

# ICC-ES Evaluation Report

ESR-4308

Reissued September 2024

This report also contains:


- CBC Supplement

Subject to renewal September 2025

- FBC Supplement

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|   |   |  |   |
|---|---|--|---|
| <p><b>DIVISION: 04 00 00—<br/>MASONRY</b></p> <p><b>Section: 04 05 19.16—<br/>Masonry Anchors</b></p> | <p><b>REPORT HOLDER:</b></p> <p><b>CONSTRUCTION<br/>ANCHORS CO., LTD.</b></p> | <p><b>EVALUATION SUBJECT:</b></p> <p><b>TAP UNIVERSAL<br/>SCREW ANCHORS IN<br/>MASONRY</b></p> |  |
|---|---|--|---|

## 1.0 EVALUATION SCOPE

### Compliance with the following codes:

- 2021 and 2018 [International Building Code® \(IBC\)](#)
- 2021 and 2018 [International Residential Code® \(IRC\)](#)

### Property evaluated:

- Structural

## 2.0 USES

The TAP Universal Screw Anchors in masonry are used as anchorage to resist static, wind and seismic tension and shear loads in fully grout-filled concrete masonry units.

The TAP Universal Screw Anchors are alternatives to cast-in-place anchors described in Section 8.1.3 (2016 edition) of TMS 402 and as referenced in Section 2107.1 of the IBC.

The TAP Universal Screw Anchors are permitted to be used in structures regulated under the IRC, provided an engineered design is submitted in accordance with Section R301.1.3.

## 3.0 DESCRIPTION

### 3.1 TAP Universal Screw Anchors:

The TAP Universal Screw Anchors are comprised of a one-piece threaded anchor body with a hex head, a slotted hex head, a Philips flat head or a trim flat head.

Available nominal diameters are <sup>3</sup>/<sub>16</sub>-inch and <sup>1</sup>/<sub>4</sub>-inch (4.8 and 6.4 mm). The anchors are manufactured from carbon steel that is case-hardened, and they have a SealProT or SealProACQ coating available in various colors. The TAP Universal Screw Anchors are illustrated in [Figure 2](#) of this report.

The anchor body is formed with alternating high-low threads and a S17 self-drilling tip. The anchors are installed in a predrilled hole with a powered tool during which the threads on the anchor body tap into the sides of the predrilled hole and interlock with the base material during installation. Installation specifications are given in [Table 1](#) and [Figures 1](#) and [3](#) of this report.

### 3.2 Grout-filled Concrete Masonry:

The specified compressive strength of masonry,  $f'_m$ , at 28 days must be a minimum of 1,500 psi (10.3 MPa). Fully grouted masonry walls must be constructed from the following materials:

**3.2.1 Concrete Masonry Units (CMUs):** Grout-filled concrete masonry walls must be constructed from minimum 6-inch-wide (152 mm), Grade N, Type II, concrete masonry units (CMUs) conforming to ASTM C90, are lightweight or medium-weight units.

**3.2.2 Grout:** Grout-filled concrete masonry units must be fully grouted with grout complying with Section 2103.3 of the IBC, or Section R606 of the IRC, as applicable. The grout must have a minimum compressive strength of 2,000 psi (13.8 MPa) at 28 days.

**3.2.3 Mortar:** Mortar must be Types M, S or N, prepared in accordance with Section 2103 of the IBC, or Section R606 of the IRC, as applicable.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Allowable Stress Design:

The design load values for anchors described in this report are based on allowable stress design (ASD) under the codes described in Section 1.0 of this report.

Allowable tension and shear loads for installation in fully grout-filled masonry wall faces are noted in [Table 3](#) of this report. The allowable tension and shear loads are for anchors installed in the grouted cells, the center web of the concrete masonry units and horizontal mortared bed joints of the fully grouted CMU construction. Allowable loads for anchors installed within 1<sup>3</sup>/<sub>8</sub> inches (35 mm) of the vertical (head) joint, as depicted in [Figure 4](#), are beyond the scope of this report.

