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GENERAL INFORMATION

MINI-UNDERCUT+™

Internally Threaded Undercut Anchor

PRODUCT DESCRIPTION

The Mini-Undercut+ anchor is an internally threaded, self-undercutting anchor designed for performance in cracked and uncracked concrete. Suitable base materials include post-tension concrete (PT slabs), hollow-core precast concrete, normal-weight concrete, sand-lightweight concrete and concrete over steel deck. The Mini-Undercut+ anchor is installed into a pre-drilled hole with a power tool and a setting tool. The result is an anchor which can provide consistent behavior at shallow embedments as low as 3/4 of an inch. After installation a steel element is threaded into the anchor body.

GENERAL APPLICATIONS AND USES

- Tension zones, seismic and wind loading applications
- Suspended Conduit

- Fire Sprinkler & pipe supports
- Cable Trays and Strut
- Suspended Lighting

FEATURE AND BENEFITS

- + Ideal for precast hollow-core plank and post-tensioned concrete slabs
- + Cracked concrete tested alternative to a mini dropin anchor
- + ANSI carbide stop bit with enlarged shoulder for accurate drill depth
- + Anchor design allows for shallow embedment as low as 3/4 of an inch
- + Internally threaded anchor for easy adjustment and removability of threaded rod or bolt
- + Drill and drive the anchor with one tool for fast anchor installation

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3912 for Concrete and Hollow-Core precast slabs, code compliant with the 2015, IBC, 2015 IRC, 2012 IBC, 2012 IRC, 2009 IBC, and 2009 IRC.
- Tested in accordance with ACI 355.2 (including ASTM E 488) and ICC-ES AC193 for use in 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)
- FM Approvals (Factory Mutual) File No. J.I. 3059197

GUIDE SPECIFICATIONS

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

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MINI-UNDERCUT+

THREAD VERSION

UNC Thread

ANCHOR MATERIALS

Zinc plated carbon steel

ANCHOR SIZE RANGE (TYP.)

• 3/8"

SUITABLE BASE MATERIALS

- Post-Tension Concrete
- Precast Hollow-Core Plank
- Normal-weight concrete





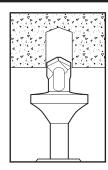




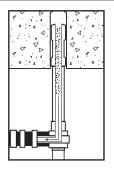


INSTALLATION INSTRUCTIONS

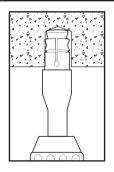
INSTALLATION PROCEDURE (USING SDS PLUS SYSTEM



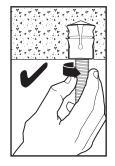
Using the required stop drill bit, drill a hole into the base material to the required depth using the shoulder of the drill bit as a guide. The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15.



Remove dust and debris from the hole during drilling (e.g. dust extractor) or following drilling (e.g. suction forced air) to extract loose particles created by drilling.



Attach the required SDS setting tool to the hammer-drill. Mount the open end of the anchor onto the setting tool. Drive the anchor into the hole until the shoulder of the anchor is flush with the base material.



Thread the rod or bolt by hand until snug tight (minimum of 4 full rotations).



Do not further tighten with adjustable wrench or similar tool.

