-1/2 (190)	9 (229)	5 (127)	10 (254)
STEEL STRENGTH IN TENSION AND SHEAR[3]												
Tensile stress area of anchor rod steel	A_{se}	in.^{2} (mm^2)	0.0775 (50)		0.1419 (91)			0.2260 (146)			0.3345 (216)	
Minimum specified yield strength of anchor rod[10]	f_y	ksi (N/mm^2)	36 (248)	105 (723)	36 (248)	105 (723)	105 (723)	36 (248)	105 (723)	105 (723)	36 (248)	105 (723)
Minimum specified ultimate tensile strength of anchor rod[10]	f_{uta}[8]	ksi (N/mm^2)	58 (400)	125 (860)	58 (400)	125 (860)	125 (860)	58 (400)	125 (860)	125 (860)	58 (400)	125 (860)
Steel strength in tension, static[10]	N_{sa}[8]	lb (kN)	4,495 (20.1)	9,685 (43.2)	8,230 (36.7)	17,735 (79.1)	17,735 (79.1)	13,100 (58.5)	28,250 (126.1)	28,250 (126.1)	19,400 (86.3)	41,810 (186.0)
Steel strength in shear, static[10]	V_{sa}[8]	lb (kN)	2,245 (10.0)	4,885 (21.7)	4,110 (18.4)	8,855 (39.5)	8,855 (39.5)	6,560 (29.3)	14,110 (63.0)	14,110 (63.0)	9,685 (43.2)	20,875 (93.2)
Steel strength in shear, seismic[10]	V_{eq}[8]	lb (kN)	2,245 (10.0)	4,885 (21.7)	4,110 (18.4)	8,855 (39.5)	8,855 (39.5)	6,560 (29.3)	14,110 (63.0)	14,110 (63.0)	9,685 (43.2)	20,875 (93.2)
Minimum specified yield strength of anchor rod (Type 316 stainless steel anchor)	$f_{y,ss}$	ksi (N/mm^2)	30 (205)	-	30 (205)	-	-	30 (205)	-	-	30 (205)	-
Minimum specified ultimate tensile strength of anchor rod (Type 316 stainless steel anchor)	$f_{uta,ss}$[8]	ksi (N/mm^2)	75 (515)	-	75 (515)	-	-	75 (515)	-	-	75 (515)	-
Steel strength in tension, static (Type 316 stainless steel anchor)[11]	$N_{sa,ss}$[8]	lb (kN)	4,415 (19.6)	-	8,085 (36.0)	-	-	12,880 (57.3)	-	-	19,065 (84.8)	-
Steel strength in shear, static (Type 316 stainless steel anchor) [11]	$V_{sa,ss}$[8]	lb (kN)	2,650 (11.8)	-	4,850 (21.6)	-	-	7,725 (34.4)	-	-	11,440 (50.9)	-
Reduction factor for steel strength in tension[2]	ϕ	-	0.75									
Reduction factor for steel strength in shear[2]	ϕ	-	0.65									
CONCRETE BREAKOUT STRENGTH IN TENSION AND SHEAR[7]												
Effectiveness factor for uncracked concrete	k_{uncr}	-	30		30			30			30	
Effectiveness factor for cracked concrete	k_{cr}	-	24		24			24			24	
Modification factor for cracked and uncracked concrete[4]	$\Psi_{c,N}$[8]	-	1 (See note 4)		1 (See note 4)			1 (See note 4)			1 (See note 4)	
Reduction factor for concrete breakout strength in tension[2]	ϕ	-	0.65 (Condition B)									
Reduction factor for concrete breakout strength in shear[2]	ϕ	-	0.70 (Condition B)									
PULLOUT STRENGTH IN TENSION[7]												
Characteristic pullout strength, uncracked concrete (2,500 psi)[5]	$N_{p,uncr}$	lb (kN)	See note 6		See note 6			See note 6			See note 6	
Characteristic pullout strength, cracked concrete (2,500 psi)[5]	$N_{p,cr}$	lb (kN)	See note 6	9,000 (40.2)	See note 6	11,500 (51.3)		See note 6	15,000 (67.0)		See note 6	22,000 (98.2)
Characteristic pullout strength, seismic (2,500 psi)[5,10]	N_{eq}[8]	lb (kN)	See note 6	9,000 (40.2)	See note 6	11,500 (51.3)		See note 6	15,000 (67.0)		See note 6	22,000 (98.2)
Reduction factor for pullout strength[2]	ϕ	-	0.65 (Condition B)									
PRYOUT STRENGTH IN SHEAR[7]												
Coefficient for pryout strength	k_{cp}	-	2.0		2.0			2.0			2.0	
Reduction factor for pryout strength[2]	ϕ	-	0.70 (Condition B)									

For SI: 1 inch = 25.4 mm, 1 ksi = 6.895 MPa (N/mm^2), 1 lbf = 0.0044 kN, 1 in^2 = 645 mm^2.

