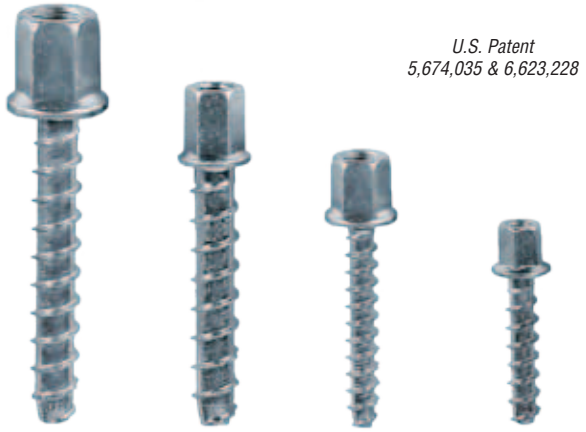
Titen HD® *Threaded Rod Hanger for Cracked and Uncracked Concrete*

Cracked & Uncracked CONCRETE IBC 2009 ICC-ES ESR-2713

SIMPSON Strong-Tie®

The Titen HD® rod hanger is a high-strength screw anchor designed to suspend threaded rod from concrete slabs and beams in order to hang pipes, cable tray and HVAC equipment. This anchor is code listed by ICC-ES for cracked and uncracked concrete applications under the 2009 IBC.

U.S. Patent 5,674,035 & 6,623,228



THD50234RH (⅜" dia. shank) **THD37212RH** (⅜" dia. shank) **THD37218RH** **THD25112RH**

FEATURES:

- High-load capacity as a result of the full-length threads that undercut the concrete and effectively transfer load into the base material
- Specialized heat-treating process creates greater hardness at the tip to facilitate cutting while the body remains ductile
- Serrated cutting teeth and patented thread design enable quick and easy installation
- No special installation tools required. Holes can be drilled with a rotary hammer or hammer drill with standard ANSI-size bit. Anchors are installed with standard-size sockets.

MATERIAL: Carbon steel, heat treated

FINISH: Zinc plated

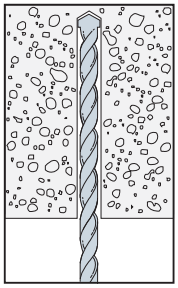
INSTALLATION:

Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with base material and will reduce the anchor's load capacity. Use a Titen HD® Rod Hanger one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity

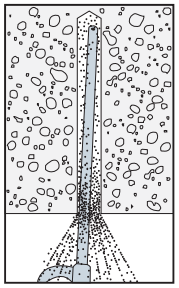
- Drill a hole using the specified diameter carbide bit into the base material to a depth of at least ½" deeper than the required embedment.
- Blow the hole clean of dust and debris using compressed air.
- IMPORTANT: Install with an applied torque of 15 ft-lbs for the THD25112RH and THD37218RH rod hangers using a torque wrench, driver drill, hammer drill or cordless ¼" impact driver with a maximum permitted torque rating of 100 ft-lb.

CODES: ICC-ES ESR-2713 *(THD37212RH and THD50234RH)*, Factory Mutual 3031136 *(THD50234RH and THD37218RH)* and 3035761 *(THD37212RH)*

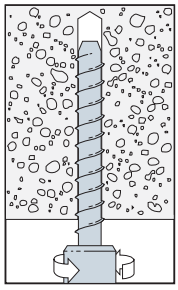
Installation Sequence



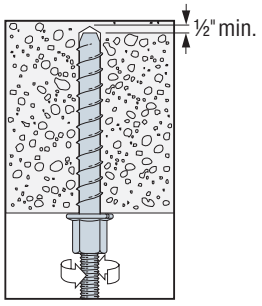
1. Drill a hole using the specified diameter carbide bit into the base material to a depth of at least ½" deeper than the required embedment.



2. Blow the hole clean of dust and debris using compressed air.



3. Insert anchor into the hole. Tighten the anchor with an impact wrench or a torque wrench into the base material until the hex washer head contacts the base material.



