

ICC-ES Evaluation Report

ESR-5109

Reissued August 2024

This report also contains:


- FBC Supplement

Subject to renewal August 2025

- LABC Supplement

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| <p>DIVISION: 03 00 00— CONCRETE</p> <p>Section: 03 16 00— Concrete Anchors</p> <p>DIVISION: 05 00 00— METALS</p> <p>Section: 05 05 19—Post- Installed Concrete Anchors</p> | <p>REPORT HOLDER: SIKA SERVICES AG</p> | <p>EVALUATION SUBJECT: SIKA ANCHORFIX®-2 ADHESIVE ANCHORS</p> |  |
|--|--|---|---|

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012, and 2009 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015, 2012, and 2009 [International Residential Code® \(IRC\)](#)

For evaluation for compliance with codes adopted by the [Los Angeles Department of Building and Safety \(LADBS\)](#), see [ESR-5109 LABC and LARC Supplement](#).

Property evaluated:

- Structural

2.0 USES

The Sika AnchorFix®-2 adhesive anchors are used to resist static, wind or earthquake (Seismic Design Categories A and B only) tension and shear loads in uncracked, normal-weight or lightweight concrete having a specified compressive strength, f'_c , of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

The anchors comply with anchors as described in Section 1901.3 of the 2021, 2018 and 2015 IBC, Section 1909 of the 2012 IBC and are an alternative to cast-in-place anchors described in Section 1908 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 DESCRIPTION

3.1 General:

The Sika AnchorFix®-2 adhesive anchors are comprised of the following:

- Sika AnchorFix®-2 adhesive packaged in cartridges
- Adhesive mixing and dispensing equipment
- Equipment for cleaning holes and injecting adhesive

The Sika AnchorFix®-2 adhesive is used with continuously threaded steel rods. Installation information, guidelines and parameters are shown in [Tables 1, 8, 9, and 10](#) of this report.

The manufacturer's printed installation instructions (MPII), included with each adhesive cartridge unit, are shown in [Figure 2](#) of this report.

3.2 Materials:

3.2.1 SIKA ANCHORFIX®-2: The Sika AnchorFix®-2 adhesive is a two-component (resin and **hardener**) epoxy-acrylate based adhesive, supplied in dual chamber cartridges separating the chemical components, which are combined when dispensed through the system static mixing nozzle. The Sika AnchorFix®-2 is available in the following cartridge configurations as depicted in [Figure 1](#):

- **SIKA ANCHORFIX®-2: CIC cartridges:** Sika AnchorFix®-2 CIC are two component cartridges containing Sika AnchorFix®-2 adhesive and labeled as CIC 300 – 300 ml (10.14 ounces), CIC 550 – 500 ml (18.60 ounces), or CIC 850 – 850 ml (28.74 ounces).

3.2.2 Dispensing Equipment: The Sika AnchorFix®-2 adhesive must be dispensed using pneumatic or manual actuated dispensing tools listed in [Table 10](#) of this report.

3.2.3 Hole Preparation Equipment: The holes must be cleaned with hole-cleaning brushes and air nozzles. The brush must be the **appropriate** size brush shown in [Tables 8](#) and [9](#) of this report, and the air nozzle must be equipped with an extension capable of reaching the bottom of the drilled hole and having an inside bore diameter of not less than 1/4 inch (6 mm). The holes must be prepared in accordance with the installation instructions shown in [Figure 2](#) of this report.

3.2.4 Steel Anchor Elements:

3.2.4.1 Threaded Steel Rod: Threaded anchor rods must be clean, continuously threaded rods (all-thread) in diameters and types as described in [Tables 2](#) and [3](#) of this report. Steel design information for the common grades of threaded rod is provided in [Tables 2](#) and [3](#). Carbon steel threaded rods may be furnished with a zinc electroplated coating or hot-dipped galvanized, or may be uncoated. Threaded steel rods must be straight and free of indentations or other defects along their length.

3.2.4.2 Ductility: In accordance with ACI 318 (-19 and -14) Section 2.3 or ACI 318-11 Section D.1, as applicable, in order for a steel element to be considered ductile, the tested elongation must be at least 14 percent and the reduction of area must be at least 30 percent. Steel elements with a tested elongation of less than 14 percent or a reduction of area less than 30 percent, or both, are considered brittle. Values for various steel materials are provided in [Tables 2](#) and [3](#) of this report. Where values are nonconforming or unstated, the steel must be considered brittle.

3.3 Concrete:

Normal-weight concrete must comply with Sections 1903 and 1905 of the IBC, as applicable. The specified compressive strength of the concrete must 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, as well as the 2021 IRC, must be determined in accordance with ACI 318-19 and this report. The design strength of anchors complying with the 2018 and 2015 IBC, as well as the 2018 and 2015 IRC must be determined in accordance with ACI 318-14 and this report. The design strength of anchors complying with the 2012, and 2009 IBC, as well as the 2012, and 2009 IRC, must be determined in accordance with ACI 318-11 and this report.

The strength design of anchors must comply with ACI 318-19 17.5.1.2, ACI 318-14 17.3.1 or ACI 318-11 D.4.1, as applicable.

A design example in accordance with the 2021 IBC is given in [Figure 3](#) of this report.

Design parameters are provided in [Tables 2](#) through [7](#) of this report. Strength reduction factors, ϕ , as described in ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, must be used for load combinations calculated in accordance with Section 1605.1 of the 2021 IBC, Section 1605.2 of the 2018, 2015, 2012, and 2009 IBC or ACI 318 (19 or -14) 5.3 or ACI 318-11 9.2, as applicable. Strength reduction factors, ϕ , described in ACI 318-11 Section D.4.4 must be used for load combinations calculated in accordance with Appendix C of ACI 318-11.

4.1.2 Static Steel Strength in Tension: The nominal static steel strength of a single anchor in tension, N_{sa} , in accordance with ACI 318-19 17.6.1.2, ACI 318-14 17.4.1.2 or ACI 318-11 D.5.1.2, as applicable, and the associated strength reduction factor, ϕ , in accordance with ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are provided in [Tables 2](#), [3](#), and [4](#) for the anchor element types included 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} , must be calculated in accordance with ACI 318-19 17.6.2, ACI 318-14 17.4.2 or ACI 318-11 D.5.2, as applicable, with the following addition:

The basic concrete breakout strength of a single anchor in tension, N_b , must be calculated in accordance with ACI 318-19 17.6.2.2, ACI 318-14 17.4.2.2 or ACI 318-11 D.5.2.2, as applicable, using the selected values of $k_{c,uncr}$ as provided in the tables of this report. Where analysis indicates no cracking in accordance with ACI 318-19 17.6.2.5, ACI 318-14 17.4.2.6 or ACI 318-11 D.5.2.6, as applicable, N_b must be calculated using $k_{c,uncr}$ and $\Psi_{c,N} = 1.0$. For anchors in lightweight concrete see ACI 318-19 17.2.4, ACI 318-14 17.2.6 or ACI 318-11 D.3.6, as applicable. The value of f'_c used for calculation must be limited to 8,000 psi (55 MPa) in accordance with ACI 318-19 17.3.1, ACI 318-14 17.2.7 or ACI 318-11 D.3.7, as applicable. Additional information for the determination of nominal bond strength in tension is given in Section 4.1.4 of this report.

