



## EVALUATION SUBJECT:

### TITEN TURBO™ SCREW ANCHORS FOR USE IN UNCRACKED CONCRETE

## REPORT HOLDER:

### SIMPSON STRONG-TIE COMPANY INC.

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## CSI Section:

03 15 19 Cast-in Concrete Anchors

05 05 19 Post-installed Concrete Anchors

## 1.0 SCOPE OF EVALUATION

### 1.1 Compliance to the following codes & regulations:

- 2021, 2018, 2015, 2012, and 2009 International Building Code® (IBC)
- 2021, 2018, 2015, 2012, and 2009 International Residential Code® (IRC)
- 2023 City of Los Angeles Building Code (LABC) – attached supplement
- 2023 City of Los Angeles Residential Code (LARC) – attached supplement

### 1.2 Evaluated in accordance with:

- ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193)

### 1.3 Properties assessed:

- Structural

## 2.0 PRODUCT USE

Simpson Strong-Tie® Titen Turbo™ Screw Anchors are used to resist static and wind tension and shear loads in uncracked normalweight concrete having a specified compressive strength,  $f'_c$ , of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa). The anchoring system is an alternative to anchors described in Section 1901.3 of the 2021, 2018, and 2015 IBC; Sections 1908 and 1909 of the 2012 IBC; and Sections 1911 and 1912 of the 2009 IBC. The anchors may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

## 3.0 PRODUCT DESCRIPTION

### 3.1 Titen Turbo™ Screw Anchors:

The Titen Turbo™ Screw Anchors are post-installed anchors that derive their holding strength from the mechanical interlock of the screw anchor threads with the grooves cut into the concrete by the screw anchor during installation. The screw anchors are manufactured from carbon steel that is given a supplementary hardening process. The screw anchors are available in nominal sizes of 3/16 inch and 1/4 inch (4.8 mm and 6.4 mm) and in a variety of lengths. The Titen Turbo™ Screw Anchors are available with either a slotted hex head, a flat head, or a trim head as shown in Figure 1 of this report. All Titen Turbo™ Screw Anchors are provided with a zinc plating and baked ceramic coating.

### 3.2 Concrete

Normalweight and light-weight concrete shall conform to Sections 1901 and 1903 of the 2021, 2018, 2015, and 2012 IBC or Sections 1903 and 1905 of the 2009 IBC. The specified compressive strength of the concrete,  $f'_c$ , shall be from 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

## 4.0 DESIGN AND INSTALLATION

### 4.1 Strength Design

**4.1.1 General:** The design strength of anchors under the 2021 IBC and Section R301.1.3 of the 2021 IRC shall be determined in accordance with ACI 318-19 as amended in IBC Section 1905 and this report. The design strength of anchors under the 2018 and 2015 IBC and Section R301.1.3 of the 2018 and 2015 IRC shall be determined in accordance with ACI 318-14 as amended in IBC Section 1905 and this report. The design strength of anchors under the 2012 and 2009 IBC and Section R301.1.3 of the 2012 and 2009 IRC shall be determined in accordance with ACI 318-11 Appendix D and this report.

Design parameters are based on ACI 318-19 for use with the 2021 IBC, ACI 318-14 for use with the 2018 and 2015 IBC, and ACI 318-11 for use with the 2012 and 2009 IBC unless noted otherwise in Sections 4.1.1 through 4.1.11 of this report.

The strength design of anchors shall conform to the requirements of ACI 318-19 and ACI 318-14 Section 17.3.1 except as required for seismic design in ACI 318-19 Section 17.5.2.5, ACI 318-14 Section 17.2.3; or ACI 318-11 Section D.4.1, except as required for seismic design in ACI 318-11 Section D.3.3.



