

ICC-ES Evaluation Report

ESR-3699

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This report also contains:

- [City of LA Supplement](#)
- [CA Supplement](#)
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DIVISION: 03 00 00— CONCRETE Section: 03 16 00— Concrete Anchors DIVISION: 05 00 00— METALS Section: 05 05 19—Post- Installed Concrete Anchors	REPORT HOLDER: ITW RED HEAD ADDITIONAL LISTEE: ITW BRANDS	EVALUATION SUBJECT: TAPCON+ SCREW ANCHORS AND SAMMYS THREADED ROD ANCHORS FOR USE IN CRACKED AND UNCRACKED CONCRETE	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018, 2015, and 2012 [International Building Code® \(IBC\)](#)
- 2024, 2021, 2018, 2015, and 2012 [International Residential Code® \(IRC\)](#)

Main references of this report are for the 2024 IBC and IRC. See [Table 6](#) and [Table 7](#) for applicable sections of the code for previous IBC and IRC editions.

Property evaluated:

- Structural

2.0 USES

The 1/4-inch-, 3/8-inch-, 1/2-inch-, and 5/8-inch diameter (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm) Tapcon+ Screw Anchors with Advanced Threadform Technology are used as anchorage in cracked and uncracked normal-weight and lightweight concrete having a specified compressive strength $f'_c = 2,500$ psi to 8,500 psi (17.2 MPa to 58.6 MPa) to resist static, wind, and seismic tension and shear loads.

The 1/2-inch- and 5/8-inch diameter (12.7 mm and 15.9 mm) Tapcon+ Screw Anchors with Advanced Threadform Technology are also used as anchorage when installed in the soffit of cracked and uncracked normal-weight and sand-lightweight concrete over steel deck having a minimum specified compressive strength $f'_c = 3,000$ psi (20.7 MPa) to resist static, wind, and seismic tension and shear loads.

The 1/4-inch-diameter (6.4 mm) SAMMYS Anchors for use with threaded rods are available in two head styles: the SAMMYS vertical threaded rod anchor, CCST 516; and SAMMYS horizontal threaded rod anchor, SW-CCST 516. The CCST 516 anchor is used as anchorage in cracked and uncracked normal-weight and sand-lightweight concrete having a specified compressive strength $f'_c = 2,500$ psi to 8,500 psi (17.2 MPa to 58.6 MPa) to resist static and wind, tension or shear loads, and seismic tension loads only. The SW-CCST 516 anchor is used as anchorage in uncracked normal-weight and sand-lightweight concrete having a specified compressive strength $f'_c = 2,500$ psi to 8,500 psi (17.2 MPa to 58.6 MPa) to resist static and wind shear loads only.

The anchoring system is an alternative to cast-in-place anchors described in Section 1901.3 of the 2024 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 DESCRIPTION

3.1 Tapcon+ Anchors with Advanced Threadform Technology:

The Tapcon+ Anchors with Advanced Threadform Technology are manufactured from carbon steel with supplementary heat treatment. The anchors have an alternating high-low thread form on the shank and are available a variety of lengths with nominal diameters of $\frac{1}{4}$ -inch, $\frac{3}{8}$ -inch, $\frac{1}{2}$ -inch, and $\frac{5}{8}$ -inch (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm). The Tapcon+ Screw Anchors are available with a hex washer head, and have a blue Climaseal® coating. The $\frac{1}{2}$ -inch diameter anchors are also available with a mechanically galvanized zinc coating in accordance with ASTM B695, Class 65, Type I. Illustrations of anchors are provided in [Figure 1](#).

3.2 SAMMYS Anchors for Threaded Rods:

The SAMMYS Screw Anchor is a two-piece, carbon steel threaded anchor that is comprised of the $\frac{1}{4}$ -inch-diameter (6.4 mm) Tapcon+ Screw Anchor with Advanced Threadform Technology and a $\frac{3}{8}$ -inch-16 UNC internal thread hex shaped cap. The hex shaped cap is manufactured from carbon steel alloy complying with UNS G1010 heat treated steel and has an electrodeposited coating of zinc, minimum thickness of 0.0002 inch (5 μ m), in accordance with ASTM B633, SC1, Type III.

The SAMMYS Screw Anchors are available with a $2\frac{1}{2}$ -inch (63.5 mm) length. Two models are available: SAMMYS Vertical Threaded Rod Anchor (Model No. CCST 516) and SAMMYS Horizontal Threaded Rod Anchor (Model No. SW-CCST 516). [Figure 3](#) illustrates the SAMMYS vertical threaded rod anchor and SAMMYS horizontal threaded rod anchor with their torque limiting installation tools. The installation tools are designed to prevent over torque conditions upon installation. The design also permits the nut driver to release from the head of the anchor once fully installed.

3.3 Concrete:

Normal-weight and lightweight concrete must comply with Sections 1903 and 1905 of the IBC, as applicable.

3.4 Steel Deck Panels:

Steel deck panels must comply with the configurations in [Figure 6](#) and have a minimum base steel thickness of 0.034 inch (0.864 mm). Steel must comply with ASTM A653 Grade 40, with a minimum yield strength of 40,000 psi (276 MPa).

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: Design strength of anchors complying with the 2024 IBC, as well as Section R301.1.3 of the 2024 IRC must be determined in accordance with ACI 318-19 Chapter 17 and this report.

Design parameters provided in [Tables 1, 2, 3](#) and [5](#) are based on the 2024 IBC (ACI 318-19) unless noted otherwise in Sections 4.1.2 through 4.1.12 of this report.

The strength design must comply with ACI 318-19 Section 17.5.1.2 except as required in ACI 318-19 Section 17.10, as applicable. Strength reduction factors, ϕ , as given in ACI 318-19 Section 17.5.3 and noted in [Tables 2, 3](#), and [5](#) must be used for load combinations calculated in accordance with Section 1605.1 of the 2024 IBC or Section 5.3 of ACI 318-19, as applicable.

The value of f'_c used in the calculations must be limited to a maximum of 8,000 psi (55.2 MPa), in accordance with ACI 318-19 Section 17.3.1.

4.1.2 Requirements for Static Steel Strength in Tension, N_{sa} : The nominal static steel strength of a single anchor in tension is calculated in accordance with ACI 318-19 Section 17.6.1.2. The N_{sa} values of a single anchor are given in [Table 2](#) of this report. Strength reduction factors, ϕ , corresponding to brittle steel elements as defined in ACI 318-19 Section 2.3, and provided in [Table 2](#), must be used.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension, N_{cb} or N_{cbg} : The nominal static concrete breakout strength for a single anchor or group of anchors in tension, N_{cb} or N_{cbg} , must be calculated in accordance with ACI 318-19 Section 17.6.2, with modifications as described in this section. The basic concrete

breakout strength in tension, N_b , must be calculated in accordance with ACI 318-19 Section 17.6.2.2, using the values of h_{ef} and k_{cr} as given in [Table 2](#). The nominal concrete breakout strength in tension in regions of concrete where analysis indicates no cracking at service loads in accordance with ACI 318-19 Section 17.6.2.5, must be calculated using the values of k_{uncr} as given in [Table 2](#) of this report with $\psi_{c,N} = 1.0$.