1. The data in this table is intended to be used with the design provisions of ACI 318 Appendix D; for anchors resisting seismic load combinations the additional requirements of ACI 318 D.3.3 shall apply.
2. All values of ϕ were determined from the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 or UBC Section 1612.2. If the load combinations of ACI 318 Appendix C or IBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5. For reinforcement that meets ACI 318 Appendix D requirements for Condition A, see ACI 318 D.4.4 for the appropriate ϕ factor.
3. Anchors are considered a ductile steel element as defined by ACI 318 D.1.
4. 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.
5. 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/2500)$^{0.5}$.
6. Pullout strength does not control design of indicated anchors. Do not calculate pullout strength for indicated anchor size and embedment.
7. Anchors are permitted to be used in structural sand-lightweight concrete provided that N_b, N_{eq} and N_{pn} mulitplied by a factor of 0.60.
8. For 2003 IBC code basis, f_{uta} replaces f_{ut}; N_{sa} replaces N_s; $\Psi_{c,N}$ replaces Ψ_3; and N_{eq} replaces $N_{p,seis}$; and V_{eq} replaces $V_{sa,seis}$.
9. The notation in brackets is for the 2006 IBC.
10. Only Applicapable for carbon steel anchors.
11. Calculated using $f_{uta,ss}$ = 57 ksi (1.9 f_y) in accordance with ACI 318 Appendix D.

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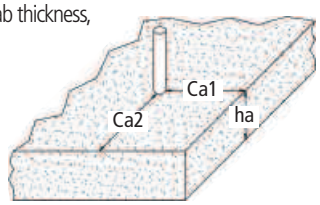
Factored Design Strength (ϕN_n and ϕV_n) Calculated in Accordance with ACI 318 Appendix D:

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 c_{a1}.
2. Calculations were performed according to ACI 318-05 Appendix D. 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 (ϕ) were based on ACI 318 Section 9.2 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 Appendix D.
6. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318 Appendix D. For other design conditions including seismic considerations please see ACI 318 Appendix D.



Tension and Shear Design Strength for Carbon Steel Atomic+ Undercut in Cracked Concrete

Nominal Anchor Size (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength, f'c (psi)									
		2,500		3,000		4,000		6,000		8,000	
		ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)
3/8	3-1/8	3,370	1,460	3,370	1,460	3,370	1,460	3,370	1,460	3,370	1,460
3/8	4-3/8	5,850	3,155	6,410	3,155	7,265	3,155	7,265	3,155	7,265	3,155
1/2	4-1/4	6,175	2,670	6,175	2,670	6,175	2,670	6,175	2,670	6,175	2,670
1/2	5-1/4	7,475	5,755	8,190	5,755	9,455	5,755	11,580	5,755	13,300	5,755
1/2	7	7,475	5,755	8,190	5,755	9,455	5,755	11,580	5,755	13,300	5,755
5/8	5	7,445	4,265	8,155	4,265	9,420	4,265	9,825	4,265	9,825	4,265
5/8	8	9,750	9,170	10,680	9,170	12,335	9,170	15,105	9,170	17,440	9,170
5/8	9-1/2	9,750	9,170	10,680	9,170	12,335	9,170	15,105	9,170	17,440	9,170
3/4	5-7/8	8,720	6,295	9,555	6,295	11,030	6,295	13,510	6,295	14,550	6,295
3/4	10-7/8	14,300	13,570	15,665	13,570	18,090	13,570	22,155	13,570	25,580	13,570

Tension and Shear Design Strength for Carbon Steel Atomic+ Undercut in Uncracked Concrete