Allowable tension and shear loads for installation in fully grout-filled masonry wall tops are noted in [Table 4](#) of this report. The allowable tension and shear loads are for anchors installed at a minimum end distance of 3 inches (76 mm) and a minimum edge distance of 1<sup>1</sup>/<sub>2</sub> inches (38 mm). Allowable loads for anchors installed within 1<sup>1</sup>/<sub>2</sub> inches (38 mm) of the vertical (head) joint are beyond the scope of this report.

The allowable loads for anchors installed in fully grout-filled concrete masonry subjected to combined tension and shear forces must be determined by the following equation:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1$$

where:

$P_s$  = Applied service tension load.

$P_t$  = Allowable service tension load.

$V_s$  = Applied service shear load.

$V_t$  = Allowable service shear load.

### 4.2 Installation:

Anchors must be installed in accordance with [Figure 3](#) and the manufacturer's published installation instructions (MPII). Anchor locations must comply with the approved plans and specifications. The anchors must not be installed until the base material has reached its minimum designated compressive strength. The TAP drill bit size, hole diameter, hole depth ( $h_o$ ), embedment depth ( $h_{nom}$ ), spacing, edge distance and base material must comply with the requirements of this report. The hole depth must be drilled 1/4-inch (6.4 mm) deeper than the embedment depth and cleaned out any dust or debris. Installation procedures and locations must be in accordance with [Tables 1, 3 and 4](#) as well as [Figures 1, 3 and 4](#) of this report.

### 4.3 Special Inspections:

Anchors must be installed with special inspection. Special inspection must be in accordance with Section 1704 and 1705 of the IBC. For fasteners installed under special inspection, the following items must be inspected: fastener type, fastener dimensions, masonry dimensions and compressive strength, grout and mortar compliance with Section 3.2 of this report, drill bit size, fastener spacing, edge distances and fastener embedment (as applicable). The special inspector must verify that anchor installation is in compliance with this report and in accordance with the manufacturer's published installation instructions.

## 5.0 CONDITIONS OF USE:

The TAP Universal Screw Anchors in masonry described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The anchors must be identified and installed in accordance with this report and the manufacturer's published installation instructions. In the event of a conflict between the instructions in this report and the manufacturer's instructions, this report must govern.
- 5.2 TAP screw anchor sizes, dimensions, and allowable loads must be as set forth in this report.
- 5.3 Anchors resisting static, seismic and wind tension and shear loads in concrete masonry must be designed in accordance with Section 4.1 of this report.
- 5.4 For installations in concrete masonry, anchors are recognized to static, seismic and wind tension and shear load applications. When using the basic load combinations in accordance with 2021 IBC Section 1605.1 or 2018 IBC Section 1605.3.1, allowable loads are not permitted to be increased for seismic or wind loading. When using the alternative basic load combinations for the 2021 or 2018 IBC, the allowable loads or load combinations must not be adjusted.
- 5.5 Grout and mortar shall have reached its minimum specified compressive strength prior to installation of the anchors.
- 5.6 Anchors must be installed in holes predrilled in substrates described in this report, using only TAP carbide-tipped drill bits complying with the dimensions in [Table 1](#) of this report.
- 5.7 Calculations demonstrating that the applied loads are less than the allowable loads described in this report must be submitted to the code official for approval. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is being constructed.
- 5.8 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of screw anchors subjected to fatigue and shock loading is unavailable at this time, the use of these anchors under these conditions is beyond the scope of this report.
- 5.9 Where not otherwise prohibited by the code, anchors are permitted for installation in fire-resistance-rated construction provided at least one of the following conditions is fulfilled:
  - Anchors are used to resist wind or seismic forces only.
  - Anchors that support fire-resistance-rated construction or gravity load-bearing structural elements are within a fire-resistance-rated envelope or a fire-resistance-rated membrane, are protected by approved fire-resistance-rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
  - Anchors are used to support nonstructural elements.
- 5.10 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of screw anchors in cracked masonry is unavailable at this time, the use of screw anchors is limited to installation in uncracked masonry. Cracking occurs when  $f_t > f_r$  due to service loads or deformations.
- 5.11 Special inspection, when required, must be provided in accordance with Section 4.3 of this report.
- 5.12 Anchors are limited to dry, interior use.
- 5.13 The TAP screw anchors are manufactured under an approved quality control program with inspections by ICC-ES.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Predrilled Fasteners \(Screw Anchors\) in Masonry \(AC106\)](#), dated March 2018 (editorially revised December 2020).

