Titen HD® Rod Hanger Design Information — Concrete

Titen HD® Threaded 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 1 ½	THD25112RH	¼	¼	⅜	1 ½	100	500
⅜ x 2 ⅛	THD37218RH	⅜	¼	½	2 ⅛	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® Threaded 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.-lb.	50	50
Maximum Impact Wrench Torque Rating[3]	$T_{impact,max}$	ft.-lb.	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.	2 11⁄16	2 11⁄16
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}	in.^{2}	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.

Titen HD® Rod Hanger Design Information — Concrete

Titen HD® Threaded Rod Hanger Tension Strength Design Data 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_{sa}	—	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.	2 11/16	2 11/16
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_{cb}	—	0.65	
Pullout Strength in Tension (ACI 318 Section D.5.3)[6]				
Pullout Resistance – Uncracked Concrete (f'_c = 2,500 psi)	$N_{p,uncr}$	lb.	2,025[3]	2,025[3]
Pullout Resistance – Cracked Concrete (f'_c = 2,500 psi)	$N_{p,cr}$	lb.	1,235[3]	1,235[3]
Strength Reduction Factor – Pullout Failure[4]	ϕ_p	—	0.65	
Tension Strength for Seismic Applications (ACI 318 Section D.3.3)[6]				
Nominal Pullout Strength for Seismic Loads (f'_c = 2,500 psi)	$N_{p,eq}$	lb.	1,235[3]	1,235[3]
Strength Reduction Factor – Pullout Failure[4]	ϕ_{eq}	—	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.4.4 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 $(f'_{c,specified}/2{,}500)^{0.5}$.
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.4.3(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.4 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.4.3(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.3(c) for Condition A are met, refer to Section D.4.3 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.4 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.3.6, 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.

* See page 12 for an explanation of the load table icons.

Titen HD® Rod Hanger Design Information — Concrete

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

Characteristic	Symbol	Units	Model No.	
			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 3,000 psi minimum. The characteristic pullout resistance for greater compressive strengths shall be increased by multiplying the tabular value by $(f'_{c,specified}/3{,}000\ psi)^{0.5}$.
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 1, 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.

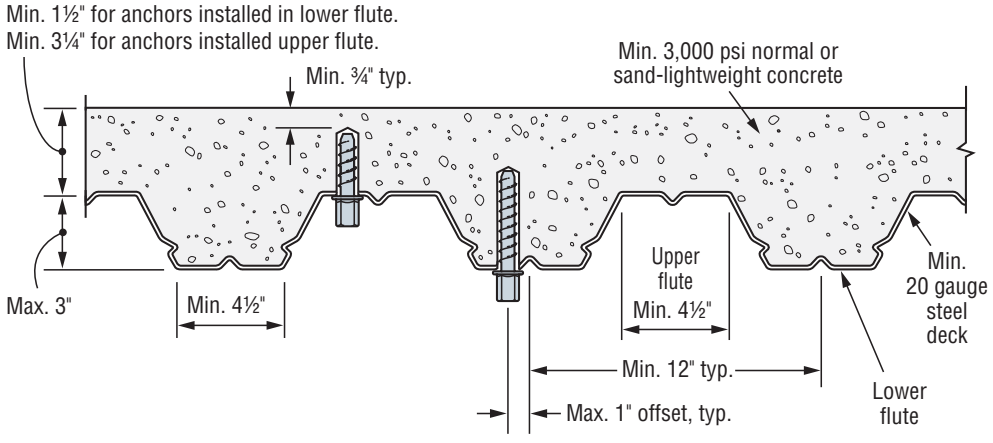

Figure 1. Installation in Concrete Over Metal Deck

Titen HD® Threaded Rod Hanger Allowable Tension Loads in Normal-Weight Concrete

Model Number	Rod Hanger Dia. (in.)	Drill Bit Dia. (in.)	Emb. Depth (in.)	Critical Edge Distance (in.)	Critical Spacing Distance (in.)	Tension Load			
						$f'_c \geq 2{,}000$ psi Concrete		$f'_c \geq 4{,}000$ psi Concrete	
						Ultimate (lb.)	Allowable (lb.)	Ultimate (lb.)	Allowable (lb.)
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 198 and 199.
4. The minimum concrete thickness is 1½ times the embedment depth.
5. Allowable load may be interpolated for concrete compressive strengths between 2,000 psi and 4,000 psi.

* See page 12 for an explanation of the load table icons.