4.1.4 Static Bond Strength in Tension: The nominal static bond strength of a single adhesive anchor or group of adhesive anchors in tension, N_a or N_{ag} , must be calculated in accordance with ACI 318-19 17.6.5, ACI 318-14 17.4.5 or ACI 318-11 D.5.5, as applicable. Bond strength values are a function of the concrete condition (uncracked), the concrete temperature range, and the installation conditions (dry or water-saturated concrete). The resulting characteristic bond strength shall be multiplied by the associated strength reduction factor ϕ_{nn} as follows corresponding to the level of special inspection provided:

| CONCRETE STATE | DRILLING METHOD | PERMISSIBLE INSTALLATION CONDITIONS | BOND STRENGTH | ASSOCIATED STRENGTH REDUCTION FACTOR |
|----------------|-----------------|-------------------------------------|-----------------|--------------------------------------|
| Uncracked | Hammer-drill | Dry concrete | $\tau_{k,uncr}$ | ϕ_d |
| | | Water-saturated concrete | $\tau_{k,uncr}$ | ϕ_{ws} |

Strength reduction factors for determination of the bond strength are given in [Tables 6](#) and [7](#) of this report.

4.1.5 Static Steel Strength in Shear: The nominal static strength of a single anchor in shear as governed by the steel, V_{sa} , in accordance with ACI 318-19 17.7.1.2, ACI 318-14 17.5.1.2 or ACI 318-11 D.6.1.2, as applicable, and strength reduction factors, ϕ , in accordance with ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are given in [Tables 2](#) and [3](#) of this report for the anchor element types included in this report.

4.1.6 Static Concrete Breakout Strength in Shear: The nominal 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 17.7.2, ACI 318-14 17.5.2 or ACI 318-11 D.6.2, as applicable, based on information given in [Tables 5](#) and [6](#) of this report. The basic concrete breakout strength of a single anchor in shear, V_b , must be calculated in accordance with ACI 318-19 17.7.2.2, ACI 318-14 17.5.2.2 or ACI 318-11 D.6.2.2, as applicable, using the values of d_o given in [Tables 4](#) and [5](#) for the corresponding anchor steel in lieu of d_a (2018, 2015, 2012 and 2009 IBC). In addition, h_{ef} must be substituted for ℓ_e . In no case shall ℓ_e exceed $8d$. For anchors in lightweight concrete, see ACI 318-19 17.2.4, ACI 318-14 17.2.6 or ACI 318-11 D.3.6, as applicable. The value of f'_c must be limited to a maximum of 8,000 psi (55 MPa), in accordance with ACI 318-19 17.3.1, ACI 318-14 17.2.7 or ACI 318-11 Section D.3.7, as applicable.

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 17.7.3, ACI 318-14 17.5.3 or ACI 318-11 D.6.3, as applicable.

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

4.1.9 Minimum Member Thickness, h_{min} , Anchor Spacing, s_{min} , and Minimum Edge Distance, c_{min} : In lieu of ACI 318-19 17.9.2, ACI 318-14 17.7.1 and 17.7.3 or ACI 318-11 D.8.1 and D.8.3, as applicable, values of s_{min} and c_{min} described in this report must be observed for anchor design and installation. The minimum member thickness, h_{min} , described in this report must be observed for anchor design and installation. For adhesive anchors that will remain untorqued, ACI 318-19 17.9.3, ACI 318-14 17.7.4 or ACI 318-11 D.8.4, as applicable, applies.

4.1.10 Critical Edge Distance c_{ac} and $\psi_{cp,Na}$: The modification factor $\psi_{cp,Na}$, must be determined in accordance with ACI 318-19 17.6.5.5, ACI 318-14 17.4.5.5 or ACI 318-11 D.5.5.5, as applicable, except as noted below:

For all cases where $c_{Na}/c_{ac} < 1.0$, $\psi_{cp,Na}$ determined from ACI 318-19 17.6.5.5, ACI 318-14 Eq. 17.4.5.5b or ACI 318-11 Eq. D-27, as applicable, need not be taken less than c_{Na}/c_{ac} . For all other cases, $\psi_{cp,Na}$ shall be taken as 1.0.

The critical edge distance, c_{ac} , must be calculated according to Eq. 17.6.5.5.1c for ACI 318-19, Eq. 17.4.5.5c for ACI 318-14 or Eq. D-27a for ACI 318-11, in lieu of ACI 318-19 17.9.5, ACI 318-14 17.7.6 or ACI 318-11 D.8.6, as applicable.

$$c_{ac} = h_{ef} \left(\frac{\tau_{k,uncr}}{1160} \right)^{0.4} \cdot \left[3.1 - 0.7 \frac{h}{h_{ef}} \right]$$

(Eq. 17.6.5.5.1c for ACI 318-19, Eq. 17.4.5.5c for ACI 318-14 or Eq. D-27a for ACI 318-11)

where

$\left[\frac{h}{h_{ef}} \right]$ need not be taken as larger than 2.4; and

$\tau_{k,uncr}$ = the characteristic bond strength stated in the tables of this report whereby $\tau_{k,uncr}$ need not be taken as larger than:

$$\tau_{k,uncr} = \frac{k_{uncr} \sqrt{h_{ef} f'_c}}{\pi \cdot d_a} \quad \text{Eq. (4-1)}$$

4.1.11 Requirements for Seismic Design: Anchors may be used to resist seismic loads in structures assigned to Seismic Design Category A or B of the IBC and IRC only.

As an exception to ACI 318-11 Section D.3.3.4.2: Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7 Equation 12.11-1 or 12.14-10 shall be deemed to satisfy ACI 318-11 D.3.3.4.3(d).

Under ACI 318-11 D.3.3.4.3(d), in lieu of requiring the anchor design tensile strength to satisfy the tensile strength requirements of ACI 318-11 D.4.1.1, the anchor design tensile strength shall be calculated from ACI 318-11 D.3.3.4.4.

The following exceptions apply to ACI 318-11 D.3.3.5.2:

1. For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or non-bearing walls of light-frame wood structures to foundations or foundation stem walls, the in-plane shear strength in accordance with ACI 318-11 D.6.2 and D.6.3 need not be computed and ACI 318-11 D.3.3.5.3 need not apply provided all of the following are satisfied:
 - 1.1. The allowable in-plane shear strength of the anchor is determined in accordance with AF&PA NDS Table 11E for lateral design values parallel to grain.
 - 1.2. The maximum anchor nominal diameter is $5/8$ inch (16 mm).
 - 1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).
 - 1.4. Anchor bolts are located a minimum of $1\ 3/4$ inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.
 - 1.5. Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.
 - 1.6. The sill plate is 2-inch or 3-inch nominal thickness.
2. For the calculation of the in-plane shear strength of anchor bolts attaching cold-formed steel track of bearing or non-bearing walls of light-frame construction to foundations or foundation stem walls, the in-plane shear strength in accordance with ACI 318-11 D.6.2 and D.6.3 need not be computed and ACI 318-11 D.3.3.5.3 need not apply provided all of the following are satisfied:
 - 2.1. The maximum anchor nominal diameter is $5/8$ inch (16 mm).

- 2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).
- 2.3. Anchors are located a minimum of 1³/₄ inches (45 mm) from the edge of the concrete parallel to the length of the track.
- 2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.
- 2.5. The track is 33 to 68 mil designation thickness.

Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete shall be permitted to be determined in accordance with AISI S100 Section E3.3.1.

