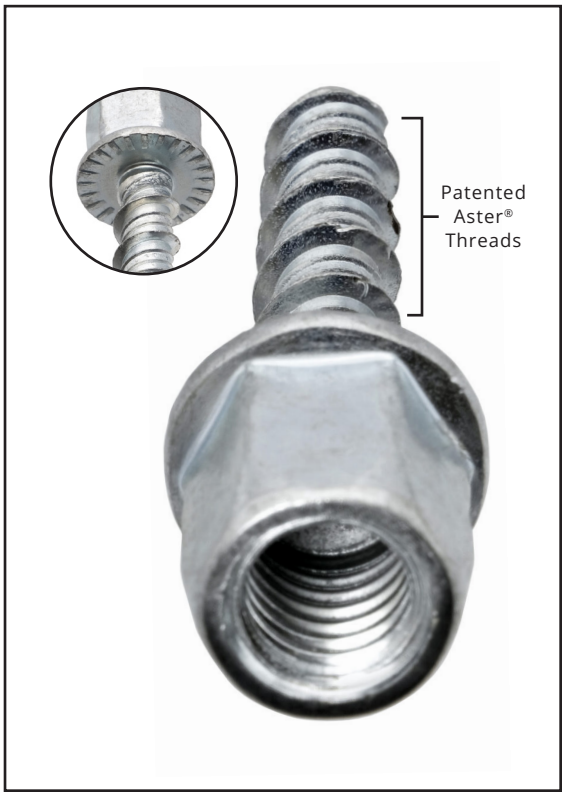
ROD HANGER ASTER SCREW

► DESCRIPTION

UCAN UTB 14158RH Post Installed Patented Aster® Screw Rod Hanger is a one piece, carbon steel screw anchor with an over-sized, internally threaded, hex washer head for coupling with 3/8"-16 threaded rod. Anchor is available zinc-plated, with a nominal diameter of 1/4 (6.4 mm). It is used as an anchorage to resist static, wind, and seismic loads, tension, and shear loads when installed into cracked and uncracked normal-weight concrete and lightweight concrete members having a specified compressive strength, f'c, from 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa). The UTB 14158RH Post Installed Rod Hanger Screw is an alternative to cast-in-place anchors for pipe support as per FM approval.



► FEATURES

- Use with UCAN standard ANSI compliant drill bit
- Fast installation and reduced edge distance requirements.
- One piece fastener with oversized, internally threaded hex washer head and locking under-head serrations
- Unique thread pattern facilitates ease of installation
- Anchor can be set with an impact or manual socket wrench.
- Removable–Ideal for temporary anchoring applications.
- FM approved for suspended pipe support, up to 4" pipe diameter

► TYPICAL APPLICATIONS

- Suspended pipe support
- Overhead anchoring for equipment support

► LIMITATIONS

Not recommended for installation into uncured concrete(less than 7 days old).

► LISTING AND APPROVALS

ICC-ES®
ESR 5290

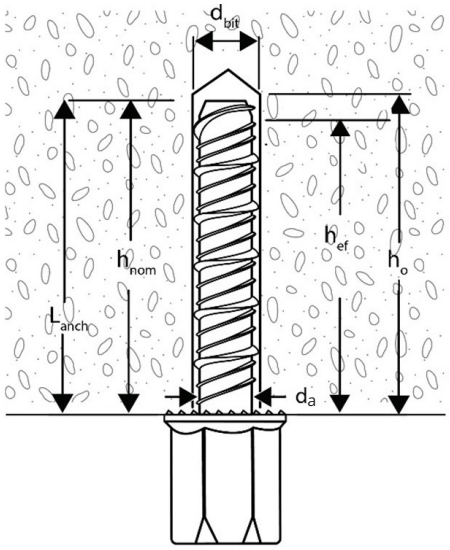
FM APPROVED
PR458424

► MATERIAL SPECIFICATIONS

Properties	Carbon Steel
Anchor body	Heat treated carbon steel
Head style	Oversized hex flange head with locking serrations and 3/8-16 internal thread
Corrosion protection	5 µm zinc plating as per ASTM B633