Nominal Anchor Size (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength, f'c (psi)									
		2,500		3,000		4,000		6,000		8,000	
		ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)
3/8	3-1/8	3,370	1,460	3,370	1,460	3,370	1,460	3,370	1,460	3,370	1,460
3/8	4-3/8	7,265	3,155	7,265	3,155	7,265	3,155	7,265	3,155	7,265	3,155
1/2	4-1/4	6,175	2,670	6,175	2,670	6,175	2,670	6,175	2,670	6,175	2,670
1/2	5-1/4	10,900	5,755	11,940	5,755	13,300	5,755	13,300	5,755	13,300	5,755
1/2	7	13,300	5,755	13,300	5,755	13,300	5,755	13,300	5,755	13,300	5,755
5/8	5	9,305	4,265	9,825	4,265	9,825	4,265	9,825	4,265	9,825	4,265
5/8	8	20,025	9,170	21,190	9,170	21,190	9,170	21,190	9,170	21,190	9,170
5/8	9-1/2	21,190	9,170	21,190	9,170	21,190	9,170	21,190	9,170	21,190	9,170
3/4	5-7/8	10,900	6,295	11,940	6,295	13,790	6,295	14,550	6,295	14,550	6,295
3/4	10-7/8	30,830	13,570	31,360	13,570	31,360	13,570	31,360	13,570	31,360	13,570

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

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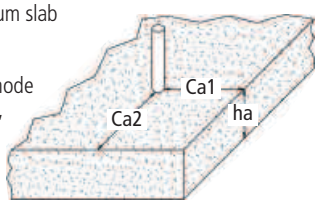
Factored Design Strength (ϕN_n and ϕV_n) Calculated in Accordance with ACI 318 Appendix D:



1. Tabular values are provided for illustration and are applicable for single anchors installed in normal-weight concrete with minimum slab thickness, ha = hmin, and with the following conditions: c_{a1} is greater than or equal to the critical edge distance, c_{ac} (table values based on $c_{a1} = c_{ac}$) and c_{a2} is greater than or equal to 1.5 c_{a1}.
2. Calculations were performed according to ACI 318-05 Appendix D. 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, hef, for the selected anchors as noted in the design information tables. Please also reference the installation specifications for more information.
3. Strength reduction factors (ϕ) were based on ACI 318 Section 9.2 for load combinations. Condition B is assumed.
4. Tabular values are permitted for static loads only, seismic loading is not considered with stainless steel Atomic+ Undercut anchors.
5. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318 Appendix D.
6. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318 Appendix D. For other design conditions including seismic considerations please see ACI 318 Appendix D.

Tension and Shear Factored Design Strength for Stainless Steel Atomic+ Undercut Anchor in Cracked Concrete

Nominal Anchor Size (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength, f'c (psi)									
		2,500		3,000		4,000		6,000		8,000	
		ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)
3/8	3 1/8	3,310	1,725	3,310	1,725	3,310	1,725	3,310	1,725	3,310	1,725
1/2	4 1/4	6,065	3,155	6,065	3,155	6,065	3,155	6,065	3,155	6,065	3,155
5/8	5	7,445	5,020	8,155	5,020	9,420	5,020	9,660	5,020	9,660	5,020
3/4	5 7/8	8,720	7,425	9,555	7,425	11,030	7,425	13,510	7,425	14,275	7,425

Tension and Shear Factored Design Strength for Stainless Steel Atomic+ Undercut Anchor in Uncracked Concrete

Nominal Anchor Size (in.)	Nominal Embed. h_{nom} (in.)	Minimum Concrete Compressive Strength, f'c (psi)									
		2,500		3,000		4,000		6,000		8,000	
		ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)	ϕN_n Tension (lbs.)	ϕV_n Shear (lbs.)
3/8	3 1/8	3,310	1,725	3,310	1,725	3,310	1,725	3,310	1,725	3,310	1,725
1/2	4 1/4	6,065	3,155	6,065	3,155	6,065	3,155	6,065	3,155	6,065	3,155
5/8	5	9,305	5,020	9,660	5,020	9,660	5,020	9,660	5,020	9,660	5,020
3/4	5 7/8	10,900	7,425	11,940	7,425	13,790	7,425	14,275	7,425	14,275	7,425

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

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ORDERING INFORMATION

Atomic+ Undercut Anchor A 36 Steel

Cat. No.	Nominal Anchor Diameter	Overall Length	Required Undercut Bit (Cat. No.)	Recommended Stop Bit (Cat. No.)	Anchor Type	Std. Box
03100SD	3/8"	5-1/2"	03200SD	03220SD	Standard	20
03102SD	3/8"	5-1/2"		*	Through bolt	20
03108SD	1/2"	7"	03201SD	03222SD	Standard	15
03110SD	1/2"	7"		*	Through bolt	15
03120SD	5/8"	7-3/4"	03202SD	03225SD	Standard	10
03122SD	5/8"	7-3/4"		*	Through bolt	10
03132SD	3/4"	8-5/8"	03203SD	03228SD	Standard	8
03134SD	3/4"	8-5/8"		*	Through bolt	8

For availability of all anchors lengths please contact Powers Fasteners.
*Contact Powers Fasteners for appropriate drilling method and hardware.