4. Install threaded rod in the anchor to support pipes, wiring, etc.

Titen HD® Rod Hanger Product Data

Size (in.)	Model No.	Accepts Rod Dia. (in.)	Drill Bit Dia. (in.)	Wrench Size (in.)	Min. Embed. (in.)	Quantity	
						Box	Carton
¼ x 1½	THD25112RH	¼	¼	⅜	1½	100	500
⅜ x 2⅛	THD37218RH	⅜	¼	½	2⅛	50	250
⅜ x 2½	THD37212RH	⅜	⅜	½	2½	50	200
½ x 2¾	THD50234RH	½	⅜	11/16	2¾	50	100

Titen HD® Rod Hanger Installation Information and Additional Data[1]

Characteristic	Symbol	Units	Model Number	
			THD37212RH	THD50234RH
Installation Information				
Rod Hanger Diameter	d_o	in.	⅜	½
Drill Bit Diameter	d_{bit}	in.	⅜	⅜
Maximum Installation Torque[2]	$T_{inst,max}$	ft-lbf	50	50
Maximum Impact Wrench Torque Rating[3]	$T_{impact,max}$	ft-lbf	150	150
Minimum Hole Depth	h_{hole}	in.	3	3¼
Embedment Depth	h_{nom}	in.	2½	2¾
Effective Embedment Depth	h_{ef}	in.	1.77	1.77
Critical Edge Distance	c_{ac}	in.	2¹¹⁄₁₆	2¹¹⁄₁₆
Minimum Edge Distance	c_{min}	in.	1¾	
Minimum Spacing	s_{min}	in.	3	
Minimum Concrete Thickness	h_{min}	in.	4¼	4¼
Anchor Data				
Yield Strength	f_{ya}	psi	97,000	
Tensile Strength	f_{uta}	psi	110,000	
Minimum Tensile and Shear Stress Area	A_{se}	in²	0.099	0.099
Axial Stiffness in Service Load Range – Uncracked Concrete	β_{uncr}	lb/in.	715,000	
Axial Stiffness in Service Load Range – Cracked Concrete	β_{cr}	lb/in.	345,000	

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D.
2. $T_{inst,max}$ is the maximum permitted installation torque for installations using a torque wrench.
3. $T_{impact,max}$ is the maximum permitted torque rating for impact wrenches.

*See page 13 for an explanation of the load table icons

Strength Design Values for Titen HD® Rod Hanger in Tension for Installations in Concrete[1,6]

Characteristic	Symbol	Units	Model Number	
			THD37212RH	THD50234RH
Anchor Category	*1, 2 or 3*	—	1	
Embedment Depth	h_{nom}	in.	2½	2¾
Steel Strength in Tension (ACI 318 Section D.5.1)				
Tension Resistance of Steel	N_{sa}	lb.	10,890	10,890
Strength Reduction Factor – Steel Failure[2]	ϕ	—	0.65	
Concrete Breakout Strength in Tension (ACI 318 Section D.5.2)[6]				
Effective Embedment Depth	h_{ef}	in.	1.77	1.77
Critical Edge Distance	c_{ac}	in.	2¹¹⁄₁₆	2¹¹⁄₁₆
Effectiveness Factor – Uncracked Concrete	k_{uncr}	—	24	
Effectiveness Factor – Cracked Concrete	k_{cr}	—	17	
Modification Factor	$\psi_{c,N}$	—	1.0	
Strength Reduction Factor – Concrete Breakout Failure[5]	ϕ	—	0.65	
Pullout Strength in Tension (ACI 318 Section D.5.3)[6]				
Pullout Resistance – Uncracked Concrete (f'_c = 2500 psi)	$N_{p,uncr}$	lb.	2,025[3]	2,025[3]
Pullout Resistance – Cracked Concrete (f'_c = 2500 psi)	$N_{p,cr}$	lb.	1,235[3]	1,235[3]
Strength Reduction Factor – Pullout Failure[4]	ϕ	—	0.65	
Tension Strength for Seismic Applications (ACI 318 Section D.3.3.3)[6]				
Nominal Pullout Strength for Seismic Loads (f'c = 2500 psi)	$N_{p,eq}$	lb.	1,235[3]	1,235[3]
Strength Reduction Factor – Pullout Failure[4]	ϕ	—	0.65	

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below.
2. The value of ϕ applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ. Anchors are considered brittle steel elements.
3. Adjust the characteristic pullout resistance for other concrete compressive strengths by multiplying the tabular value by $(f'_{c,specified}/2500)^{0.5}$.
4. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
5. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition A are met, refer to Section D.4.4 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of ϕ.
6. For sand-lightweight concrete, the modification factor for concrete breakout strength must be taken as 0.6. Additionally, the pullout strength $N_{p,uncr}$, $N_{p,cr}$ and $N_{p,eq}$ must be multiplied by 0.6, as applicable.
7. For sand-lightweight concrete, in lieu of ACI 318 Section D.3.4, modify the value of concrete breakout strength, $N_{p,cr}$, $N_{p,uncr}$ and N_{eq} by 0.6. All-lightweight concrete is beyond the scope of this table.