For 1/2-inch-diameter and 5/8-inch (12.7 mm and 15.9 mm) Tapcon+ Screw Anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in [Figure 6](#), calculation of the concrete breakout strength is not required.

4.1.4 Requirements for Static Pullout Strength in Tension, N_p : The nominal pullout strength of a single anchor in tension in accordance with ACI 318-19 Sections 17.6.3.1 and 17.6.3.2.1, in cracked and uncracked concrete, $N_{p,cr}$ and $N_{p,uncr}$, respectively, is given in [Table 2](#) of this report. For all design cases $\psi_{c,p} = 1.0$. In accordance with ACI 318-19 Section 17.6.3, the nominal pullout strength in cracked concrete may be adjusted for concrete strengths according to Eq-1:

$$N_{p,f'_c} = N_{p,cr} \left(\frac{f'_c}{2,500} \right)^n \quad (\text{lb,psi}) \quad (\text{Eq-1})$$

$$N_{p,f'_c} = N_{p,cr} \left(\frac{f'_c}{17.2} \right)^n \quad (\text{N, MPa})$$

where f'_c is the specified compressive strength and n is the factor defining the influence of concrete strength on the pullout strength. For the 3/8-inch-diameter anchor in cracked concrete, n is 0.12. For all other diameters, n is 0.5.

In regions where analysis indicates no cracking in accordance with ACI 318-19 Section 17.6.3.3, the nominal pullout strength in tension may be adjusted for concrete strengths according to Eq-2:

$$N_{p,f'_c} = N_{p,uncr} \left(\frac{f'_c}{2,500} \right)^n \quad (\text{lb,psi}) \quad (\text{Eq-2})$$

$$N_{p,f'_c} = N_{p,uncr} \left(\frac{f'_c}{17.2} \right)^n \quad (\text{N, MPa})$$

where f'_c is the specified compressive strength and n is the factor defining the influence of concrete strength on the pullout strength. For all diameters, n is 0.5.

Where values for $N_{p,cr}$ or $N_{p,uncr}$ are not provided in [Table 2](#), the pullout strength in tension need not be evaluated.

The nominal pullout strength in cracked concrete of the 1/2-inch- and 5/8-inch-diameter (12.7 mm and 15.9 mm) Tapcon+ Screw Anchor installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in [Figure 6](#), is given in [Table 5](#). In accordance with ACI 318-19 Section 17.6.3.2.1, the nominal pullout strength in cracked concrete must be calculated in accordance with Eq-1, whereby the value of $N_{p,deck,cr}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. In regions where analysis indicates no cracking in accordance with ACI 318-19 Section 17.6.3.3, the nominal strength in uncracked concrete must be calculated according to Eq-2, whereby the value of $N_{p,deck,uncr}$ must be substituted for $N_{p,uncr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator.

4.1.5 Requirements for Static Steel Strength in Shear, V_{sa} : The nominal steel strength in shear, V_{sa} , of a single anchor in accordance with ACI 318-19 Section 17.7.1.2, is given in [Table 3](#) of this report and must be used in lieu of the values derived by calculation from ACI 318-19 Eq. 17.7.1.2b. Strength reduction factors, ϕ , corresponding to brittle steel elements as defined in ACI 318-19 Section 2.3, and provided in [Table 3](#), must be used.

The nominal shear strength $V_{sa,deck}$, of anchors installed in the soffit of sand-lightweight or normal-weight concrete filled steel deck floor and roof assemblies, as shown in [Figure 6](#), is given in [Table 5](#).

4.1.6 Requirements for Static Concrete Breakout Strength of Anchor in Shear, V_{cb} or V_{cbg} : The nominal static concrete breakout strength of a single anchor or group of anchors in shear, V_{cb} or V_{cbg} , must be calculated in accordance with ACI 318-19 Section 17.7.2, with modifications as described in this section. The basic concrete breakout strength of a single anchor in shear, V_b , must be calculated in accordance with ACI 318-19 Section 17.7.2.2.1, based on the values provided in [Table 3](#). The value of l_e used in ACI 318-19 Eq. 17.7.2.2.1a, must be taken as no greater than the lesser of h_{ef} or $8d_a$.

For 1/2-inch- and 5/8-inch-diameter (12.7 mm and 15.9 mm) Tapcon+ Screw Anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in [Figure 6](#), calculation of the concrete breakout strength in shear is not required.

4.1.7 Requirements for Static Concrete Pryout Strength in Shear, V_{cp} or $V_{cp,g}$: The nominal static concrete pryout strength of a single anchor or group of anchors in shear, V_{cp} or $V_{cp,g}$, must be calculated in accordance with ACI 318-19 Section 17.7.3, using the value of k_{cp} described in [Table 3](#), and the values of N_{cb} or $N_{cb,g}$ as calculated in Section 4.1.3 of this report.

For 1/2 inch and 5/8-inch (12.7 mm and 15.9 mm) diameter Tapcon+ Screw Anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in [Figure 6](#), calculation of the concrete pryout strength in shear is not required.

4.1.8 Requirements for Seismic Design:

4.1.8.1 General: For load combinations including seismic, the design must be performed according to ACI 318-19 Section 17.10. Modifications to ACI 318-19 Section 17.10 shall be applied under Section 1905.7 of the 2024 IBC, as applicable.

The anchors comply with ACI 318-19 Section 2.3, as brittle steel elements and must be designed in accordance with ACI 318-19 Sections 17.10.4, 17.10.5, 17.10.6, or 17.10.7, as applicable.

The 1/4-inch-, 3/8-inch-, 1/2-inch-, and 5/8-inch diameter (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm) Tapcon+ Screw Anchors may be installed in regions designated as IBC Seismic Design Categories A through F.

The 1/4-inch (6.4 mm) SAMMYS vertical threaded rod anchors (CCST 516) are limited to seismic tension loads only, and seismic shear loads are beyond the scope of this report. The 1/4-inch (6.4 mm) SAMMYS horizontal threaded rod anchors (SW-CCST 516) are limited to static shear loads only, and seismic tension or shear loads are beyond the scope of this report. The SAMMYS vertical threaded rod anchors (CCST 516) may be installed in regions designated as IBC Seismic Design Categories A through F.

4.1.8.2 Seismic Tension: The nominal steel strength and nominal concrete breakout strength for anchors in tension must be calculated according to ACI 318-19 Sections 17.6.1 and 17.6.2, as described in Sections 4.1.2 and 4.1.3 of this report. In accordance with ACI 318-19 Section 17.6.3.2.1, the value for nominal pullout strength in tension for seismic loads, $N_{p,eq}$ or $N_{p,deck,eq}$, given in [Table 2](#) and [Table 5](#) of this report, must be used in lieu of N_p . The values of $N_{p,eq}$ or $N_{p,deck,eq}$ must be adjusted for the concrete strength in accordance with Eq-2 and Section 4.1.4 whereby the value of $N_{p,deck,eq}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. If no values for $N_{p,eq}$ are given in [Table 2](#) or [Table 5](#), the static design strength values govern.

