GENERAL INFORMATION

WOOD-KNOCKER®II+ AND PAN-KNOCKER™II+

Concrete Inserts

PRODUCT DESCRIPTION

Wood-Knocker II+ and Pan-Knocker II+ concrete inserts are installed onto forms used to support newly poured concrete floor slabs, roof slabs or walls. The concrete inserts are specifically designed to provide hanger attachments for mechanical, electrical, plumbing (MEP) and fire protection.

When the forms are stripped, the color-coded flange is visibly embedded in the concrete surface. The inserts allow the attachment of steel threaded rod or threaded bolts in sizes ranging from 1/4" to 3/4" in diameter. The sturdy base and rib design minimizes the chance of inserts accidentally being hit out of place after attachment to the forms. The impact plate offers resistance to rotation within the concrete as a steel threaded rod or threaded bolt is being turned during installation.

A push-in thread version is also available which does not require turning the threaded rod or threaded bolt during installation which can be ideal for applications such as mounting prefabricated hardware and hanger assemblies.

GENERAL APPLICATIONS AND U

- Hanging Pipe and Sprinkler Systems
- HVAC Ductwork and Strut Channels
- Suspending Trapeze and Cable Trays
- Cast-In Pre-installed Anchoring Points

FEATURES AND BENEFITS

- + Fast and simple to install, low installed cost
- + Sturdy base design resists inserts from being kicked over after placement
- + Color coded by size for simple identification, can be further marked by trade and/or utility
- + Inserts can be installed in form pours only 3.5" thick: low profile (LP) inserts can be installed in form pours only 2.5" thick (see installation details)
- + Suitable for seismic and wind loading (see design information)
- + Multi thread inserts allow for multiple diameters using the same part
- + All sizes of multi thread inserts have performance data for tension and shear loading
- + Push-In thread version does not require turning threaded rod elements during installation

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3657 for concrete
- Code compliant with the 2021 IBC/IRC, 2018 IBC/IRC, 2015 IBC/IRC, and 2012 IBC/IRC
- Tested in accordance with ASTM E488 and ICC-ES AC446 for use in cracked and uncracked concrete and with the design provisions of ACI 318 (Strength Design method)
- Evaluated and gualified by an accredited independent testing laboratory for recognition in cracked and uncracked concrete including seismic and wind loading
- Underwriters Laboratories (UL Listed) File No. EX1289, see listing for sizes Also UL listed and recognized for use in air handling spaces (i.e. plenum rated locations)
- FM Approvals (Factory Mutual) File No. J.I. 3059197, see approval for sizes

GUIDE SPECIFICATIONS

CSI Divisions: 03 15 19 - Cast-In Concrete Anchors and 03 16 00 - Concrete Anchors, Concrete inserts shall be Wood-Knocker II+ or Pan-Knocker II+ as supplied by DEWALT, Towson, MD, Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

- Distribution Systems / Utility Lines Conduit and Lighting Systems
- Cracked and Uncracked Concrete
- Seismic Qualification (SDC A F)

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WOOD-KNOCKER II+ FORM INSERT

PAN-KNOCKER II-FORM INSERT OF WOOD-KNOCKER II-







WOOD-KNOCKER II+ FORM INSERT PUSH-IN THREAD

PAN-KNOCKER II+ FORM INSERT **PUSH-IN THREAD**

ANCHOR MATERIALS

• Carbon Steel and Engineered Plastic

ROD/ANCHOR SIZE RANGE (TYP.)

1/4" through 3/4" threaded rod (UNC)

INSERT VERSIONS

- Single Thread-In
- Multi Thread
- Push-In Thread

SUITABLE BASE MATERIALS

- Normal-weight Concrete
- Lightweight Concrete







MATERIAL SPECIFICATIONS

Wood-Knocker II+ and Pan-Knocker II+

Anchor Component	Component Material
Insert Body	AISI 1008 Carbon Steel or equivalent
Plastic sleeve	Engineered Plastic (polypropylene)
Zinc Plating (metal components)	ASTM B633 (Fe/Zn5) Min. plating requirements for mild service condition

Material Properties for Common Threaded Rods

Description	Steel Specification (ASTM)	Threaded Rod Diameter (inch)	Minimum Yield Strength, f _y (ksi)	Minimum Ultimate Strength, fu (ksi)
Standard Carbon Steel	A36	1/4 to 3/4	36.0	58.0
High Strength Carbon Steel	A193, Grade B7	1/4 to 3/4	105.0	125.0

Inserts may be considered for use in conjunction with all grades of continuously threaded carbon steels (all-thread) that comply with code reference standards and that have thread characteristics comparable with ANSI B1.1 UNC Coarse Thread Series.

INSTALLATION INSTRUCTIONS

Installation Instructions for Wood-Knocker II+

POSITION



Step 1 Position insert on formwork plastic down.



Step 2 Drive insert head down until head contacts plastic (e.g. Wood-Knocker installation tool, hammer).

Installation Instructions for Wood-Knocker II+ Push-In DRIVE

POSITION



Step 1 Position insert on formwork plastic down.



Step 2 Drive insert head down until head contacts plastic (e.g. Wood-Knocker installation tool, hammer).

Installation Instructions for Pan-Knocker II+ POSITION MOUNT



Step 1 Position insert on formwork plastic down.

Installation Instructions for Pan-Knocker II+ Push-In POSITION MOUNT

Step 2

Mount/secure insert to

(e.g. with screws, pins).



Step 1 Position insert on formwork plastic down.

1-800-4 DEWALT



Step 2 Mount/secure insert to formwork through plastic base (e.g. with screws, pins).



Step 3

PREPARE

Step 3

PREPARE

Step 3

PREPARE

After formwork removal,

flush mounted fixtures).

After formwork removal,

flush mounted fixtures).

remove nails as necessary (e.g





(e.g. flush mounted fixtures).

After formwork removal, remove

pins or screws as necessary

Step 3 After formwork removal, remove formwork through plastic base pins or screws as necessary

ATTACH





Step 4 Guide threaded rod/bolt through plastic thread seal cover. Turn until steel element fully threaded. Attach fixtures as applicable.

ATTACH





Guide threaded rod/bolt through plastic thread seal cover. Push in until steel element is fully seated. Attach fixtures as applicable.

ATTACH





Step 4 Guide threaded rod/bolt through plastic thread seal cover. Turn until steel element fully threaded. Attach fixtures as applicable.

ATTACH





Step 4

Guide threaded rod/bolt through plastic thread seal cover. Push in until steel element is fully seated. Attach fixtures as applicable.

ANCHORS ECHANICAL /

Concrete Inserts WOOD-KNOCKER®II+/PAN-KNOCKER[™]I





INSTALLATION SPECIFICATIONS

Wood-Knocker II+ Inserts for Form Pour Concrete





Installation Specifications for Wood-Knocker II+ and Pan-Knocker II+ Single Thread Inserts

Incart Dimension (December	Complete	Unite		Nominal Rod/Anchor Size									
insert Dimension / Property	Symbol	Units	1/4" (LP)	3/8" (LP)	1/4"	3/8"	1/2"	5/8"	3/4"				
Outside diameter of steel insert body	da	in. (mm)	0 (1	.5 3)		0.7 (18)	• 	1 (2	.0 :5)				
Insert head plate diameter	Chp	in. (mm)	1. (3	30 33)		1.50 (38)		1. (4	75 5)				
Plastic sleeve diameter	ds	in. (mm)	(5	2 51)		2-3/8 (60)		2	3/8 i0)				
Nominal embedment depth	h _{nom}	in. (mm)	1- (3	1/2 38)		2 (51)		(5	<u>2</u> 1)				
Effective embedment depth	h _{ef}	in. (mm)	1. (3	25 32)	1.75 1.75 (45) (45)								
Minimum member thickness	h _{min}	in. (mm)	2- (6	1/2 64)		3-1/2 (89)		3-1/2 (89)					
Minimum spacing distance	Smin	in. (mm)	4	da		4da		4	da				
Minimum edge distance	Cmin	in. (mm)	0.5dhp	0 + 3/4 (19)		0.5dhp + 3/4 (19)		0.5dhp	+ 3/4 (19)				
Insert head plate thickness	t _{hp}	in. (mm)	1	/8 3)		1/8 (3)		1.	/8 3)				
UNC internal thread size	-	TPI	1/4-20	3/8-16	1/4-20	3/8-16	1/2-13	5/8-11	3/4-10				
Approx. internal thread length	-	in.	5/16	7/16	3/8	1/2	5/8	3/4	7/8				
Approx. gap between plastic sleeve opening and start of internal thread, after setting	-	in.	5/	16	3/8								
1. Inserts have internal thread size designations	for coarse th	eads matchi	ng the nominal ro	d / anchor size.									