Strength reduction factors,  $\phi$ , described in ACI 318-19 Section 17.5.2, ACI 318-14 Section 17.3.3, or ACI 318-11 Section D.4.3, and noted in [Tables 3](#) and [4](#) of this report, shall be used for load combinations calculated in accordance with Section [1605.1](#) of the 2021 IBC, Section [1605.2](#) of the 2018, 2015, 2012 or 2009 IBC, ACI 318-19 or -14 Section 5.3, and ACI 318-11 Section 9.2. Strength reduction factors,  $\phi$ , described in ACI 318-11 Section D.4.4 shall be used for load combinations calculated in accordance with Appendix C of ACI 318-11. Construction documents shall include the information specified in ACI 318-19 Section 26.7, ACI 318-14 Sections 17.7.7 and 26.7, or ACI 318-11 Sections 1.2 and D.8.7.

**4.1.2 Static Steel Strength in Tension:** The nominal steel strength of a single anchor in tension,  $N_{sa}$ , in accordance with ACI 318-19 Section 17.6.1.2, ACI 318-14 Section 17.4.1.2 or ACI 318-11 Section D.5.1.2, and the corresponding strength reduction factors,  $\phi$ , corresponding to a brittle steel element in accordance with ACI 318-19 Section 17.5.3, ACI 318-14 Section 17.3.3, or ACI 318-11 Section D.4.3, are provided in [Table 3](#) of this report for each anchor type referenced in this report.

**4.1.3 Static Concrete Breakout Strength in Tension:** The nominal static concrete breakout strength of a single anchor or group of anchors in tension,  $N_{cb}$  or  $N_{cbg}$ , shall be calculated in accordance with ACI 318-19 Section 17.6.2, ACI 318-14 Section 17.4.2, or ACI 318-11 Section D.5.2. The nominal concrete breakout strength in tension in regions of the concrete where analysis indicates no cracking in accordance with ACI 318-19 Section 17.6.2.5, ACI 318-14 Section 17.4.2.6, or ACI 318-11 Section D.5.2.6, shall be calculated using  $k_{uncr}$  given in [Table 3](#) and where  $\Psi_{c,N} = 1.0$ . The value of  $f'_c$  used for calculation purposes shall be limited to 8,000 psi (55.1 MPa) maximum in accordance with ACI 318-19 Section 17.3.1, ACI 318-14 Section 17.2.7, or ACI 318-11 Section D.3.7.

**4.1.4 Static Pullout Strength in Tension:** The nominal pullout strength of a single anchor in tension in accordance with ACI 318-19 Sections 17.6.3.1, ACI 318-14 Sections 17.4.3.1 and 17.4.3.2 or ACI 318-11 Sections D.5.3.1 and D.5.3.2 in uncracked concrete,  $N_{p,uncr}$ , is given in [Table 3](#) of this report. For all design cases,  $\Psi_{c,P} = 1.0$ . The nominal pullout strength may be adjusted for concrete strengths as follows:

$$\begin{aligned} \text{For 3/16'' anchors: } N_{p,f'c} &= N_{p,uncr}(f'_c/2500)^{0.0} \\ \text{For SI: } N_{p,f'c} &= N_{p,uncr}(f'_c/17.2)^{0.0} \end{aligned}$$

$$\begin{aligned} \text{For 1/4'' anchors: } N_{p,f'c} &= N_{p,uncr}(f'_c/2500)^{0.23} \\ \text{For SI: } N_{p,f'c} &= N_{p,uncr}(f'_c/17.2)^{0.23} \end{aligned}$$

Where  $f'_c$  is the specified concrete compression strength.

**4.1.5 Static Steel Strength in Shear:** The nominal static steel strength of a single anchor in shear as governed by the steel,  $V_{sa}$ , and the corresponding strength reduction factor for

a brittle steel element,  $\phi$ , complying with ACI 318-19 Section 17.7.1.2, ACI 318-14 Sections 17.5.1.2 and 17.3.3 or ACI 318-11 Sections D.6.1.2 and D.4.3 respectively, are given in [Table 4](#) of this report and shall be used in lieu of the values derived by calculation from ACI 318-19 Eq. 17.7.1.2a, ACI 318-14 Eq. 17.5.1.2b or ACI 318-11 Eq. D-29.