4.1.8.3 Seismic Shear: The nominal concrete breakout strength and pryout strength for anchors in shear must be calculated according to ACI 318-19 Sections 17.7.2 and 17.7.3, as described in Sections 4.1.6 and 4.1.7 of this report. In accordance with ACI 318-19 Section 17.7.1.2, the value for nominal steel strength in shear for seismic loads, $V_{sa,eq}$, or $V_{sa,deck,eq}$, given in [Tables 3](#) or [5](#) of this report, must be used in lieu of V_{sa} , as applicable.

4.1.9 Requirements for Interaction of Tensile and Shear Forces: For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-19 Section 17.8. For the Sammys anchors, influence of bending on tension values when loaded in shear must be considered.

4.1.10 Requirements for Critical Edge Distance: 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, must be further multiplied by the factor $\psi_{cp,N}$ given by Eq-3:

$$\psi_{cp,N} = \frac{c}{c_{ac}} \quad (\text{Eq-3})$$

whereby the factor $\psi_{cp,N}$ need not be taken as less than $\frac{1.5h_{ef}}{c_{ac}}$. For all other cases, $\psi_{cp,N} = 1.0$. In lieu of ACI 318-19 Section 17.9.5, the values for the critical edge distance, c_{ac} , must be taken from [Table 1](#).

4.1.11 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: In lieu of ACI 318-19 Section 17.9.2, values of s_{min} and c_{min} as given in [Table 1](#) of this report must

be used. In lieu of ACI 318-19 Section 17.9.4, minimum concrete thickness h_{min} as given in [Table 1](#) of this report must be used.

For $1/2$ -inch- and $5/8$ -inch-diameter (12.7 mm and 15.9 mm) Tapcon+ Screw Anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, the anchors must be installed in accordance with [Figure 6](#) and must have an axial spacing along the flute equal to the greater of $3h_{ef}$ or 1.5 times the flute width.

4.1.12 Lightweight Concrete: For the use of anchors in lightweight concrete, the modification factor λ_a equal to 0.8λ is applied to all values of $\sqrt{f'_c}$ affecting N_n and V_n .

λ shall be determined in accordance with the corresponding version of ACI 318.

For anchors installed in the soffit of sand-lightweight concrete-filled steel deck and floor and roof assemblies, further reduction of the pullout values provided in this report is not required.

4.2 Allowable Stress Design:

4.2.1 General: Design values for use with allowable stress design (working stress design) load combinations calculated in accordance with Section 1605.1 of the 2024 IBC must be established as follows:

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

$$V_{allowable, ASD} = \frac{\phi V_n}{\alpha} \quad (\text{Eq-5})$$

where:

$T_{allowable, ASD}$	=	Allowable tension load (lbf or kN).
$V_{allowable, ASD}$	=	Allowable tension load (lbf or kN).
ϕN_n	=	Lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318-19 Chapter 17 and 2024 IBC Section 1905.7, and Section 4.1 of this report, as applicable (lbf or kN).
ϕV_n	=	Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318-19 Chapter 17 and 2024 IBC Section 1905.7, and Section 4.1 of this report, as applicable (lbf or kN).
α	=	Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition, α must include all applicable factors to account for nonductile failure modes and required over-strength.

Limits on edge distance, anchor spacing and member thickness as given in Section 4.1.11 of this report must apply. An illustrative example of allowable stress design values is shown in [Table 4](#).

4.2.2 Interaction of Tensile and Shear Forces: The interaction must be calculated and consistent with ACI 318-19 Section 17.8, as follows:

If $T_{applied} \leq 0.2 T_{allowable, ASD}$, the full allowable load in shear $V_{allowable, ASD}$ shall be permitted.

If $V_{applied} \leq 0.2 V_{allowable, ASD}$, the full allowable load in tension $T_{allowable, ASD}$ shall be permitted.

For all other cases:

$$\frac{T_{applied}}{T_{allowable, ASD}} + \frac{V_{applied}}{V_{allowable, ASD}} \leq 1.2 \quad (\text{Eq-6})$$

4.3 Installation:

Installation parameters are provided in [Table 1](#) and [Figures 4](#) and [6](#) of this report. The Tapcon+ Screw Anchors and SAMMYS Anchors must be installed in accordance with the manufacturer's published instructions and this

report. In case of conflict, this report governs. Anchor locations must comply with this report and the plans and specifications approved by the code official.

4.3.1 Tapcon+ Screw Anchors with Advanced Threadform Technology: $\frac{1}{4}$ -inch-, $\frac{3}{8}$ -inch-, $\frac{1}{2}$ -inch- and $\frac{5}{8}$ -inch diameter (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm) Tapcon+ Screw Anchors must be installed according to ITW's published instructions and this report. For the $\frac{1}{4}$ -inch-diameter (6.4 mm) anchor, the holes must be predrilled in concrete with a carbide-tipped drill bit complying with ANSI B212.15-1994 or a Tapcon+ carbide-tipped drill bit, supplied by ITW. For the $\frac{3}{8}$ -inch-, $\frac{1}{2}$ -inch-, and $\frac{5}{8}$ -inch diameter (9.5 mm, 12.7 mm, and 15.9 mm) anchors, the holes must be predrilled in concrete with a carbide-tipped drill bit complying with ANSI B212.15-1994. The hole must be drilled to the specified minimum hole depth, h_{hole} , in accordance with [Table 1](#). Before anchor installation, dust and other debris must be removed by use of a vacuum or compressed air. The anchors must then be installed through the attachment into the hole, in accordance with ITW's instructions, to the specified nominal embedment depth using a powered impact wrench or manual torque wrench until the proper embedment depth is obtained. The maximum impact wrench torque and maximum installation torque for the manual torque wrench must be in accordance with [Table 1](#). The Tapcon+ Screw Anchors may be loosened by a maximum of one turn and retightened with a manual torque wrench or powered impact wrench to facilitate fixture attachment or realignment. Complete removal and reinstallation of the anchor is not allowed.

For installation of the $\frac{1}{2}$ -inch- and $\frac{5}{8}$ -inch-diameter (12.7 mm and 15.9 mm) Tapcon+ Screw Anchor in the soffit of concrete on steel deck assemblies, the hole diameter in the steel deck must not exceed the diameter of the hole in the concrete by more than $\frac{1}{8}$ inch (3.2 mm). For member thickness and edge distance restrictions for installations into the soffit of concrete on steel deck assemblies, see [Figure 6](#).