Installation Specifications for Wood-Knocker II+ and Pan-Knocker II+ Multi Thread Inserts

			Nominal Rod/Anchor Size													
Insert Dimension / Property	Symbol	Units	1/4" a Mult	& 3/8" i (LP)	1/4" (M	& 3/8" ulti	1/ &	4" & 3/3 1/2" Mi	8'' Ilti	3/8" 8 M	& 1/2" ulti	3/8" 8	1/2" & Multi	5/8"	5/8" 8 Mu	& 3/4" Ilti
Outside diameter of steel insert body	da	in. (mm)	0(1	.5 3)				0.7 (18)						1.0 (25)		
Insert head plate diameter	Сhр	in. (mm)	1. (3	30 33)				1.50 (38)						1.75 (45)		
Plastic sleeve diameter	ds	in. (mm)	(5	2 51)				2-3/8 (60)						2-3/8 (60)		
Nominal embedment depth	h _{nom}	in. (mm)	1-	1/2 38)				2 (51)						2-3/8 (60)		
Effective embedment depth	h _{ef}	in. (mm)	1.	25 32)				1.75 (45)						2.25 (57)		
Minimum member thickness	h _{min}	in. (mm)	2-	1/2 64)				3-1/2 (89)						3-1/2 (89)		
Minimum spacing distance	Smin	in. (mm)	4	da				4da						4da		
Minimum edge distance	Cmin	in. (mm)	0.5dhp) + 3/4 (19)			0.	5dhp + 3 (3/4 19)				0.5	dhp + 3 (1	/4 9)	
Insert head plate thickness	thp	in. (mm)	1.	/8 3)				1/8 (3)						1/8 (3)		
UNC internal thread size	-	TPI	1/4- 20	3/8- 16	1/4- 20	3/8- 16	1/4- 20	3/8- 16	1/2- 13	3/8- 16	1/2- 13	3/8-16	1/2- 13	5/8- 11	5/8- 11	3/4- 10
Approx. internal thread length	-	in.	5/16	7/16	3/8	1/2	5/16	3/8	1/2	7/16	9/16	3/8	1/2	5/8	5/8	3/4
Approx. gap between plastic sleeve opening and start of internal thread, after setting	-	in.	7/8	5/16	1	5/16	1-7/16	15/16	5/16	1	5/16	1-11/16	1-1/16	5/16	1-3/16	5/16
 Inserts have internal thread size designations f 	for coarse t	hreads m	atching th	he nomin	al rod / a	nchor siz	'e									



Installation Specifications for Wood-Knocker II+ and Pan-Knocker II+ Push-In Thread Inserts

Incert Dimension / Drenerty	Cumhol	lluito	Nominal Rod	/Anchor Size
insert dimension / Property	Symbol	Units	3/8"	1/2"
Outside diameter of steel insert body	da	in. (mm)	1.0 (25)	1.125 (29)
Insert head plate diameter	Chp	in. (mm)	1.9 (48)	2.2 (56)
Plastic sleeve diameter	ds	in. (mm)	2-3/8 (60)	2-3/8 (60)
Nominal embedment depth	h _{nom}	in. (mm)	1-7/8 (48)	2-3/16 (56)
Effective embedment depth	h _{ef}	in. (mm)	1.7 (43)	2.0 (56)
Minimum member thickness	h _{min}	in. (mm)	3-1/2 (89)	3-1/2 (89)
Minimum spacing distance	Smin	in. (mm)	4da	4da
Minimum edge distance	Cmin	in. (mm)	0.5dhp + 3/4 (19)	0.5dhp + 3/4 (19)
Insert head plate thickness	thp	in. (mm)	3/	16 5)
UNC internal thread size	-	TPI	3/8-16	1/2-13
Approx. internal thread length	-	in.	5/8	11/16
Approx. gap between plastic sleeve opening and start of internal thread, after setting	-	in.	3/4	7/8
1. Inserts have internal thread size designations	for coarse th	reads match	ing the nominal rod / anchor size.	

Wood-Knocker II+ and Pan-Knocker II+ Inserts Installed in Soffit of Form Pour Concrete Floor and Roof Members



REFERENCE DATA (ASD)

Allowab	le Desig	yn Value	es for in	serts in	Uncrac	ked Con	icrete (lb	(S) ^{1,2,3,4,5,6,}	7,8,9,10,11,12					
Load	Wood-Knocker II+ and Pan-Knocker II+ Single Thread Inserts Wood-Knocker II+ and Pan-Knocker II+												nocker II+ ts	
Type	1/4" (L	P) 3/	/8" (LP)	1/4"	;	3/8"	1/2"	5	j/8"	3/4"		3/8"	1.	/2"
Tension	1,085	5	1,085	1,055	1	,800	1,800	1,	,800	1,800	1	1,725	2,	200
Shear	400		1,085	720	1	,710	1,800	1,	,800	1,800	1	1,470	2,	200
					Wood-I	(nocker II+	and Pan-Kr	ocker II+ N	/lulti Threa	d Inserts				
Load Type	1/4 & 3/8	Multi (LP)	1/4 & 3	/8 Multi	1/4 8	& 3/8 & 1/2	Multi	3/8 & 1	/2 Multi	3/8 8	a 1/2 & 5/8	Multi	5/8 & 3	/4 Multi
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1/4"	3/8"	1/4"	3/8"	1/4"	3/8"	1/2"	3/8"	1/2"	3/8"	1/2"	5/8"	5/8"	3/4"
Tension	1,085	1,085	1,355	1,800	1,555	1,800	1,800	1,800	1,800	2,625	2,625	2,625	2,625	2,625
Shear	400	1,085	370	1,710	720	1,710	1,800	1,410	1,800	1,510	2,625	2,625	2,625	2,625
Allowable Stre	ess Desian Va	alues in table	s for inserts a	re provided fo	r illustration	and applicab	le only when t	ne followina	desian assur	nptions are fol	owed:			

1. Concrete compressive strength, f'c = 3,000 psi given for normal weight concrete.

2. Single anchors with static loads and with installation in accordance with published instructions.

3. Concrete determined to remain uncracked for the life of the anchorage.

4. Load combinations from ACI 318-14 5.3 or ACI 318-11 9.2, as applicable (no seismic loading considered).

5. 30% dead load and 70% live load, controlling load combination 1.2D + 1.6L.

6. Calculation of the weighted average for $\alpha = 1.2^{\circ}0.3 + 1.6^{\circ}0.7 = 1.48$.

7. Assuming no edge distance influence ($\ensuremath{Ca1}\xspace\geq1.5\ensuremath{her}\xspace$) and no side-face blowout in tension.

8. Assuming no edge distance ($c_{a1} \ge 3h_{ef}$) or corner distance influence ($c_{a2} \ge 1.5c_{a1}$) in shear.

9. Shear loads may be applied in any direction.

 $10.\,h \geq h_{\text{min}}$ according to ACI 318-14 17.7 or ACI 318-11 D.8, as applicable.