**4.1.6 Static Concrete Breakout Strength in Shear:** The nominal static concrete breakout strength of a single anchor or group of anchors in shear,  $V_{cb}$ , or  $V_{cbg}$ , shall be calculated in accordance with ACI 318-19 Section 17.7.2, ACI 318-14 Section 17.5.2 or ACI 318-11 Section D.6.2, based on the information given in [Table 4](#) of this report. The basic concrete breakout strength of a single anchor in shear,  $V_b$ , shall be calculated in accordance with ACI 318-19 Section 17.7.2.2, ACI 318-14 Section 17.5.2.2, or ACI 318-11 Section D.6.2.2 using the values given in [Table 4](#) of this report. In addition,  $h_{ef}$  shall replace  $l_e$  in ACI 318-19 Eq. 17.7.2.2.1a, ACI 318-14 Eq. 17.5.2.2a, or ACI 318-11 Eq. D-33 and in no case shall  $h_{ef}$  exceed  $8d_a$ . The value of  $f'_c$  used for calculation purposes shall be limited to 8,000 psi (55.1 MPa) maximum in accordance with ACI 318-19 Section 17.3.1, ACI 318-14 Section 17.2.7, or ACI 318-11 Section D.3.7.

**4.1.7 Static Concrete Pryout Strength in Shear:** The nominal static pryout strength of a single anchor or group of anchors in shear,  $V_{cp}$ , or  $V_{cpg}$ , shall be calculated in accordance with ACI 318-19 Section 17.7.3, ACI 318-14 Section 17.5.3 or ACI 318-11 Section D.6.3, using the value of  $k_{cp}$ , described in [Table 4](#), and the values of  $N_{cb}$  or  $N_{cbg}$ , as calculated in Section 4.1.3 of this report.

**4.1.8 Interaction of Tensile and Shear Forces:** For designs that include combined tension and shear, the interaction of tension and shear loads shall be calculated in accordance with ACI 318-19 Section 17.8, ACI 318-14 Section 17.6 or ACI 318-11 Section D.7.

**4.1.9 Minimum Member Thickness  $h_{min}$ , Minimum Anchor Spacing,  $s_{min}$ , and Minimum Edge Distance,  $c_{min}$ :** In lieu of ACI 318-19 Section 17.9.2, ACI 318-14 Sections 17.7.1 and 17.7.3 or ACI 318-11 Sections D.8.1 and D.8.3, values of  $c_{min}$  and  $s_{min}$  used for anchor design and installation shall conform to the values provided in [Table 2](#) of this report. In lieu of ACI 318-19 Section 17.9.4, ACI 318-14 Section 17.7.5, or ACI 318-11 Section D.8.5, the minimum member thicknesses,  $h_{min}$ , shall be in accordance with [Table 2](#) of this report.

**4.1.10 Critical Edge Distance,  $c_{ac}$ :** In applications where  $c < c_{ac}$  and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength in tension for uncracked concrete, calculated in accordance with ACI 318-19 Section 17.6.2, ACI 318-14 Section 17.4.2 or ACI 318-11 Section D.5.2 shall be further multiplied by the factor  $\Psi_{cp,N}$  as follows:



$$\Psi_{cp, N} = c/c_{ac}$$

whereby the factor  $\Psi_{cp, N}$  need not be taken as less than  $1.5h_{ef}/c_{ac}$ . For all other cases,  $\Psi_{cp, N} = 1.0$ . In lieu of ACI 318-19 Section 17.9.5, ACI 318-14 Section 17.7.6, or ACI 318-11 Section D.8.6, the values for critical edge distance,  $c_{ac}$ , shall be taken from [Table 2](#) of this report.

**4.1.11 Lightweight Concrete:** For the use of anchors in lightweight concrete, the modification factor  $\lambda_a$  equal to 0.8  $\lambda$  is applied to all values of  $\sqrt{f'_c}$  affecting  $N_n$  and  $V_n$ . For ACI 318-19 (2021 IBC), ACI 318-14 (2018 and 2015 IBC), ACI 318-11 (2012 IBC), and ACI 318-08 (2009 IBC),  $\lambda$  shall be determined in accordance with the corresponding version of ACI 318.