Installation Information for Mini-Undercut+ Anchor^{1,2,3}

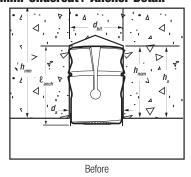
Anchor Property/Setting Information		Symbol	Units	Nominal Anchor Diameter (inch)
Alichor Property/3	etung information	Зунион	Units	3/8
Anchor outside diameter		da	in. (mm)	0.625 (15.9)
Internal thread diameter	(UNC)	d	in. (mm)	3/8 (9.5)
Nominal drill bit diamete	r	d _{bit}	in. (mm)	5/8 ANSI
Minimum nominal embe	dment depth	h _{nom}	in. (mm)	3/4 (19)
Effective embedment de	pth	h _{ef}	in. (mm)	3/4 (19)
Hole depth		h₀	in. (mm)	3/4 (19)
Overall anchor length (be	efore setting)	$\ell_{ ext{anch}}$	in. (mm)	15/16 (24)
Approximate tool impact power (hammer-drill)		-	J	2.1 to 2.8
Minimum diameter of hole clearance in fixture for steel insert element (following anchor installation)		dh	in.	7/16
Minimum member thickness in normal-weight concrete		h _{min}	in. (mm)	2-1/2 (64)
Minimum cover thicknes slabs (see Hollow-Core c	s in hollow core concrete concrete figure)	h _{min,core}	in. (mm)	1-1/2 (38)
Critical edge distance		Cac	in. (mm)	2-1/4 (57)
Minimum edge distance		C _{min}	in. (mm)	2-1/2 (64)
Minimum spacing distan	num spacing distance S _{min}		in. (mm)	3 (76)
Maximum installation tor	rque	T _{max}	ftlb. (N-m)	5 (7)
Effective tensile stress area (undercut anchor body)		Ase	in.² (mm²)	0.044 (28.4)
Minimum specified ultimate strength		futa	psi (N/mm²)	95,000 (655)
Minimum specified yield	strength	fya	psi (N/mm²)	76,000 (524)
Moon ovial atiffaces	Uncracked concrete	$eta_{ ext{uncr}}$	lbf/in.	50,400
Mean axial stiffness⁴	Cracked concrete	$eta_{ ext{cr}}$	lbf/in.	29,120

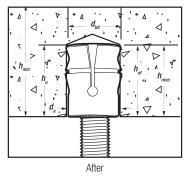
For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

- 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, as applicable.
- 2. For installation detail for anchors in hollow-core concrete slabs, see Hollow-Core concrete figure.
- 3. The embedment depth, h_{nom} , is measured from the outside surface of the concrete member to the embedded end of the anchor.
- 4. Mean values shown, actual stiffness varies considerably depending on concrete strength, loading and geometry of application.

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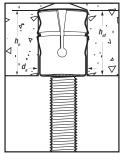
Mini-Undercut+ Anchor Detail

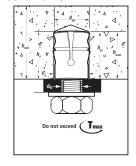


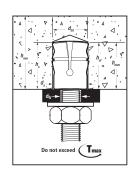




Mini-Undercut+ Anchor Installed with Steel Insert Element







REFERENCE DATA (ASD)

Ultimate and Allowable Tension Load Capacities for Mini-Undercut+ in Normal-Weight Concrete^{1,2,3}



	l	Minimum Concrete Compressive Strength									
Nominal Rod/	Minimum Nominal	f'c = 3,000 psi (20.7 MPa)				f'c = 4,000 psi (27.6 MPa)					
Anchor Diameter	Embed. Depth in. (mm)	Ultir	nate	Allowable		Ultimate		Allowable			
d in.		Tension lbs (kN)	Shear Ibs (kN)	Tension lbs (kN)	Shear Ibs (kN)	Tension lbs (kN)	Shear Ibs (kN)	Tension lbs (kN)	Shear lbs (kN)		
3/8	3/4 (19)	1,535 (6.8)	1,975 (8.8)	385 (1.7)	495 (2.2)	1,770 (7.9)	2,275 (10.1)	445 (2.0)	570 (2.5)		

- 1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
- 2. Allowable load capacities are calculated using an applied safety factor of 4.0.
- 3. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.

