TORQ-CUT™ *Self-Undercutting Anchor for Cracked and Uncracked Concrete*

TESTED TO MEET IBC® 2006

SIMPSON StrongTie ANCHOR SYSTEMS

The Torq-Cut™ self-undercutting anchor is a heavy-duty, high-capacity anchor designed and tested for use in cracked and uncracked concrete under static and seismic loading conditions. It is designed to meet the requirements that the 2006 IBC places on post-installed anchors. The built in ring with hardened cutters expands with installation torque forming undercut grooves in the concrete. This interlocking connection between the anchor and the concrete provides superior load carrying capacity.

FEATURES:

- Self-undercutting feature provides higher load carrying capacity than conventional mechanical anchors
- AC193 code tested to ensure outstanding performance in both cracked and uncracked concrete
- Excellent for resisting seismic and vibratory loads
- Suitable for seismic applications categories A-F
- Ductile steel rod provides consistent, reliable performance
- Specially designed, low-friction wedge cone minimizes binding and speeds installation
- Installs just like a conventional wedge anchor, no special tool, drill bit, or secondary drilling is required
- The head is stamped with the Simpson Strong-Tie® "≠" sign and size ID for easy post installation identification

MATERIAL: ASTM A193 grade B7 or B7M rod with SAE J403 grade 1144 expansion clip and cone

FINISH: Zinc plated

CODES: ICC-ES pending

⚠ The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

TEST CRITERIA: The Torq-Cut anchor has been tested in accordance with ICC-ES's *Acceptance Criteria for Mechanical Anchors in Concrete Elements* (AC193) and ACI 355.2 for the following:

- Static tension and shear loading in cracked and uncracked concrete
- Seismic and wind loading in cracked and uncracked concrete
- Performance in cracked concrete

INSTALLATION:

⚠ Caution: Oversized holes in the base material will make it difficult to set the anchor and will reduce the anchor's load capacity.

- Do not use an impact wrench to set or tighten the Torq-Cut™ anchor.

Installation Instructions: Pre-Set Version

- Drill a hole in the base material to the specified embedment depth using the appropriate diameter carbide drill bit specified for each diameter.
- Blow the hole clean using compressed air.
- Assemble the anchor with nut and washer and finger tighten nut so all components are snug (spacer sleeve, expansion sleeve and cone). The bottom of the threaded rod should be flush with the bottom of the cone.
- Place the anchor into the drilled hole and use a hammer and setting tube* to drive the anchor until the washer and nut are tight against the surface of the base material.
- Remove the nut and washer and install the fixture. Re-assemble the nut and washer over the fixture.
- Tighten to the required installation torque.

Installation Instructions: Through-Set Version

- Drill a hole in the base material to the specified embedment depth using the appropriate diameter carbide drill bit specified for each diameter.
- Blow the hole clean using compressed air.
- Assemble the anchor with nut and washer and finger tighten nut so all components are snug (spacer sleeve, expansion sleeve and cone). The bottom of the threaded rod should be flush with the bottom of the cone.
- Place the anchor through the fixture and into the drilled hole. Use a hammer and setting tube* to drive the anchor until the washer and nut are tight against the fixture.
- Tighten to the required installation torque.

APPLICATION:

- Interior environment where low levels of moisture and corrosive chemicals are present

SUGGESTED SPECIFICATIONS:

Self-undercutting anchors shall have an expansion ring with undercutting teeth which expands by tightening the nut that pushes the ring into a cone expander via a spacer sleeve. The anchor shall have been tested and qualified for performance in cracked and uncracked concrete per ACI 355.2 and ICC-ES AC193. Undercut anchor shall be the Torq-Cut™ self-undercutting anchor from Simpson Strong-Tie, Pleasanton, CA, and be installed following the Simpson Strong-Tie instructions.

Torq-Cut™ Self-Undercutting Anchor
U.S. Patent 7,357,613

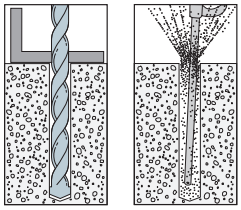
NEW

(Call for availability)

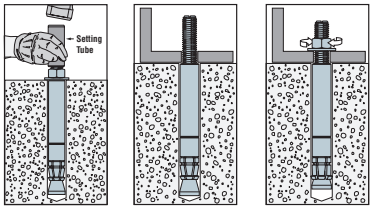
ANCHOR DESIGNER ACI 318 Software Supported

(Check latest software version or www.simpsonanchors.com for available support)

Installation Sequence



Pre-Set



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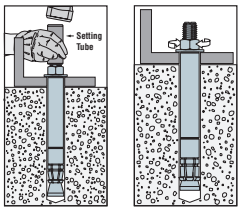


*Setting tube is a metal spacer tube that prevents damage to the threaded portion of the anchor when the anchor is driven into the hole with a hammer. One setting tube is included with every box of anchors.