3. In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch (25 mm) in diameter attaching a sill plate or track to foundation or foundation stem wall need not satisfy ACI 318-11 D.3.3.5.3 (a) through (c) when the design strength of the anchors is determined in accordance with ACI 318-11 D.6.2.1(c).

4.2 Allowable Stress Design (ASD):

4.2.1 General: For anchors designed using load combinations calculated in accordance with Section 1605.1 of the 2021 IBC, or 2018, 2015, and 2012 IBC Section 1605.3 (Allowable Stress Design), allowable loads must be established using the following relationships:

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

$$V_{allowable,ASD} = \phi V_n / \alpha \quad \text{Eq. (4-3)}$$

where

$T_{allowable,ASD}$ = Allowable tension load (lbf or kN)

$V_{allowable,ASD}$ = Allowable shear load (lbf or kN)

ϕN_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 and 2021, 2018 and 2015 IBC Section 1905.1.8; ACI 318-11 Appendix D as amended in this report; and 2009 IBC Sections 1908.1.9 and 1908.1.10; and Section 4.1 of this report, as applicable. For the 2012 IBC, Section 1905.1.9 shall be omitted.

ϕV_n = The lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318 (-19 and -14) Chapter 17 and 2021, 2018 and 2015 IBC Section 1905.1.8; ACI 318-11 Appendix D as amended in this report; and 2009 IBC Sections 1908.1.9 and 1908.1.10; and Section 4.1 of this report, as applicable. For the 2012 IBC, Section 1905.1.9 shall be omitted.

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 non-ductile failure modes and required over-strength.

[Table 12](#) provides an illustration of calculated Allowable Stress Design (ASD) values for each anchor diameter at minimum and maximum embedment depth.

The requirements for member thickness, edge distance and spacing, as described in [Table 1](#) of this report, must apply. An example of allowable stress design values for illustrative purposes is shown in [Figure 3](#) of this report.

4.2.2 Interaction of Tensile and Shear Forces: In lieu of ACI 318-19 17.8, ACI 318-14 17.6.1, 17.6.2 and 17.6.3 or ACI 318-11 D.7.1, D.7.2 and D.7.3, as applicable, interaction of tension and shear loads must be calculated as follows:

For tension loads $T \leq 0.2 \cdot T_{allowable,ASD}$, the full allowable strength in shear, $V_{allowable,ASD}$, shall be permitted.

For shear loads $V \leq 0.2 \cdot V_{allowable,ASD}$, the full allowable strength in tension, $T_{allowable,ASD}$, shall be permitted.

For all other cases:

$$\frac{T}{T_{allowable,ASD}} + \frac{V}{V_{allowable,ASD}} \leq 1.2 \quad \text{Eq. (4-4)}$$

4.3 Installation:

Installation parameters are provided in [Tables 1, 8, 9, 10, 11](#) and [Figure 2](#). Installation must be in accordance with ACI 318-19 26.7.2, ACI 318-14 17.8.1 and 17.8.2 or ACI 318-11 D.9.1 and D.9.2, as applicable. Anchor locations must comply with this report and the plans and specifications approved by the building official. Installation of the Sika AnchorFix®-2 adhesive anchors must conform to the manufacturer's printed installation instructions (MPII) included in each package unit and as described in [Figure 2](#). The nozzles, brushes, dispensing tools, and resin stoppers shown in [Figure 1](#) and listed in [Tables 8, 9, and 10](#) supplied by the manufacturer, must be used along with the adhesive cartridges. Installation of anchors may be vertically down (floor), horizontal (walls) and vertically overhead. Use of nozzle extension tubes and resin stoppers must be in accordance with [Tables 8 and 9](#).

4.4 Special Inspection:

Periodic special inspection must be performed where required in accordance with Section 1705.1.1 and Table 1705.3 of the 2021, 2018, 2015 and 2012 IBC, 1704.4 and 1704.15 of the 2009 IBC and this report. The special inspector must be on the jobsite initially during anchor or post-installed reinforcing bar installation to verify the anchor or post-installed reinforcing bar type and dimensions, adhesive expiration date, concrete type, concrete compressive strength, hole dimensions, hole cleaning procedures, spacing, edge distances, concrete thickness, anchor or post-installed reinforcing bar embedment, tightening torque, and adherence to the manufacturers printed installation instructions.

The special inspector must verify the initial installations of each type and size of adhesive anchor or post-installed reinforcing bar by construction personnel on site. Subsequent installations of the same anchor or post-installed reinforcing bar type and size by the same construction personnel are permitted to be performed in the absence of the special inspector. Any change in the anchor or post-installed reinforcing bar product being installed or the personnel performing the installation requires an initial inspection. For ongoing installations over an extended period, the special inspector must make regular inspections to confirm correct handling and installation of the product.

Continuous special inspection of adhesive anchors installed in horizontal or upwardly inclined orientations to resist sustained tension loads shall be performed in accordance with ACI 318-19 26.13.3.2(e), ACI 318-14 17.8.2.4 or ACI 318-11 D.9.2.4, as applicable.

Under the IBC, additional requirements as set forth in Section 1705.1.1 and Table 1705.3 of the 2021, 2018, 2015 or 2012 IBC and Sections 1705, 1706 or 1707 of the 2009 IBC must be observed, where applicable.

5.0 CONDITIONS OF USE:

The Sika AnchorFix®-2 adhesive anchors described in this report complies with or is a suitable alternative to what is specified in the codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Sika AnchorFix®-2 adhesive anchors must be installed in accordance with the manufacturer's printed installation instructions (MPII) and as shown in [Figure 3](#) of this report.
- 5.2 The anchors are limited to installation in concrete that is uncracked and may be expected to remain uncracked for the service life of the anchor. The anchors must be installed in uncracked normal-weight or lightweight concrete having a specified compressive strength, $f'_c = 2,500$ psi to 8,500 psi (17.2 MPa to 58.6 MPa).
- 5.3 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.1 MPa).
- 5.4 The concrete shall have attained its minimum design strength prior to installation of the adhesive anchors.
- 5.5 Anchors must be installed in concrete base materials in holes predrilled in accordance with the instructions provided in [Figure 2](#) of this report, with carbide-tipped drill bits complying with ANSI B212.15-1994.
- 5.6 Loads applied to the anchors must be adjusted in accordance with Section 1605.1 of the 2021 IBC for strength and allowable stress design, Section 1605.2 of the 2018, 2015, 2012 and 2009 IBC for strength design, and Section 1605.3 of the 2018, 2015, 2012 and 2009 IBC for allowable stress design.
- 5.7 Sika AnchorFix®-2 adhesive anchors are recognized for use to resist short- and long-term loads, including wind and earthquake (Seismic Design Category A and B only) subject to the conditions of this report.
- 5.8 Strength design values must be established in accordance with Section 4.1 of this report.
- 5.9 Allowable stress design values must be established in accordance with Section 4.2 of this report.

