



ICC-ES Evaluation Report

ESR-3056

Reissued October 2022

This report is subject to renewal October 2023.

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

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, AND KH-EZ CRC CARBON STEEL SCREW ANCHORS AND KH-EZ SS316 AND KH-EZ C SS316 STAINLESS STEEL SCREW ANCHORS FOR USE IN MASONRY

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 *International Building Code*® (IBC)
- 2021, 2018, 2015 and 2012 *International Residential Code*® (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see [ESR-3056 LABC and LARC Supplement](#).

Property evaluated:

Structural

2.0 USES

The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC screw anchors are used as anchorage to resist static, wind and seismic tension and shear loads in grout-filled concrete masonry units.

The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC screw anchors are alternatives to cast-in-place anchors described in Section 8.1.3 (2016 or 2013 edition), or Section 2.1.4 (2011 edition) of TMS 402/ ACI 530/ ASCE 5, as applicable, as referenced in Section 2107 of the IBC.

The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC screw anchors are permitted to be used in structures regulated by the IRC, provided an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 KH-EZ:

The KH-EZ screw anchors are comprised of a threaded body with hex washer head. The anchor is manufactured from carbon steel and is heat treated. It has a minimum 0.0003-inch (8 µm) zinc coating in accordance with DIN EN ISO 4042. The Hilti KH-EZ is available in a variety of lengths with nominal diameters of 1/4 inch, 3/8 inch, 1/2 inch, 5/8 inch, and 3/4 inch (6.4 mm, 9.5 mm, 12.7 mm, 15.9 mm and 19.1 mm). The KH-EZ is illustrated in Figure 1.

The hex head is larger than the anchor diameter and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the base material on the sides of the hole and interlock with the base material during installation.

3.2 KH-EZ P, KH-EZ PM and KH-EZ PL:

The KH-EZ P, KH-EZ PM and KH-EZ PL anchors are comprised of a body with round pan style head with an indented area in the top of the head with a six point star configuration. The KH-EZ P, KH-EZ PM and KH-EZ PL have different size pan style heads: small (P), medium (PM) and large (PL). The anchor is manufactured from carbon steel and is heat-treated. It has a minimum 0.0003-inch-thick (8 µm) zinc coating in accordance with DIN EN ISO 4042. The KH-EZ P, KH-EZ PM and KH-EZ PL are available in nominal diameter of 1/4 inch (6.4 mm). The KH-EZ P, KH-EZ PM and KH-EZ PL are illustrated in Figure 2.

3.3 KH-EZ CRC:

The KH-EZ CRC anchors are comprised of a body with hex washer head. The anchor is manufactured from carbon steel and is heat-treated. It has a minimum of 0.0021-inch-thick (53 µm) mechanically deposited zinc coating in accordance with ASTM B695, Class 55. The KH-EZ CRC is available in a variety of lengths with nominal diameters of 3/8 inch, 1/2 inch, 5/8 inch and 3/4 inch (9.5 mm, 12.7 mm, 15.9 mm and 19.1 mm). The KH-EZ CRC is illustrated in Figure 4.

The hex head is larger than the anchor diameter and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench or torque wrench. The anchor threads cut into the base material on the sides of the hole and interlock with the base material during installation.

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3.4 KH-EZ C:

The KH-EZ C anchors are comprised of the same thread profile as the hex head but with a countersunk head. The anchor is manufactured from carbon steel and is heat-treated. It has a minimum of 0.0003-inch-thick (8 μm) zinc coating in accordance with DIN EN ISO 4042. The KH-EZ C is available in nominal diameters of 1/4 inch and 3/8 inch (6.4 mm and 9.5 mm). The KH-EZ C is illustrated in Figure 3.

3.5 KH-EZ SS316:

The KH-EZ SS316 screw anchors are comprised of a threaded body with hex washer head. The anchor is manufactured from AISI Type 316 stainless steel material. The KH-EZ SS316 is available in a variety of lengths with nominal diameters of 1/4 inch, 3/8 inch and 1/2 inch (6.4 mm, 9.5 mm and 12.7 mm). The KH-EZ SS316 is illustrated in Figure 5.

