Titen HD® Rod Hanger Design Information — Concrete

SIMPSON Strong-Tie®

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.)	Hole Depth Overdrill (in.)	Quantity	
							Box	Carton
¼ x 1⅝	THDB25158RH	¼	¼	⅜	1⅝	⅛	100	500
⅜ x 1⅝	THDB37158RH	⅜	¼	½	1⅝	⅛	50	200
½ x 2¾	THD50234RH	½	⅜	11⁄16	2½	¼	50	100

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

Characteristic	Symbol	Units	Model Number	
			THDB25158RH THDB37158RH	THD50234RH
Installation Information				
Rod Hanger Diameter	d_o	in.	¼ or ⅜	½
Drill Bit Diameter	d_{bit}	in.	¼	⅜
Maximum Installation Torque[2]	$T_{inst,max}$	ft.-lb.	24	50
Maximum Impact Wrench Torque Rating[3]	$T_{impact,max}$	ft.-lb.	125	150
Minimum Hole Depth	h_{hole}	in.	1¾	3
Embedment Depth	h_{nom}	in.	1⅝	2¾
Effective Embedment Depth	h_{ef}	in.	1.19	1.77
Critical Edge Distance	c_{ac}	in.	3	2 11⁄16
Minimum Edge Distance	c_{min}	in.	1½	1¾
Minimum Spacing	s_{min}	in.	1½	3
Minimum Concrete Thickness	h_{min}	in.	3¼	4¼
Anchor Data				
Yield Strength	f_{ya}	psi	100,000	97,000
Tensile Strength	f_{uta}	psi	125,000	110,000
Minimum Tensile and Shear Stress Area	A_{se}	in.^{2}	0.042	0.099
Axial Stiffness in Service Load Range — Uncracked Concrete	β_{uncr}	lb./in.	202,000	715,000
Axial Stiffness in Service Load Range — Cracked Concrete	β_{cr}	lb./in.	173,000	345,000

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.
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.

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Titen HD Threaded Rod Hanger Tension Strength Design Data for Installations in Concrete[1]

Characteristic	Symbol	Units	Model Number	
			THDB25158RH THDB37158RH	THD50234RH
Anchor Category	1, 2 or 3	—	1	
Embedment Depth	h_{nom}	in.	1⅝	2½
Steel Strength in Tension (ACI 318-14 17.4.1 or ACI 318-11 Section D.5.1)				
Tension Resistance of Steel	N_{sa}	lb.	5,195	10,890
Strength Reduction Factor — Steel Failure[2]	ϕ_{sa}	—	0.65	
Concrete Breakout Strength in Tension (ACI 318-14 17.4.2 or ACI 318-11 Section D.5.2)				
Effective Embedment Depth	h_{ef}	in.	1.19	1.77
Critical Edge Distance	c_{ac}	in.	3	2 11/16
Effectiveness Factor — Uncracked Concrete	k_{uncr}	—	30	24
Effectiveness Factor — Cracked Concrete	k_{cr}	—	17	
Modification Factor	$\psi_{c,N}$	—	1.0	
Strength Reduction Factor — Concrete Breakout Failure[3]	ϕ_{cb}	—	0.65	
Pullout Strength in Tension (ACI 318-14 17.4.3 or ACI 318-11 Section D.5.3)				
Pullout Resistance — Uncracked Concrete (f'_c = 2,500 psi)	$N_{p,uncr}$	lb.	N/A[4]	2,025[5]
Pullout Resistance — Cracked Concrete (f'_c = 2,500 psi)	$N_{p,cr}$	lb.	N/A[4]	1,235[5]
Strength Reduction Factor — Pullout Failure[6]	ϕ_p	—	0.65	
Tension Strength for Seismic Applications (ACI 318-14 17.2.3.3 or ACI 318-11 Section D.3.3.3)				
Nominal Pullout Strength for Seismic Loads (f'_c = 2,500 psi)	$N_{p,eq}$	lb.	N/A[4]	1,235[5]
Strength Reduction Factor — Pullout Failure[6]	ϕ_{eq}	—	0.65	