## 4.2 Allowable Stress Design (ASD)

**4.2.1 General:** For anchors designed using ASD load combinations in accordance with 2021 IBC Sections 1605.1 and [1605.2](#), 2018, 2015, 2012, and 2009 IBC Section [1605.3](#), allowable loads shall be established using Eq. (4-1) or Eq. (4-2), as follows:

$$T_{\text{allowable, ASD}} = \phi N_n / \alpha \quad \text{Eq. (4-1)}$$

$$V_{\text{allowable, ASD}} = \phi V_n / \alpha \quad \text{Eq. (4-2)}$$

Where:

$T_{\text{allowable, ASD}}$  = Allowable tension load (lb or kN)

$V_{\text{allowable, ASD}}$  = Allowable shear load (lb or kN)

$\phi N_n$  = The lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318-19 and -14 Chapter 17 or ACI 318-11 Appendix D as amended in Section [4.1](#) of this report.

$\phi V_n$  = The lowest design strength of an anchor or group in shear as determined in accordance with ACI 318-19 and -14 Chapter 17 or ACI 318-11 Appendix D as amended in Section [4.1](#) of this report.

$\alpha$  = Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition,  $\alpha$  shall include all applicable factors to account for non-ductile failure modes and required over-strength.

The requirements for member thickness, edge distance, and spacing, described in [Table 2](#) of this report, shall apply.

**4.2.2 Interaction of Tension and Shear Forces:** In lieu of ACI 318-19 Sections 17.8.1, 17.8.2, and 17.8.3; ACI 318-14 Sections 17.6.1, 17.6.2, and 17.6.3; or ACI 318-11 Sections

D.7.1, D.7.2, and D.7.3, the interaction of tension and shear loads shall be calculated as follows:

**17.6.1 (D.7.1):** If  $V_{\text{applied}} \leq 0.2 V_{\text{allowable, ASD}}$  for the governing strength in shear, then the full allowable strength in tension,  $T_{\text{allowable, ASD}}$ , shall be permitted.

**17.6.2 (D.7.2):** If  $T_{\text{applied}} \leq 0.2 T_{\text{allowable, ASD}}$  for the governing strength in tension, then the full allowable strength in shear,  $V_{\text{allowable, ASD}}$ , shall be permitted.

**17.6.3 (D.7.3):** If  $V_{\text{applied}} > 0.2 V_{\text{allowable, ASD}}$  for the governing strength in shear and  $T_{\text{applied}} > 0.2 T_{\text{allowable, ASD}}$  for the governing strength in tension, then:

$$T_{\text{applied}} / T_{\text{allowable, ASD}} + V_{\text{applied}} / V_{\text{allowable, ASD}} \leq 1.2 \text{ Eq. (4-3)}$$

## 4.3 Installation

Installation parameters are provided in [Table 2](#) of this report. The Titen Turbo™ Screw Anchors shall be installed in accordance with the manufacturer's published instructions and this report. Screw anchor locations shall comply with this report and the plans and specifications approved by the building official. Screw anchors shall be installed in holes drilled using carbide-tipped drill bits conforming to [ANSI B212.15-1994](#) and [Table 2](#) of this report. The hole shall be drilled to the minimum depth noted in [Table 2](#) of this report. Dust and debris in the hole are not required to be removed prior to screw anchor installation. The screw anchor shall be driven into the predrilled hole using a cordless impact driver or cordless drill with a Titen Turbo™ drive adaptor.

## 4.4 Special Inspection

Special inspection is required in accordance with 2021, 2018, 2015, and 2012 IBC Sections [1705.1](#) and [1705.3](#) or 2009 IBC Sections [1704.4](#) and [1704.15](#) and this report. The special inspector shall make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete compressive strength, hole dimensions, drill bit size, anchor spacing, edge distances, concrete thickness, anchor embedment, and adherence to the manufacturer's published installation instructions. The special inspector shall be present as often as required in accordance with the "statement of inspection."

## 5.0 LIMITATIONS

The Simpson Strong-Tie® Titen Turbo™ Screw Anchors described in this report are suitable alternatives to what is specified in the codes listed in Section [1.0](#) of this report, subject to the following limitations:

**5.1** Titen Turbo™ Screw Anchors shall be installed in accordance with the manufacturer's published installation instructions and this report as shown in [Figure 2](#) of this report. Where conflicts between this report and the published



installation instructions occur, the more restrictive shall prevail.