4.3.2 SAMMYS Anchors for Threaded Rod: The SAMMYS Anchors must be installed according to ITW's published instructions and this report. Holes must be predrilled in concrete with a Tapcon carbide-tipped drill bit complying with ANSI B212.15-1994, supplied by ITW. The hole must be drilled to the specified nominal embedment depth plus a minimum of $\frac{1}{4}$ inch (6.4 mm). Before anchor installation, dust and other debris must be removed by use of a vacuum or compressed air. The anchors must then be installed into the hole, in accordance with ITW's instructions, to the specified nominal embedment depth using a powered impact wrench in conjunction with the ITW torque limiting nut driver until the proper embedment depth is obtained. Removal and reinstallation of the anchor is not allowed.

4.4 Special Inspection:

Periodic special inspection is required in accordance with Section 1705.1.1 and Table 1705.3 of the 2024 IBC, as applicable. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, hole dimensions, anchor spacing, edge distances, concrete thickness, anchor embedment, drill bit type and size, hole cleaning procedures, installation torque, and adherence to the manufacturer's published installation instructions and the conditions of this report (in case of conflict, this report governs). The special inspector must be present as often as required in accordance with the "statement of special inspection."

5.0 CONDITIONS OF USE:

The Tapcon+ Screw Anchors and SAMMYS Anchors described in this report are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Anchor sizes, dimensions, embedment, and installation are as set forth in this report.
- 5.2 The anchors must be installed in accordance with the manufacturer's published installation instructions and this report. In case of conflict, this report governs.
- 5.3 The $\frac{1}{4}$ -inch-, $\frac{3}{8}$ -inch-, $\frac{1}{2}$ -inch-, and $\frac{5}{8}$ -inch diameter (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm) anchors must be used in cracked and uncracked normal-weight concrete 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).
- 5.4 The $\frac{1}{2}$ -inch- and $\frac{5}{8}$ -inch-diameter (12.7 mm and 15.9 mm) anchor may be used in cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a minimum specified compressive strength, f'_c , of 3,000 psi (20.7 MPa).
- 5.5 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.1 MPa).
- 5.6 The concrete shall have attained its minimum design strength prior to installation of the anchors.

- 5.7 Strength design values must be established in accordance with Section 4.1 of this report.
- 5.8 Allowable stress design values must be established in accordance with Section 4.2 of this report.
- 5.9 Anchor spacing, edge distance, and minimum concrete thickness must comply with Section 4.1.11, [Table 1](#), and [Figure 6](#) of this report.
- 5.10 Reported values for the SAMMYS Anchors for Threaded Rod do not consider the steel element threaded into the anchor, which must be verified by the design professional. SAMMYS Anchors must be installed directly into the concrete, without the use of a baseplate.
- 5.11 Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the code official for approval. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.12 Since an ICC-ES acceptance 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 these conditions is beyond the scope of this report.
- 5.13 The 1/4-inch-, 3/8-inch-, 1/2-inch-, and 5/8-inch diameter (6.4 mm, 9.5 mm, 12.7 mm, and 15.9 mm) Tapcon+ Screw Anchors may be used to resist short-term loading due to wind forces and for seismic load combinations in locations designated as Seismic Design Categories A through F under the IBC, subject to the conditions of this report.
- 5.14 The 1/4-inch-diameter (6.4 mm) SAMMYS Anchors may be used to resist short-term loading due to wind forces and seismic tension loads only in locations designated as Seismic Design Categories A through F under the IBC, subject to the conditions of this report.
- 5.15 Anchors are not permitted to support fire-resistance-rated construction. Where not otherwise prohibited by the code, anchors are permitted for installation in fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:
- Anchors are used to resist wind or seismic forces only.
 - Anchors that support 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.
- 5.16 The anchors have been evaluated for reliability against brittle failure and found to be not significantly sensitive to stress-induced hydrogen-embrittlement.
- 5.17 The design of anchor groups in accordance with ACI 318-19 Chapter 17, is valid for screw anchors with a thread length of at least 80 percent of the nominal embedment depth. Anchors with a thread length less than 80 percent of the nominal embedment depth shall be designed as single anchors.
- 5.18 Use of the Tapcon+ Screw Anchors and SAMMYS Anchors with blue Climaseal[®] coating as described in Sections 3.1 and 3.2 must be limited to dry, interior locations.
- 5.19 Use of the 1/2-inch diameter Tapcon+ Screw Anchors with mechanically galvanized zinc coating in accordance with ASTM B695 as described in Section 3.1 is permitted for exterior exposure or damp environments, and for interior locations where anchors are in contact with preservative-treated and fire-retardant-treated wood.
- 5.20 Special inspection must be provided in accordance with Section 4.4 of the report.
- 5.21 Anchors are manufactured in the U.S.A. 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 Mechanical Anchors in Concrete Elements AC193 \(24\)](#), published April 2025; and quality-control documentation.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-3699) along with the name, registered trademark, or registered logo of the report holder or listee must be included in the product label.
- 7.2 Additionally, the Tapcon+ Screw Anchors and SAMMYS Anchors are identified by packaging labeled with the manufacturer's name (ITW Red Head, ITW Buildex, or ITW Brands), contact information, anchor name and anchor size. The Red Head logo or "BX" logo, and a length identification code letter are stamped on the head of each anchor. See the length identification system illustrated in [Figure 2](#) of this report.
- 7.3 The report holder's contact information is the following:

ITW RED HEAD
ITW BUILDDEX
155 HARLEM AVENUE
GLENVIEW, ILLINOIS 60025
(800) 848-5611
www.itw-redhead.com
techsupport@itwccna.com

- 7.4 The Additional Listee's contact information is the following:

ITW BRANDS
155 HARLEM AVENUE
GLENVIEW, ILLINOIS 60025
(877) 489-2726
www.itwbrands.com

TABLE A—PRODUCT IDENTIFICATION CROSS REFERENCE BY MANUFACTURER

PRODUCT REFERENCE PER ICC-ES ESR-3699	ITW RED HEAD	ITW BUILDEX	ITW BRANDS
1/4" SAMMYS for Vertical Rod	Not applicable	1/4" SAMMYS for Vertical Rod Part No. CCST 516	Not applicable
1/4" SAMMYS for Horizontal Rod	Not applicable	1/4" SAMMYS for Horizontal Rod Part No. SW-CCST 516	Not applicable
1/4" Tapcon+ Anchor	1/4" Tapcon+ Anchor	Not applicable	Buildex 5/16" Tapcon+ Anchor
3/8" Tapcon+ Anchor	3/8" Tapcon+ Anchor	Not applicable	Buildex 3/8" Tapcon+ Anchor
1/2" Tapcon+ Anchor	1/2" Tapcon+ Anchor	Not applicable	Buildex 1/2" Tapcon+ Anchor
5/8" Tapcon+ Anchor	5/8" Tapcon+ Anchor	Not applicable	Buildex 5/8" Tapcon+ Anchor



FIGURE 1—TAPCON+ SCREW ANCHOR WITH ADVANCED THREADFORM TECHNOLOGY

LENGTH MARKING ON ANCHOR HEAD			A	B	C	D	E	F	G	H	I	J
Length of anchor (inches)	From	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
	Up to, but not including	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2

For SI: 1 inch = 25.4 mm.