The hex head is larger than the anchor diameter and is formed with serrations on the underside. The anchor body is formed with threads running most of the length of the anchor body. The anchor is installed in a predrilled hole with a powered impact wrench. The anchor threads cut into the base material on the sides of the hole and interlock with the base material during installation.

3.6 KH-EZ C SS316:

The KH-EZ C SS316 anchors are comprised of the same thread profile as the stainless steel hex head but with a countersunk head. The anchor is manufactured from AISI Type 316 stainless steel material. The KH-EZ C SS316 is available in nominal diameters of 1/4 inch and 3/8 inch (6.4 mm and 9.5 mm). The KH-EZ C SS316 is illustrated in Figure 6.

3.7 Grout-filled Concrete Masonry:

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

3.7.1 Concrete Masonry Units (CMUs): CMUs must be minimum Grade N, Type II, lightweight, medium-weight, or normal-weight conforming to ASTM C90. The minimum size of the CMU must be a nominal 8 inches wide by a nominal 8 inches high by a nominal 16 inches long.

3.7.2 Grout: Grout must comply, as applicable, with Section 2103.3 of the 2021, 2018 and 2015 IBC, Section 2103.13 of the 2012 IBC, or Section R606.2.12 of the 2021 and 2018 IRC, Section R606.2.11 of the 2015 IRC, and Section R609.1.1 of the 2012 IRC, as applicable. Alternatively, the grout must have a minimum compressive strength, when tested in accordance with ASTM C1019, equal to its specified strength but not less than 2,000 psi (13.8 MPa).

3.7.3 Mortar: Mortar must be Type M or S in compliance with Section 2103.2.1 of the 2021, 2018 and 2015 IBC, Section 2103.9 of the 2012 IBC, or Section R606.2.8 of the 2021 and 2018 IRC, Section R606.2.7 of the 2015 IRC, and Section R607.1 of the 2012 IRC, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Allowable Stress Design:

4.1.1 General: Anchors described in this report are assigned allowable tension and shear loads for designs based on allowable stress design (ASD).

4.1.2 Design of Anchors Installed in Uncracked Grout-filled Concrete Masonry: Allowable tension and shear loads for anchors installed in the face of uncracked grout-filled masonry are noted in Tables 3 through 6. The

allowable tension and shear loads are for anchors installed in the grouted cells, the center web of concrete masonry units and horizontal mortared bed joints of fully grouted CMU construction. Allowable loads for anchors installed within 1 1/4 inches (32 mm) of the vertical (head) joint, as depicted in Figure 7, are beyond the scope of this report. Critical and minimum spacings and edge distances are given in Tables 1 and 2. Allowable load reduction factors for anchors installed at reduced spacing and reduced edge distances (between critical and minimum) are noted in Tables 3 through 6.

Allowable tension and shear loads for 1/2-inch and 5/8-inch (12.7 mm and 15.9 mm) anchors installed in the top of uncracked fully grouted concrete masonry walls are noted in Table 7. Separate values are given for shear loads towards the edge and parallel to the edge of the masonry wall. Allowable loads for anchors installed within 1 1/4 inches (32 mm) of the head joint are beyond the scope of this report.

Allowable loads for anchors installed in uncracked grout-filled masonry subjected to combined tension and shear loads must be determined by the following equations:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1. \quad \text{for all diameters installed in the top of the wall and stainless steel anchors installed in the face of the wall}$$

$$\left(\frac{P_s}{P_t}\right)^{5/3} + \left(\frac{V_s}{V_t}\right)^{5/3} \leq 1.0 \quad \text{for all diameters installed in the face of the wall, except stainless steel anchors}$$

where:

P_s = Applied service tension load

P_t = Allowable service tension load

V_s = Applied service shear load

V_t = Allowable service shear load

4.2 Installation

Installation parameters are provided in Tables 1 through 7, and Figures 7 through 11. Anchor locations must comply with this report and with plans and specifications approved by the code official. The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC screw anchors must be installed according to this report and the manufacturer's published instructions (MPII) as depicted in Figures 9 through 11. In case of conflict, this report governs. Anchors must be installed into base material perpendicular to the surface using carbide-tipped masonry drill bits complying with ANSI B212.15-1994. The nominal drill bit diameter must be equal to that of the anchor. The minimum drilled hole depth is given in Tables 1 and 2. Prior to installation, dust and debris must be removed from the drilled hole using a hand pump, compressed air or a vacuum. The anchor must be installed into the predrilled hole using a powered impact wrench or with a torque wrench until the proper nominal embedment depth is obtained. The maximum impact wrench torque and the maximum installation torque for a manually calibrated torque wrench must be in accordance with Tables 1 and 2.

4.3 Special Inspection:

Anchors must be installed with special inspection. For the IBC and IRC, special inspection must conform to Sections 1704 and 1705 of the IBC.

For fasteners installed with special inspection, the following items, as applicable, must be inspected: fastener type, diameter and length; masonry dimensions and compliance with ASTM C90; grout and mortar compliance with standards listed in Section 3.6, and, where required, masonry prism compressive strength; drill bit diameter and compliance with ANSI B212.12-1994; and fastener embedment, spacing, and edge distance. The special inspector must verify that anchor installation complies with this evaluation report and the manufacturer's published installation instructions.

5.0 CONDITIONS OF USE

The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC Screw Anchors described in this report are suitable alternatives to what is specified in the codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Anchors are identified and installed in accordance with this report and the manufacturer's published installation instructions. In case of conflict, this report governs.
- 5.2 Anchors resisting static, seismic or wind load in grout-filled concrete masonry must be designed in accordance with Section 4.1 of this report.
- 5.3 Grout and mortar shall have reached its minimum specified compressive strength prior to installation of the anchors.
- 5.4 When using the basic load combinations in accordance with 2021 IBC Section 1605.1 or 2018, 2015 and 2012 IBC Section 1605.3.1, as applicable, allowable loads are not permitted to be increased for seismic or wind loading. For the 2021, 2018, 2015 or 2012 IBC, the allowable loads or load combinations must not be adjusted.
- 5.5 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of screw 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.
- 5.6 Where not otherwise prohibited by the applicable code, anchors are permitted for use with 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 fire-resistance-rated construction or gravity load-bearing structural elements are within a fire resistance-rated envelope or a fire-resistance-rated membrane, are protected by approved fire-resistance-rated materials or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.
- 5.7 Since an ICC-ES acceptance criteria for evaluating the performance of screw anchors in cracked masonry is unavailable at this time, the use of anchors is limited to installation in uncracked masonry. Cracking occurs when $f_t > f_c$ due to service loads or deformations.
- 5.8 Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the building official for approval. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.9 Special inspection must be provided in accordance with Section 4.3.
- 5.10 Use of anchors are limited to dry, interior use except as noted in Section 5.11 of this report.
- 5.11 Use of KH-EZ SS316, KH-EZ C SS316 and KH-EZ CRC are permitted for exterior exposure or damp environments
- 5.12 Anchors must be installed in holes predrilled in masonry as described in this report, using drill bits in compliance with ANSI B212.15-1994.
- 5.13 The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 and KH-EZ CRC screw anchors are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry (AC106), dated March 2018 (editorially revised December 2020); including tests for seismic qualification, edge distance and spacing, and installations for top of fully grouted CMU masonry wall construction.
- 6.2 Quality control documentation.