## 7.0 IDENTIFICATION

- 7.1 The screw anchors product names described in Section 3.1 of this report must be identified in the field by labels on the packaging bearing the company name (Construction Anchors Co., Ltd.), the product name (TAP), the anchor diameter and length, and the evaluation report number (ESR-4308). In addition, the anchor length code (see [Table 2](#)) is stamped on the head of each screw anchor.

7.2 The report holder's contact information is the following:

**CONSTRUCTION ANCHORS CO., LTD.**  
**9/F NO. 21 SEC. 3 XINSHENG S. RD.**  
**DA'AN DISTRICT TAIPEI106**  
**TAIWAN**  
<https://www.constructionanchors.net>  
[info@constructionanchors.net](mailto:info@constructionanchors.net)

**TABLE 1—TAP UNIVERSAL SCREW ANCHOR INSTALLATION SPECIFICATIONS**

| Anchor Property / Setting Information | Symbol                 | Units | Nominal Anchor Size, <i>d</i> (inch) |                                   |
|---------------------------------------|------------------------|-------|--------------------------------------|-----------------------------------|
|                                       |                        |       | <sup>3</sup> / <sub>16</sub>         | <sup>1</sup> / <sub>4</sub>       |
| Nominal outside anchor diameter       | <i>d<sub>a</sub></i>   | in.   | 0.145                                | 0.185                             |
| Nominal drill bit diameter            | <i>d<sub>bit</sub></i> | in.   | ANSI <sup>5</sup> / <sub>32</sub>    | ANSI <sup>3</sup> / <sub>16</sub> |
| Hex head wrench / socket size         | <i>d<sub>h</sub></i>   | in.   | <sup>1</sup> / <sub>4</sub>          | <sup>5</sup> / <sub>16</sub>      |
| Hex head Height                       | -                      | in.   | <sup>7</sup> / <sub>64</sub>         | <sup>9</sup> / <sub>64</sub>      |
| Phillips flat head bit tip size       | -                      | No.   | 2                                    | 3                                 |

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

**TABLE 2—FASTENER SPECIFICATIONS – TAP UNIVERSAL SCREW ANCHOR**

| Length ID marking on head <sup>1</sup> | #                       | A   | B    | C                             | D                             | E                             | F                             | G                             | H                             | I                             | J                             |                               |
|--|-------------------------|---|------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|  |                         | Overall anchor length, <i>ℓ<sub>anch</sub></i> , (inches) | From | 1                             | 1 <sup>1</sup> / <sub>2</sub> | 2                             | 2 <sup>1</sup> / <sub>2</sub> | 3                             | 3 <sup>1</sup> / <sub>2</sub> | 4                             | 4 <sup>1</sup> / <sub>2</sub> | 5                             |
|  | Up to but not including | 1 <sup>1</sup> / <sub>2</sub>                             | 2    | 2 <sup>1</sup> / <sub>2</sub> | 3                             | 3 <sup>1</sup> / <sub>2</sub> | 4                             | 4 <sup>1</sup> / <sub>2</sub> | 5                             | 5 <sup>1</sup> / <sub>2</sub> | 6                             | 6 <sup>1</sup> / <sub>2</sub> |

For SI: 1 inch = 25.4 mm; 1 psi = 6.9 kPa.

