UCAN UTB TZ ASTER® TORPEDO® BOLT

► DESCRIPTION

UCAN UTB TZ Patented Aster Thread TORPEDO BOLT is an excellent anchoring solution for medium-duty applications. TORPEDO® Bolt screw anchors are comprised of a body with a hex flange head. The anchor is manufactured from carbon steel and is heat-treated. It features a 0.0021-inch (53 µm) Mechanical galvanized zinc coating, as per ASTM B695, Class 65, Type 1. TORPEDO® Bolt screw anchors are used as anchorage to resist static, wind, and seismic (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked average weight and lightweight concrete having a specified compressive strength, f'c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

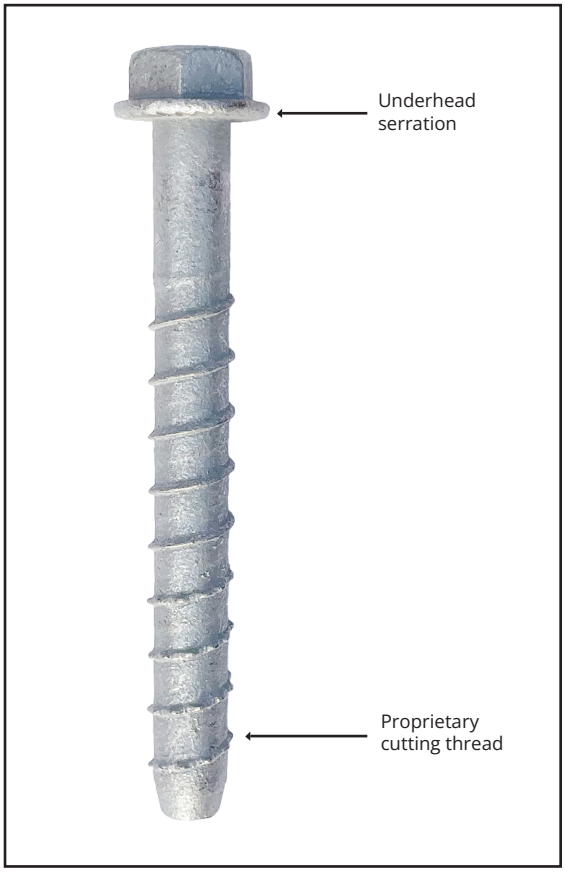
The anchor is tested by an accredited testing agency (American Association for Laboratory Accreditation) in compliance with:
- ASTM E488 ("Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements")
- ICC-ES AC193 ("Acceptance Criteria for Mechanical Anchors in Concrete Elements
- ACI 355.2 ("Qualification of Post-Installed Mechanical Anchors in Concrete")

UTB TZ TORPEDO® BOLT has been evaluated by an accredited independent agency (ICC-ES) for recognition of use in cracked and uncracked concrete, including seismic and wind loads in 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 TZ TORPEDO bolt is listed in the ICC-ES Report ESR4596.

Matched with a standard UCAN ANSI tolerance drill bit, this fastener exhibits consistently high load values. The UCAN TORPEDO® BOLT installs quickly using the UCAN TST Installation Driver, leaving the working surface with the clean appearance of a finished hex washer head.

► FEATURES

- Use with UCAN standard ANSI compliant drill bit
- Fast installation and reduced edge distance requirements, compared to mechanical expansion anchors.
- One piece fastener with finished hex flange head and locking under-head serration
- Unique thread pattern facilitates ease of installation
- Anchor can be set with an impact or manual socket wrench.
- Removable–Ideal for temporary anchoring applications.
- Anchor size is stamped on head for easy identification and enhanced quality control after anchor Installation.