7.0 IDENTIFICATION

- 7.1 The Hilti KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC anchors are identified by packaging with the company name (Hilti, Inc.), anchor name, anchor size, and evaluation report number (ESR-3056). The anchors have KH-EZ (Hex, P, PM, PL, C, C SS316, CRC or SS316) accordingly, HILTI, and the anchor diameter and anchor length embossed on the anchor head. Identifications are visible after installation, for verification.
- 7.2 The report holder's contact information is the following:

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FIGURE 1—HILTI KH-EZ SCREW ANCHOR

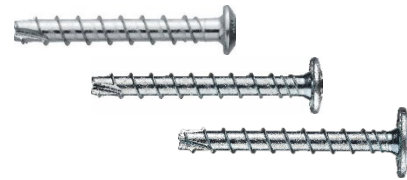


FIGURE 2—HILTI KH-EZ P, KH-EZ PM, KH-EZ PL SCREW ANCHOR



FIGURE 3—HILTI KH-EZ C SCREW ANCHOR



FIGURE 4—HILTI KH-EZ CRC SCREW ANCHOR



FIGURE 5—HILTI KH-EZ SS316 SCREW ANCHOR



FIGURE 6—HILTI KH-EZ C SS316 SCREW ANCHOR

TABLE 1—HILTI KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C AND KH-EZ CRC INSTALLATION INFORMATION AND ANCHOR SPECIFICATION^{1,2,3,4}

| INSTALLATION DETAIL | UNITS | NOMINAL ANCHOR DIAMETERS (INCHES) | | | | | | | | | |
|---|----------------|--|---------------------------------------|--|---------------------------------------|---|--|---|--|---|--|
| | | 1/4 | | 3/8 | | 1/2 | | 5/8 | | 3/4 | |
| Head Style and Coating | - | Hex, P, PM, PL, C Head | | Hex, C Head | | Hex, C Head (including CRC) | | Hex Head (including CRC) | | Hex Head (including CRC) | |
| Drill Bit Diameter | in. (mm) | 1/4 (6.4) | | 3/8 (9.5) | | 1/2 (12.7) | | 5/8 (15.9) | | 3/4 (19.0) | |
| Minimum Baseplate Clearance Hole Diameter | in. (mm) | 3/8 (9.5) | | 1/2 (12.7) | | 5/8 (15.9) | | 3/4 (19.0) | | 7/8 (22.2) | |
| Maximum Installation Torque ⁵ KH-EZ (Hex, P, PM, PL, C) | ft-lbf (Nm) | 21 (28.5) | | 22 (29.8) | | 34 (46.1) | | 38 (51.5) | | 70 (94.9) | |
| Maximum Installation Torque ⁵ KH-EZ CRC | ft-lbf (Nm) | - | | 20 (27.1) | | 25 (34.0) | | 35 (47.5) | | 45 (61.0) | |
| Maximum Impact Wrench Torque Rating ⁶ KH-EZ (Hex, P, PM, PL, C) | ft-lbf (Nm) | 114 (155) | | 114 (155) | | 332 (450) | | 332 (450) | | 332 (450) | |
| Maximum Impact Wrench Torque Rating ⁶ KH-EZ CRC | ft-lbf (Nm) | - | | 100 (136) | | 100 (136) | | 332 (450) | | 332 (450) | |
| Minimum Nominal Embedment Depth | in. (mm) | 1 ⁵ / ₈ (41) | 2 ¹ / ₂ (64) | 1 ⁵ / ₈ (41) | 3 ¹ / ₄ (83) | 2 ¹ / ₄ (57) | 4 ¹ / ₂ (114) | 3 ¹ / ₄ (83) | 5 (127) | 4 (102) | 6 ¹ / ₄ (160) |
| Minimum Hole Depth | in. (mm) | 2 (52) | 2 ⁷ / ₈ (73) | 1 ⁷ / ₈ (48) | 3 ¹ / ₂ (89) | 2 ⁵ / ₈ (67) | 4 ⁵ / ₈ (118) | 3 ⁵ / ₈ (92) | 5 ³ / ₈ (137) | 4 ³ / ₈ (111) | 6 ⁵ / ₈ (168) |
| Critical Edge Distance | in. (mm) | 4 (102) | | 6 (152) | | 8 (203) | | 10 (254) | | 12 (305) | |
| Minimum Edge Distance | in. (mm) | 4 (102) | | | | | | | | | |
| Critical Spacing Distance | in. (mm) | 4 (102) | | 6 (152) | | 8 (203) | | 10 (254) | | 12 (305) | |
| Minimum Spacing Distance | in. (mm) | 4 (102) | | | | | | | | | |
| Wrench Socket Size | in. (mm) | 7 ¹ / ₁₆ (11.1) | | 9 ¹ / ₁₆ (14.3) | | 3 ³ / ₄ (19.0) | | 15 ¹ / ₁₆ (23.8) | | 1 ¹ / ₈ (28.6) | |