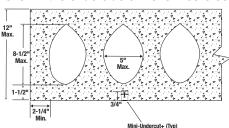
Ultimate and Allowable Tension Load Capacities for Mini-Undercut+ in Hollow-Core Plank^{1,2,3}



	l		Minimum Concrete Compressive Strength											
Nominal Rod/	Minimum Nominal	f	'c = 5,000 p	si (34.5 MPa)	f'c = 6,000 psi (41.4 MPa)			f	f'c = 8,000 psi (55.2 MPa)				
Anchor Diameter	Embed. Depth in. (mm)		Ultir	nate	Allov	vable	Ultin	nate	Allov	rable	Ultir	nate	Allov	vable
d in.		Tension lbs (kN)	Shear Ibs (kN)	Tension lbs (kN)	Shear Ibs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear Ibs (kN)	
3/8	3/4 (19)	1,855 (8.3)	2,590 (11.5)	465 (2.1)	650 (2.9)	2,035 (9.1)	2,835 (12.6)	510 (2.3)	710 (3.2)	2,345 (10.4)	3,275 (14.6)	585 (2.6)	820 (3.6)	

- 1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
- 2. Allowable load capacities are calculated using an applied safety factor of 4.0.
- 3. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.

Mini-Undercut+ Installed Detail for Anchor in the Underside of Hollow-Core Concrete slabs





STRENGTH DESIGN (SD)

Tension Design Information for Mini-Undercut+ Anchors in the Underside of Normal-weight Concrete and the Underside of Hollow-Core Concrete Slabs^{12,3,4,5,6,7}





Design Characteristic	Notation	Units	Nominal Anchor Size / Threaded Rod Diameter (inch)						
Design Gnaracteristic	Notation	Units	3/8						
Anchor category	1, 2 or 3	-	1						
Nominal embedment depth	h _{nom}	in. (mm)	3/4 (19)						
	Steel Strength In Tensio	on (ACI 318-14 17.4.1	or ACI 318-11 D.5.1)						
Steel strength in tension	N _{sa}	lb (kN)	4,180 (18.6)						
Reduction factor for steel strength	ϕ	-	0.65						
Concrete Breakout Strength In Tension (ACI 318-14 17.4.2 or ACI 318-11 D.5.2)									
Effective embedment	hef	in. (mm)	3/4 (19)						
Effectiveness factor for uncracked concrete	Kuncr	-	24						
Effectiveness factor for cracked concrete	Kcr	-	17						
Modification factor for cracked and uncracked concrete	$\Psi_{c,N}$	-	1.0 (see note 5)						
Critical edge distance	Cac	in. (mm)	2-1/4 (57)						
Reduction factor, concrete breakout strength ³	φ	-	0.40						
P	ullout Strength In Tensi	on (ACI 318-14 17.4.	3 or ACI 318-11 D.5.3)						
Pullout strength, uncracked concrete	$N_{p,uncr}$	lb (kN)	See note 7						
Pullout strength, cracked concrete	$N_{p,cr}$	lb (kN)	455 (2.0)						
Reduction factor, pullout strength	φ	-	0.40						
Pullout Strengti	ı In Tension For Seismic	Applications (ACI 31	8-14 17.2.3.3 or ACI 318-11 D.3.3.3)						
Characteristic pullout strength, seismic	$N_{p,eq}$	lb (kN)	410 (1.82)						
Reduction factor, pullout strength, seismic	φ	-	0.40						

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 manufacturer's published installation instructions and details.
- 3. All values of ϕ are applicable with the load combinations of IBC Section 1605.2, ACI 318-14 Section 5.3, or ACI 318-11 Section 9.2.
- 4. The threaded rod or bolt strength must also be checked, and the controlling value of ϕ_{Nisa} between the anchor and rod must be used for design.
- 5. Select the appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) and use $\psi_{c,N}=1.0$.
- 6. The characteristic pullout strength for concrete compressive strengths greater than 2,500 psi for anchors may be increased by multiplying the value in the table by (f'c / 2,500)^{a.s} for psi or (f'c / 17.2)^{a.s}. For hollow-core concrete slabs the characteristic pullout strength for concrete compressive strengths greater than 6,000 psi for anchors may be increased by multiplying the value in the table by (f'c / 6,000)^{a.s} for psi or (f'c / 41.4)^{a.s}.
- 7. Reported values for characteristic pullout strength in tension for seismic applications are based on test results per ACI 355.2, Section 9.5.