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. The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used, 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(b), as applicable.
3. The tabulated values of ϕ_{cb} applies when both the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-11 D.4.3(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided in concrete. For installations were complying reinforcement can be verified, the ϕ_{cb} factors described in ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c), as applicable, may be used for Condition A. 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(c) for Condition B.
4. As described in this report, N/A denotes that pullout resistance does not govern and does not need to be considered.
5. The characteristic pullout resistance for greater compressive strengths may be increased by multiplying the tabular value by $(f'_c/2{,}500)^{0.5}$.
6. The tabulated values of ϕ_p or ϕ_{eq} applies when both the load combinations of ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided in concrete. For installations were complying reinforcement can be verified, the ϕ_p or ϕ_{eq} factors described in ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c), as applicable, may be used for Condition A. 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(c) for Condition B.

* See p. 13 for an explanation of the load table icons.

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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]

IBC *

Characteristic	Symbol	Units	Model No.		
			Lower Flute		Upper Flute
			Figure 2	Figure 1	Figure 2
			THDB25158RH THDB37158RH	THD50234RH	THDB25158RH THDB37158RH
Minimum Hole Depth	h_{hole}	in.	1¾	3	1¾
Embedment Depth	h_{nom}	in.	1⅝	2½	1⅝
Effective Embedment Depth	h_{ef}	in.	1.19	1.77	1.19
Pullout Resistance – Cracked Concrete[2,3,4]	$N_{p,deck,cr}$	lbf.	420	870	655
Pullout Resistance – Uncracked Concrete[2,3,4]	$N_{p,deck,uncr}$	lbf.	995	1,430	1,555

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. 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 or Figure 2, calculation of the concrete breakout strength may be omitted.
4. In accordance with ACI 318-14 Section 17.4.3.2 or ACI 318-11 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.

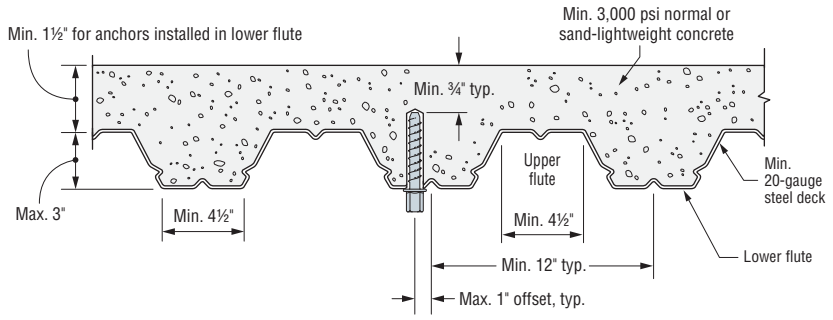


Figure 1. THD50234RH Installation in Concrete over Metal Deck

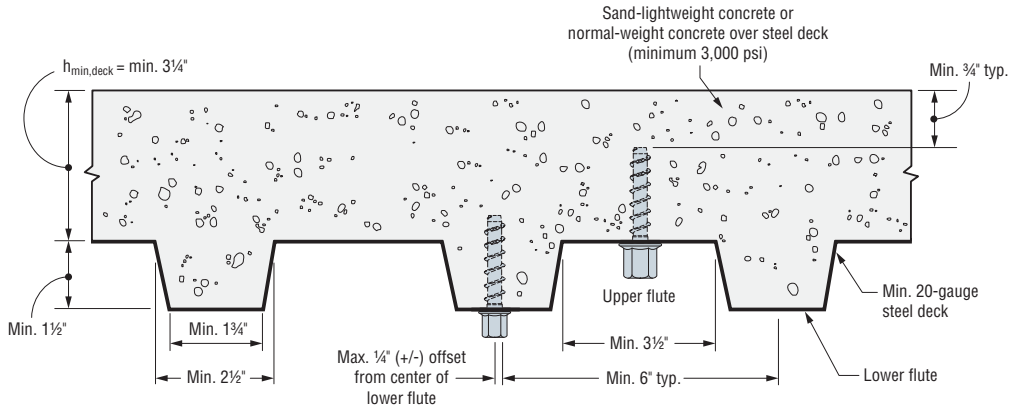


Figure 2. THDB25158RH and THDB37158RH Installation in Concrete over Metal Deck

* See p. 13 for an explanation of the load table icons.

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