¹Values in this table are to be used in conjunction with load values contained in Tables 3, 5, and 7, and the appropriate figures in this report, except for the minimum spacing, edge, and end distances for anchors installed in the top of grout filled concrete masonry, which are listed in Table 7.

²Critical spacings and edge distances are the anchor spacing and edge distances for which no reduction in load capacity is required.

³Minimum spacings and minimum edge distances in this report are the smallest values for which anchor installation is allowed.

⁴Anchors may be installed anywhere in the fully grouted masonry wall except within 1¹/₄ inch of a vertical joint (see Figure 7).

⁵Maximum Installation Torque applies to installations using a calibrated torque wrench.

⁶Because of the variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over-torqueing can damage the anchor and/or reduce its holding capacity.

TABLE 2—HILTI KH-EZ SS316 AND KH-EZ C SS316 INSTALLATION INFORMATION AND ANCHOR SPECIFICATION^{1,2,3,4}

| INSTALLATION DETAIL | UNITS | NOMINAL ANCHOR DIAMETERS (INCHES) | | | | | |
|--|----------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|
| | | 1/4 | | 3/8 | | 1/2 | |
| Head Style | - | Hex and C | | Hex and C | | Hex | |
| Drill Bit Diameter | in. (mm) | 1/4 (6.4) | | 3/8 (9.5) | | 1/2 (12.7) | |
| Minimum Baseplate Clearance Hole Diameter | in. (mm) | 3/8 (9.5) | | 1/2 (12.7) | | 5/8 (15.9) | |
| Maximum Impact Wrench Torque Rating ⁵ | ft-lbf (Nm) | 66 (89.5) | | 100 (135.6) | | 157 (212.9) | |
| Minimum Nominal Embedment Depth | in. (mm) | 1 ⁵ / ₈ (41) | 2 ¹ / ₂ (64) | 2 (52) | 3 ¹ / ₄ (83) | 2 ¹ / ₄ (57) | 4 ¹ / ₄ (108) |
| Minimum Hole Depth | in. (mm) | 2 (52) | 2 ⁷ / ₈ (73) | 2 ¹ / ₄ (57) | 3 ¹ / ₂ (89) | 2 ⁵ / ₈ (67) | 4 ⁵ / ₈ (118) |
| Critical Edge Distance | in. (mm) | 4 (102) | | 6 (152) | | 8 (203) | |
| Minimum Edge Distance | in. (mm) | 4 (102) | | | | | |
| Critical Spacing Distance | in. (mm) | 4 (102) | | 6 (152) | | 8 (203) | |
| Minimum Spacing Distance | in. (mm) | 4 (102) | | | | | |
| Wrench Socket Size | in. (mm) | 7/16 (11.1) | | 9/16 (14.3) | | 3/4 (19.0) | |

¹Values in this table are to be used in conjunction with load values contained in Tables 4, 6, and 7, and the appropriate figures in this report, except for the minimum spacing, edge, and end distances for anchors installed in the top of grout filled concrete masonry, which are listed in Table 7.

²Critical spacings and edge distances are the anchor spacing and edge distances for which no reduction in load capacity is required.

³Minimum spacings and minimum edge distances in this report are the smallest values for which anchor installation is allowed.