11. Values are for Condition B where supplementary reinforcement in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, is not provided.

12. The allowable loads shown in the table are for the inserts only. The design professional is responsible for checking threaded rod strength in tension, shear and combined tension and shear, as applicable. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

Allowable Design Values for Inserts in Cracked Concrete (Ibs)1,2,3,4,5,6,7,8,9,10,11,12

Load		Wood		Wood-Knocker II+ and Pan-Knocker II+ Push-In Thread Inserts					
Type	1/4" (LP)	3/8" (LP)	1/4"	3/8"	1/2"	5/8"	3/4"	3/8"	1/2"
Tension	870	870	1,440	1,440	1,440	1,440	1,440	1,380	1,760
Shear	400	870	720	1,440	1,440	1,440	1,440	1,380	1,760

		Wood-Knocker II+ and Pan-Knocker II+ Multi Thread Inserts													
Load Type	1/4 & 3/8 Multi (LP) 1/4			/8 Multi	1/4 & 3/8 & 1/2 Multi			3/8 & 1/2 Multi		3/8 & 1/2 & 5/8 Multi			5/8 & 3/4 Multi		
, jpo	1/4"	3/8"	1/4"	3/8"	1/4"	3/8"	1/2"	3/8"	1/2"	3/8"	1/2"	5/8"	5/8"	3/4"	
Tension	870	870	1,355	1,440	1,440	1,440	1,440	1,440	1,440	2,100	2,100	2,100	2,100	2,100	
Shear	400	870	370	1,440	720	1,440	1,440	1,440	1,440	1,510	2,100	2,100	2,100	2,100	

Allowable Stress Design Values in tables for inserts are for illustration and applicable only when the following design assumptions are followed:

1. Concrete compressive strength, f'c = 3,000 psi given for normal weight concrete.

2. Single anchors with static loads and with installation in accordance with published instructions.

3. Concrete determined to remain cracked for the life of the anchorage.

4. Load combinations from ACI 318-14 5.3 or ACI 318-11 9.2, as applicable (no seismic loading considered).

5. 30% dead load and 70% live load, controlling load combination 1.2D + 1.6L.

6. Calculation of the weighted average for $\alpha = 1.2*0.3 + 1.6*0.7 = 1.48$.

7. Assuming no edge distance influence ($c_{a1} \geq 1.5 h_{ef}$) and no side-face blowout in tension.

8. Assuming no edge distance ($c_{a1} \ge 3h_{ef}$) or corner distance influence ($c_{a2} \ge 1.5c_{a1}$) in shear.

9. Shear loads may be applied in any direction.

 $10,h \geq h_{\text{min}}$ according to ACI 318-14 17.7 or ACI 318-11 D.8, as applicable.

11. Values are for Condition B where supplementary reinforcement in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, is not provided.

12. The allowable loads shown in the table are for the inserts only. The design professional is responsible for checking threaded rod strength in tension, shear and combined tension and shear, as applicable. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

UL Listings and FM Approvals for Supporting Fire Protection Services & Automatic Sprinkler Systems

					-							-		
Listing/Approval			Wood-K	Wood-Knocker II+ and Pan-Knocker II+ Push-In Thread Inserts										
	1/4" L	P 3/	/8" LP	1/4"	3/	/8''	1/2"	2" 5/8"		3/4"	3/8"		1/2"	
UL Max. Pipe Size	N/A		4"	N/A	4	4"	8"	8'	'	8"		4"	3	3"
FM Max. Pipe Size	N/A		4"	N/A	4	4"	8"	-		-		4"	3	3"
	ĺ	Wood-Knocker II+ and Pan-Knocker II+ Multi Thread Inserts												
Listing/Approval	1/4 & 3/8 Multi (LP) 1/4 & 3/8 M			3/8 Multi	8 Multi 1/4 & 3/8 & 1/2 Multi				3/8 & 1/2 Multi 3/8 8			Multi	5/8 & 3	/4 Multi
	1/4"	3/8"	1/4"	3/8"	1/4"	3/8"	1/2"	3/8"	1/2"	3/8"	1/2"	5/8"	5/8"	3/4"
UL Max. Pipe Size	N/A	4"	N/A	4"	N/A	4"	8"	4"	8"	4"	8"	12"	12"	12"
FM Max. Pipe Size	N/A	4"	N/A	4"	N/A	4"	8"	4"	8"	4"	8"	12"	12"	12"
Underwriters Laboratorie	es (UL Listed)) – File No. E	X1289											
FM Approvals (Factory N	/lutual) – File	e No. J.I. 305	59197											

- REV. I

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STRENGTH DESIGN (SD)

DEWALI

ANCHORS & FASTENERS

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Single Thread Inserts Installed in Form Poured Concrete and Roof Members - Uncracked Concrete^{1,2,3,4,5,6}

				Minimum Concrete C	compressive Strength							
Nominal Anchor	Embed. Depth	f'c = 3,	000 psi	f'c = 4,	000 psi	f'c = 6,000 psi						
Diameter (in.)	h _{ef} (in.)	ϕ Nn Tension (Ibs.)	∲Vn Shear (Ibs.)	ϕ Nn Tension (lbs.)	∲Vn Shear (Ibs.)	ϕ Nn Tension (lbs.)	∲Vn Shear (lbs.)					
1/4" (LP)	1-1/4	1,605	590	1,855	590	2,275	590					
3/8" (LP)	1-1/4	1,605	1,235	1,855	1,425	2,275	1,700					
1/4	1-3/4	2,665	2,420	3,075	2,795	3,765	3,425					
3/8	1-3/4	2,665	2,420	3,075	2,795	3,765	3,425					
1/2	1-3/4	2,665	2,420	3,075	2,795	3,765	3,425					
5/8	1-3/4	2,665	2,665	3,075	3,075	3,765	3,765					
3/4	1-3/4	2,665	2,665	3,075	3,075	3,765	3,765					
- Anchor Pullout/Pry	🗌 - Anchor Pullout/Pryout Strength Controls 🔲 - Concrete Breakout Strength Controls 📕 - Steel Strength Controls											

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Single Thread Inserts Installed in Form Poured Concrete and Roof Members - Cracked Concrete^{1,2,3,4,5,6}

				Minimum Concrete C	ompressive Strength							
Nominal Anchor	Embed.	f'c = 3,	000 psi	f'c = 4,	000 psi	f'c = 6,000 psi						
Diameter (in.)	h _{ef} (in.)	ψNnψVnTensionShear(lbs.)(lbs.)		ϕ Nn Tension (Ibs.)	ØVn Shear (Ibs.)	ϕ Nn Tension (Ibs.)	∲Vn Shear (lbs.)					
1/4" (LP)	1-1/4	1,285	590	1,485	590	1,820	590					
3/8" (LP)	1-1/4	1,285	885	1,485	1,020	1,820	1,250					
1/4	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445					
3/8	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445					
1/2	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445					
5/8	1-3/4	2,130	2,130	2,460	2,460	3,015	3,015					
3/4	1-3/4	2,130	2,130	2,460	2,460	3,015	3,015					
- Anchor Pullout/Prv	🗋 - Anchor Dullaut/Priorit Strangth Controls 🔲 - Concrete Breakout Strangth Controls 📮 - Steal Strangth Controls											

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:
 No edge distance influence (c_{a1} ≥ 1.5h_e) and no side-face blowout in tension.

- No edge distance initiative ($c_{a1} \ge 1.5$ me) and no side-race blowout in tension. - No edge distance ($c_{a1} \ge 3$ he) or corner distance influence ($c_{a2} \ge 1.5$ c_{a1}) in shear.

2- Calculations were performed following methodology in ACI 318-14 Chapter 17 or ACI 318-11 Appendix D. The load level corresponding to the failure mode listed [steel strength of insert (Nsa,met, Vsa,met), concrete breakout strength, or pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod type, (Nsa,med), the lowest load level controls.