Shear Design Information for Mini-Undercut+ Anchors in the Underside of Normal-weight Concrete and the Underside of Hollow-Core Concrete Slabs^{1,2,3,4,5,6}



Design Characteristic	Notation	Units	Nominal Anchor Size / Threaded Rod Diameter (inch)					
Design Characteristic	Notation	Units	3/8					
Anchor category	1, 2 or 3	-	1					
Nominal embedment depth	h _{nom}	in. (mm)	3/4 (19)					
Steel Strength in Shear (ACI 318-14 17.5.1 or ACI 318-11 D.6.1)								
Steel strength in shear	V_{sa}	lb (kN)	985 (4.4)					
Reduction factor, steel strength	φ	-	0.60					
Steel Strength in Shear for Seismic (ACI 318-14 17.2.3.3 or ACI 318-11 D.3.3.3)								
Steel strength in shear, seismic	V _{sa, eq}	lb (kN)	895 (4.0)					
Reduction factor, steel strength in shear, seismic	φ	-	0.60					
Concrete	Breakout Strength in	n Shear (ACI 318-14 1	7.5.2 or ACI 318-11 D.6.2)					
Load bearing length of anchor in shear	le	in. (mm)	3/4 (19)					
Nominal outside anchor diameter	da	in. (mm)	0.625 (15.9)					
Reduction factor for concrete breakout strength	φ	-	0.45					
Pry	out Strength in Shea	ır (ACI 318-14 17.5.3	or ACI 318-11 D.6.3)					
Coefficient for pryout strength	k _{cp}	-	1.0					
Effective embedment	h _{ef}	in. (mm)	3/4 (19)					
Reduction factor, pryout strength	ϕ	-	0.45					

For SI: 1 inch = 25.4 mm, 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 318-17 17.2.3 or ACI 318-11 D.3.3, as applicable shall apply
- 2. Installation must comply with manufacturer's published installation instructions and details.
- 3. All values of ϕ are applicable with the load combinations of IBC Section 1605.2, ACI 318-14 Section 5.3, or ACI 318-11 Section 9.2.
- 4. The strengths shown in the table are for the Mini-Undercut+ anchors only. Design professional is responsible for checking threaded rod strength in tension, shear, and combined tension and shear, as applicable.
- 5. Reported values for steel strength in shear are based on test results per ACI 355.2, Section 9.4 and must be used for design in lieu of the calculated results using equation 17.5.1.2b of ACI 318-14 or equation D-29 in ACI 318-11 D.6.1.2.
- 6. Reported values for steel strength in shear for the Mini-Undercut+ anchors are for seismic applications and based on test results in accordance with ACI 355.2, Section 9.6 and must be used



ORDERING INFORMATION

Mini-Undercut+

Cat. No.	Anchor Size	Rod/Anchor Dia.	Drill Diameter	Overall Length	Box Qty.	Ctn. Qty.
PFM2111820	3/8" x 3/4"	3/8"	5/8"	3/4"	100	600



Accu-Bit™ for DEWALT Mini-Undercut+

Cat. No.	Mini-Undercut+ Size	Rod/Anchor Dia.	Drill Diameter	Drill Depth	Std. Pack
PPA2431720	5/8" x 3/4" Stop Drill Bit - PT Anchor	3/8"	5/8"	3/4"	1



SDS Plus Setting Tool for DEWALT Mini-Undercut+

Cat. No.	Mini-Undercut+ Size	Rod/Anchor Dia.	Std. Pack
PFM2101720	3/8" SDS+ Setting Tool - PT Anchor	3/8"	1



Mini-Undercut+ Ordering Matrix

Description	Anchor Cat No.	Accu-Bit™ Cat. No.	SDS Plus Setting Tool Cat. No.	Recommended SDS Hammer-Tools (DEWALT)
3/8" x 3/4" Mini-Undercut+	PFM2111820	PPA2431720	PFM2101720	DCH273, DCH133, D25133, D25262