⁴Anchors may be installed anywhere in the fully grouted masonry wall except within 1 1/4 inch of a vertical joint (see Figure 7).

⁵Because of the variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over-torquing can damage the anchor and/or reduce its holding capacity.

TABLE 3—ALLOWABLE TENSION LOADS FOR KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C AND KH-EZ CRC IN THE FACE OF GROUT-FILLED MASONRY WALLS (POUNDS)^{1,3,6}

| NOMINAL ANCHOR DIAMETER (INCHES) | MINIMUM EMBEDMENT (INCHES) ² | ALLOWABLE TENSION LOADS AT S _{CR} AND C _{CR} ⁵ | EDGE DISTANCE | | | SPACING | | |
|----------------------------------|---|---|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| | | | CRITICAL C _{CR} (INCHES) | MINIMUM C _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ | CRITICAL S _{CR} (INCHES) | MINIMUM S _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ |
| 1/4 | 1 ⁵ / ₈ | 424 ⁷ | 4 | 4 | 1.00 | 4 | 4 | 1.00 |
| | 2 ¹ / ₂ | 728 ⁸ | | | | | | |
| 3/8 | 1 ⁵ / ₈ | 428 ⁸ | 6 | 4 | 1.00 | 6 | 4 | 0.80 |
| | 3 ¹ / ₄ | 968 | | | | | | |
| 1/2 | 2 ¹ / ₄ | 556 | 8 | 4 | 1.00 | 8 | 4 | 0.60 |
| | 4 ¹ / ₄ | 1,212 | | | | | | |
| 5/8 | 3 ¹ / ₄ | 924 | 10 | 4 | 1.00 | 10 | 4 | 0.57 |
| | 5 | 1,388 | | | | | | |
| 3/4 | 4 | 1,156 | 12 | 4 | 1.00 | 12 | 4 | 0.53 |
| | 6 ¹ / ₄ | 1,628 | | | | | | |

¹Anchors shall be installed in base materials in compliance with Section 3.6 of this report.

²Embedment depth is measured from the outside surface of the concrete masonry unit.

³Refer to Section 5.4 of this report for modifying allowable loads in this table for anchors resisting short-term loads.

⁴Allowable loads are based on installation at critical spacing and edge distance. Load reduction factors are applicable at the minimum spacing and edge distance. Linear interpolation of reduction factors is allowed for spacings and edge distances between critical and minimum.

⁵Tabulated allowable loads for the IBC/IRC are based on a safety factor of 5.0.

⁶Special inspection must be provided in accordance with Section 4.3 of this report.

⁷Load values for installations within 1 1/4 inch of bed joint for 1/4" diameter at 1 5/8 inch embedment shall be reduced by 21%.

⁸Load values for installations within 1 1/4 inch of bed joint for 1/4 inch diameter at 2 1/2 inch embedment and 3/8 inch diameter at 1 5/8 inch embedment shall be reduced by 13%.

TABLE 4—ALLOWABLE TENSION LOADS FOR KH-EZ SS316 AND KH-EZ C SS316 IN THE FACE OF GROUT-FILLED MANSORY WALLS (POUNDS) ^{1,3,6}

| NOMINAL ANCHOR DIAMETER (INCHES) | MINIMUM EMBEDMENT (INCHES) ² | ALLOWABLE TENSION LOADS AT S _{CR} AND C _{CR} ⁵ | Spacing | | | Edge Distance | | |
|----------------------------------|---|---|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| | | | CRITICAL S _{CR} (INCHES) | MINIMUM S _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ | CRITICAL C _{CR} (INCHES) | MINIMUM C _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ |
| 1/4 | 1 ⁵ / ₈ | 125 | 4 | 4 | 1.00 | 4 | 4 | 1.00 |
| | 2 ¹ / ₂ | 194 | | | 1.00 | | | 1.00 |
| 3/8 | 2 | 332 | 6 | 4 | 0.74 | 6 | 4 | 0.71 |
| | 3 ¹ / ₄ | 629 | | | 0.62 | | | 0.86 |
| 1/2 | 2 ¹ / ₄ | 331 | 8 | 4 | 0.56 | 8 | 4 | 0.91 |
| | 4 ¹ / ₄ | 874 | | | 0.56 | | | 0.75 |

¹Anchors shall be installed in base materials in compliance with Section 3.6 of this report.