3- Strength reduction factors shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3 for cast-in headed anchors. Condition B is assumed. Strength reduction factors for load combinations in accordance with ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 governed by steel strength of the insert are taken as 0.65 for tension and 0.60 for shear; values correspond to brittle steel elements.

4- Tabular values are permitted for short-term static loads only, seismic loading is not considered with these tables.

5- For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

6- Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D and information contained in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Multi Thread Inserts Installed in Form Poured Concrete and Roof Members - Uncracked Concrete

			r	Ainimum Concrete C	ompressive Streng	th	
Nominal Anchor Diameter	Embed. Denth	f'c = 3,	,000 psi	f'c = 4,	000 psi	f'c = 6,	,000 psi
(in.)	h _{ef} (in.)	∲Nn Tension (lbs.)	∲Vn Shear (Ibs.)	∲Nn Tension (lbs.)	∲Vn Shear (lbs.)	∲Nn Tension (lbs.)	∲Vn Shear (lbs.)
1/4" (1/4 - 3/8" Multi LP)	1-1/4	1,605	590	1,855	590	2,275	590
3/8" (1/4 - 3/8" Multi LP)	1-1/4	1,605	1,235	1,855	1,425	2,275	1,700
1/4" (1/4 - 3/8" Multi)	1-3/4	2,005	545	2,005	545	2,005	545
3/8" (1/4 - 3/8" Multi)	1-3/4	2,665	2,420	3,075	2,530	3,765	2,530
1/4" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,305	1,065	2,305	1,065	2,305	1,065
3/8" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,665	2,420	3,075	2,530	3,765	2,530
1/2" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,665	2,420	3,075	2,795	3,765	3,425
3/8" (3/8 - 1/2" Multi)	1-3/4	2,665	2,085	3,075	2,085	3,765	2,085
1/2" (3/8 - 1/2" Multi)	1-3/4	2,665	2,420	3,075	2,795	3,765	3,425
3/8" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,880	2,230	4,485	2,230	5,490	2,230
1/2" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,880	3,880	4,485	4,485	5,490	5,490
5/8" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,880	3,880	4,485	4,485	5,490	5,490
5/8" (5/8 - 3/4" Multi)	2-1/4	3,880	3,880	4,485	4,485	5,490	5,490
3/4" (5/8 - 3/4" Multi)	2-1/4	3,880	3,880	4,485	4,485	5,490	5,490
- Anchor Pullout/Pryout Strength Cor	ntrols 🔲 - Concrete B	Breakout Strength Contr	ols 🔲 - Steel Strenath	1 Controls			

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Multi Thread Inserts Installed in Form Poured Concrete and Roof Members - Cracked Concrete

		Minimum Concrete Compressive Strength								
Nominal Anchor Diameter	Embed. Depth	f'c = 3,	000 psi	f'c = 4,	000 psi	f'c = 6,	,000 psi			
(in.)	h _{ef} (in.)	ϕ Nn Tension (lbs.)	∲Vn Shear (lbs.)	ϕ Nn Tension (lbs.)	∲Vn Shear (lbs.)	ϕ Nn Tension (lbs.)	∲Vn Shear (lbs.)			
1/4" (1/4 - 3/8" Multi LP)	1-1/4	1,285	590	1,485	590	1,820	590			
3/8" (1/4 - 3/8" Multi LP)	1-1/4	1,285	885	1,485	1,020	1,820	1,250			
1/4" (1/4 - 3/8" Multi)	1-3/4	2,005	545	2,005	545	2,005	545			
3/8" (1/4 - 3/8" Multi)	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445			
1/4" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,130	1,065	2,305	1,065	2,305	1,065			
3/8" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445			
1/2" (1/4 - 3/8 - 1/2" Multi)	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445			
3/8" (3/8 - 1/2" Multi)	1-3/4	2,130	1,730	2,460	2,000	3,015	2,085			
1/2" (3/8 - 1/2" Multi)	1-3/4	2,130	1,730	2,460	2,000	3,015	2,445			
3/8" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,105	2,230	3,585	2,230	4,390	2,230			
1/2" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,105	2,895	3,585	3,340	4,390	4,090			
5/8" (3/8 - 1/2 - 5/8" Multi)	2-1/4	3,105	2,895	3,585	3,340	4,390	4,090			
5/8" (5/8 - 3/4" Multi)	2-1/4	3,105	2,895	3,585	3,340	4,390	4,090			
3/4" (5/8 - 3/4" Multi)	2-1/4	3,105	2,895	3,585	3,340	4,390	4,090			
- Anchor Pullout/Pryout Strength Con	trols 🔲 - Concrete	Breakout Strength Cont	rols 🔲 - Steel Strengtl	n Controls						

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:
 No edge distance influence (c_{a1} ≥ 1.5h_e) and no side-face blowout in tension.
 No edge distance (c_{a1} ≥ 3h_e) or corner distance influence (c_{a2} ≥ 1.5c_{a1}) in shear.

2- Calculations were performed following methodology in ACI 318-14 Chapter 17 or ACI 318-11 Appendix D. The load level corresponding to the failure mode listed [steel strength of insert (Nsansert, Vsansert, Vsanse

3- Strength reduction factors shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3 for cast-in headed anchors. Condition B is assumed. Strength reduction factors for load combinations in accordance with ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 governed by steel strength of the insert are taken as 0.65 for tension and 0.60 for shear; values correspond to brittle steel elements.

4- Tabular values are permitted for short-term static loads only, seismic loading is not considered with these tables.

5- For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

6- Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D and information contained in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Push-In Thread Inserts Installed in Form Poured Concrete and Roof Members - Uncracked Concrete

		Minimum Concrete Compressive Strength									
Nominal Anchor	Embed. Denth	f'c = 3,	,000 psi	f'c = 4,	,000 psi	f'c = 6,000 psi					
Diameter (in.)	h _{ef} (in.)	ØNn Tension (Ibs.)	∲Vn Shear (lbs.)	ØNn Tension (Ibs.)	∲Vn Shear (lbs.)	ØNn Tension (Ibs.)	∲Vn Shear (lbs.)				
3/8" Push-In	1.70	2,550	2,175	2,945	2,175	3,605	2,175				
1/2" Push-In	2.00	3,255	3,255	3,755	3,575	4,600	3,575				
- Anchor Pullout/Pry	out Strength Controls	- Concrete Breakout Stre	anath Controls 🔲 - Steel	Strength Controls							

Tension and Shear Design Strengths for Wood-Knocker II+ and Pan-Knocker II+ Push-In Thread Inserts Installed in Form Poured Concrete and Roof Members - Cracked Concrete

		Minimum Concrete Compressive Strength									
Nominal Anchor Diameter (in.)	Embed. Depth	f'c = 3,	000 psi	f'c = 4,	000 psi	f'c = 6,000 psi					
	hef (in.)	ØNn Tension (lbs.)	∲Vn Shear (lbs.)	ØNn Tension (Ibs.)	∲Vn Shear (Ibs.)	ϕ Nn Tension (Ibs.)	∲Vn Shear (lbs.)				
3/8" Push-In	1.70	2,040	2,040	2,355	2,175	2,885	2,175				
1/2" Push-In	2.00	2,605	2,605	3,005	3,005	3,680	3,575				
		a		<u></u>							

🔲 - 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, ha = hmin, and with the following conditions: - No edge distance influence ($c_{a1} \ge 1.5h_{ef}$) and no side-face blowout in tension. - No edge distance ($c_{a1} \ge 3h_{ef}$) or corner distance influence ($c_{a2} \ge 1.5c_{a1}$) in shear.