FIGURE 2—LENGTH IDENTIFICATION SYSTEM



SAMMYS Vertical Threaded Rod Anchor (Model No. CCST 516) with torque-limiting nut driver (#14 Black Nut Driver)

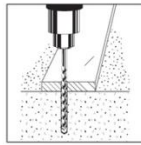
SAMMYS Horizontal Threaded Rod Anchor (Model No. SW-CCST 516) with torque-limiting nut driver (#14 SW Red Nut Driver)

FIGURE 3—SAMMYS SCREW ANCHORS FOR THREADED ROD

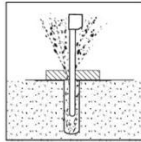


INSTALLATION INSTRUCTIONS FOR TAPCON+ SCREW ANCHORS

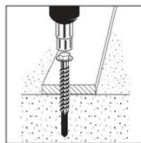
Installation Steps for Concrete, Lightweight Concrete and Metal Deck



1. Using a carbide drill bit, drill a hole at least 1/4" deeper than anchor embedment.



2. Clean hole with pressurized air or vacuum to remove any excess dust/debris.



3. Using an impact or manual wrench, insert anchor into hole and tighten anchor until fully seated.

ANCHOR DIAMETER (inch)	ANSI DRILL BIT DIAMETER (inch) ¹	ANCHOR HEAD (SOCKET SIZE) DIAMETER (inch)	ANCHOR HEAD HEIGHT (inch)	WASHER DIAMETER (inch)	MANUAL WRENCH MAX TORQUE ²	IMPACT WRENCH MAX TORQUE RATING
¹ / ₄ (ITW Red Head Anchor)	¹ / ₄	³ / ₈	0.24	¹ / ₂	20 FT LBS	115 FT LBS
⁵ / ₁₆ (ITW Brands Anchor)	¹ / ₄	³ / ₈	0.24	¹ / ₂	20 FT LBS	115 FT LBS
³ / ₈	³ / ₈	⁹ / ₁₆	0.35	¹³ / ₁₆	50 FT LBS	200 FT LBS
¹ / ₂	¹ / ₂	³ / ₄	0.45	1	70 FT LBS	345 FT LBS
⁵ / ₈	⁵ / ₈	1	0.63	1 ⁵ / ₁₆	100 FT LBS	350 FT LBS

¹ A ¹/₄-inch Tapcon+ drill bit may also be used for installation of the ¹/₄-inch anchor.

² For manual installation, use a torque wrench to verify that the maximum installation torque has not been exceeded.

SAMMYS[®]

Installation Steps for Concrete

1. Using a ¹/₄-inch Tapcon+ drill bit, drill a hole at least ¹/₄-inch deeper than anchor embedment.
2. Clean hole with compressed air or vacuum to remove any excess dust/debris.
3. Insert appropriate torque-limiting nut driver into the drill. See chart below.
4. Insert the anchor into the nut driver, position the anchor into hole and tighten anchor until nut driver spins free on cap of anchor.

Anchor Model	Torque-Limiting Nut Driver (Color)	Installation Orientation	Rod Size (inch)
CCST 516	#14 (Black)	Vertical	3/8
SW-CCST 516	#14 SW (Red)	Horizontal	3/8

FIGURE 4—INSTALLATION INSTRUCTIONS FOR TAPCON+ SCREW ANCHOR AND SAMMYS THREADED ROD ANCHOR

**TABLE 1—INSTALLATION INFORMATION FOR TAPCON+ SCREW ANCHORS
AND SAMMYS THREADED ROD ANCHORS^{1,5}**

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)							
			¹ / ₄		¹ / ₄	³ / ₈	¹ / ₂		⁵ / ₈	
Head Style	—	—	SAMMYS for Vertical Rod (CCST 516)	SAMMYS for Horizontal Rod (SW-CCST 516)	Hex Head	Hex Head	Hex Head		Hex Head	
Nominal Outside diameter (Shank)	d_a	in.	0.25		0.25	0.38	0.50		0.625	
Nominal Outside diameter (threads)	—	in.	0.33		0.33	0.46	0.59		0.74	
Drill bit specification	d_{bit}	in.	¹ / ₄ Tapcon+ Bit		¹ / ₄ Tapcon+ Bit	¹ / ₄ ANSI Bit	³ / ₈ ANSI Bit	¹ / ₂ ANSI Bit	⁵ / ₈ ANSI Bit	⁵ / ₈ ANSI Bit
Minimum base plate clearance hole diameter	d_h	in.	Not applicable ²		³ / ₈	¹ / ₂	⁵ / ₈		³ / ₄	
Maximum installation torque ⁴	$T_{inst, max}$	ft-lbf	Not applicable ³		20	50	70		100	
Maximum Impact Wrench Torque Rating	$T_{impact, max}$	ft-lbf	Not applicable ³		115	200	345		350	
Effective embedment depth	h_{ef}	in.	1.67		1.45	1.78	1.32	2.17	3.02	4.30
Minimum nominal embedment depth ⁵	h_{nom}	in.	2 ¹ / ₄		2	2 ¹ / ₂	2	3	4	5 ¹ / ₂
Minimum hole depth	h_{hole}	in.	2 ¹ / ₂		2 ¹ / ₄	2 ³ / ₄	2 ¹ / ₄	3 ¹ / ₄	4 ¹ / ₄	6
Minimum concrete member thickness	h_{min}	in.	4		4	4	4	6		8 ¹ / ₂
Critical edge distance	c_{ac}	in.	2 ¹ / ₂		2 ¹ / ₂	4 ¹ / ₂	3	4	5	6 ¹ / ₂
Minimum edge distance	c_{min}	in.	1 ¹ / ₂		1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₂	1 ³ / ₄	2 ¹ / ₂	4 ¹ / ₂
Minimum spacing	s_{min}	in.	3		3	3	3	3 ¹ / ₂	3	3

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

¹The data presented in this table is to be used in conjunction with the design criteria of ACI 318-19 Chapter 17.

²The Sammys Anchor is installed without a base plate, directly into the concrete.

³Installation must be performed with an ITW torque limiting nut driver, as applicable. See Section 4.3 for additional information.

⁴ $T_{inst, max}$ applies to installations using a calibrated torque wrench.

⁵For the ³/₈-inch-, ¹/₂-inch-, and ⁵/₈-inch-diameter Tapcon+ anchors, the design of anchor groups in accordance with ACI 318-19 Chapter is only valid for screw anchors with a thread length of at least 80 percent of the nominal embedment depth. Anchors with a thread length less than 80 percent of the nominal embedment depth shall be designed as single anchors.