²Embedment depth is measured from the outside surface of the concrete masonry unit.

³Refer to Section 5.4 of this report for modifying allowable loads in this table for anchors resisting short-term loads.

⁴Allowable loads are based on installation at critical spacing and edge distance. Load reduction factors are applicable at the minimum spacing and edge distance.

Linear interpolation of reduction factors is allowed for spacings and edge distances between critical and minimum.

⁵Tabulated allowable loads for the IBC/IRC are based on a safety factor of 5.0.

⁶Special inspection must be provided in accordance with Section 4.3 of this report.

TABLE 5—ALLOWABLE SHEAR LOADS FOR KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C AND KH-EZ CRC INSTALLED IN THE FACE OF GROUT-FILLED MASONRY WALLS (POUNDS) ^{1,3,6}

| NOMINAL ANCHOR DIAMETER (INCHES) | MINIMUM EMBEDMENT (INCHES) ² | ALLOWABLE SHEAR LOADS AT S _{CR} AND C _{CR} ⁵ | SPACING | | | EDGE DISTANCE | | | |
|----------------------------------|---|---|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|---------------------------------|
| | | | CRITICAL S _{CR} (INCHES) | MINIMUM S _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ | CRITICAL C _{CR} (INCHES) | MINIMUM C _{MIN} (INCHES) | LOAD DIRECTION PERPENDICULAR TO EDGE | LOAD DIRECTION PARALLEL TO EDGE |
| 1/4 | 1 ⁵ / ₈ | 532 | 4 | 4 | 1.00 | 4 | 4 | 1.00 | 1.00 |
| | 2 ¹ / ₂ | 650 | | | | | | 1.00 | |
| 3/8 | 1 ⁵ / ₈ | 912 | 6 | 4 | 0.94 | 6 | 4 | 0.61 | 1.00 |
| | 3 ¹ / ₄ | 952 | | | | | | 0.70 | |
| 1/2 | 2 ¹ / ₄ | 1476 | 8 | 4 | 0.88 | 8 | 4 | 0.50 | 1.00 |
| | 4 ¹ / ₄ | 1959 | | | | | | 0.40 | |
| 5/8 | 3 ¹ / ₄ | 2432 | 10 | 4 | 0.62 | 10 | 4 | 0.36 | 1.00 |
| | 5 | 2731 | | | | | | 0.34 | |
| 3/4 | 4 | 2432 | 12 | 4 | 0.36 | 12 | 4 | 0.36 | 1.00 |
| | 6 ¹ / ₄ | 2731 | | | | | | 0.34 | |

¹Anchors shall be installed in base materials in compliance with Section 3.6 of this report.

²Embedment depth is measured from the outside surface of the concrete masonry unit.

³Refer to Section 5.4 of this report for modifying allowable loads in this table for anchors resisting short-term loads.

⁴Allowable loads are based on installation at critical spacing and edge distance. Load reduction factors are applicable at the minimum spacing and edge distance.

Linear interpolation of reduction factors is allowed for spacings and edge distances between critical and minimum.

⁵Tabulated allowable loads for the IBC/IRC are based on a safety factor of 5.0.

⁶Special inspection must be provided in accordance with Section 4.3 of this report.