**5.2** Screw anchor sizes, dimensions, and minimum embedment depths are as set forth in this report.

**5.3** The screw anchors shall be installed in uncracked normalweight concrete and lightweight concrete having a specified compressive strength of  $f'_c = 2,500$  psi to 8,500 psi (17.2 MPa to 58.6 MPa).

**5.4** The values of  $f'_c$  used for calculation purposes shall not exceed 8,000 psi (55.1 MPa).

**5.5** Screw anchors shall be installed in concrete base materials in holes predrilled with carbide-tipped drill bits complying with ANSI B212.15-1994 in accordance with the installation details shown in [Table 2](#) of this report.

**5.6** Strength design values shall be established in accordance with Section [4.1](#) of this report.

**5.7** Allowable design values shall be established in accordance with Section [4.2](#) of this report.

**5.8** Minimum anchor spacing, minimum edge distance, minimum member thickness, critical spacing, and minimum critical edge distance shall comply with the values described in this report.

**5.9** Prior to installation, calculations, and details demonstrating compliance with this report shall be submitted to the building official. The calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

**5.10** Since an evaluation criteria for evaluating data to determine the performance of anchors subjected to fatigue or shock loading is unavailable at this time, the use of these anchors under such conditions is beyond the scope of this report.

**5.11** Screw anchors shall not be installed in regions of concrete where cracking has occurred or where analysis indicates cracking may occur ( $f_t > f_{cr}$ ), subject to the conditions of this report.

**5.12** Screw anchors used to resist short-term loads due to wind and seismic load combinations are limited to locations designated as Seismic Design Categories A and B under the IBC, subject to the conditions of this report. The use of anchors in structures assigned to Seismic Design Categories C, D, E, or F is beyond the scope of this report.

**5.13** Screw anchors shall not be used to support fire-resistive construction. Where not otherwise prohibited in the IBC or

IRC, Titen Turbo™ Screw Anchors are permitted for installation in fire-resistive construction provided at least one of the following conditions are met.

- Anchors are used to resist wind or seismic forces only.
- Anchors that support gravity load-bearing structural elements are within a fire-resistive envelope or a fire-resistive membrane, are protected by approved fire-resistive materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.

**5.14** Use of screw anchors is limited to dry, interior locations.

**5.15** Screw anchors have been evaluated for reliability against brittle failure and found to be not significantly sensitive to stress-induced hydrogen embrittlement.

**5.16** Special inspection shall be provided in accordance with Section [4.4](#) of this report.

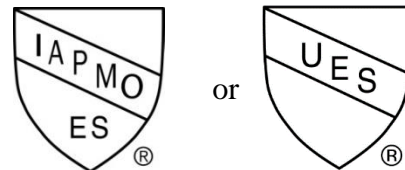
**5.17** Titen Turbo™ Screw Anchors are manufactured under an approved quality control program.

## 6.0 SUBSTANTIATING DATA

Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), approved October 2017, editorially revised December 2020. Test reports are from laboratories in compliance with [ISO/IEC 17025](#).

## 7.0 IDENTIFICATION

Titen Turbo™ Screw Anchors are identified in the field by labels on the packaging, bearing the company name (Simpson Strong-Tie Company, Inc.), product name (Titen Turbo™), the anchor diameter and length, catalog number, and the evaluation report number (ER-712). In addition, the ≠ symbol and a length identification code letter are stamped on the head of each screw anchor. Either IAPMO UES Mark of Conformity may also be used.