► INSTALLATION INFORMATION

FIGURE 1



Nomenclature:

d_a = Diameter of Anchor

h_{nom} = Minimum Nominal Embedment

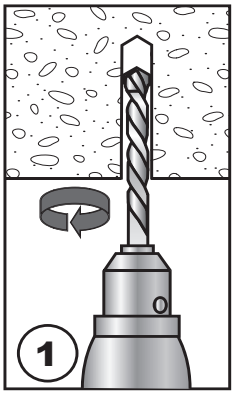
h_o = Minimum hole depth

d_{bit} = Diameter of Drill Bit

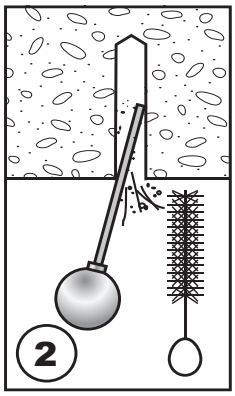
h_{ef} = Effective Embedment

L_{anch} = Nominal Anchor Length

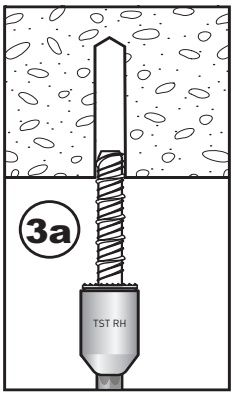
► INSTALLATION INSTRUCTION[1]



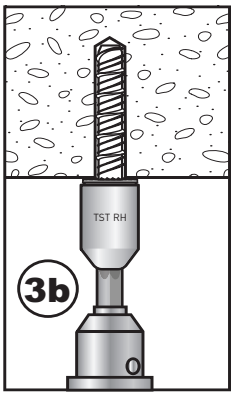
Drill hole to the specified diameter and depth. It is advised to over drill the depth by at least ½". Do not ream the holes.



Blow out dust from the hole



Attach the recommended size TST RH Torpedo® setter to a 1/2" drive impact wrench, place the setter over the head of the anchor and insert into the hole.



Install the anchor. Immediately stop when the setter spins/ disengages from the anchor's head.

[1] When using impact wrench, there is a risk of over-tightening and damaging the screw, impact tool may not correlate properly with the above setting torques. Over torquing can damage the base material, anchor and/or reduce its holding capacity. If the TST Setter is not used, immediately stop when the bottom of the anchor head comes in contact with the fixture. Use a calibrated hand torque wrench to finish the installation.

► TECHNICAL DATA FOR CARBON STEEL UTB FOR LIMIT STATE / STRENGTH DESIGN IN CRACKED AND UNCRACKED CONCRETE

TABLE 1 - INSTALLATION INFORMATION FOR UTB 14158RH POST INSTALLED ROD HANGER SCREW[1,2]

Anchor Property		Symbol	Units	Nominal anchor Diameter (inch) 1/4
Coupler/Threaded Rod Connection Connection thread size (UNC)		-	-	3/8-16
Coupler Head Style				Internally Threaded
Nominal anchor diameter (Screw Body Only)		d_a	in. (mm)	1/4 (6.4)
Drill Bit Diameter (ANSI)		d_{bit}	in. (mm)	1/4 (6.4)
Nominal Embedment Depth		h_{nom}	in. (mm)	1 5/8 (41)
Effective Embedment Depth		h_{ef}	in. (mm)	1.20 (30)
Minimum Hole Depth		h_o	in. (mm)	2 (51)
Minimum Concrete Thickness		h_{min}	in. (mm)	4 (102)
Maximum Installation Torque		$T_{inst,max}$	ft-lbf (N-m)	19 (26)
Minimum Edge Distance		-	in. (mm)	1/2 (38)
Minimum spacing Distance		-	in. (mm)	1/2 (38)
Coupler Head	Wrench Socket Size	-	in.	1/2
	Max. Head Height	-	in.	0.670
	Max. Washer diameter	-	in.	0.667

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

[1] The information presented in this table must be used in conjunction with the design requirements of ACI 318 (-19 or -14) Chapter 17, as applicable.
[2] See Figure 1 for additional information.