**TABLE 3—ALLOWABLE TENSION AND SHEAR LOADS FOR TAP UNIVERSAL SCREW ANCHORS INSTALLED IN THE FACE OF GROUT-FILLED CONCRETE MASONRY<sup>1,2,3,4,5</sup>**

| ANCHOR INSTALLED INTO GROUTED MASONRY WALL FACE |   |  |  |  |                |  |                |
|---|---|--|--|--|----------------|--|----------------|
| NOMINAL ANCHOR SIZE <i>d</i> (inch)             | MINIMUM EMBEDMENT <i>h<sub>nom</sub></i> (inches) | MINIMUM EDGE / END DISTANCE, <i>C<sub>min</sub></i> (inches) | MINIMUM SPACING, <i>S<sub>min</sub></i> (inches) | 1,500 psi Minimum Masonry Compressive Strength, <i>f<sub>m</sub></i> |                | 1,900 psi Minimum Masonry Compressive Strength, <i>f<sub>m</sub></i> |                |
|   |   |  |  | TENSION (pounds)   | SHEAR (pounds) | TENSION (pounds)   | SHEAR (pounds) |
| <sup>3</sup> / <sub>16</sub>                    | 1 <sup>1</sup> / <sub>2</sub>                     | 3  | 3  | 90   | 115            | 105  | 130            |
| <sup>1</sup> / <sub>4</sub>                     | 1 <sup>1</sup> / <sub>2</sub>                     | 4  | 4  | 145  | 245            | 165  | 270            |

For SI: 1 inch = 25.4 mm; 1 lbs = 0.0044 kN.

<sup>1</sup>The tabulated allowable loads are for anchors installed in minimum 6-inch-wide (152 mm) grout-filled concrete masonry units described in Section 3.2 of this report and must have reached the minimum specified masonry compressive strength at the time of installation.

<sup>2</sup>The minimum embedment, *h<sub>nom</sub>*, is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.

<sup>3</sup>Anchors may only be installed in the grouted cells and in cell webs and bed joints not closer than <sup>1</sup>/<sub>8</sub> inches from head joints. The minimum edge and end distances, *C<sub>min</sub>*, must be maintained.

<sup>4</sup>The tabulated minimum edge and end distances, *C<sub>min</sub>*, are equal to the critical edge distance, *c<sub>cr</sub>*, for the anchors. The tabulated minimum spacing *S<sub>min</sub>*, is also equal to the critical spacing, *s<sub>cr</sub>*, for the anchors.

<sup>5</sup>The tabulated allowable loads are based on a safety factor of 5.0.

**TABLE 4—ALLOWABLE TENSION AND SHEAR LOADS FOR TAP UNIVERSAL SCREW ANCHORS INSTALLED INTO THE TOP OF GROUT-FILLED CONCRETE MASONRY<sup>1,2,3,4,5</sup>**

| ANCHOR INSTALLED INTO TOP OF GROUTED MASONRY WALLS |   |   |  |   |  |                |  |                |
|--|---|---|--|---|--|----------------|--|----------------|
| NOMINAL ANCHOR SIZE <i>d</i> (inch)                | MINIMUM EMBEDMENT <i>h<sub>nom</sub></i> (inches) | MINIMUM EDGE DISTANCE <i>C<sub>min</sub></i> (inches) | MINIMUM END DISTANCE <i>C<sub>min</sub></i> (inches) | MINIMUM SPACING <i>S<sub>min</sub></i> (inches) | 1,500 psi Minimum Masonry Compressive Strength, <i>f<sub>m</sub></i> |                | 1,900 psi Minimum Masonry Compressive Strength, <i>f<sub>m</sub></i> |                |
|  |   |   |  |   | TENSION (pounds)   | SHEAR (pounds) | TENSION (pounds)   | SHEAR (pounds) |
| <sup>3</sup> / <sub>16</sub>                       | 1 <sup>1</sup> / <sub>2</sub>                     | 3   | 3  | 3   | 160  | 120            | 180  | 135            |
| <sup>3</sup> / <sub>16</sub>                       | 1 <sup>1</sup> / <sub>2</sub>                     | 1 <sup>1</sup> / <sub>2</sub>                         | 3  | 3   | 140  | 105            | 155  | 115            |
| <sup>1</sup> / <sub>4</sub>                        | 1 <sup>1</sup> / <sub>2</sub>                     | 4   | 4  | 4   | 250  | 205            | 280  | 230            |
| <sup>1</sup> / <sub>4</sub>                        | 1 <sup>1</sup> / <sub>2</sub>                     | 1 <sup>1</sup> / <sub>2</sub>                         | 4  | 4   | 195  | 210            | 220  | 235            |

For SI: 1 inch = 25.4 mm; 1 lbs = 0.0044 kN.