## IAPMO UES ER-712

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)





**TABLE 1**  
**LENGTH IDENTIFICATION HEAD MARKS ON TITEN TURBO™ SCREW ANCHORS**  
**(CORRESPONDS TO ANCHOR LENGTH IN INCHES)**

Length ID marking on the head		-	A	B	C	D	E	F	G	H	I	J
Length of anchor (inch)	From	1	1½	2	2½	3	3½	4	4½	5	5½	6
	Up to, but not including	1½	2	2½	3	3½	4	4½	5	5½	6	6½

For SI: 1 inch = 25.4 mm

**TABLE 2**  
**TITEN TURBO™ SCREW ANCHOR INSTALLATION INFORMATION<sup>1</sup>**

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL SCREW ANCHOR DIAMETER (inch)	
			3/16	¼
Nominal Outside Diameter (shank)	d <sub>a</sub>	in	0.129	0.164
Drill Bit Diameter	d <sub>bit</sub>	in	5/32	3/16
Nominal Embedment depth	h <sub>nom</sub>	in	1¾	1¾
Effective Embedment depth	h <sub>ef</sub>	in	1.25	1.20
Minimum Concrete Thickness	h <sub>min</sub>	in	3¼	3¼
Critical Edge Distance	c <sub>ac</sub>	in	3	3
Minimum Edge Distance	c <sub>min</sub>	in	1¾	1¾
Minimum Spacing Distance	s <sub>min</sub>	in	1	2
Minimum Hole Depth	h <sub>hole</sub>	in	2¼	2¼
Maximum Installation Torque	T <sub>inst,max</sub>	ft-lb	Not applicable <sup>2</sup>	Not applicable <sup>2</sup>
Maximum Impact Wrench Torque Rating	T <sub>impact,max</sub>	ft-lb	Not applicable <sup>2</sup>	Not applicable <sup>2</sup>

For SI: 1 inch = 25.4 mm, 1 ft-lb = 1.36 N-m

<sup>1</sup> The information presented in this table is to be used in conjunction with the design criteria of ACI 318-19, [ACI 318-14](#) Chapter 17, or [ACI 318-11](#) Appendix D, as applicable.

<sup>2</sup> Installation shall be performed with a Simpson Titen Turbo Drive Adaptor. Section [4.3](#) of this report provides additional information.



**TABLE 3**  
**TITEN TURBO™ SCREW ANCHOR CHARACTERISTIC TENSION STRENGTH DESIGN VALUES<sup>1</sup>**

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL SCREW ANCHOR DIAMETER (inch)	
			3/16	1/4
Anchor Category	1, 2, or 3	-	1	1
Nominal Embedment Depth	$h_{nom}$	in	1 <sup>3/4</sup>	1 <sup>3/4</sup>
<b>Steel Strength in Tension</b>				
Minimum Specified Yield Strength	$f_{ya}$	Psi	100,000	100,000
Minimum Specified Ultimate Strength	$f_{uta}$	Psi	125,000	125,000
Effective Tensile Stress Area	$A_{se}$	in <sup>2</sup>	0.0131	0.0211
Steel Strength in Tension	$N_{sa}$	Lbf	1640	2640
Strength Reduction Factor – Steel Failure <sup>2</sup>	$\phi_{sa}$	-	0.65	0.65
<b>Concrete Breakout in Tension</b>				
Effective Embedment	$h_{ef}$	in	1.25	1.20
Critical Edge Distance	$c_{ac}$	in	3	3
Effectiveness Factor for Uncracked Concrete	$k_{unscr}$	-	24	24
Modification Factor	$\Psi_{c,N}$	-	1	1
Strength Reduction Factor-Concrete Breakout Failure <sup>3</sup>	$\phi_{cb}$	-	0.65	0.65
<b>Pullout Strength in Tension</b>				
Pullout Resistance in Uncracked Concrete ( $f'_c=2500$ psi) <sup>5</sup>	$N_{p,unscr}$	Lbf	1515	1515
Strength Reduction Factor – Pullout Failure <sup>4</sup>	$\phi_p$	-	0.65	0.65

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 6.895 kPa

<sup>1</sup> The information presented in this table is to be used in conjunction with the design criteria of ACI 318-19 and ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable.

<sup>2</sup> The tabulated value of  $\phi_{sa}$  applies when the load combinations of Section 1605.1 of the 2021 IBC, Section 1605.2 of the 2018, 2015, 2012, and 2009 IBC, [ACI 318-19](#), ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of  $\phi$  shall be determined in accordance with ACI 318-11 Section D.4.4.