Calculations were performed following methodology in ACI 318-14 Chapter 17 or ACI 318-11 Appendix D. The load level corresponding to the failure mode listed [steel strength of insert 2-Nsa.msert, Vsa.meerl), concrete breakout strength, or pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod type, (Nsa.med, Vsa.med, the lowest load level controls

3-Strength reduction factors shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3 for cast-in headed anchors. Condition B is assumed. Strength reduction factors for load combinations in accordance with ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 governed by steel strength of the insert are taken as 0.65 for tension and 0.60 for shear; values correspond to brittle steel elements

4- Tabular values are permitted for short-term static loads only, seismic loading is not considered with these tables.

5- For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D and 6information contained in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

Tension and Shear Design Strength of Steel Elements (Steel Strength)^{1,2,3,4}

		Steel Elements	- Threaded Rod			
Nominal Rod Diameter	AST	N A36	ASTM A193 Grade B7			
(in.)	ØNsarod Tension (lbs.)	ØV _{sarod} Shear (Ibs.)	ØNsarod Tension (Ibs.)	ØV _{sarod} Shear (Ibs.)		
1/4	1,390	720	3,000	1,550		
3/8	3,395	1,750	7,315	3,780		
1/2	6,175	3,210	13,315	6,915		
5/8	9,835	5,115	21,190	11,020		
3/4	14,550	7,565	31,405	16,305		

- Steel Strength Controls

1. Steel tensile design strength according to ACI 318 Appendix D and ACI 318 Chapter 17, ϕ Nsa = $\phi \bullet$ Ase,N \bullet futa

2. The tabulated steel design strength in tension for the threaded rod must be checked against the design strength of the steel insert, concrete breakout and pullout design strength to determine the controlling failure mode, the lowest load level controls.

3. Steel shear design strength according to ACI 318 Appendix D and ACI 318 Chapter 17, ϕ V_{sa} = $\phi \bullet 0.60 \bullet A_{se,N} \bullet f_{uta}$

4. The tabulated steel design strength in shear for the threaded rod must be checked against the design strength of the steel insert, concrete breakout and pryout design strength to determine the controlling failure mode, the lowest load level controls.

Design Information For Wood Knocker II+ and Pan-Knocker II+ Single Thread Inserts^{1,2,3,4,5}



Design Information / Insert Property	Symbol	Units	1/4" (LP)	3/8" (LP)	1/4"	3/8"	1/2"	5/8"	3/4"
Outside diameter of the steel insert body	da	in.	0	.5	0.7				1.0
,		(mm)	(1	(13) (18) (2				25)	
Insert head net bearing area	Abrg	IN ² (mm ²)	1.	00		1.20		1 (0	.40
		in	1	25		1 75		1	75
Effective embedment depth	hef	(mm)	(3	32)	(45) (45)				
	STEEL ST	RENGTH IN	TENSION (ACI 3	18-14 17.4.1 o	or ACI 318-11 S	ection D.5.1)		·	
Steel strength in tension of single insert	Nsa,insert	lb (kN)	3,545 6,535 3,545 9,005 12,685 (15.8) (29.1) (15.8) (40.1) (56.4)						2,685 6.4)
Steel strength in tension of single insert, seismic	Nsa,insert,eq	lb (kN)	3,545 (15.8)	6,535 (29.1)	3,545 (15.8)	9,0 (40	005 0.1)	12 (5	2,685 6.4)
Reduction factor, steel strength in tension	φ	-	0.	65		0.65		C	0.65
	CONCRETE BR	EAKOUT ST	RENGTH IN TE	NSION (ACI 318	-14 17.4.2 or A	CI 318-11 D.5.	2)		
Effectiveness factor for cracked concrete	k₀	-			24 (fc	r SI use a value	of 10)		
Modification factor for uncracked concrete	Ψc,N	-				1.25	·		
Reduction factor, concrete strength in tension	ϕ	-				0.70			
	STEEL ST	RENGTH IN	SHEAR (ACI 31	18-14 17.5.1 or	ACI 318-11 Se	ction D.6.1)			
Steel strength in shear of single insert	Vsa,insert,deck	lb (kN)	985 (4.4)	2,835 (12.6)	1,775 (7.9)	4,220 (18.8)	7,180 (31.9)	9. (4	075 0.4)
Steel strength in shear of single insert, seismic	Vsa,insert,eq,deck	lb (kN)	385 (1.7)	625 (2.8)	1,775 (7.9)	4,220 (18.8)	7,180 (31.9)	9. (4	075 0.4)
Reduction factor, concrete strength in tension	φ	-	0.	60		0.60		C	0.60
C	ONCRETE BRE PRYO	akout str ut streng	ength in She/ Th in Shear (#	AR (ACI 318-14 Aci 318-14 17.5	17.5.2 or ACI 3 5.3 or ACI 318-	818-11 D.6.2) / 11 D.6.3)	AND		
Load bearing length of insert	le	in. (mm)	1. (3	25 32)		1.75 (45)		1	.75 45)
Reduction factor, concrete strength in shear	φ	-	0.	70		0.70		C	.70
Coefficient for pryout strength	Kcp	-		1		1			1
Reduction factor, pryout strength in shear	φ	-	0.	70		0.70		C	.70
 Concrete must have a compressive strength Design of headed cast-in specialty inserts st breakout strength must also be in accordance 	f 'c of 2,500 ps nall be in accord a with and stee	si minimum. ance with th I deck figure	Installation must e provisions of A(s, as applicable.	comply with publi Cl 318-14 Chapte	shed instructions. r 17 or ACI 318-	11 Appendix D, a	s applicable, for c	ast-in headed a	nchors. Concrete

3. Strength reduction factors for the inserts shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for cast-in headed anchors. Strength reduction factors for load combinations in accordance with ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, governed by steel strength of the insert are tabulated. Strength reduction values correspond to brittle steel elements. The value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 19.4.3, as applicable. If the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-11 D.4.3. 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 must be determined in accordance with ACI 318-11 D.4.4.

4. Minimum spacing distance between anchors and minimum edge distances for cast-in headed anchors shall be in accordance with ACI 318-11 17.7 or ACI 318-11 D.4.4. installation tables for the inserts.

 The strengths shown in the table are for inserts only. Design professional is responsible for checking threaded rod strength in tension, shear, and combined tension and shear, as applicable. See steel design information for common threaded rod elements.