<sup>1</sup>The tabulated allowable loads are for anchors installed in minimum 6-inch-wide (152 mm) grout-filled concrete masonry units described in Section 3.2. of this report and must have reached the minimum specified masonry compressive strength at the time of installation.

<sup>2</sup>The minimum embedment, *h<sub>nom</sub>*, is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.

<sup>3</sup>Anchors may only be installed in the grouted cells not closer than <sup>1</sup>/<sub>2</sub> inches from head joints. The minimum edge and end distances, *C<sub>min</sub>*, must be maintained.

<sup>4</sup>The tabulated minimum edge and end distances, *C<sub>min</sub>*, are equal to the critical edge distance, *c<sub>cr</sub>*, for the anchors. The tabulated minimum spacing *S<sub>min</sub>*, is also equal to the critical spacing, *s<sub>cr</sub>*, for the anchors.

<sup>5</sup>The tabulated allowable loads are based on a safety factor of 5.0.

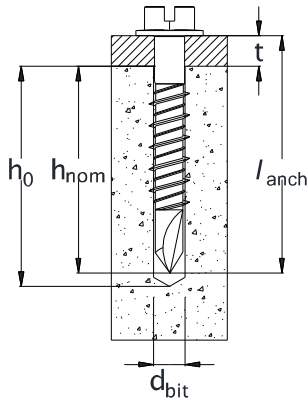
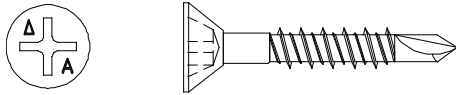


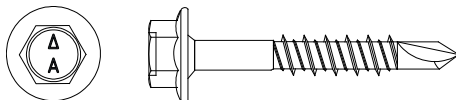
FIGURE 1—SCREW DETAIL



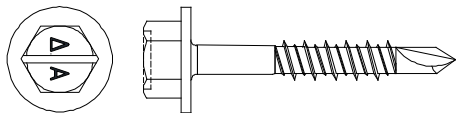
FIGURE 2—TAP UNIVERSAL SCREW ANCHORS (SLOTTED HEAD)



TAP FH3 – FLAT HEAD  
TAP FH4 – FLAT HEAD  
TAP FT4 – TRIM FLAT HEAD



TAP HF4 – HEX FLANGED HEAD



TAP HS3 – HEX SLOTTED HEAD  
TAP HS4 – HEX SLOTTED HEAD

FIGURE 4—TAP UNIVERSAL SCREW ANCHORS HEAD STYLES

**STEP 1**

Use a specified ANSI drill bit, drill a hole in to the base material to the required depth,  $h_0$ , and meet the minimum embedment depth,  $h_{nom}$ .

**STEP 2**

Remove dust and debris from hole during drilling by compressor blower gun or manual cleaning pump.

**STEP 3**

Install the **TAP UNIVERSAL SCREW ANCHOR** head into the corresponding socket and drive the anchor through the fixture into the predrilled hole.

**STEP 4**

When the anchor is fully seated at the proper embedment, stop driving the anchor (do not over tighten).

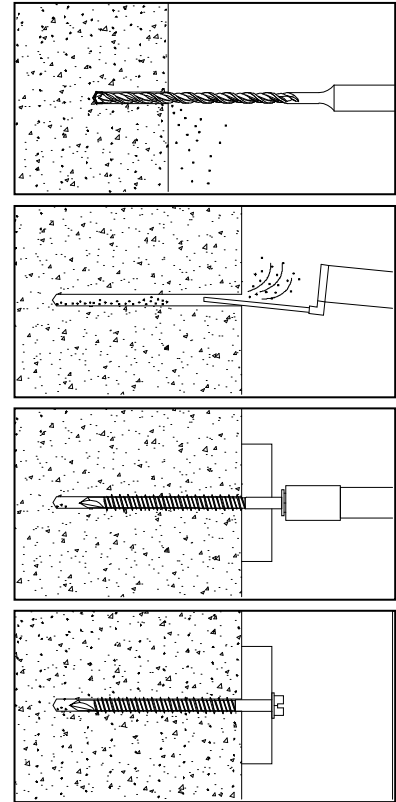
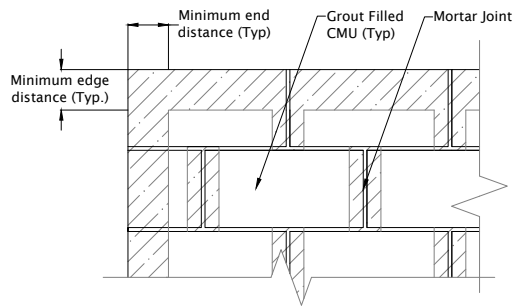