TABLE 2 - RESISTANCE FACTORS FOR LIMIT STATE DESIGN IN ACCORDANCE WITH CSA A23.3-14, ANNEX D

Setting information	Symbol	Units	Nominal Anchor Diameter 1/4"
Concrete material resistance factor	Φ_C	-	0.65
Steel material resistance factor	Φ_S	-	0.85
Strength reduction factor for tension, steel failure modes	R		0.80
Strength reduction factor for shear, steel failure modes	R		0.75
Strength reduction factor for tension, concrete failure modes	R	Cond. A	1.15
		Cond. B	1.00
Strength reduction factor for Shear, concrete failure modes	R	Cond. A	1.15
		Cond. B	1.00

TABLE 3 - TENSION STRENGTH DESIGN INFORMATION FOR UTB 14158RH ROD HANGER SCREWS[1,2,3,4,5]

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)
			1/4
Anchor Category	1, 2 or 3	-	3
Nominal Embedment Depth	h_{nom}	in. (mm)	1 5/8
Critical Edge Distance	c_{ac}	in. (mm)	3 (76)
Minimum Edge Distance	c_{min}	in. (mm)	1 1/2 (38)
Minimum Spacing	s_{min}	in. (mm)	1 1/2 (38)
Steel Strength in Tension (ACI 318-19 17.6.1 or ACI 318-14 17.4.1)			
Minimum Specified Yield Strength	f_{ya}	psi (N/mm²)	100,000 (689)
Minimum Specified Tensile Strength	f_{uta}	psi (N/mm²)	125,000 (862)
Effective Tensile Stress Area	A_{se}	in² (mm²)	0.0382 (25)
Steel Strength in Tension	N_{sa}	lbf (kN)	4,775 (21.2)
Strength Reduction Factor-Steel Failure[2]	ϕ_{sa}	-	0.65
Concrete Breakout Strength in Tension (ACI 318-19 17.6.2 or ACI 318-14 17.4.2)			
Effective Embedment Depth	h_{ef}	in. (mm)	1.20 (30)
Effectiveness Factor-Uncracked Concrete	k_{uncr}	-	24
Effectiveness Factor-Cracked Concrete	k_{cr}	-	17
Strength Reduction Factor-Concrete Breakout Failure[2]	ϕ_{cb}	-	0.45
Modification Factor for Concrete[3]	$\Psi_{c,N}$	-	1.00
Pull-Out Strength in Tension (ACI 318-19 17.6.3 or ACI 318-14 17.4.3)			
Pull-Out Resistance Uncracked Concrete (f'_c = 2,500 psi)[4]	$N_{p,uncr}$	lbf (kN)	1,736 (7.72)
Pull-Out Resistance Cracked Concrete (f'_c = 2,500 psi)[4]	$N_{p,cr}$	lbf (kN)	1,259 (5.60)
Strength Reduction Factor-Pullout Failure[2]	ϕ_p	-	0.45
Tension Strength for Seismic Applications (ACI 318-19 17.10.3 or ACI 318-14 17.2.3.3)			
Nominal Pullout Strength for Seismic Loads (f'c=2,500 psi)[4]	$N_{p,eq}$	lbf (kN)	1,259 (5.60)
Strength Reduction Factor forPullout Failure[2]	ϕ_{eq}	-	0.45
Tension, normalization factor			
Normalization factor, uncracked concrete	n_{uncr}	-	0.27
Normalization factor,cracked concrete, seismic	n_{un}	-	0.32
Axial stiffness			
Axial stiffness in service load range in uncracked concrete	β_{uncr}	lb/in (N/mm)	155,254 (27,189)
Axial stiffness in service load range in cracked concrete	β_{cr}	lb/in (N/mm)	73,309 (12,838)

For SI: 1 inch = 25.4mm, 1lbf = 4.45N, 1 lb/in = 0.175 N/mm, 1 psi = 0.00689 MPa = 0.00689 N/mm², 1 in² = 645 mm², 1 lb/in = 0.175 N/mm.