	I KIIUCK		ани г		IUCKE	r II + I V	iuiu i	nreau	mser	15,2,0,1,0						
Symbol	Units	1/4 8 Multi	& 3/8 i (LP)	1/4 a M	& 3/8 ulti	1/4	& 3/8 & Multi	1/2	3/8 8 Mi	& 1/2 ulti	3/8	& 1/2 & Multi	5/8	5/8 a Mi	& 3/4 ulti	
		1/4"	3/8"	1/4"	3/8"	1/4"	3/8"	1/2"	3/8"	1/2"	3/8"	1/2"	5/8"	5/8"	3/4"	
da	in. (mm)	0.(1	.5 3)				0.7 (18)						1.0 (25)			
Abrg	in² (mm²)	1.1 (64	00 45)				1.20 (762)						1.40 (903)			
hef	in. (mm)	1.: (3	25 2)				1.75 (45)						2.25 (57)			
	STEEL	STRENG	TH IN TEI	NSION (A	CI 318-1	4 17.4.1	or ACI 3	18-11 S	ection D.	5.1)						
Nsa,insert	lb (kN)	3,545 (15.8)	6,535 (29.1)	3,085 (13.7)	9,005 (40.1)	3,545 (18.1)	7,515 (33.4)	9,005 (40.1)	9,005 (40.1)	9,005 (40.1)	8,630 (38.4)	16, (73	610 3.9)	17, (76	100 3.1)	
Nsa,insert,eq	lb (kN)	3,545 (15.8)	6,535 (29.1)	3,085 (13.7)	9,005 (40.1)	3,545 (18.1)	7,515 (33.4)	9,005 (40.1)	9,005 (40.1)	9,005 (40.1)	8,630 (38.4)	16, (73	610 3.9)	17, (76	100 3.1)	
φ	-	0.	0.65 0.65 0.65													
CONCRETE BREAKOUT STRENGTH IN TENSION (ACI 318-14 17.4.2 or ACI 318-11 D.5.2)																
k₀	-						24 (f	or SI use	a value c	of 10)						
Ψ _{C,N}	-							1.	25							
φ	-							0.	70							
	STEEL	. STRENG	GTH IN SI	iear (ad	CI 318-14	17.5.1	or ACI 31	8-11 Se	ction D.&	i.1)					l	
Vsa,insert,deck	lb (kN)	985 (4.4)	2,835 (12.6)	910 (4.1)	4,220 (18.8)	1,775 (7.9)	4,220 (18.8)	7,180 (31.9)	3,475 (15.5)	7,180 (31.9)	3,720 (16.2)	9,410 (41.9)	10,570 (47.0	10, (48	965 3.8)	
Vsa,insert,eq	lb (kN)	385 (1.7)	625 (2.8)	365 (1.6)	4,220 (18.8)	480 (2.1)	715 (3.2)	7,180 (31.9)	695 (3.1)	7,180 (31.9)	1,080 (4.8)	4,705 (20.9)	10,570 (47.0)	4,385 (19.1)	10,965 (48.8)	
φ	-	0.	60				0.60						0.60			
C	ONCRETE I	BREAKOU Yout st	IT STREN Rength	gth in s in shea	SHEAR (A R (ACI 31	CI 318-1 18-14 17	4 17.5.2 .5.3 or A	or ACI 3 CI 318-1	18-11 D 1 D.6.3)	.6.2) ANI)					
le	in. (mm)	1.1 (3	25 2)				1.75 (45)						2.25 (57)			
φ	-	0.	0.70 0.70 0.70													
Kcp	-	1	1				1						1			
φ	-	0.	70				0.70						0.70			
	Symbol Cla Abrg her Nsa,insert,eq Ø Kc ¥C,N Ø Vsa,insert,eq Ø La Kc Vsa,insert,eq Ø C La Abrg C C C C C C C C C C C C C	SymbolUnitsdain. (mm) A_{brg} in² (mm²) her in² (mm²) her in² (mm²) her in² (mm²) her in² (MN) σ STEELNsa,insert.qalb (KN) ϕ - $\mathcal{V}_{C,N}$ - ψ - $\mathcal{V}_{C,N}$ - ψ - $V_{Sa,insert.deck}$ lb (KN) $V_{Sa,insert.qek}$ lb (KN) ψ - e in. (mm) ϕ -	$\begin{tabular}{ c c c c } \hline Symbol & Units & Multicket IIII \\ \hline Multicket & Multicket IIII \\ \hline Multicket & Multicket IIII \\ \hline Multicket & III \\ \hline Multicket & IIII \\ \hline Multicket & IIII$	Symbol Units 1/4 & 3/8 Multi (LP) 1/4 3/8" da in. (mm) 0.5 (13) Abrg in² (mm?) 1.00 (645) her in. (mm) 3.25 her in. (mm) 3.545 Nsa.insert lb (kN) 3.545 6.535 Nsa.insert.q (MN) (15.8) (29.1) ϕ - 0.5 (29.1) ϕ <td>Symbol Units 1/4 & 3/8 Multi (LP) 1/4 / Multi (LP) da in. (mm) 0.5 (13) 1/4" da in. (mm) 0.5 (13) 1/4" Abry in² (mm²) 1.00 (645) 1/4" her in. (mm²) 1.00 (645) 1/4" her in. (mm²) 1.25 (55) 1/4" Nsainsert lb 3,545 (15.8) 6,535 (29.1) 3,085 (13.7) Nsainsert.eq lb 3,545 (KN) 6,535 (29.1) 3,085 (13.7) Ø - 0.65 1/4 / (12.6) 1/4" Kc - 0.65 1/4 / (4.1) 1/4" Vsainsert.deck lb 3,545 (KN) 6,535 (13.7) 3,085 (13.7) Ø - 0.65 1/4 / (12.6) 1/4 / (4.1) Vsainsert.deck lb 985 (1.7) 2,835 (1.6) 910 (4.1) Vsainsert.deck lb 385 625 (2.8) 365 (1.6) Ø - 0.60 1 1.6 Ø</td> <td>Symbol Units 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi da in. (mm) 0.5 (13) 1/4 & 3/8 1/4 & 3/8 da in. (mm) 0.5 (13) 1/4 & 3/8 1/4 3/8" Abrg in² (mm²) 1.00 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" Nsainsert.eq lb 3,545 (15.8) 6,535 (29.1) 3,085 (13.7) 9,005 (13.7) 1/4.0.1) ϕ - 0.65 1/4 1/4.1) 1/4.22 ϕ - 0.65 1/4 1/4.1) 1/4.23 ψ - 0.65 1/4 1/4.1 1/4.23 ψ - 0.60 1/4 1/4.220 ψ 1/4.</td> <td>Symbol Units 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi 1/4 & 3/8 Multi 1/4 & 3/8 1/4 da in. (mm) 0.5 (13) 1/4" 3/8" 1/4" 3/8" 1/4" da in. (mm) 0.5 (13) 1/4" 3/8" 1/4" 3/8" 1/4" da in? (mm) 1.00 (645) her in. (mm) 1.25 (32) Nsa.neert lb 3.545 (KN) 6.535 (13.8) 3.085 (29.1) 9.005 (13.7) 3.545 (40.1) 3.545 (18.1) Maa.neert.eq lb 3.545 (KN) 6.535 (29.1) 3.085 (13.7) 9.005 (40.1) 3.545 (18.1) ϕ - 0.65 ψ - 0.65 ψ - ψ - </td> <td>Symbol Units (mm) 1/4 & 3/8 (multi (LP)) 1/4 & 3/8 & 3/8 (Multi (LP)) 0.7 (TS) Abrg in² 1.00 </td> <td>Symbol Units 1/4 & 3/8 Multi (P) 1/4 & 3/8 Multi 1/4 & 3/8 Multi 1/2 Multi 3/4 Multi 1/2</td> <td></td> <td>Or model symbol Units (III 4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/4 &</td> <td></td> <td></td> <td>Note where the analysis of the analysis of</td> <td>Numbed Numbed Numed Numbed <th colspan<="" td=""></th></td>	Symbol Units 1/4 & 3/8 Multi (LP) 1/4 / Multi (LP) da in. (mm) 0.5 (13) 1/4" da in. (mm) 0.5 (13) 1/4" Abry in ² (mm ²) 1.00 (645) 1/4" her in. (mm ²) 1.00 (645) 1/4" her in. (mm ²) 1.25 (55) 1/4" Nsainsert lb 3,545 (15.8) 6,535 (29.1) 3,085 (13.7) Nsainsert.eq lb 3,545 (KN) 6,535 (29.1) 3,085 (13.7) Ø - 0.65 1/4 / (12.6) 1/4" Kc - 0.65 1/4 / (4.1) 1/4" Vsainsert.deck lb 3,545 (KN) 6,535 (13.7) 3,085 (13.7) Ø - 0.65 1/4 / (12.6) 1/4 / (4.1) Vsainsert.deck lb 985 (1.7) 2,835 (1.6) 910 (4.1) Vsainsert.deck lb 385 625 (2.8) 365 (1.6) Ø - 0.60 1 1.6 Ø	Symbol Units 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi da in. (mm) 0.5 (13) 1/4 & 3/8 1/4 & 3/8 da in. (mm) 0.5 (13) 1/4 & 3/8 1/4 3/8" Abrg in² (mm²) 1.00 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" hef in. (mm²) 1.25 (645) 1/4 3/8" 1/4 3/8" Nsainsert.eq lb 3,545 (15.8) 6,535 (29.1) 3,085 (13.7) 9,005 (13.7) 1/4.0.1) ϕ - 0.65 1/4 1/4.1) 1/4.22 ϕ - 0.65 1/4 1/4.1) 1/4.23 ψ - 0.65 1/4 1/4.1 1/4.23 ψ - 0.60 1/4 1/4.220 ψ 1/4.	Symbol Units 1/4 & 3/8 Multi (LP) 1/4 & 3/8 Multi 1/4 & 3/8 Multi 1/4 & 3/8 1/4 da in. (mm) 0.5 (13) 1/4" 3/8" 1/4" 3/8" 1/4" da in. (mm) 0.5 (13) 1/4" 3/8" 1/4" 3/8" 1/4" da in? (mm) 1.00 (645) her in. (mm) 1.25 (32) Nsa.neert lb 3.545 (KN) 6.535 (13.8) 3.085 (29.1) 9.005 (13.7) 3.545 (40.1) 3.545 (18.1) Maa.neert.eq lb 3.545 (KN) 6.535 (29.1) 3.085 (13.7) 9.005 (40.1) 3.545 (18.1) ϕ - 0.65 ψ - 0.65 ψ - ψ - 	Symbol Units (mm) 1/4 & 3/8 (multi (LP)) 1/4 & 3/8 & 3/8 (Multi (LP)) 0.7 (TS) Abrg in ² 1.00	Symbol Units 1/4 & 3/8 Multi (P) 1/4 & 3/8 Multi 1/4 & 3/8 Multi 1/2 Multi 3/4 Multi 1/2		Or model symbol Units (III 4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/4 & 3/3 & 11/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/3 & 1/2 & 3/3 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 & 1/2 & 3/4 &			Note where the analysis of	Numbed Numed Numbed <th colspan<="" td=""></th>	