- 5.10** Minimum anchor spacing and edge distance, as well as minimum member thickness, must comply with the values described in this report.
- 5.11** Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the code official. 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** Anchors are not permitted to support fire-resistive construction. Where not otherwise prohibited by the code, Sika AnchorFix®-2 adhesive anchors are permitted for installation in fire-resistive construction provided at least one of the following conditions is fulfilled:
- 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.
- 5.13** Since an ICC-ES acceptance criteria for evaluating data to determine the performance of adhesive 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.
- 5.14** Use of zinc-plated carbon steel threaded rods is limited to dry, interior locations.
- 5.15** Use of hot-dipped galvanized carbon steel and stainless steel rods is permitted for exterior exposure or damp environments.
- 5.16** Steel anchoring materials in contact with preservative-treated wood and fire-retardant-treated wood must be zinc-coated carbon steel or stainless steel. The minimum coating weights for zinc-coated steel must comply with ASTM A153.
- 5.17** Special inspection must be provided in accordance with Section 4.4 in this report. Continuous special inspection for anchors installed in horizontal or upwardly inclined orientations to resist sustained tension loads must be provided in accordance with Section 4.4 of this report.
- 5.18** Installation of anchors in horizontal or upwardly inclined orientations to resist sustained tension loads shall be performed by personnel certified by an applicable certification program in accordance with ACI 318-19 26.7.1(l) and 26.7.2(e), ACI 318-14 17.8.2.2 or 17.8.2.3; or ACI 318-11 D.9.2.2 or D.9.2.3, as applicable.
- 5.19** Sika AnchorFix®-2 adhesive anchors may be used to resist tension and shear forces in floor, wall, and overhead installations. Floor and wall installation may be into concrete with a temperature between 32°F and 95°F (0°C and 35°C) for threaded rods. Overhead installation may be into concrete with a temperature between 50°F and 95°F (10°C and 35°C) for threaded rods. Upwardly inclined installations are limited to ⁵/₁₆-inch, ³/₈-inch ¹/₂-inch-, and ⁵/₈-inch- (8 mm, 10mm, 12 mm, and 16 mm) anchor diameters. See [Tables 8](#) and [9](#) for additional information. The anchor must be supported until fully cured (i.e., with wedges, or other suitable means). Where temporary restraint devices are used, their use shall not result in impairment of the anchor shear resistance.
- 5.20** Anchors shall not be used for installations where the concrete temperature can rise from 40°F (4°C) [or less] to 80°F (27°C) [or higher] within a 12-hour period. Such applications may include but are not limited to anchorage of building facade systems and other applications subject to direct sun exposure
- 5.21** Sika AnchorFix®-2 adhesive is manufactured and packaged into cartridges, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements \(AC308\)](#), dated June 2019 (editorially revised February 2021) which incorporates requirements in ACI 355.4-19 and ACI 355.4-11.

7.0 IDENTIFICATION

- 7.1** Sika AnchorFix®-2 adhesive is identified in the field by labels on the cartridge and packaging, bearing the company name (Sika Servies AG), product name (Sika AnchorFix®-2), the batch number, the expiration date, and the evaluation report number (ESR-5109).

7.2 Threaded rods, nuts, and washers are standard elements, and must conform to applicable national or international specifications.

7.3 The report holder’s contact information is the following:

SIKA SERVICES AG
TUEFFENWIES 16-22
ZUERICH CH-8048
SWITZERLAND
+41 (0) 58 436 40 40
www.sika.com

TABLE 1—SIKA ANCHORFIX®-2 ANCHOR SYSTEM INSTALLATION INFORMATION

| CHARACTERISTIC | | SYMBOL | UNITS | NOMINAL ANCHOR ELEMENT DIAMETER | | | | |
|----------------------------|------------|---------------------|-------|-----------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Fractional Threaded Rod | Size | d _o | inch | 5/16 | 3/8 | 1/2 | 5/8 | 3/4 |
| | Drill Size | d _{hole} | inch | 3/8 | 7/16 | 9/16 | 11/16 | 13/16 |
| Metric Threaded Rod | Size | d _o | mm | M8 | M10 | M12 | M16 | M20 |
| | Drill Size | d _{hole} | mm | 10 | 12 | 14 | 18 | 22 |
| Maximum Tightening Torque | | T _{inst} | ft·lb | 7.5 | 15 | 25 | 55 | 80 |
| Embedment Depth Range | | h _{ef,min} | inch | 2 ³ / ₈ | 2 ³ / ₈ | 2 ³ / ₄ | 3 ¹ / ₈ | 3 ¹ / ₂ |
| | | h _{ef,max} | inch | 3 ³ / ₄ | 4 ¹ / ₂ | 6 | 7 ¹ / ₂ | 9 |
| Minimum Concrete Thickness | | h _{min} | inch | 1.5 · h _{ef} | | | | |
| Critical Edge Distance | | c _{ac} | inch | See Section 4.1.10 of this report | | | | |
| Minimum Edge Distance | | c _{min} | inch | 1 ¹ / ₂ | 1 ⁵ / ₈ | 2 | 2 ¹ / ₂ | 3 ¹ / ₈ |
| Minimum Anchor Spacing | | s _{min} | inch | 1 ¹ / ₂ | 1 ⁵ / ₈ | 2 | 2 ¹ / ₂ | 3 ¹ / ₈ |

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

TABLE 2—STEEL DESIGN INFORMATION FOR FRACTIONAL CARBON STEEL AND STAINLESS STEEL THREADED ROD^{1,2}

| CHARACTERISTIC | | SYMBOL | UNITS | NOMINAL ROD DIAMETER, d_o | | | | |
|------------------------------|--|----------|------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Nominal Size | | d_o | inch | ⁵ / ₁₆ | ³ / ₈ | ¹ / ₂ | ⁵ / ₈ | ³ / ₄ |
| Stress Area ¹ | | A_{se} | in. ² | 0.0524 | 0.0775 | 0.1419 | 0.226 | 0.334 |
| Carbon Steel Threaded Rod | Strength Reduction Factor for Tension Steel Failure ² | ϕ | - | 0.75 | | | | |
| | Strength Reduction Factor for Shear Steel Failure ² | ϕ | - | 0.65 | | | | |
| | Tension Resistance of Carbon Steel ASTM F1554 Grade 36 | N_{sa} | lb (kN) | 3,039 (13.5) | 4,495 (20.0) | 8,230 (36.6) | 13,110 (58.3) | 19,370 (86.2) |
| | Tension Resistance of Carbon Steel ASTM A193 B7 | N_{sa} | lb (kN) | 6,552 (29.1) | 9,690 (43.1) | 17,740 (78.9) | 28,250 (125.7) | 41,750 (185.7) |
| | Shear Resistance of Carbon Steel ASTM F1554 Grade 36 | V_{sa} | lb (kN) | 1,823 (8.1) | 2,697 (12.0) | 4,940 (22.0) | 7,865 (35.0) | 11,625 (51.7) |
| | Shear Resistance of Carbon Steel ASTM A193 B7 | V_{sa} | lb (kN) | 3,931 (17.5) | 5,814 (25.9) | 10,645 (47.4) | 16,950 (75.4) | 25,050 (111.4) |
| Stainless Steel Threaded Rod | Strength Reduction Factor for Tension Steel Failure ² | ϕ | - | 0.65 | | | | |
| | Strength Reduction Factor for Shear Steel Failure ² | ϕ | - | 0.60 | | | | |
| | Tension Resistance of Stainless Steel ASTM F593 CW1 | N_{sa} | lb (kN) | 4,980 (22.2) | 7,365 (32.8) | 13,480 (60.0) | 21,470 (95.5) | -- -- |
| | Tension Resistance of Stainless Steel ASTM F593 CW2 | N_{sa} | lb (kN) | -- -- | -- -- | -- -- | -- -- | 25,385 (112.9) |
| | Tension Resistance of Stainless Steel ASTM F593 SH1 | N_{sa} | lb (kN) | 6,028 (26.8) | 8,915 (39.7) | 16,320 (72.6) | 25,990 (115.6) | -- -- |
| | Tension Resistance of Stainless Steel ASTM F593 SH2 | N_{sa} | lb (kN) | -- -- | -- -- | -- -- | -- -- | 35,070 (156.0) |
| | Shear Resistance of Stainless Steel ASTM F593 CW1 | V_{sa} | lb (kN) | 2,488 (11.1) | 3,680 (16.4) | 6,740 (30.0) | 10,735 (47.8) | -- -- |
| | Shear Resistance of Stainless Steel ASTM F593 CW2 | V_{sa} | lb (kN) | -- -- | -- -- | -- -- | -- -- | 12,690 (56.4) |
| | Shear Resistance of Stainless Steel ASTM F593 SH1 | V_{sa} | lb (kN) | 3,012 (13.4) | 4,455 (19.8) | 9,790 (43.5) | 15,595 (69.4) | -- -- |
| | Shear Resistance of Stainless Steel ASTM F593 SH2 | V_{sa} | lb (kN) | -- -- | -- -- | -- -- | -- -- | 17,535 (78.0) |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹Values provided for steel threaded rod are based on minimum specified strengths and calculated in accordance with ACI 318-19 Eq. 17.6.1.2 and Eq. 17.7.1.2(b), ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. D-2 and Eq. D-29, as applicable.