**TABLE 2—TENSION STRENGTH DESIGN INFORMATION FOR TAPCON+ SCREW ANCHORS
AND SAMMYS THREADED ROD ANCHORS¹**

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)									
			1/4		1/4		3/8	1/2		5/8		
Head Style	—	—	SAMMYS for Vertical Rod (CCST 516)	SAMMYS for Horizontal Rod (SW-CCST 516)	Hex Head		Hex Head	Hex Head		Hex Head		
Drill bit specification		in.	1/4 Tapcon+ Bit		1/4 Tapcon+ Bit	1/4 ANSI Bit	3/8 ANSI Bit	1/2 ANSI Bit		5/8 ANSI Bit		
Anchor category	1, 2 or 3	—	1		1	2	1	1		1		
Effective embedment depth	h_{ef}	in.	1.45 ⁴		1.45		1.78	1.32	2.17	3.02	3.02	4.30
Minimum concrete member thickness	h_{min}	in.	4		4		4	4	6		6	8 ^{1/2}
Critical edge distance	c_{ac}	in.	2 ^{1/2}		2 ^{1/2}		4 ^{1/2}	3	4	5	5	6 ^{1/2}
Data for Steel Strength in Tension												
Minimum specified yield strength	f_y	psi	Not applicable		100,000		100,000	100,000		100,000		100,000
Minimum specified ultimate strength	f_{uta}	psi	Not applicable		125,000		125,000	125,000		125,000		125,000
Effective tensile stress area	A_{se}	in ²	Not applicable		0.0470		0.098	0.1850		0.1850		0.2850
Steel strength in tension	N_{sa}	lbf	1,822 ⁵		5,900		12,250	23,125		23,125		39,470
Strength reduction factor ϕ for tension, steel failure modes ²	ϕ_{sa}	—	0.65		0.65		0.65	0.65		0.65		0.65
Data for Concrete Breakout Strength in Tension												
Effectiveness factor - uncracked concrete	k_{uncr}	—	24		24		27	30		30		27
Effectiveness factor - cracked concrete	k_{cr}	—	17		17		17	17		24		21
Modification factor for cracked and uncracked concrete	$\psi_{c,N}$	—	1.0		1.0		1.0	1.0		1.0		1.0
Strength reduction factor ϕ for tension, concrete failure modes ²	ϕ_{cb}	—	0.65		0.65		0.55	0.65		0.65		0.65
Data for Pullout Strength in Tension												
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	2,107		2,107		See Footnote 3	See Footnote 3		See Footnote 3		See Footnote 3
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	857		857		1,837	See Footnote 3		See Footnote 3		See Footnote 3
Pullout strength for seismic loads	$N_{p,eq}$	lbf	857		857		1,677	See Footnote 3		See Footnote 3		See Footnote 3
Strength reduction factor ϕ for tension, pullout failure modes ²	ϕ_p	—	0.65		0.65		0.55	0.65		See Footnote 3		See Footnote 3
Additional Anchor Data												
Axial stiffness in service load range in uncracked concrete	β_{uncr}	lbf /in	385,000		385,000		800,000	800,000		800,000		830,000
Axial stiffness in service load range in cracked concrete	β_{cr}	lbf /in	225,000		225,000		365,000	365,000		365,000		417,000

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

¹The data presented in this table is to be used in conjunction with the design criteria of ACI 318-19 Chapter 17.

²The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 Section 17.5.3 are met.

³Pullout resistance does not govern design and does not need to be considered.

⁴For calculation only. For actual h_{ef} see [Table 1](#).

⁵For the strength between the threaded cap and anchor head.

**TABLE 3—SHEAR STRENGTH DESIGN INFORMATION FOR TAPCON+ SCREW ANCHORS
AND SAMMYS THREADED ROD ANCHORS¹**

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)								
			¹ / ₄		¹ / ₄	³ / ₈	¹ / ₂			⁵ / ₈	
Head Style	—	—	SAMMYS for Vertical Rod (CCST 516)	SAMMYS for Horizontal Rod (SW-CCST 516)	Hex Head	Hex Head	Hex Head	Hex Head	Hex Head	Hex Head	Hex Head
Drill bit specification		in.	¹ / ₄ Tapcon+ Bit	¹ / ₄ Tapcon+ Bit	¹ / ₄ ANSI Bit	³ / ₈ ANSI Bit	¹ / ₂ ANSI Bit	¹ / ₂ ANSI Bit	⁵ / ₈ ANSI Bit	⁵ / ₈ ANSI Bit	⁵ / ₈ ANSI Bit
Anchor category	1, 2 or 3	—	1	1	2	1	1	1	1	1	1
Minimum effective embedment depth	h_{ef}	in.	1.45 ⁴	1.45	1.45	1.78	1.32	2.17	3.02	3.02	4.30
Minimum concrete member thickness	h_{min}	in.	4	4	4	4	4	6	6	6	8 ¹ / ₂
Critical edge distance	c_{ac}	in.	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	4 ¹ / ₂	3	4	5	5	6 ¹ / ₂
Data for Steel Strengths in Shear											
Minimum specified yield strength	f_y	psi	Not applicable	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Minimum specified ultimate strength	f_{uta}	psi	Not applicable	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Effective shear stress area	A_{se}	in ²	Not applicable	0.047	0.047	0.098	0.098	0.185	0.185	0.285	0.285
Steel strength in shear - static	V_{sa}	lbf	905 ⁵	2,045	2,045	3,621	3,621	12,610	12,610	15,830	15,830
Steel strength in shear - seismic	$V_{sa,eq}$		Not applicable ³	1,350	1,350	2,920	2,920	9,300	9,300	15,830	15,830
Strength reduction factor ϕ for shear, steel failure modes ²	ϕ_{sa}	—	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Data for Concrete Breakout and Concrete Pryout Strengths in Shear											
Nominal Outside diameter (shank)	d_a	in.	0.25	0.25	0.25	0.38	0.38	0.50	0.50	0.63	0.63
Load bearing length of anchor	ℓ_e	—	1.67	1.45	1.45	1.78	1.32	2.17	3.02	3.02	4.30
Coefficient for Pryout Strength	κ_{cp}	—	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0
Strength reduction factor for shear, concrete breakout ²	ϕ_{cb}	—	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Strength reduction factor for shear, pryout ²	ϕ_{cp}	—	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

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

¹The data presented in this table is to be used in conjunction with the design criteria of ACI 318-19 Chapter 17.

²The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 Section 17.5.3 are met.

³The SAMMYS anchors have not been evaluated for seismic shear design under this report.

⁴For calculation only. For actual h_{ef} see [Table 1](#).

⁵For the strength between the threaded cap and anchor head.

**TABLE 4—EXAMPLE ALLOWABLE STRESS DESIGN TENSION VALUES FOR ILLUSTRATIVE PURPOSES
FOR TAPCON+ SCREW ANCHORS AND SAMMYS THREADED ROD ANCHORS** ^{1,2,3,4,5,6,7,8,9}

NOMINAL ANCHOR DIAMETER (inch)	NOMINAL EMBEDMENT DEPTH (inches)	EFFECTIVE EMBEDMENT DEPTH (inches)	ALLOWABLE TENSION LOAD (pounds)
1/4 SAMMYS	2.25	1.45 ¹⁰	920
1/4	2.00	1.45	779
3/8	2.50	1.78	1,408
1/2	2.00	1.32	999
	3.00	2.17	2,106
	4.00	3.02	3,457
5/8	4.00	3.02	3,112
	5.50	4.30	5,287

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa.