1. Concrete must have a compressive strength f 'c of 2,500 psi minimum. Installation must comply with published instructions.

Design of headed cast-in specialty inserts shall be in accordance with the provisions of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable, for cast-in headed anchors. Concrete
breakout strength must also be in accordance with and steel deck figures, as applicable.

3. Strength reduction factors for the inserts shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for cast-in headed anchors. Strength reduction factors for load combinations in accordance with ACI 318-14 5.3 or ACI 318-11 J2, as applicable, governed by steel strength of the insert are tabulated. Strength reduction values correspond to brittle steel elements. The value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 J2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 D,4.4. 4. Minimum spacing distance between anchors and minimum edge distances for cast-in headed anchors shall be in accordance with ACI 318-14 17.7 or ACI 318-11 D.8, as applicable and the

installation tables for the inserts.

The strengths shown in the table are for inserts only. Design professional is responsible for checking threaded rod strength in tension, shear, and combined tension and shear, as applicable. See steel design information for common threaded rod elements. 5.

MECHANICAL ANCHORS

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Desian	Information	for Wood-Knoc	ker II+ and	Pan-Knocker II-	Push-In	Thread Inserts ^{1,2,3,4,5}
Design	mormation		лы пт апа			milliouu moorto

Design mitormation for Wood-Knooker	пт апе			
Design Information	Symbol	Units	3/8"	1/2"
Outside diameter of the steel insert body	da	in. (mm)	1.0 (25)	1.125 (29)
Insert head plate net bearing area	Abrg	in² (mm²)	2.0 (1290)	2.7 (1742)
Effective embedment depth	hef	in. (mm)	1.7 (43)	2.0 (51)
STEEL ST	RENGTH IN	TENSION (A	ACI 318-14 17.4.1 or ACI 318-11 Se	ction D.5.1)
Steel strength in tension of single insert	Nsa,insert	lb (kN)	11,265 (50.1)	17,595 (78.3)
Steel strength in tension of single insert, seismic	Nsa,insert,eq	lb (kN)	11,265 (50.1)	17,595 (7.3)
Reduction factor, steel strength in tension	ϕ	-		0.65
CONCRETE BR	EAKOUT ST	RENGTH IN	I TENSION (ACI 318-14 17.4.2 or AC	il 318-11 D.5.2)
Effectiveness factor for cracked concrete	Kc	-	2	4 (for SI use a value of 10)
Modification factor for uncracked concrete	Ψc,n	-		1.25
Reduction factor, concrete strength in tension	ϕ	-		0.70
STEEL ST	RENGTH IN	SHEAR (A	CI 318-14 17.5.1 or ACI 318-11 Sec	tion D.6.1)
Steel strength in shear of single insert	Vsa,insert,deck	lb (kN)	3,625 (16.1)	5,955 (26.5)
Steel strength in shear of single insert, seismic	Vsa,insert,eq	lb (kN)	3,625 (16.1)	5,955 (26.5)
Reduction factor, concrete strength in tension	ϕ	-		0.60
CONCRETE BRE PRYOI	AKOUT STR UT STRENG	Rength in 9 Th in shea	SHEAR (ACI 318-14 17.5.2 or ACI 31 IR (ACI 318-14 17.5.3 or ACI 318-1	18-11 D.6.2) AND 1 D.6.3)
Load bearing length of insert	le	in. (mm)	1.7 (43)	2.0 (51)
Reduction factor, concrete strength in shear	ϕ	-		0.70
Coefficient for pryout strength	Kcp	-		1
Reduction factor, pryout strength in shear	ϕ	-		0.70
 Concrete must have a compressive strength f 'c of 2,500 ps Design of headed cast-in specialty inserts shall be in accord breakout strength must also be in accordance with and stee Strength reduction factors for the inserts shall be taken from combinations in accordance with ACI 318-14 5.3 or ACI 31. elements. The value of \$\phi\$ and so the load combination 	si minimum. lance with th l deck figure n ACI 318-14 8-11 9.2, as ns of Section	Installation n e provisions s, as applica 1 17.3.3 or A applicable, e 1605.2 of th	nust comply with published instructions. of ACI 318-14 Chapter 17 or ACI 318-1 ble. CI 318-11 D.4.3, as applicable, for cast- governed by steel strength of the insert a e IRC, ACI 318-14 F.3 or ACI 318-11 9	1 Appendix D, as applicable, for cast-in headed anchors. Concrete in headed anchors. Strength reduction factors for load re tabulated. Strength reduction values correspond to brittle steel 2. as apolicable. are used in accordance with ACI 318-14 17.3.3

combinations in accordance with ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, governed by steel strength of the insert are tabulated. Strength reduction values correspond to brittle steel elements. The value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 7.3.3 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 must be determined in accordance with ACI 318-11 D.4.4.

Minimum spacing distance between anchors and minimum edge distances for cast-in headed anchors shall be in accordance with ACI 318-14 17.7 or ACI 318-11 D.8, as applicable and the installation tables for the inserts.

5. The strengths shown in the table are for inserts only. Design professional is responsible for checking threaded rod strength in tension, shear, and combined tension and shear, as applicable. See steel design information for common threaded rod elements.

DEWALT.

Specifications And Physical Properties Of Common Carbon Steel Threaded Rod Elements

Threa	ded Rod Specification	cification Units Min. Specified Ultimate Strength, Futa		Min. Specified Yield Strength 0.2 Percent Offset, F _{ya}	Futa — Fya	Elongation Minimum Percent ⁴	Reduction Of Area Min. Percent	Related Nut Specification ⁵	
Carbon	ASTM A36/A36M or ASTM F1554 Grade 36	psi (MPa)	58,000 (400)	36,000 (248)	1.61	23	40 (50 for A36)	ASTM A194 / A563 Grade A	
Steel	ASTM A193/A193M ³ Grade B7	psi (MPa)	125,000 (860)	105,000	1.19	16	50	ASTM A194 / A563 Grade DH	

For SI: 1 inch = 25.4 mm, 1 psi = 0.006897 MPa. For pound-inch units: 1 mm = 0.03937 inch, 1 MPa = 145.0 psi.

1. Inserts may be used in conjunction with all grades of continuously threaded carbon steels (all-thread) that comply with code reference standards and that have thread characteristics comparable with ANSI B1.1 UNC Coarse Thread Series.