²The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3, or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate strength reduction factor must be determined in accordance with ACI 318-11 D.4.4.

TABLE 3—STEEL DESIGN INFORMATION FOR METRIC THREADED ROD^{1,2}

| CHARACTERISTIC | | SYMBOL | UNITS | NOMINAL ROD DIAMETER, d_o | | | | |
|---------------------|--|----------|-----------------|-----------------------------|------------------|------------------|-------------------|-------------------|
| Metric Threaded Rod | Nominal Size | d_o | mm | M8 | M10 | M12 | M16 | M20 |
| | Stress Area | A_{se} | mm ² | 36.6 | 58 | 84 | 157 | 245 |
| | Strength Reduction Factor for Tension Steel Failure | ϕ | - | 0.65 | | | | |
| | Strength Reduction Factor for Shear Steel Failure | ϕ | - | 0.60 | | | | |
| | Tension Resistance of Carbon Steel ISO 898-1 Class 5.8 | N_{sa} | kN lb | 18.3 (4,114) | 29.0 (6,519) | 42.2 (9,476) | 78.5 (17,648) | 122.5 (27,539) |
| | Tension Resistance of Carbon Steel ISO 898-1 Class 8.8 | N_{sa} | kN lb | 29.3 (6,583) | 46.4 (10,431) | 67.4 (15,161) | 125.6 (28,236) | 196.0 (44,063) |
| | Tension Resistance of Carbon Steel ISO 898-1 Class 12.9 | N_{sa} | kN lb | 43.9 (9,874) | 50.0 (11,240) | 72.7 (16,336) | 135.3 (30,424) | 211.2 (47,477) |
| | Tension Resistance of Stainless Steel ISO 3506-1 A4-70 | N_{sa} | kN lb | 25.6 (5,760) | 40.6 (9,127) | 59.0 (13,266) | 109.9 (24,707) | 171.5 (38,555) |
| | Tension Resistance of Stainless Steel ISO 3506-1 A4-80 | N_{sa} | kN lb | 29.3 (6,583) | 46.4 (10,431) | 67.4 (15,161) | 125.6 (28,236) | 196.0 (44,063) |
| | Shear Resistance of Carbon Steel ISO 898-1 Class 5.8 | V_{sa} | kN lb | 11.0 (2,469) | 17.4 (3,912) | 25.3 (5,685) | 47.1 (10,589) | 73.5 (16,523) |
| | Shear Resistance of Carbon Steel ISO 898-1 Class 8.8 | V_{sa} | kN lb | 17.6 (3,950) | 27.8 (6,259) | 40.5 (9,097) | 75.4 (16,942) | 117.6 (26,438) |
| | Shear Resistance of Carbon Steel ISO 898-1 Class 12.9 | V_{sa} | kN lb | 26.3 (5,924) | 30.0 (6,744) | 43.6 (9,802) | 81.2 (18,255) | 126.7 (28,486) |
| | Shear Resistance of Stainless Steel ISO 3506-1 A4-70 | V_{sa} | kN lb | 15.4 (3,456) | 24.4 (5,476) | 35.4 (7,960) | 65.9 (14,824) | 102.9 (23,133) |
| | Shear Resistance of Stainless Steel ISO 3506-1 A4-80 | V_{sa} | kN lb | 17.6 (3,950) | 27.8 (6,259) | 40.5 (9,097) | 75.4 (16,942) | 117.6 (26,438) |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹Values provided for steel threaded rod are based on minimum specified strengths and calculated in accordance with ACI 318-19 Eq. 17.6.1.2 and Eq. 17.7.1.2(b), ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. D-2 and Eq. D-29, as applicable.

²The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3, or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate strength reduction factor must be determined in accordance with ACI 318-11 D.4.4.

TABLE 4—FRACTIONAL THREADED ROD CONCRETE BREAKOUT STRENGTH DESIGN INFORMATION

| CHARACTERISTIC | | SYMBOL | UNITS | NOMINAL ANCHOR ELEMENT DIAMETER | | | | |
|---|------------|--------------|------------|-----------------------------------|-----------|-----------|-----------|-----------|
| US Threaded Rod | Size | d_o | Inch | $5/16$ | $3/8$ | $1/2$ | $5/8$ | $3/4$ |
| | Drill Size | d_{hole} | Inch | $3/8$ | $7/16$ | $9/16$ | $11/16$ | $13/16$ |
| Embedment Depth Range | | $h_{ef,min}$ | Inch | $2^{3/8}$ | $2^{3/8}$ | $2^{3/4}$ | $3^{1/8}$ | $3^{1/2}$ |
| | | $h_{ef,max}$ | Inch | $3^{3/4}$ | $4^{1/2}$ | 6 | $7^{1/2}$ | 9 |
| Minimum Anchor Spacing | | s_{min} | Inch | $1^{1/2}$ | $1^{5/8}$ | 2 | $2^{1/2}$ | $3^{1/8}$ |
| Minimum Edge Distance | | c_{min} | Inch | $1^{1/2}$ | $1^{5/8}$ | 2 | $2^{1/2}$ | $3^{1/8}$ |
| Minimum Concrete Thickness | | h_{min} | Inch | $1.5 \cdot h_{ef}$ | | | | |
| Critical Edge Distance | | c_{ac} | - | See Section 4.1.10 of this report | | | | |
| Effectiveness Factor for Uncracked Concrete, Breakout | | $k_{c,uncr}$ | -- (SI) | 24 (10) | | | | |
| Strength Reduction Factor for Tension, Concrete Failure Modes, Condition B, (supplemental reinforcement not present) ¹ | | ϕ | -- | 0.65 | | | | |
| Strength Reduction Factor for Shear, Concrete Failure Modes, Condition B, (supplemental reinforcement not present) ¹ | | ϕ | -- | 0.70 | | | | |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹ The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4.