Torq-Cut™ Anchor Installation Data

Nominal Anchor Dia (in)	3/8	1/2	5/8	3/4
Drill Bit Size (in)	5/8	7/8	1	1 1/4
Min. Fixture Hole Dia Pre-Set (in)	7/16	9/16	11/16	13/16
Min. Fixture Hole Dia Through-Set (in)	11/16	15/16	1 1/16	1 5/16
Wrench Size (in)	9/16	3/4	15/16	1 1/8

Torq-Cut™ Anchor Product Data, Pre-Set Version

Size (in.)	Model No.	Drill Bit Dia. (in.)	Min. Hole Depth (A) (in.)	Base of Anchor to Top of Sleeve (B) (in.)	Max. Fixture Thickness (C) (in.)	Min. Fixture Hole Dia. (in.)	Threaded Rod Length (D) (in.)	Quantity	
								Box	Carton
⅜ x 6	TCAP370600	⅝	5	4.6	¾	7/16	6	10	4
½ x 8¾	TCAP500834	⅞	7	6.6	1¼	9/16	8¾	5	2
½ x 9½	TCAP500912	⅞	7	6.6	2	9/16	9½	5	2
⅝ x 11½	TCAP621112	1	9.5	8.9	1½	11/16	11½	4	2
⅝ x 12½	TCAP621212	1	9.5	8.9	2½	11/16	12½	4	2
¾ x 14⅝	TCAP751458	1¼	12	11.4	2	13/16	14⅝	2	2
¾ x 16⅝	TCAP751658	1¼	12	11.4	4	13/16	16⅝	2	2

1. See detail below

Torq-Cut™ Anchor Product Data, Through-Set Version

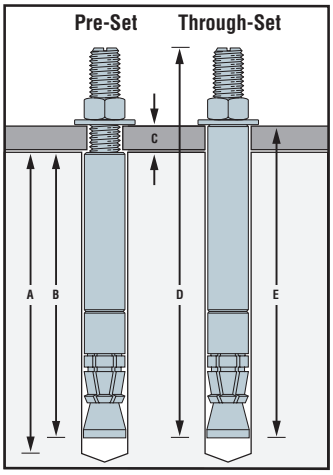
Size (in.)	Model No.	Drill Bit Dia. (in.)	Min. Hole Depth (A) (in.)	Base of Anchor to Top of Sleeve (E) (in.)	Max. Fixture Thickness (C) (in.)	Min. Fixture Hole Dia. (in.)	Threaded Rod Length (D) (in.)	Quantity	
								Box	Carton
⅜ x 6	TCAT370600	⅝	5	5.4	¾	11/16	6	10	4
½ x 8¾	TCAT500834	⅞	7	7.9	1¼	15/16	8¾	5	2
½ x 9½	TCAT500912	⅞	7	8.6	2	15/16	9½	5	2
⅝ x 11½	TCAT621112	1	9.5	10.4	1½	1 1/16	11½	4	2
⅝ x 12½	TCAT621212	1	9.5	11.4	2½	1 1/16	12½	4	2
¾ x 14⅝	TCAT751458	1¼	12	13.4	2	1 5/16	14⅝	2	2
¾ x 16⅝	TCAT751658	1¼	12	15.4	4	1 5/16	16⅝	2	2

1. See detail below

Torq-Cut™ Anchor Material Specifications

Carbon Steel Component Materials					
Threaded Rod	Nut	Washer	Spacer Sleeve	Expansion Sleeve	Cone
ASTM A193[1]	SAE J995, Grade 8	ASTM F436, Type 1	AISI 1045 Steel	SAE J403 Grade 1144 Steel	SAE J403 Grade 1144 Steel
Zinc Plated ASTM B633 SC1	Commercial Zinc	Commercial Zinc	Zinc Plated ASTM B633 SC1	Zinc Plated ASTM B633 SC1	Zinc Plated ASTM B633 SC1

1. 3/8" TCA uses ASTM A193 Grade B7 rod. 1/2", 5/8" and 3/4" TCA uses ASTM A193 Grade B7M rod.



Dimensions A, B, C, D, E

Torq-Cut™ Anchor Installation and Additional Data[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			3/8	1/2	5/8	3/4
Installation Information						
Drill Bit Diameter	d	in.	5/8	7/8	1	1 1/4
Minimum Baseplate Clearance Hole Diameter	d_c	in.	1 1/16	1 5/16	1 1/16	1 5/16
Installation Torque	T_{inst}	ft-lb	55	90	185	240
Embedment Depth	h_{nom}	in.	5	7	9 1/2	12
Critical Edge Distance	c_{ac}	in.	6	8 5/8	12	15 3/8
Minimum Edge Distance	c_{min}	in.	6	7	10	7 3/4
Minimum Spacing	s_{min}	in.	6	7	9	7 3/4
Minimum Concrete Thickness	h_{min}	in.	6	8 5/8	12	15 3/8
Additional Data						
Anchor Category	category	—	1	1	1	1
Yield Strength	f_{ya}	ksi	105	80	80	80
Tensile Strength	f_{uta}	ksi	125	100	100	100
Minimum Tensile and Shear Stress Area	A_{se}	in^2	0.078	0.142	0.226	0.334
Axial Stiffness in Service Load Range – uncracked concrete	β_{uncr}	lb/in.	635,830			
Axial Stiffness in Service Load Range - cracked concrete	β_{cr}	lb/in.	346,694			

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D.

