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Evaluation reports are the opinion of the engineer who prepared the report, based on the findings, and in no way constitute or imply approval by a local building authority. The engineer, in review of the data submitted, finds that, in his opinion, the product, material, system, or method of construction specifically identified in this report conforms with or is a suitable alternate to that specified in the Florida Building Code, SUBJECT TO THE LIMITATIONS IN THIS REPORT

Jeffrey P. Arneson, P.E., a licensed Florida professional engineer and employee of Jax Apex Technology, Inc. (Apex Technology) has reviewed the data submitted for compliance with the Florida Building Code. Neither Jeffrey P. Arneson, nor Apex Technology, are responsible for any errors or omissions to any documents, calculations, drawings, specifications, tests, or summaries prepared and submitted by the design professional or preparer of record who are listed in the Substantiating Data section of this report.

REPORT NO: SIM201705

CATEGORY: Structural Components

SUBCATEGORY: Anchors

SUBMITTED BY:

SIMPSON STRONG-TIE COMPANY, INC.
5956 W. LAS POSITAS BOULEVARD
PLEASANTON, CA 94588

1. CERTIFICATION OF INDEPENDENCE:

Jeffrey P. Arneson, the Florida engineer who prepared this report, and Apex Technology have no financial interest in the manufacturing, sales, or distribution of the products included in this report. Jeffrey P. Arneson and Apex Technology comply with all criteria as stated in Florida Administrative Code Chapter 61 G20-3.

2. PRODUCT NAME:

Mechanical Anchors
Titen® Concrete & Masonry Screws (TTN)

3. SCOPE OF EVALUATION:

Load evaluation as a structural component using the requirements of the *6th Edition (2017) Florida Building Code, Building* and *6th Edition (2017) Florida Building Code, Residential*.

4. DESCRIPTION:

- 4.1 Titen® Concrete and Masonry Screws (TTN).** Titen® screws are for installation into concrete and masonry substrates. Allowable loads in this report apply to masonry applications. The screws are available in a carbon steel or stainless steel version. Carbon steel Titen screws are available in $\frac{3}{16}$ " and $\frac{1}{4}$ " diameters with a minimum overall length of $1\frac{1}{4}$ ". Stainless steel Titen screws are available in $\frac{1}{4}$ " diameter with a minimum overall length of $1\frac{1}{4}$ ". The screws are available with a slotted hex-head (model numbers ending with H) or a flat Phillips head (model numbers ending with PF) as shown in Figures 1 and 2, respectively. Allowable loads and installation requirements are shown in Tables 1 and 2.

5. MATERIALS:

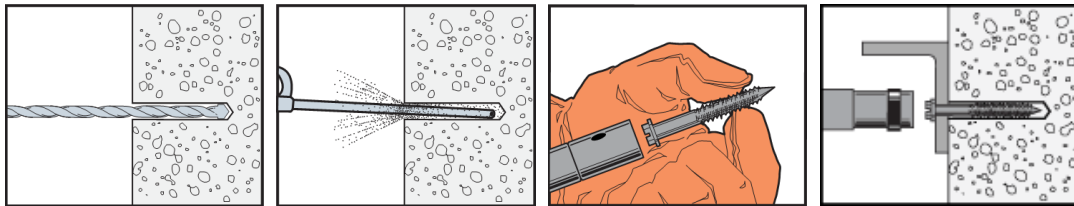
- 5.1 Fastener Material.** Carbon steel Titen® screws are manufactured from AISI C1022 steel with a zinc plating and baked-on ceramic coating. Hex-head carbon steel Titen screws have a standard blue color, while the Phillips head models are also available in white (model numbers beginning with TTNW). Stainless steel Titen screws (model numbers ending with SS) are manufactured from heat-treated AISI Type 410 stainless steel with a zinc plating and protective overcoat.
- 5.2 Masonry.** Masonry design specifications shall be the stricter of the specifications by the Engineer of Record, the Florida Building Code minimum standards, or the following:

Material	Specification	Minimum Compressive Strength
Masonry, f_m	ASTM E447	1,500 psi
Masonry Unit	ASTM C90	1,900 psi
Mortar	ASTM C270 Type S	1,800 psi (or by proportions)
Grout	ASTM C476	2,000 psi (or by proportions)

6. INSTALLATION:

Installation shall be in accordance with this report and the most recent edition of the Simpson Strong-Tie *Anchoring & Fastening Systems* catalog. Information in this report supersedes any conflicting information between information provided in this report and the catalog.