► LISTING AND APPROVALS

ICC-ES®
ESR 4596

UTB 38134, UTB 38212,
UTB 383, UTB 384, UTB 385,
UTB 12212, UTB 123, UTB 124,
UTB 125, UTB 126

► TYPICAL APPLICATIONS

- Racking, Railing, Sill plates, Stadium seating.
- Anchoring equipment

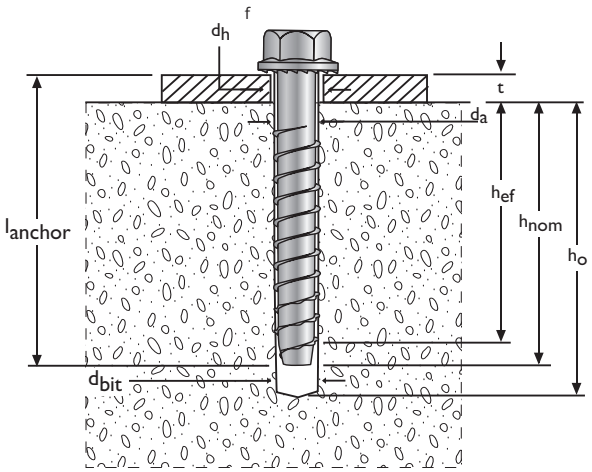
► LIMITATIONS

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

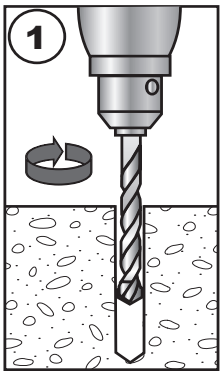
► MATERIAL SPECIFICATIONS

Properties	Carbon Steel
Anchor body	Heat treated carbon steel
Head style	Hex flange head with locking serrations
Corrosion protection	Mechanically galvanized as per ASTM B-695, Class 55, Type 1

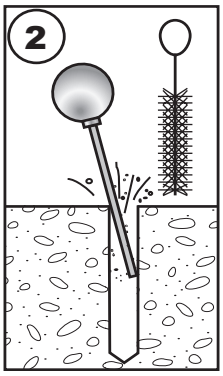
► INSTALLATION INFORMATION



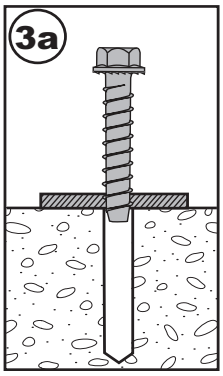
► INSTALLATION INSTRUCTION[1]



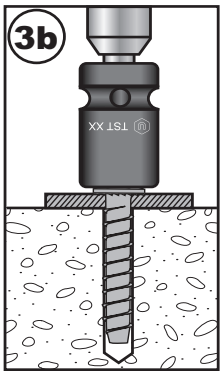
Drill hole to the specified diameter and depth. It is advised to over drill the depth by at least ½". Do not ream the holes.



Blow out dust from the hole



Place the anchor through the fixture



Attach the recommended size TST Torpedo® setter to a 1/2" drive impact wrench, place the setter over the head of the anchor and install. 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- TORPEDO BOLT SCREW ANCHOR INSTALATION INFORMATION[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter	
			3/8-inch	1/2-inch
Nominal Anchor Diameter	d_a	in (mm)	3/8 (9.5)	1/2 (12.7)
Nominal Drill Bit Diameter	d_{bit}	in (mm)	3/8 (9.5)	1/2 (12.7)
Nominal Embedment Depth	h_{nom}	in (mm)	3 (76)	3 (76)
Effective Embedment Depth	h_{ef}	in (mm)	2.30 (58)	2.28 (58)
Minimum Hole Depth	h_{hole}	in (mm)	3 1/4 (83)	3 1/4 (83)
Fixture Hole Diameter	d_f	in (mm)	1/2 (12.7)	5/8 (15.9)
Maximum Installation Torque	$T_{inst,max}$	ft.lb (Nm)	25 (34)	55 (75)
Maximum impact wrench torque rating	$T_{impact.max}$	ft lb (Nm)	380 (515)	380 (515)
Minimum Concrete Thickness	h_{min}	in (mm)	4¾ (121)	4 ½ (114)
Critical Edge Distance	c_{ac}	in (mm)	5 (127)	4 (102)
Minimum Edge Distance	c_{min}	in (mm)	2 (51)	2 (51)
Minimum Spacing	s_{min}	in (mm)	3 (76)	3 (76)

[1]The tabulated data is to be used in conjunction with the design criteria given in ACI 318-(19 and -14) Chapter 17 or ACI 318-11 Appendix D or for Canadian design CSA A23.3-19 Annex D as applicable.