Torq-Cut™ Anchor Characteristic Tension Design Data[1,6]

*See page 10 for an explanation of the load table icons

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			3/8	1/2	5/8	3/4
Embedment Depth	h_{nom}	in.	5	7	9 1/2	12
Steel Strength in Tension						
Nominal Steel Strength in Tension	N_{sa}	lb.	9,690	14,190	22,600	33,450
Strength Reduction Factor – Steel Failure	ϕ	—	0.75[2]	0.75[2]	0.75[2]	0.75[2]
Concrete Breakout Strength in Tension[6]						
Effective Embedment Depth	h_{ef}	in.	4	5 3/4	8	10 1/4
Critical Edge Distance[4]	c_{ac}	in.	6	8 5/8	12	15 3/8
Effectiveness Factor – Uncracked Concrete	k_{uncr}	—	30	30	30	24
Effectiveness Factor – Cracked Concrete	k_{cr}	—	24	24	24	24
Ratio of k_{uncr}/k_{cr}	$\psi_{c,N}$	—	1.25	1.25	1.25	1.00
Strength Reduction Factor – Concrete Breakout Failure	ϕ	—	0.65[5]	0.65[5]	0.65[5]	0.65[5]
Pullout Strength in Tension[7]						
Nominal Pullout Strength Uncracked Concrete	$N_{pn,uncr}$	lb	—[3]	—[3]	—[3]	—[3]
Nominal Pullout Strength Cracked Concrete	$N_{pn,cr}$	lb	—[3]	—[3]	—[3]	—[3]
Strength Reduction Factor - Pullout Failure	ϕ	—	—[3]	—[3]	—[3]	—[3]
Tension Resistance for Seismic Applications[7]						
Tension Resistance - Seismic Loads	N_{eq}	lb	9,690	14,190	22,600	33,450
Strength Reduction Factor – Steel Failure	ϕ	—	0.75[2]	0.75[2]	0.75[2]	0.75[2]

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 D4.5 to determine the appropriate value of ϕ. Anchors are considered ductile steel elements.
3. Pullout strength is not reported since steel failure controls.
4. The modification factor $\psi_{cp,N} = 1.0$ for cracked concrete. Otherwise, the modification factor for uncracked concrete without supplementary reinforcement to control splitting is either: (1) $\psi_{cp,N} = 1.0$ if $c_{a,min} \geq c_{ac}$ or (2) $\psi_{cp,N} = c_{a,min} / c_{ac} \geq 1.5h_{ef} / c_{ac}$ if $c_{a,min} < c_{ac}$. The modification factor, $\psi_{cp,N}$ is applied to the nominal concrete breakout strength, N_{cb} or N_{cbg}.
5. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition A are met, refer to Section D4.4 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of ϕ.
6. For sand-lightweight concrete, in lieu of ACI 318 Section D.3.4, modify the value of N_n by multiplying all values of $\sqrt{f'_c}$ affecting N_n by 0.60. All-lightweight concrete is beyond the scope of this table.
7. For sand-lightweight concrete, modify the value of $N_{pn,cr}$, $N_{pn,uncr}$ and N_{eq} by 0.60. All-lightweight concrete is beyond the scope of this table.

Torq-Cut™ Characteristic Shear Design Data[1,5]

*See page 10 for an explanation of the load table icons

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			⅜	½	⅝	¾
Embedment Depth	h_{nom}	in.	5	7	9½	12
Steel Strength in Shear						
Nominal Steel Strength in Shear	V_{sa}	lb.	5,815	8,515	13,560	20,070
Strength Reduction Factor – Steel Failure	ϕ	—	0.65[2]			
Concrete Breakout Strength in Shear[5]						
Outside Diameter	d_o	in.	⅝	⅞	1	1¼
Load Bearing Length of Anchor in Shear	ℓ_e	in.	4	5¾	8	10
Strength Reduction Factor – Concrete Breakout Failure	ϕ	—	0.70[3]			
Concrete Pryout Strength in Shear						
Coefficient for Pryout Strength	k_{cp}	—	2.0	2.0	2.0	2.0
Strength Reduction Factor – Concrete Pryout Failure	ϕ	—	0.70[4]			
Steel Strength in Shear for Seismic Applications						
Nominal Steel Strength in Shear for Seismic Loads	V_{eq}	lb	5,815	8,515	13,560	20,070
Strength Reduction Factor – Steel Failure	ϕ	—	0.65[2]			

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 D4.5 to determine the appropriate value of ϕ. Anchors are considered ductile steel elements
3. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition A are met, refer to Section D4.4 to determine the appropriate value of ϕ. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of ϕ.
4. The value of ϕ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of ϕ.
5. For sand-lightweight concrete, in lieu of ACI 318 Section D.3.4, modify the value of V_n by multiplying all values of $\sqrt{f'_c}$ affecting V_n by 0.60. All-lightweight concrete is beyond the scope of this table.