[1] The information presented in this table must be used in conjunction with the design requirements of ACI 318 (-19 or -14) Chapter 17, as applicable.

[2] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 or ACI 318-14 17.3.3, as applicable, are met. The strength reduction factors are applicable with supplementary reinforcement not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.

[3] For all design cases, $\Psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (kcr) or uncracked concrete (kuncr) must be used.

[4] For all design cases, $\Psi_{c,P}$ = 1.0. Tabulated value for pullout strength is for a concrete compressive strength of 2,500 psi (17.2 MPa). Pullout strength for concrete compressive strength greater than 2,500 psi (17.2 MPa) may be increased by multiplying the tabular pullout strength by (f'c / 2,500)n for psi, or (f'c / 17.2)n for MPa, where n is given as nun_{cr} for uncracked concrete and n_{cr} for cracked concrete.

[5] For limit State Design as per CSA A23.3-19 Annex D, material resistance factors (Φ) and resistance modification factor (R) listed in Table 4 shall be used.

TABLE 4—SHEAR STRENGTH DESIGN INFORMATION FOR UTB 14158RH ROD HANGER SCREWS[1,2,3]

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)
			1/4
Anchor Category	1, 2 or 3	-	3
Nominal Embedment Depth	h_{nom}	in. (mm)	1 5/8 (41)
Critical Edge Distance	c_{ac}	in. (mm)	3 (76)
Minimum Edge Distance	c_{min}	in. (mm)	1 1/2 (38)
Minimum Spacing	s_{min}	in. (mm)	1 1/2 (38)
Effective Embedment Depth	h_{ef}	in. (mm)	1.20 (30)
Steel Strength in Shear (ACI 318-19 17.7.1)			
Minimum Specified Yield Strength	f_{ya}	psi (N/mm²)	100,000 (689)
Minimum Specified Tensile Strength	f_{uta}	psi (N/mm²)	125,000 (862)
Effective Shear Stress Area	A_{se}	in² (mm²)	0.0382 (25)
Steel strength in shear - static	V_{sa}	lbf (kN)	1,287 (5.72)
Strength Reduction Factor-Steel Failure[2]	ϕ_{sa}	-	0.60
Concrete Breakout Strength in Shear (ACI 318-19 17.7.2)			
Nominal Diameter	d_a	in. (mm)	1/4 (6.4)
Load Bearing Length of Anchor in Shear (h_{ef} or $8d_o$, whichever is less)	l_e	in. (mm)	1.20 (30)
Strength Reduction Factor-Concrete Breakout Failure[2]	ϕ_{cb}	-	0.70
Concrete Pryout Strength in Shear (ACI 318-19 17.7.3)			
Coefficient for Pryout Strength	k_{cp}	-	1.0
Strength Reduction Factor-Concrete Pryout Failure[2]	ϕ_{cp}	-	0.70
Shear Resistance of Single Anchor for Seismic Loads (f'_c=2,500 psi)	$V_{sa,eq}$	lbf (kN)	1,173 (5.22)
Strength Reduction Factor -Steel Failure[2]	ϕ_{eq}	-	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45 N, 1 psi = 0.00689 MPa = 0.00689 N/mm², 1 in2 = 645 mm2.

[1] The information presented in this table must be used in conjunction with the design requirements of ACI 318 (-19 or -14) Chapter 17, as applicable.

[2] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 or ACI 318-14 17.3.3, as applicable, are met. The strength reduction factors are applicable with supplementary reinforcement not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.

[3] For limit State Design as per CSA A23.3-19 Annex D, material resistance factors (Φ) and resistance modification factor (R) listed in Table 4 shall be used.