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

Setting information	Symbol	Units	Nominal Anchor Diameter
			3/8" and 1/2"
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 - STRENGTH DESIGN DATA IN CRACKED AND UNCRACKED NORMAL WEIGHT CONCRETE[1,2,3,4]

Characteristic	Symbol	Units	Nominal Anchor Diameter	
			3/8-inch	1/2-inch
Nominal Embedment Depth	h_{nom}	in (mm)	3 (76)	3 (76)
Anchor Category	1, 2 or 3	-	1	1
Steel Strength in Tension and Shear				
Minimum specified ultimate strength	f_{uta}	psi (N/mm^2)	147,000 (1,014)	147,000 (1,014)
Minimum specified yield strength	f_y	psi (N/mm^2)	117,600 (811)	117,600 (811)
Effective stress area (screw anchor body)	A_{se}	in^2 (mm^2)	0.103 (66.5)	0.193 (124.5)
Steel Strength in Tension	N_{sa}	lb (kN)	12875 (57.3)	24,125 (107.3)
Strength Reduction Factor for Steel Failure in Tension	ϕ	-	0.65	0.65
Steel Strength in Shear	V_{sa}	lb (kN)	5517 (24.54)	6.570 (29.2)
Steel Strength in Shear, Seismic	$V_{sa,eq}$	lb (kN)	5517 (24.54)	6.570 (29.2)
Strength Reduction Factor for Steel Failure in Shear	ϕ	-	0.60	0.60
Pullout Strength in Tension[3]				
Pullout Strength in Uncracked Concrete	$N_{p,uncr}$	lb (kN)	-	-
Pullout Strength in Cracked Concrete	$N_{p,cr}$	lb (kN)	-	-
Pullout Strength in Cracked Concrete, Seismic	$N_{p,eq}$	lb (kN)	-	-
Concrete Breakout Strength in Tension				
Effective embedment	h_{ef}	in (mm)	2.30 (58 mm)	2.28 (58)
Effectiveness Factor for Uncracked Concrete	k_{uncr}	-	27	27
Effectiveness Factor for Cracked Concrete	k_{cr}	-	17	17
Strength Reduction Factor for Concrete Breakout Strength in Tension	ϕ	-	0.65	0.65
Axial stiffness in service load range in uncracked concrete	β_{uncr}	lb/inch (N/mm)	246,746 (43,212)	189,880 (33,250)
Axial stiffness in service load range in cracked concrete	β_{cr}	lb/inch (N/mm)	177,965 (31,167)	101,150 (17,715)
Concrete Breakout Strength in Shear				
Nominal Diameter	d_o[2]	in (mm)	3/8 (9.5)	1/2 (12.7)
Load Bearing Length of Anchor	l_e	in (mm)	2.30 (58 mm)	2.28 (58)
Reduction Factor for Concrete Breakout Strength in Shear	ϕ	-	0.70	0.70
Concrete Pryout Strength in Shear				
Coefficient for Pryout Strength	k_{cp}	-	1.0	1.0
Reduction Factor for Pryout Strength in Shear	ϕ	-	0.70	0.70

[1]The tabulated data is to be used in conjunction with the design criteria given in ACI 318(-19 and -14) Chapter 17 or ACI 318-11 Appendix D, as applicable.

[2]All values of ϕ were determined from the load combinations of 2021 IBC Section 1605.1, 2018, 2015 and 2012 IBC Section 1605.2, ACI 318 (-19 and -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable. If the load combinations of ACI 318-11Appendix C are used, then the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4. For reinforcement that meets ACI 318 (-19 and -14) Chapter 17 or ACI 318 Appendix D, as applicable, requirements for Condition A, see ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for the appropriate ϕ factor when the load combinations of 2021 IBC Section 1605.1 or 2018, 2015 and 2012 IBC Section 1605.2, ACI 318(-19 and -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used.

[3]Where no value is reported for pullout strength, this resistance does not need to be considered.

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