FIGURE 3—TAP UNIVERSAL SCREW ANCHORS INSTALLATION INSTRUCTIONS

**FACE OF WALL INSTALLATION LOCATION**

(Anchor within hatched area is not allowed)



**TOP OF WALL INSTALLATION LOCATION**

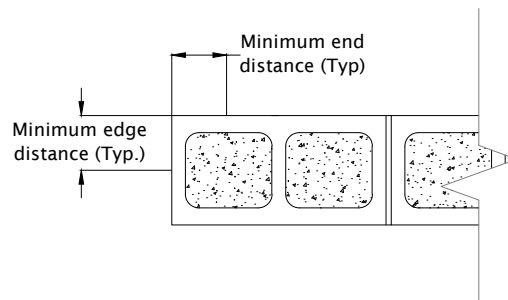


FIGURE 5—TAP UNIVERSAL SCREW ANCHORS INSTALLED INTO GROUT-FILLED CONCRETE MASONRY

**DIVISION: 04 00 00—MASONRY**  
**Section: 04 05 19.16—Masonry Anchors**

**REPORT HOLDER:**

**CONSTRUCTION ANCHORS CO., LTD.**

**EVALUATION SUBJECT:**

**TAP UNIVERSAL SCREW ANCHORS IN MASONRY**

**1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Tap Universal Screw Anchors in Masonry, described in ICC-ES evaluation report ESR-4308, have also been evaluated for compliance with the code(s) noted below.

**Applicable code edition(s):**

- 2022 and 2019 *California Building Code* (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 and 2019 *California Residential Code* (CRC)

**2.0 CONCLUSIONS****2.1 CBC:**

The Tap Universal Screw Anchors in Masonry, described in Sections 2.0 through 7.0 of the evaluation report ESR-4308, comply with CBC Chapters 21, provided the design and installation are in accordance with the 2021 and 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 21, as applicable.

**2.1.1 OSHPD:**

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

**2.1.2 DSA:**

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

**2.2 CRC:**

The Tap Universal Screw Anchors in Masonry, described in Sections 2.0 through 7.0 of the evaluation report ESR-4308, comply with CRC Chapters 3, provided the design and installation are in accordance with the 2021 and 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapters 3 and 6, as applicable.

This supplement expires concurrently with the evaluation report, reissued September 2024.

**DIVISION: 04 00 00—MASONRY**  
**Section: 04 05 19.16—Masonry Anchors**

**REPORT HOLDER:**

**CONSTRUCTION ANCHORS CO., LTD.**

**EVALUATION SUBJECT:**

**TAP UNIVERSAL SCREW ANCHORS IN MASONRY**

**1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that the TAP Universal Screw Anchors in masonry, described in ICC-ES evaluation report ESR-4308, have also been evaluated for compliance with the codes noted below.

**Applicable code editions:**

- 2020 *Florida Building Code—Building*
- 2020 *Florida Building Code—Residential*

**2.0 CONCLUSIONS**

The TAP Universal Screw Anchors in masonry, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-4308, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in the ICC-ES evaluation report ESR-4308 for the 2018 *International Building Code*® meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the TAP Universal Screw Anchors in masonry have also been found to be in compliance with the High-velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*, with the following condition:

- a) Design and installation must meet the requirements of Section 2122.7 of the *Florida Building Code—Building*.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued September 2024.