TABLE 5—METRIC THREADED ROD CONCRETE BREAKOUT STRENGTH DESIGN INFORMATION

| CHARACTERISTIC | | SYMBOL | UNITS | NOMINAL ANCHOR ELEMENT DIAMETER | | | | |
|--|------------|--------------|------------|-----------------------------------|-----------|-----------|-----------|-----------|
| SI Threaded Rod | Size | d_o | mm | M8 | M10 | M12 | M16 | M20 |
| | Drill Size | d_{hole} | mm | 10 | 12 | 14 | 18 | 22 |
| Embedment Depth Range | | $h_{ef,min}$ | inch | $2^{3/8}$ | $2^{3/8}$ | $2^{3/4}$ | $3^{1/8}$ | $3^{1/2}$ |
| | | $h_{ef,max}$ | inch | $3^{3/4}$ | $4^{1/2}$ | 6 | $7^{1/2}$ | 9 |
| Minimum Anchor Spacing | | s_{min} | inch | $1^{1/2}$ | $1^{5/8}$ | 2 | $2^{1/2}$ | $3^{1/8}$ |
| Minimum Edge Distance | | c_{min} | inch | $1^{1/2}$ | $1^{5/8}$ | 2 | $2^{1/2}$ | $3^{1/8}$ |
| Minimum Concrete Thickness | | h_{min} | inch | $1.5 \cdot h_{ef}$ | | | | |
| Critical Edge Distance | | -- | -- | See Section 4.1.10 of this report | | | | |
| Effectiveness Factor for Uncracked Concrete, Breakout | | k_{uncr} | -- (SI) | 24 (10) | | | | |
| Strength Reduction Factor for Tension, Concrete Failure Modes, Condition B ¹ , (supplemental reinforcement not present) | | ϕ | -- | 0.65 | | | | |
| Strength Reduction Factor for Shear, Concrete Failure Modes, Condition B ¹ , (supplemental reinforcement not present) | | ϕ | -- | 0.70 | | | | |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹ The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.5.

TABLE 6—FRACTIONAL THREADED ROD BOND STRENGTH DESIGN INFORMATION^{1,4,5}

| DESIGN INFORMATION | | SYMBOL | UNITS | NOMINAL THREADED ROD DIAMETER | | | | |
|---|--|-------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | | | | ⁵ / ₁₆ " | ³ / ₈ " | ¹ / ₂ " | ⁵ / ₈ " | ³ / ₄ " |
| Minimum Effective Installation Depth | | $h_{ef,min}$ | in. | 2 ³ / ₈ | 2 ³ / ₈ | 2 ³ / ₄ | 3 ¹ / ₈ | 3 ¹ / ₂ |
| | | | mm | 60 | 60 | 70 | 80 | 90 |
| Maximum Effective Installation Depth | | $h_{ef,max}$ | in. | 3 ³ / ₄ | 4 ¹ / ₂ | 6 | 7 ¹ / ₂ | 9 |
| | | | mm | 96 | 120 | 144 | 192 | 240 |
| Temperature Category A ^{2,3} | Characteristic Bond Strength in Uncracked Concrete | $\tau_{k,uncr}$ | psi | 1,405 | 1,335 | 1,270 | 1,135 | 1,000 |
| | | | N/mm ² | 9.7 | 9.2 | 8.8 | 7.8 | 6.9 |
| Anchor Category, dry and water saturated concrete | | — | - | 2 | 2 | 2 | 2 | 2 |
| Strength Reduction Factor | | $\phi_{d,ws}$ | - | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 |
| Sustained Load Reduction Factor ⁵ | | $\alpha_{p,sust}$ | - | 0.72 | | | | |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹Bond strength values correspond to concrete compressive strength $f_c = 2,500$ psi. Bond strength values must not be increased for increased concrete compressive strength.

²Temperature Category A: Maximum Long Term Temperature: 110°F (43°C); Maximum Short Term Temperature: 176°F (80°C)

³Short-term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long-term concrete temperatures are roughly constant over significant periods of time.

⁴The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3. or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate strength reduction factor must be determined in accordance with ACI 318-11 D.4.4.

⁵For sustained loads, bond strengths must be multiplied by 0.72.

TABLE 7—METRIC THREADED ROD BOND STRENGTH DESIGN INFORMATION^{1,4,5}

| DESIGN INFORMATION | | SYMBOL | UNITS | NOMINAL THREADED ROD DIAMETER | | | | |
|---|--|-------------------|-------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | | | | M8 | M10 | M12 | M16 | M20 |
| Minimum Effective Installation Depth | | $h_{ef,min}$ | in. | 2 ³ / ₈ | 2 ³ / ₈ | 2 ³ / ₄ | 3 ¹ / ₈ | 3 ¹ / ₂ |
| | | | mm | 60 | 60 | 70 | 80 | 90 |
| Maximum Effective Installation Depth | | $h_{ef,max}$ | in. | 3 ³ / ₄ | 4 ¹ / ₂ | 6 | 7 ¹ / ₂ | 9 |
| | | | mm | 96 | 120 | 144 | 192 | 240 |
| Temperature Category A ^{2,3} | Characteristic Bond Strength in Uncracked Concrete | $\tau_{k,uncr}$ | psi | 1,405 | 1,335 | 1,270 | 1,135 | 1,000 |
| | | | N/mm ² | 9.7 | 9.2 | 8.8 | 7.8 | 6.9 |
| Anchor Category, dry and water saturated concrete | | — | - | 2 | 2 | 2 | 2 | 2 |
| Strength Reduction Factor | | $\phi_{d,ws}$ | - | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 |
| Sustained Load Reduction Factor ⁵ | | $\alpha_{p,sust}$ | - | 0.72 | | | | |

For SI: 1 inch = 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

¹Bond strength values correspond to concrete compressive strength $f_c = 2,500$ psi. Bond strength values must not be increased for increased concrete compressive strength.

²Temperature Category A: Maximum Long Term Temperature: 110°F (43°C); Maximum Short Term Temperature: 176°F (80°C)

³Short-term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long-term concrete temperatures are roughly constant over significant periods of time.

⁴The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3. or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate strength reduction factor must be determined in accordance with ACI 318-11 D.4.4.

⁵For sustained loads, bond strengths must be multiplied by 0.72.



Sika AnchorFix[®]-2 CIC 300ml

Sika AnchorFix[®]-2 CIC 550ml

Sika AnchorFix[®]-2 S/S 850ml



SAF KW, SAF RM, SAF TB and SAF EZ nozzle



Left to right: $\frac{3}{8}$ " (9 mm) \varnothing extension tube, $\frac{9}{16}$ " (14 mm) \varnothing extension tube, resin stoppers

FIGURE 1—SIKA ANCHORFIX[®]-2 ADHESIVE ANCHORING SYSTEM

TABLE 8—INSTALL PARAMETERS (FRACTIONAL SIZES)

| Anchor Size | h _{ef} min (inch) | h _{ef} max (inch) | Drill diameter d _o (inch) | Cleaning Brush d _b (size) | Nozzle, Extension Tube, and resin Stopper Combination | | | | |
|-------------|----------------------------|----------------------------|--------------------------------------|--------------------------------------|---|--------|--------|--------|--------------|
| | | | | | SAF KW | SAF RM | SAF TB | SAF EZ | Instructions |
| 5/16" | 2 3/8 | 3 3/4 | 3/8 | H11 | | | | | |

TABLE 10—ALLOWABLE COMBINATIONS OF CARTRIDGE, MIXER NOZZLE AND DISPENSING TOOL

| Cartridge | Dispenser | | |
|----------------------------|-----------|---|---|
| | A | B | C |
| CIC/300/ Sika AnchorFix®-2 | X | | |
| CIC/550/ Sika AnchorFix®-2 | | | X |
| CIC/850/ Sika AnchorFix®-2 | | X | |



Dispenser A – Cox 41004-2T



Dispenser B – Cox 41002



Dispenser C – Sika 550ml Applicator

TABLE 11—GEL AND CURE TIMES¹

| SUBSTRATE TEMPERATURE (°C) | SUBSTRATE TEMPERATURE (°F) | GEL TIME | CURE TIME |
|----------------------------|----------------------------|----------|-----------|
| 0 to 9 | 32 to 49 | 4 mins | 48 hours |
| 10 to 19 | 50 to 67 | | 70 mins |
| 20 to 24 | 68 to 76 | 3 mins | 40 mins |
| 25 to 29 | 77 to 85 | 2 mins | 40 mins |
| 30 to 35 | 86 to 95 | 1 min | 40 mins |

¹ When base material temperature is 32°F < T ≤ 50°F, cartridge must be conditioned to a minimum 68°F (20°C).