Atomic+ Undercut Anchor High Strength A 193, Grade B7 Steel

Cat. No.	Nominal Anchor Diameter	Overall Length	Required Undercut Bit (Cat. No.)	Recommended Stop Bit (Cat. No.)	Anchor Type	Std. Box
03104SD	3/8"	6-3/4"	03200SD	03221SD	Standard	20
03106SD	3/8"	6-3/4"		*	Through bolt	20
03112SD	1/2"	8"	03201SD	03223SD	Standard	15
03114SD	1/2"	8"		*	Through bolt	15
03116SD	1/2"	9-3/4"		03224SD	Standard	15
03118SD	1/2"	9-3/4"		*	Through bolt	15
03124SD	5/8"	10-3/4"	03202SD	03226SD	Standard	10
03126SD	5/8"	10-3/4"		*	Through bolt	10
03128SD	5/8"	12-1/4"		03227SD	Standard	10
03130SD	5/8"	12-1/4"		*	Through bolt	10
03136SD	3/4"	13-5/8"	03203SD	03229SD	Standard	8
03138SD	3/4"	13-5/8"		*	Through bolt	8

For availability of all anchors lengths please contact Powers Fasteners.
*Contact Powers Fasteners for appropriate drilling method and hardware.

Atomic+ Undercut Anchor Type 316 Stainless Steel

Cat. No.	Nominal Anchor Diameter	Overall Length	Required Undercut Bit (Cat. No.)	Recommended Stop Bit (Cat. No.)	Anchor Type	Std. Box
03600SD	3/8"	5-1/2"	03200SD	03220SD	Standard	20
03602SD	3/8"	5-1/2"		*	Through bolt	20
03608SD	1/2"	7"	03201SD	03222SD	Standard	15
03610SD	1/2"	7"		*	Through bolt	15
03620SD	5/8"	7-3/4"	03202SD	03225SD	Standard	10
03622SD	5/8"	7-3/4"		*	Through bolt	10
03632SD	3/4"	8-5/8"	03203SD	03228SD	Standard	8
03634SD	3/4"	8-5/8"		*	Through bolt	8

For availability of all anchors lengths please contact Powers Fasteners.
*Contact Powers Fasteners for appropriate drilling method and hardware.

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ORDERING INFORMATION

Stop Drill Bits

Cat. No.	Nominal Stop Drill Bit Diameter	Corresponding Nominal Anchor Diameter	Max. Drill Depth	Shank Type	Std. Tube
03220SD	5/8	3/8	3-1/8"	SDS	1
03221SD	5/8	3/8	4-3/8"	SDS	1
03222SD	3/4	1/2	4-1/4"	SDS	1
03223SD	3/4	1/2	5-1/4"	SDS	1
03224SD	3/4	1/2	7"	SDS	1
03225SD	1	5/8	5"	SDS-Max	1
03226SD	1	5/8	8"	SDS-Max	1
03227SD	1	5/8	9-1/2"	SDS-Max	1
03228SD	1-1/8	3/4	5-13/16"	SDS-Max	1
03229SD	1-1/8	3/4	10-13/16"	SDS-Max	1

The Stop Drill Bit creates a drill hole to the proper depth for standard installations of the Atomic+ Undercut anchor (for through bolt applications please contact Powers Fasteners for appropriate drilling method and hardware).

Undercut Drill Bits

Cat. No.	Nominal Undercut Drill Bit Diameter	Corresponding Nominal Anchor Diameter	Maximum Depth of Hole	Shank Type	Std. Tube
03200SD	5/8	3/8	9"	SDS	1
03201SD	3/4	1/2	10-1/4"	SDS	1
03202SD	1	5/8	12-1/4"	SDS-Max	1
03203SD	1-1/8	3/4	13-1/2"	SDS-Max	1

The Undercut Drill Bit has a unique design that enlarges the bottom of the drill hole creating a reverse cone sized to receive the Atomic+ Undercut anchor.

Undercut Setting Sleeve

CAT. NO.	Corresponding Nominal Anchor Diameter	Std. Box
03210SD	3/8	1
03211SD	1/2	1
03212SD	5/8	1
03213SD	3/4	1

Note: One Undercut Setting Sleeve is packaged with each box of Atomic+ Undercut anchors.