2. Standard Specification for Carbon Structural Steel.

3. Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.

4. Based on 2-inch (50 mm) gauge length except for ASTM A36/A36M and ASTM A193, which are based on a gauge length of 4d (drod).

5. Where nuts are applicable, nuts of other grades and style having specified proof load stress greater than the specified grade and style are also suitable.

Steel Design Information For Common Threaded Rod Elements Used With Concrete Inserts^{1,2,3,4}

Design Information		Symbol	Units	1/4-inch	3/8-inch	1/2-inch	5/8-inch	3/4-inch
Threaded rod nominal outside diameter		drod	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Threaded rod effective cross-sectional area	Ase	in² (mm²)	0.032 (21)	0.078 (50)	0.142 (92)	0.226 (146)	0.335 (216)	
Steel strength in tension of threaded rod	ACTM A26	Nsa,rod,A36	lb (kN)	1,855 (8.2)	4,525 (20.0)	8,235 (36.6)	13,110 (58.3)	19,430 (86.3)
Steel strength in tension of threaded rod, seismic	ASTIVI ASU	Nsa,rod,eq,A36	lb (kN)	1,855 (8.2)	4,525 (20.0)	8,235 (36.6)	13,110 (58.3)	19,430 (86.4)
Steel strength in tension of threaded rod	ASTM A193,	Nsa,rod,B7	lb (kN)	4,000 (17.7)	9,750 (43.1)	17,750 (78.9)	28,250 (125.7)	41,875 (186.0)
Steel strength in tension of threaded rod, seismic	Gr. B7	Nsa,rod,eq,B7	lb (kN)	4,000 (17.7)	9,750 (43.1)	17,750 (78.9)	28,250 (125.7)	41,875 (186.0)
Reduction factor, steel strength in tension		ϕ	-	0.75				
Steel strength in shear of threaded		V _{sa,rod,A36}	lb (kN)	1,115 (4.9)	2,715 (12.1)	4,940 (22.0)	7,865 (35.0)	11,660 (51.9)
Steel strength in shear of threaded rod, seismic	ASTIVI ASU	V _{sa,rod,eq,A36}	lb (kN)	780 (3.5)	1,900 (8.4)	3,460 (15.4)	5,505 (24.5)	8,160 (36.3)
Steel strength in shear of threaded rod	ASTM A193,	Vsa,rod,B7	lb (kN)	2,385 (10.6)	5,815 (25.9)	10,640 (7.3)	16,950 (75.4)	25,085 (111.6)
Steel strength in shear of threaded rod, seismic	Gr. B7	Vsa,rod,eq,B7	lb (kN)	1,680 (7.5)	4,095 (18.2)	7,455 (34.2)	11,865 (52.8)	17,590 (78.2)
Reduction factor, steel strength in tension		ϕ	-			0.65		

For SI: 1 inch = 25.4 mm, 1 pound = 0.00445 kN, 1 in² = 645.2 mm². For pound-inch unit: 1 mm = 0.03937 inches.

1. Values provided for steel element material types based on minimum specified strengths and calculated in accordance with ACI 318-11 Eq. (D-2) and Eq. (D-29).

2. ϕN_{sa} shall be the lower of the $\phi N_{sa,roset}$ or $\phi N_{sa,inset}$ for static steel strength in tension; for seismic loading $\phi N_{sa,eq}$ shall be the lower of the $\phi N_{sa,roset,eq}$ or $\phi N_{sa,inset}$ for static steel strength in tension; for seismic loading $\phi N_{sa,eq}$ shall be the lower of the $\phi N_{sa,roset,eq}$ or $\phi N_{sa,inset,eq}$.

3. $\phi_{V_{sa}}$ shall be the lower of the $\phi_{V_{sa,rod,eq}}$ or $\phi_{V_{sa,insert}}$ for static steel strength in tension; for seismic loading $\phi_{V_{sa,eq}}$ shall be the lower of the $\phi_{V_{sa,rod,eq}}$ or $\phi_{V_{sa,insert,eq}}$.

4. Strength reduction factors shall be taken from ACI 318-14 17.3.3 or ACI 318-11 D.4.3 for steel elements. Condition B is assumed. Strength reduction factors for load combinations in accordance with ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 governed by steel strength of the threaded rod are taken as 0.75 for tension and 0.65 for shear; values correspond to ductile steel elements. The value of ø applies when the load combinations of IBC Section 1605.2, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 governed by steel strength of the threaded rod are taken as 0.75 for tension and 0.65 for shear; values correspond to ductile steel elements. The value of ø applies when the load combinations of IBC Section 1605.2, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used in accordance with 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, then the appropriate value of ø must be determined in accordance with ACI 318-11 D.4.4.

Concrete Inserts

WOOD-KNOCKER®II+/PAN-KNOCKER™I

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IECHANICAL ANCHORS



ORDERING INFORMATION

Wood-Knocker®II+ Form Insert (UNC internal thread)

Cat. No.	Description	Color Code	Pack Otv.	
PFM2500014	1/4" Wood-Knocker II+ LP (Low Profile)	Brown	100	
PFM2500038	3/8" Wood-Knocker II+ LP (Low Profile)	Green	100	
PFM2521100	1/4" Wood-Knocker II+	Brown	100	
PFM2521150	3/8" Wood-Knocker II+	Green	100	
PFM2521200	1/2" Wood-Knocker II+	Yellow	100	
PFM2521250	5/8" Wood-Knocker II+	Red	100	
PFM2521300	3/4" Wood-Knocker II+	Purple	100	
DEM2501/28	1/4 2/8" Wood Knocker II , Multi I P / ow Profile)	W/bito	100	
PFM2521438	1/4-3/8" Wood-Knocker II+ Multi	White	100	
PFM2521350	3/8-1/2" Wood-Knocker II+ Multi	Grav	100	
PFM253143812	1/4-3/8-1/2" Wood-Knocker II+ Multi	Aqua	100	
PFM253381258	3/8-1/2-5/8" Wood-Knocker II+ Multi	Orange	50	
PFM2525834	5/8-3/4" Wood-Knocker II+ Multi	Black	50	
PFM2610038	3/8" Wood-Knocker II+ Push-In Thread	Green	50	
PFM2610012	1/2" Wood-Knocker II+ Push-In Thread	Yellow	50	
nserts are color coded to easily identify location, type and sizes of the internal diameters.				







Pan-Knocker II+ Form Insert (UNC internal thread) 'No nail' version of Wood-Knocker II+

Cat. No.	Description	Color Code	Pack Qty.
PFM2501438NN	1/4-3/8" Pan-Knocker II+ Multi LP (Low Profile)	White	100
PFM253143812NN	1/4-3/8-1/2" Pan-Knocker II+ Multi	Aqua	100
PFM253381258NN	3/8-1/2-5/8" Pan-Knocker II+ Multi	Orange	100
PFM2525834NN	5/8-3/4" Pan-Knocker II+ Multi	Black	100
PFM2610038NN	3/8" Pan-Knocker II+ Push-In Thread	Green	50
PFM2610012NN	1/2" Pan-Knocker II+ Push-In Thread	Yellow	50
Pan-Knocker II+ form inserts must be mounted (e.g. screwed) to the form work. Fasteners are not included.			



Wood-Knocker II+ Installation Accessories and Tools

Cat. No.	Description	Pack Qty.
PFM3612000	Wood-Knocker II+ Installation Tool	1
DWHT51439	16oz Steel Curve Claw Hammer	1
The Wood-Knocker I		

Push-In Thread Couplers

Cat. No.	Description	Pack Qty.		
PFM3613038	3/8"-16 Coupler Push-In Thread	20		
PFM3613012	1/2"-13 Coupler Push-In Thread	20		
Push-In couplers have one end that does not require turning threaded rod elements during installation which can be ideal for applications such as mounting prefabricated hardware and hanger assemblies.				



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