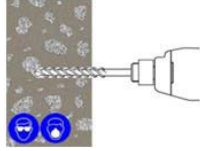
Sika AnchorFix®-2: MPII

Before commencing installation ensure the installer is equipped with appropriate personal protection equipment, SDS Hammer Drill, Air Lance, Hole Cleaning Brush, good quality dispensing tool – either manual or power operated, adhesive cartridge with mixing nozzle, and extension tube with resin stopper as required in [Tables 8, 9 and 10](#). Refer to [Figure 1, Table 1, Table 8, Table 9, and Table 10](#) for parts specification or guidance for individual items or dimensions.

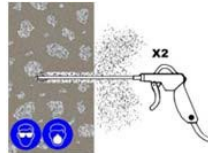
Important: check the expiration date on the cartridge (do not use expired material) and that the cartridge has been stored in its original packaging, the correct way up, in cool conditions (50°F to 77°F) out of direct sunlight.

Solid Substrate Installation Method

- Using the SDS Hammer Drill in rotary hammer mode for drilling, with a carbide tipped drill bit of the appropriate size, drill the hole to the specified hole diameter and depth.

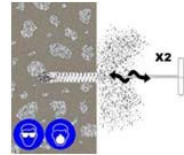


- Select the correct Air Lance, insert to the bottom of the hole and depress the trigger for 2 seconds. The compressed air must be clean – free from water and oil – and at a minimum pressure of 90 psi (6 bar).



Perform the blowing operation twice.

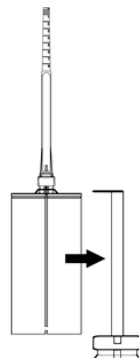
- Select the correct size Hole Cleaning Brush. The correct diameter hybrid brush to use, supplied by the manufacturer (indicated in [Tables 9 and 10](#)). Ensure that the brush is in good condition and the correct diameter. Insert the brush to the bottom of the hole, using a brush extension if needed (indicated in [tables 9 and 10](#)) to reach the bottom of the hole and withdraw with a twisting motion. *There should be positive interaction between the steel bristles of the brush and the sides of the drilled hole.*



Perform the brushing operation twice.

- Repeat 2 (blowing operation) twice.
- Repeat 3 (brushing operation) twice.
- Repeat 2 (blowing operation) twice.

- Select the appropriate static mixer nozzle, checking that the mixing elements are present and correct (**do not modify the mixer**). Attach mixer nozzle to the cartridge. Check the Dispensing Tool is in good working order. Place the cartridge into the dispensing tool.



- Extrude some resin to waste until an even-colored mixture is extruded, the cartridge is now ready for use.



- Attach an extension tube with resin stopper (required for overhead and horizontal installation) to the end of the



mixing nozzle with a push fit. (The extension tubes may be pushed into the resin stoppers and are held in place with a coarse internal thread).

- Insert the mixing nozzle to the bottom of the hole. Extrude the resin and slowly withdraw the nozzle from the hole. **Ensure no air voids are created** as the nozzle is withdrawn. Inject resin until the hole is approximately ¾ full and remove the nozzle from the hole.



- Select the steel anchor element ensuring it is free from oil or other contaminants, and mark with the required embedment depth. Insert the steel element into the hole using a back and forth twisting motion to ensure complete cover, until it reaches the bottom of the hole. Excess resin will be expelled from the hole evenly around the steel element and there shall be no gaps between the anchor element and the wall of the drilled hole.

- Clean any excess resin from around the mouth of the hole.

- Do not disturb the anchor until at least the minimum cure time has elapsed. Refer to the Gel and Cure Times to determine the appropriate cure time.



- Position the fixture and tighten the anchor to the appropriate installation torque.



Do not over-torque the anchor as this could adversely affect its performance.

Important Note:

When installing Sika AnchorFix®-2: at decreased installation temperature (32°F < T < 50°F) the cartridge must be conditioned to 68°F

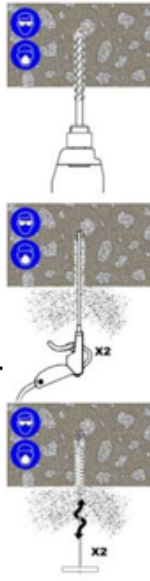
Note for use of SAF RM nozzle:

The SAF RM nozzles consists of two pieces: the component containing the mixer elements and an extension piece. The extension piece must be snapped off the component containing the mixer element before use. The two pieces are then pushed together until a positive engagement is felt.

FIGURE 2—MANUFACTURERS PRINTED INSTALLATION INSTRUCTIONS

Overhead Substrate Installation

- Using the SDS Hammer Drill in rotary hammer mode for drilling, with a carbide tipped drill bit of the appropriate size, drill the hole to the specified hole diameter and depth.
- Select the correct Air Lance, insert to the bottom of the hole and depress the trigger for 2 seconds. The compressed air must be clean – free from water and oil – and at a minimum pressure of 90 psi (6 bar).

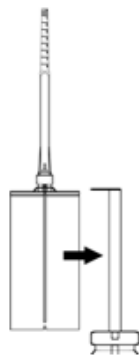


Perform the blowing operation twice.

- Select the correct size Hole Cleaning Brush. Ensure that the brush is in good condition and the correct diameter. Insert the brush to the bottom of the hole, using a brush extension if needed to reach the bottom of the hole, and withdraw with a twisting motion. *There should be positive interaction between the steel bristles of the brush and the sides of the drilled hole.*

Perform the brushing operation twice.

- Repeat 2 (blowing operation) twice.
- Repeat 3 (brushing operation) twice.
- Repeat 2 (blowing operation) twice.
- Select the appropriate static mixer nozzle checking that the mixing elements are present and correct (do not modify the mixer). Attach mixer nozzle to the cartridge. Check the Dispensing Tool is in good working order. Place the cartridge into the dispensing tool.



Extrude some resin to waste until an even-colored mixture is extruded. The cartridge is now ready for use.



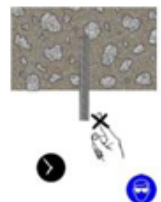
- Attach an extension tube with resin stopper to the end of the mixing nozzle with a push fit. (The extension tubes may be pushed into the resin stoppers and are held in place with a coarse internal thread).
- Insert the mixing nozzle to the bottom of the hole. Extrude the resin and slowly withdraw the nozzle from the hole. **Ensure no air voids are created as the nozzle is withdrawn.** Inject resin until the hole is approximately 3/4 full and remove the nozzle from the hole.