Installation Sequence:



1. Drill a hole in the base material using the appropriate diameter carbide drill bit as specified in the table. Drill the hole to the specified embedment depth plus $\frac{1}{2}$ " to allow the thread tapping dust to settle and blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.
2. Position fixture, insert screw and tighten using drill and installation tool fitted with a hex socket or Phillips bit. Use caution not to damage coating during installation.

Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity.

Caution: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie installation tool kit. It is designed to reduce the potential for overtightening the screw.

7. SUBSTANTIATING DATA:

Supporting test data has been submitted from:

- CEL Consulting Report No. 0S78, dated August 25, 2000
- Stork Materials Technology Report No. 3295545.1R1, dated June 24, 2008

8. FINDINGS:

The anchors listed in this evaluation report comply with the *6th Edition (2017) Florida Building Code, Building*, and *6th Edition (2017) Florida Building Code, Residential* when installed in accordance with this report.

9. LIMITATIONS:

1. Maximum allowable loads shall not exceed the allowable loads listed in this report. Allowable loads listed in this report are based on allowable stress design. The loads in this report are not applicable to Load and Resistance Factor Design.
2. Allowable loads for more than one direction for a single anchor shall be checked using the following interaction equation:

$$(P_s/P_t) + (V_s/V_t) \leq 1.0$$

where: P_s = Applied service tension load, lb.
 P_t = Allowable service tension load, lb.
 V_s = Applied service shear load, lb.
 V_t = Allowable service shear load, lb.
3. Preservative-treated wood applications: suitable for use in preservative-treated wood with non-ammonia formulations of CCA, ACQ-C, ACQ-D, CA-B, SBX/DOT and zinc borate. Carbon steel Titen® screws are for use in dry, interior environments only. Stainless steel Titen® screws are acceptable for use in exterior environments. Recommendations are based on testing and experience at time of publication and may change. Simpson Strong-Tie cannot provide estimates on service life of screws.

10. ALLOWABLE LOADS AND INSTALLATION DATA:

The tables that follow reference the allowable loads for the aforementioned products.

TABLE 1: Allowable Loads for Carbon Steel Titen® Screws into Hollow or Grout-Filled CMU						
Titen Diameter (in.)	Drill Bit Diameter (in.)	Minimum Embedment Depth (in.)	Minimum Spacing (in.)	Minimum Edge Distance (in.)	Allowable Tension Load (lb.)	Allowable Shear Load (lb.)
3/16	5/32	1	2 1/4	1 1/8	110	205
1/4	3/16	1	3	1 1/2	150	250

Notes:

1. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
2. The attached member or element may govern the allowable load. The Designer shall verify allowable load.

TABLE 2: Allowable Loads for Stainless Steel Titen® Screws into Hollow or Grout-Filled CMU						
Titen Diameter (in.)	Drill Bit Diameter (in.)	Minimum Embedment Depth (in.)	Minimum Spacing (in.)	Minimum Edge Distance (in.)	Allowable Tension Load (lb.)	Allowable Shear Load (lb.)
1/4	3/16	1	4	1 1/2	110	100

Notes:

1. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
2. The attached member or element may govern the allowable load. The Designer shall verify allowable load.



FIGURE 1: Carbon Steel Titen® Screw with Slotted Hex-Head in Standard Blue Color



FIGURE 2: Stainless Steel Titen® Screw with Flat Phillips Head

11. REFERENCES:

Florida Building Code, Building 6th Edition (2017)

Section 104.11 Alternative materials, design, and methods of construction and equipment
 Chapter 21 Masonry

Florida Building Code, Residential 6th Edition (2017)

Section R101.2.1 Scope
 Section R4407 HVHZ Masonry

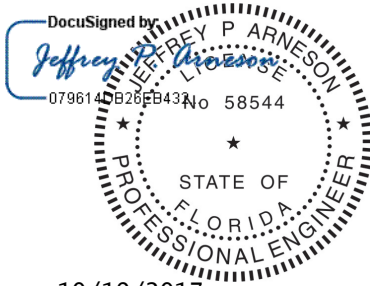
Standards

ACI 530 2013

12. IDENTIFICATION:

Titen® Concrete and Masonry Screws are identified in the field by labels on the packaging, bearing the company name (Simpson Strong-Tie Company, Inc.), product name (Titen®), the anchor diameter and length. Heads of the Titen screws are stamped with length identification marks as shown in Table 3.

Table 3: Length Identification Head Marks on Titen® Screw Anchors									
Length ID Marking on Head	None	A	B	C	D	E	F	H	J
Length of anchor (in.)	1 1/4	1 3/4	2 1/4	2 3/4	3 1/4	3 3/4	4	5	6



10/19/2017

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October 19, 2017