¹Single anchor with static tension load only.

²Concrete determined to remain uncracked for the life of the anchorage.

³Load combination from ACI 318-19 Section 5.3, (no seismic loading).

⁴30 percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L.

⁵Calculation of weighted average for $\alpha = 0.3 \cdot 1.2 + 0.7 \cdot 1.6 = 1.48$.

⁶Normalweight concrete, $f'_c = 2,500$ psi

⁷ $C_{a1} = C_{a2} > C_{ac}$.

⁸ $h \geq h_{min}$.

⁹Condition B where supplementary reinforcement in accordance with ACI 318-19 Section 17.5.3, is not provided.

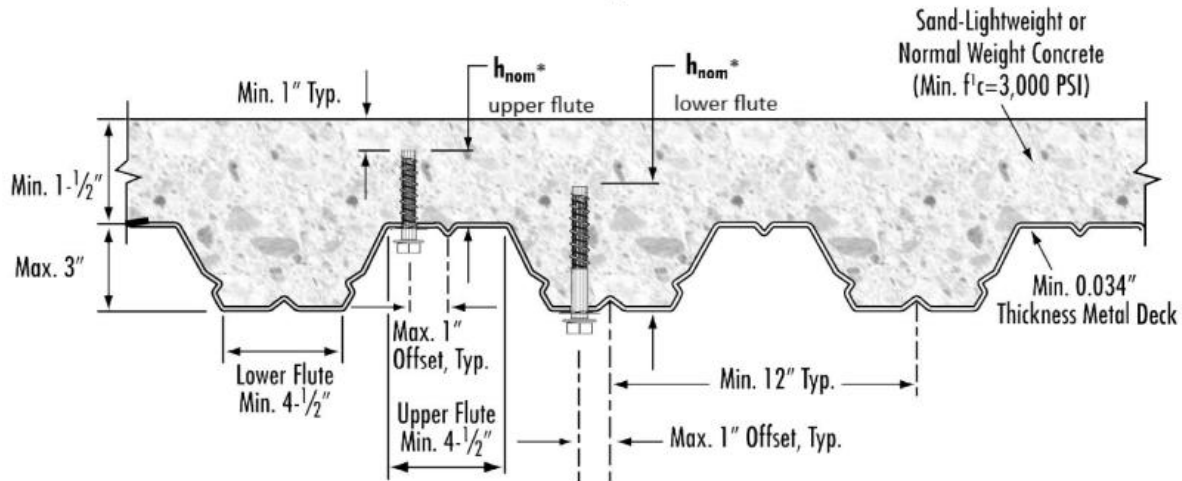
¹⁰For calculation only. For actual h_{ef} see [Table 1](#).

Illustrative Procedure to Calculate Allowable Stress Design Tension Value:

Tapcon+ Screw Anchor 1/2-inch diameter, using an embedment of 4-inches, assuming the conditions given in [Table 4](#).

PROCEDURE		CALCULATION
Step 1	Calculate steel strength of a single anchor in tension per ACI 318-19 Section 17.6.1.2 and Table 2 of this report:	$\phi N_{sa} = \phi N_{sa}$ $= 0.65 \cdot 23,125$ =15,031 lbs steel strength
Step 2	Calculate concrete breakout strength of a single anchor in tension per ACI 318-19 Section 17.6.2.2 and Table 2 of this report:	$N_b = k_{uncr} \sqrt{f'_c} h_{ef}^{1.5}$ $= 30 \cdot \sqrt{2,500} \cdot 3.02^{1.5}$ $= 7,872$ lbs $\phi N_{cb} = \phi A_{NC}/A_{NCO} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ $= 0.65 \cdot 1.0 \cdot 1.0 \cdot 1.0 \cdot 1.0 \cdot 7,872$ $= 0.65 \cdot 7,872$ = 5,117 lbs concrete breakout strength
Step 3	Calculate pullout strength per Table 2 of this report:	$\phi N_{pn} = \phi N_{p,uncr} \psi_{c,P}$ n/a – pullout strength does not control (see Table 2, footnote 4)
Step 4	Determine controlling resistance strength in tension per ACI 318-19 Section 17.5.2:	= 5,117 lbs controlling resistance (concrete)
Step 5	Calculate allowable stress design conversion factor for loading condition per ACI 318-19 Section 5.3:	$\alpha = 1.2D + 1.6L$ $= 1.2(0.3) + 1.6(0.7)$ =1.48
Step 6	Calculate allowable stress design value per Section 4.2 of this report:	$T_{allowable, ASD} = \phi N_n / \alpha$ $= 5,117 / 1.48$ = 3,457 lbs allowable stress design

FIGURE 5—EXAMPLE DESIGN CALCULATION



*See Table 6 for h_{nom}

FIGURE 6—TAPCON+ SCREW ANCHOR LOCATED IN THE SOFFIT OF CONCRETE OVER STEEL DECK FLOOR AND ROOF ASSEMBLIES
(1 inch = 25.4 mm)

TABLE 5—TAPCON+ SCREW ANCHOR DESIGN INFORMATION FOR ANCHORS LOCATED IN THE SOFFIT OF CONCRETE OVER STEEL DECK FLOOR AND ROOF ASSEMBLIES^{1,2,3,4,5}

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)			
			¹ / ₂		⁵ / ₈	
Location of installation	—	—	Lower Flute		Upper Flute	Upper or Lower Flute
Minimum hole depth	h_{hole}	in.	2 1/2	4 1/2	2 1/2	4 1/2
Nominal embedment depth	h_{nom}	in.	2	4	2	4
Minimum effective embedment depth	h_{ef}	in.	1.32	3.02	1.32	3.02
Characteristic pullout strength, uncracked concrete over metal deck	$N_{p,deck,uncr}$	lbf	1,720	4,950	2,405	4,920
Characteristic pullout strength, cracked concrete over metal deck	$N_{p,deck,cr}$	lbf	975	2,805	1,360	4,195
Characteristic pullout strength, seismic, concrete over metal deck	$N_{p,deck,eq}$	lbf	975	2,805	1,360	4,195
Characteristic shear strength, concrete over metal deck	$V_{sa,deck}$	lbf	3,825	6,130	3,825	5,470
Characteristic shear strength - seismic, concrete over metal deck	$V_{sa,deck,eq}$	lbf	2,820	4,520	2,820	5,470
Reduction factor for pullout strength in tension	ϕ	—	0.65			
Reduction factor for steel strength in shear	ϕ	—	0.60			

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

¹Values for $N_{p,deck,uncr}$, $N_{p,deck,cr}$, $N_{p,deck,eq}$, $V_{sa,deck}$ and $V_{sa,deck,eq}$ apply to sand-lightweight concrete having a minimum concrete compressive strength, f'_c , of 3,000 psi.

²The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c/3,000 \text{ psi})^{0.5}$.