<sup>3</sup> The tabulated value of  $\phi_{cb}$  applies when both the load combinations of Section 1605.1 of the 2021 IBC, Section 1605.2 of the 2018, 2015, 2012, and 2009 IBC, ACI 318-19, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-19 Section 17.5.3, ACI 318-14 Section 17.3.3 (c) or ACI 318-11 Section D.4.3, as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of  $\phi$  shall be determined in accordance with ACI 318-11 Section D.4.4 for Condition B.

<sup>4</sup> The tabulated value of  $\phi_p$  applies when both the load combinations of ACI 318-11 Section 9.2 are used and the requirement of ACI 318-11 Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of  $\phi$  shall be determined in accordance with ACI 318-11 Section D.4.5(c) for Condition B.

<sup>5</sup> The value of  $N_{p,unscr}$  may be increased in accordance with Section 4.1.4 of this report.



**TABLE 4**  
**TITEN TURBO™ SCREW ANCHOR CHARACTERISTIC SHEAR STRENGTH DESIGN VALUES<sup>1</sup>**

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL SCREW ANCHOR DIAMETER (inch)	
			3/16	1/4
Anchor Category	1, 2 or 3	-	1	1
Nominal Embedment Depth	$h_{nom}$	in	1 <sup>3/4</sup>	1 <sup>3/4</sup>
<b>Steel Strength in Shear</b>				
Steel Strength in Shear	$V_{sa}$	lbf	475	720
Strength Reduction Factor – Steel Failure <sup>2</sup>	$\phi_{sa}$	-	0.6	0.6
<b>Concrete Breakout in Shear</b>				
Load Bearing Length of Anchor in Shear	$l_e$	in	1.25	1.20
Nominal Outside Diameter (shank)	$d_a$	in	0.129	0.164
Strength Reduction Factor – Concrete Breakout Failure <sup>4</sup>	$\phi_{cb}$	-	0.7	0.7
<b>Concrete Pryout Strength in Shear</b>				
Coefficient for Pryout Strength	$K_{cp}$	-	1.0	1.0
Strength Reduction Factor – Concrete Pryout Failure <sup>3</sup>	$\phi_{cp}$	-	0.7	0.7

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N

<sup>1</sup> 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.

<sup>2</sup> The tabulated value of  $\phi_{sa}$  applies when the load combinations of Section 1605.1 of the 2021 IBC, Section 1605.2 of the 2018, 2015, 2012, and 2009 IBC, ACI 318-19 and ACI 318-14 Section 5.3, or ACI 318-11 Section 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of  $\phi$  shall be determined in accordance with ACI 318-11 Section D.4.4.

<sup>3</sup> The tabulated values of  $\phi_{cb}$  and  $\phi_{cp}$  apply when both the load combinations of Section 1605.1 of the 2021 IBC, Section 1605.2 of the 2018, 2015, 2012, and 2009 IBC, ACI 318-19, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 Section 17.3.3(c) or ACI 318-11 Section D.4.3, as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of  $\phi$  shall be determined in accordance with ACI 318-11 Section D.4.4 for Condition B.



**FIGURE 1 - TITEN TURBO™ SCREW ANCHORS**



**FIGURE 2 – INSTALLATION INSTRUCTIONS FOR TITEN TURBO™ SCREW ANCHORS**



## CITY OF LOS ANGELES SUPPLEMENT

**SIMPSON STRONG-TIE COMPANY INC.**  
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**(800) 925-5099**  
[www.strongtie.com](http://www.strongtie.com)

### TITEN TURBO™ SCREW ANCHORS FOR USE IN UNCRACKED CONCRETE

#### CSI Divisions:

03 00 00—CONCRETE  
05 00 00—METALS

#### CSI Sections:

03 16 00—Concrete Anchors  
05 05 19—Post-installed Concrete Anchors

## 1.0 RECOGNITION

The Simpson Strong-Tie Titen Turbo™ Screw Anchors for Use in Uncracked Concrete as evaluated and represented in IAPMO UES Evaluation Report ER-712 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2023 City of Los Angeles Building Code (LABC)
- 2023 City of Los Angeles Residential Code (LARC)

## 2.0 LIMITATIONS

Use of the Simpson Strong-Tie Titen Turbo™ Screw Anchors for Use in Uncracked Concrete recognized in this report is subject to the following limitations:

**2.1** The design, installation, conditions of use, and identification of the Titen Turbo™ Screw Anchors shall be in accordance with the 2021 International Building Code or the 2021 International Residential Code, as applicable, as noted in ER-712.