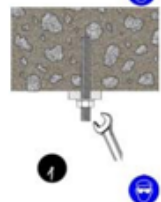
- Select the steel anchor element ensuring it is free from oil or other contaminants, and mark with the required embedment depth. Insert the steel element into the hole using a back and forth twisting motion to ensure complete cover, until it reaches the bottom of the hole. Excess resin will be expelled from the hole evenly around the steel element and there shall be no gaps between the anchor element and the wall of the drilled hole.



- Clean any excess resin from around the mouth of the hole.
- Do not disturb the anchor until at least the minimum cure time has elapsed. Refer to the Working and Load Timetable to determine the appropriate cure time.



- Position the fixture and tighten the anchor to the appropriate installation torque.



Do not over-torque the anchor as this could adversely affect its performance. |

FIGURE 2—MANUFACTURERS PRINTED INSTALLATION INSTRUCTIONS (Continued)

TABLE 12—EXAMPLE OF ALLOWABLE STRESS DESIGN (ASD) TENSION VALUES FOR ILLUSTRATIVE PURPOSES

| EXAMPLE ALLOWABLE STRESS DESIGN (ASD) CALCULATION FOR ILLUSTRATIVE PURPOSES | | | | |
|---|---------------------------------|--|---|--------------------------|
| Anchor Diameter (in.) | Embedment Depth Max / Min (in.) | Characteristic Bond Strength $\tau_{k,uncr}$ (psi) | Allowable Tension Load (lb) 2500 psi Concrete | Controlling Failure Mode |
| 5/16" | 2.375 | 1,405 | 1,217 | Bond Strength |
| | 3.750 | 1,405 | 1,922 | Bond Strength |
| 3/8" | 2.375 | 1,335 | 1,388 | Bond Strength |
| | 4.500 | 1,335 | 2,630 | Bond Strength |
| 1/2" | 2.750 | 1,270 | 2,039 | Bond Strength |
| | 6.000 | 1,270 | 4,448 | Bond Strength |
| 5/8" | 3.125 | 1,135 | 2,588 | Bond Strength |
| | 7.500 | 1,135 | 6,211 | Bond Strength |
| 3/4" | 3.500 | 1,000 | 3,065 | Bond Strength |
| | 9.000 | 1,000 | 7,881 | Bond Strength |

Design Assumptions:

1. Single anchor in static tension only, Grade B7 threaded rod.
2. Vertical downwards installation.
3. Inspection regimen = Periodic.
4. Installation temperature 70F to 110F
5. Long term temperature 110F
6. Short term temperature 176F
7. Dry condition (carbide drilled hoe).
8. Embedment (h_{ef}) = min / max for each diameter.
9. Concrete determined to remain uncracked for life of anchor.
10. Load combinations from ACI 318-19 Section 5.3 (no seismic loading).
11. 30% dead load and 70% live load. Controlling load combination 1.2D + 1.6L
12. Calculation of weighted average for $\alpha = 1.2(0.3) + 1.6(0.7) = 1.48$
13. $f'_c = 2500$ psi (normal weight concrete)
14. $C_{ac1} = C_{ac2} \geq C_{ac}$
15. $h \geq h_{min}$

ILLUSTRATIVE PROCEDURE TO CALCULATE ALLOWABLE STRESS DESIGN TENSION VALUE

Sika AnchorFix®-2 Adhesive Anchor 1/2" Diameter, using an embedment of 2.75", with the design assumptions given in [Table 12](#) (for use with the 2021 IBC, based on ACI 318-19 Chapter 17)

| <u>Procedure</u> | <u>Calculation</u> |
|--|---|
| Step 1: Calculate steel strength of a single anchor in tension per ACI 318-19 17.6.1.2 (Table 2 of this report). | $\phi N_{sa} = \phi N_{sa}$ $= 0.65 \times 17740$ $= \mathbf{11531 \text{ lb}}$ |
| Step 2: Calculate breakout strength of a single anchor in tension per ACI 318-19 17.6.2 (Table 4 of this report). | $N_b = k_{c,uncr} \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ $= (24) \times (1.0) \times (2500)^{0.5} \times (2.75)^{1.5}$ $= 5472 \text{ lb}$ $\phi N_{cb} = \phi (A_{NC} / A_{NC0}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ $= 0.65 \times 1.0 \times 1.0 \times 1.0 \times 1.0 \times 5472$ $= \mathbf{3557 \text{ lb}}$ |
| Step 3: Calculate bond strength of a single anchor in tension per ACI 318-19 17.6.5 (Table 6 of this report). | $N_{ba} = \lambda_a \tau_{k,uncr} \pi d h_{ef}$ $= 1.0 \times 1270 \times 3.141 \times 0.5 \times 2.75$ $= 5486 \text{ lb}$ $\phi N_a = \phi (A_{Na} / A_{Na0}) \psi_{ed,Na} \psi_{cp,Na} N_{ba}$ $= 0.55 \times 1.0 \times 1.0 \times 1.0 \times 5486$ $= \mathbf{3017 \text{ lb}}$ |
| Step 4: Determine controlling resistance strength in tension per ACI 318-19 17.5.1.2 and 17.5.2. | $\mathbf{3017 \text{ lb}} = \text{controlling resistance}$ <p style="text-align: center;">(bond strength)</p> |
| Step 5: Calculate Allowable Stress Design conversion factor for loading condition per ACI 318-19 Section 5.3. | $\alpha = 1.2DL + 1.6LL$ $= 1.2 \times 0.3 + 1.6 \times 0.7$ $= \mathbf{1.48}$ |
| Step 6: Calculate Allowable Stress Design value per Section 4.2 of this report. | $T_{allowable,ASD} = 3017 / 1.48$ $= \mathbf{2039 \text{ lb}}$ |

FIGURE 3—SAMPLE CALCULATIONS

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:

SIKA SERVICES AG

EVALUATION SUBJECT:

SIKA ANCHORFIX®-2 ADHESIVE ANCHOR

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Sika AnchorFix®-2 adhesive anchors, described in ICC-ES evaluation report [ESR-5109](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The Sika AnchorFix®-2 adhesive anchors, described in Sections 2.0 through 7.0 of the evaluation report [ESR-5109](#), comply with the LABC Chapter 19, and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Sika AnchorFix®-2 adhesive anchors described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-5109](#).
- The design, installation, conditions of use and identification of the anchor system are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-5109](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, 17, Section 1905.1.8 and City of Los Angeles Information Bulletin P/BC 2020-092, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The strength design values listed in the evaluation report and tables are for the connection of the anchor system to the concrete. The connection between the anchor system and the connected members shall be checked for capacity (which may govern).
- For the design of wall anchorage assemblies to flexible diaphragms, the anchor shall be designed per the requirements of City of Los Angeles Information Bulletin P/BC 2020-071.

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

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:

SIKA SERVICES AG

EVALUATION SUBJECT:

SIKA ANCHORFIX®-2 ADHESIVE ANCHORS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Sika AnchorFix®-2 adhesive anchors, described in ICC-ES evaluation report ESR-5109, 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 Sika AnchorFix®-2 adhesive anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-5109, 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 ICC-ES evaluation report ESR-5109 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 Sika AnchorFix®-2 adhesive anchors 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) For connections subject to uplift, the connection 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).

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