³The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 Section 17.5.3 are met.

⁴The minimum anchor spacing along the flute must be the greater of $3h_{ef}$ or 1.5 times the flute width in accordance with Section 4.1.11 of this report.

⁵Installation must comply with [Figure 6](#) of this report.

TABLE 6— APPLICABLE SECTIONS OF THE IBC UNDER EACH EDITION OF THE IBC

2024 IBC	2021 IBC	2018 IBC	2015 IBC	2012 IBC
Section 1605.1		Section 1605.2 or 1605.3		
Section 1705.1.1 and Table 1705.3				
Section 1901.3				Sections 1908 and 1909
Sections 1903 and 1905				
Section 1905.7	Section 1905.1.8			N/A

TABLE 7— APPLICABLE SECTIONS OF ACI 318 UNDER EACH EDITION OF THE IBC

2024 IBC	2021 IBC	2018 IBC	2015 IBC	2012 IBC
ACI 318-19		ACI 318-14		ACI 318-11
2.3		2.3		D.1
5.3		5.3		9.2
Chapter 17		Chapter 17		Appendix D
17.3.1		17.2.7		D.3.7
17.5.1.2		17.3.1		D.4.1
17.5.3		17.3.3		D.4.3
17.6.1		17.4.1		D.5.1
17.6.1.2		17.4.1.2		D.5.1.2
17.6.2		17.4.2		D.5.2
17.6.2.2		17.4.2.2		D.5.2.2
17.6.2.5		17.4.2.6		D.5.2.6
17.6.3		17.4.3		D.5.3
17.6.3.1		17.4.3.1		D.5.3.1
17.6.3.2.1		17.4.3.2		D.5.3.2
17.6.3.3		17.4.3.6		D.5.3.6
17.7.1.2		17.5.1.2		D.6.1.2
Eq. 17.7.1.2b		Eq. 17.5.1.2b		Eq. D-29
17.7.2		17.5.2		D.6.2
17.7.2.2.1		17.5.2.2		D.6.2.2
Eq. 17.7.2.2.1a		Eq. 17.5.2.2a		Eq. D-33
17.7.3		17.5.3		D.6.3
17.8		17.6		D.7
17.9.2		17.7.1 and 17.7.3		D.8.1 and D.8.3
17.9.4		17.7.5		D.8.5
17.9.5		17.7.6		D.8.6
17.10		17.2.3		D.3.3
17.10.4, 17.10.5, 17.10.6, 17.10.7		17.2.3.4, 17.2.3.5, 17.2.3.6, 17.2.3.7		D.3.3.4, D.3.3.5, D.3.3.6, D.3.3.7

This report remains under an active [continuous compliance program](#) through the end of March 2028.

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

TAPCON+ SCREW ANCHORS AND SAMMYS THREADED ROD ANCHORS FOR USE IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Tapcon+ Screw Anchors and SAMMYS Threaded Rod Anchors for use in cracked and uncracked concrete, described in ICC-ES evaluation report [ESR-3699](#), have also been evaluated for compliance with the codes noted below as adopted by Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2026 City of Los Angeles Building Code ([LABC](#))
- 2026 City of Los Angeles Residential Code ([LARC](#))

2.0 CONCLUSIONS

The Tapcon+ Screw Anchors and SAMMYS Threaded Rod Anchors for use in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3699](#), comply with LABC Chapter 19, and the LARC, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Tapcon+ Screw Anchors and SAMMYS Threaded Rod Anchors described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-3699](#).
- The design, installation, conditions of use and labeling of the anchors are in accordance with the 2024 *International Building Code*® (IBC) and 2024 *International Residential Code*® (IRC) provisions, as applicable, noted in the evaluation report [ESR-3699](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, and City of Los Angeles Information Bulletin P/BC 2023-092, as applicable. References to Los Angeles Research Reports (LARR) within the COLA Information Bulletin P/BC may be substituted with this supplement.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The allowable and strength design values listed in the evaluation report and tables are for the connection of the anchors to the concrete. The connection between the anchors and the connected members shall be checked for capacity (which may govern).
- For use in wall anchorage assemblies to flexible diaphragm applications, anchors shall be designed per the requirements of City of Los Angeles Information Bulletin P/BC 2026-071.

This supplement expires concurrently with the evaluation report, reissued March 2026, revised August 2026.

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ICC-ES Evaluation Report

ESR-3699 CA Supplement

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

TAPCON+ SCREW ANCHORS AND SAMMYS THREADED ROD ANCHORS FOR USE IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Tapcon+ screw anchors and SAMMYS threaded rod anchors for use in cracked and uncracked concrete, described in ICC-ES evaluation report [ESR-3699](#), have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2025 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.

- 2025 California Residential Code (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The Tapcon+ screw anchors and SAMMYS threaded rod anchors for use in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3699](#), comply with CBC Chapter 19, provided the design and installation are in accordance with the 2024 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16 and 17.

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 Tapcon+ screw anchors and SAMMYS threaded rod anchors for use in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3699](#), comply with CRC Section R301.1.3, provided the design and installation are in accordance with the 2024 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 3.

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ICC-ES Evaluation Report

ESR-3699 FL Supplement with HVHZ

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TAPCON+ SCREW ANCHORS AND SAMMYS THREADED ROD ANCHORS FOR USE IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Tapcon+ Screw Anchors and SAMMYS Anchors for Threaded Rods for use in cracked and uncracked concrete, described in ICC-ES evaluation report [ESR-3699](#), have also been evaluated for compliance with the codes noted below.

Compliance with the following codes:

- 2026 and 2023 *Florida Building Code—Building*
- 2026 and 2023 *Florida Building Code—Residential*

2.0 PURPOSE OF THIS SUPPLEMENT

The Tapcon+ Screw Anchors and SAMMYS Screw Anchors for use in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report, [ESR-3699](#), comply with the *Florida Building Code—Building* and *Florida Building Code—Residential*. The design requirements must be determined in accordance with the *Florida Building Code—Building* or *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report, [ESR-3699](#) for the 2024 and 2021 *International Building Code*®, as applicable, meet the requirements of the *Florida Building Code—Building* or *Florida Building Code—Residential*, as applicable, with the following condition:

For use within 3,000 feet of a saltwater coastline under the 2026 *Florida Building Code—Building* or the 2026 *Florida Building Code—Residential*, fasteners and connectors must comply with Section 1711 and Table 1711.1 of the 2026 *Florida Building Code—Building* or Section R332 and Table R332.1 of the 2026 *Florida Building Code—Residential*, as applicable.

Use of the Tapcon+ Screw Anchors and SAMMYS Screw Anchors for use in cracked and uncracked concrete have also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and *Florida Building Code—Residential* with the following conditions:

- a) For anchorage of wood members, the connection subject to uplift must be designed for no less than 700 pounds (3114 N).

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). Florida Rule 61G20-3 is applicable to products and/or systems which comprise the building envelope and structural frame for compliance with the structural requirements of the Florida Building Code

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