**2.2** Prior to installation, calculations and details demonstrating compliance with this approval report and the 2023 Los Angeles Building Code or 2023 Los Angeles Residential Code shall be submitted to the structural plan check section for review and approval. The calculations and details shall be prepared, stamped, and signed by a California registered design professional.

**2.3** The design, installation, and inspection of the Titen Turbo™ Screw Anchors shall be in accordance with LABC Chapters 16 and 17, as applicable, due to local amendments to these chapters.

**2.4** The allowable and strength design values listed in ER-712 are for fasteners only. Connected members shall be checked for their capacity (which may govern).

**2.5** Periodic special inspection shall be provided by the Registered Deputy Inspector in accordance with Section 1705 of the 2023 LABC during installations of the Titen Turbo™ Screw anchors.

**2.6** Under the LARC, a design in accordance with Section R301.1.3 shall be submitted.

**2.7** This supplement expires concurrently with ER-712.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)





## FLORIDA SUPPLEMENT

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### TITEN TURBO™ SCREW ANCHORS FOR USE IN UNCRACKED CONCRETE

#### CSI Divisions:

03 00 00—CONCRETE  
05 00 00—METALS

#### CSI Sections:

03 16 00—Concrete Anchors  
05 05 19—Post-installed Concrete Anchors

#### 1.0 RECOGNITION

Simpson Strong-Tie Titen Turbo™ Screw Anchors for use in uncracked concrete recognized in ER-712 have been evaluated for use to resist dead, live, wind, and seismic tension and shear loads limited to locations designated as Seismic Design Categories A and B under the IBC. The structural performance properties of the Simpson Strong-Tie Titen Turbo™ Screw Anchors were evaluated for compliance with the following codes:

- 2023 Florida Building Code, Building, 8<sup>th</sup> Edition (FBC--Building)
- 2023 Florida Building Code, Residential, 8<sup>th</sup> Edition (FBC--Residential)

#### 2.0 LIMITATIONS

Simpson Strong-Tie® Titen Turbo™ Screw Anchors described in ER-712 comply with the 2023 FBC--Building and the 2023 FBC--Residential, subject to the following limitations:

**2.1** The design and installation of the Titen Turbo™ Screw Anchors shall be in accordance with the 2021 International Building Code and the 2021 International Residential Code as noted in ER-712.

**2.2** Load combinations shall be in accordance with Section [1605.2](#) of the FBC--Building.

**2.3** Design wind loads shall be in accordance with Section [1609.1.1](#) of the FBC--Building or Section [R301.2.1.1](#) of the FBC--Residential, as applicable, and Section [1620](#) of the FBC--Building where used in High-velocity Hurricane Zones (HVHZ).

**2.4** Use of Simpson Strong-Tie® Titen®2 Screw Anchors in applications exposed to the weather within High-velocity Hurricane Zones (HVHZ) as set forth in the FBC--Building and the FBC--Residential is beyond the scope of this supplemental report.

**2.5** Use of Simpson Strong-Tie® Titen Turbo™ Screw Anchors in High-velocity Hurricane Zones (HVHZ) as set forth in Section [2321.5.2](#) of the FBC--Building and Section [R4409](#) of the FBC--Residential, to resist wind uplift is permitted. The anchors shall be designed to resist the uplift forces as required in Section [1620](#) (HVHZ) of the FBC--Building or 700 pounds (3114 N), whichever is greater, per FBC--Building Section [2321.7](#).

**2.6** For products falling under Section (5)(d) of Florida Rule 61G20-3.008, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission) is required to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

**2.7** This supplement expires concurrently with ER-712.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)