Strength Design Values for Titen HD® Rod Hanger in Tension for Installations in the Lower and Upper Flute of Normal-Weight or Sand-Lightweight Concrete through Metal Deck[1,2,5,6]

* See page 13 for an explanation of the load table icons

Characteristic	Symbol	Units	Catalog Number	
			THD37212RH	THD50234RH
Minimum Hole Depth	h_{hole}	in.	3	3¼
Embedment Depth	h_{nom}	in.	2½	2¾
Effective Embedment Depth	h_{ef}	in.	1.77	1.77
Pullout Resistance – Cracked Concrete[2,3,4]	$N_{p,deck,cr}$	lbf	870	870
Pullout Resistance – Uncracked Concrete[2,3,4]	$N_{p,deck,uncr}$	lbf	1,430	1,430

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below.
2. Concrete compressive strength shall be 3000 psi minimum. The characteristic pullout resistance for greater compressive strengths shall be increased by multiplying the tabular value by $(f'_{c,\,specified}/3000\ psi)^{0.5}$.
3. For anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and roof assemblies, as shown in Figure A, calculation of the concrete breakout strength may be omitted.
4. In accordance with ACI 318 Section D.5.3.2, the nominal pullout strength in cracked concrete for anchors installed in the soffit of sand-lightweight or normal-weight-concrete-over-metal-deck floor and roof assemblies $N_{p,deck,cr}$ shall be substituted for $N_{p,cr}$. Where analysis indicates no cracking at service loads, the normal pullout strength in uncracked concrete $N_{p,deck,uncr}$ shall be substituted for $N_{p,uncr}$.
5. Minimum distance to edge of panel is $2h_{ef}$.
6. The minimum anchor spacing along the flute must be the greater of $3h_{ef}$ or 1.5 times the flute width.

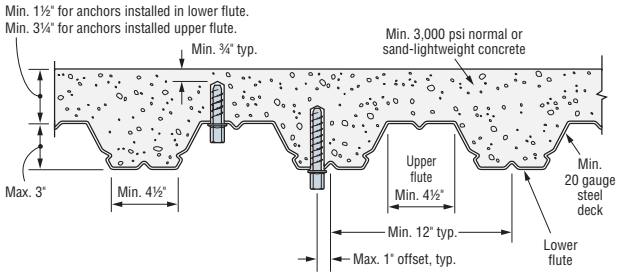


Figure A – Installation in Concrete Over Metal Deck

Allowable Stress Design (ASD) Values for Titen HD® Rod Hanger with ¼" and ⅜" Shanks Tension Loads in Normal-Weight Concrete

* See page 13 for an explanation of the load table icons

Catalog Number	Rod Hanger Dia. (in.)	Drill Bit Dia. (in.)	Emb. Depth (in.)	Critical Edge Distance (in.)	Critical Spacing Distance (in.)	Tension Load			
						$f'_c \geq 2000$ psi Concrete		$f'_c \geq 4000$ psi Concrete	
						Ultimate (lbs.)	Allowable (lbs.)	Ultimate (lbs.)	Allowable (lbs.)
THD25112RH	¼	¼	1½	3	6	1,319	330	2,102	525
THD37218RH	⅜	¼	2⅛	3	6	2,210	555	3,227	805
THD37212RH	⅜	⅜	2½	3	6	3,650	915	5,275	1,320
THD50234RH	½	⅜	2¾	3	6	4,297	1,075	6,204	1,550

1. The allowable loads listed are based on a safety factor of 4.0.
2. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
3. Refer to allowable load-adjustment factors for spacing and edge distance on pages 120–121.
4. The minimum concrete thickness is 1½ times the embedment depth.
5. Allowable load may be interpolated for concrete compressive strengths between 2000 psi and 4000 psi.