TABLE 6—ALLOWABLE SHEAR LOADS FOR KH-EZ SS316 AND KH-EZ C SS316 IN THE FACE OF GROUT-FILLED MASONRY WALLS (POUNDS)^{1,3,6}

| NOMINAL ANCHOR DIAMETER (INCHES) | MINIMUM EMBEDMENT (INCHES) ² | ALLOWABLE SHEAR LOADS AT S _{CR} AND C _{CR} ⁵ | SPACING | | | EDGE DISTANCE | | | |
|----------------------------------|---|---|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|---------------------------------|
| | | | CRITICAL S _{CR} (INCHES) | MINIMUM S _{MIN} (INCHES) | LOAD REDUCTION FACTOR ⁴ | CRITICAL C _{CR} (INCHES) | MINIMUM C _{MIN} (INCHES) | LOAD DIRECTION PERPENDICULAR TO EDGE | LOAD DIRECTION PARALLEL TO EDGE |
| 1/4 | 1 ⁵ / ₈ | 468 | 4 | 4 | 0.95 | 4 | 4 | 1.00 | 1.00 |
| | 2 ¹ / ₂ | 574 | | | | | | 1.00 | 1.00 |
| 3/8 | 2 | 742 | 6 | 4 | | 6 | 4 | 0.90 | 1.00 |
| | 3 ¹ / ₄ | 1006 | | | | | | 0.98 | 0.99 |
| 1/2 | 2 ¹ / ₄ | 1039 | 8 | 4 | | 8 | 4 | 0.82 | 0.97 |
| | 4 ¹ / ₄ | 1787 | | | | | | 0.48 | 0.94 |

¹Anchors shall be installed in base materials in compliance with Section 3.6 of this report.

²Embedment depth is measured from the outside surface of the concrete masonry unit.

³Refer to Section 5.4 of this report for modifying allowable loads in this table for anchors resisting short-term loads.

⁴Allowable loads are based on installation at critical spacing and edge distance. Load reduction factors are applicable at the minimum spacing and edge distance. Linear interpolation of reduction factors is allowed for spacings and edge distances between critical and minimum.

⁵Tabulated allowable loads for the IBC/IRC are based on a safety factor of 5.0.

⁶Special inspection must be provided in accordance with Section 4.3 of this report.

TABLE 7—ALLOWABLE TENSION AND SHEAR LOADS FOR KH-EZ, KH-EZ SS316 AND KH-EZ CRC INSTALLED IN THE TOP OF GROUT-FILLED CONCRETE MASONRY CONSTRUCTION^{1,3,4,5,6}

| NOMINAL ANCHOR DIAMETER (INCHES) | MINIMUM EMBEDMENT DEPTH (INCHES) ² | EDGE DISTANCE (INCHES) | MINIMUM SPACING (INCHES) | MINIMUM END DISTANCE (INCHES) | TENSION (POUNDS) | SHEAR (POUNDS) | |
|----------------------------------|---|-------------------------------|--------------------------|-------------------------------|------------------|----------------------------------|---------------------------------------|
| | | | | | | LOAD DIRECTION | |
| | | | | | | PARALLEL TO EDGE OF MASONRY WALL | PERPENDICULAR TO EDGE OF MASONRY WALL |
| 1/2 KH-EZ (CRC) | 4 ¹ / ₄ | 1 ³ / ₄ | 8 | 8 | 540 | 885 | 245 |
| 5/8 KH-EZ (CRC) | 5 | 1 ³ / ₄ | 10 | 10 | 1045 | 930 | 245 |
| 1/2 KH-EZ SS316 | 4 ¹ / ₄ | 1 ³ / ₄ | 8 | 8 | 614 | 809 | 200 |

¹Anchors shall be installed in base materials in compliance with Section 3.6 of this report.

²Embedment depth is measured from the outside surface of the concrete masonry unit.

³Refer to Section 5.4 of this report for modifying allowable loads in this table for anchors resisting short-term loads.

⁴See Figure 8 for details of anchor location in top of CMU wall. Additionally, anchors shall be installed with a minimum 4-inch distance to the head joint.

⁵Tabulated allowable loads for the IBC/IRC are based on a safety factor of 5.0.

⁶Special Inspection must be provided in accordance with Section 4.3 of this report.

Anchor Installation is Restricted to Shaded Areas

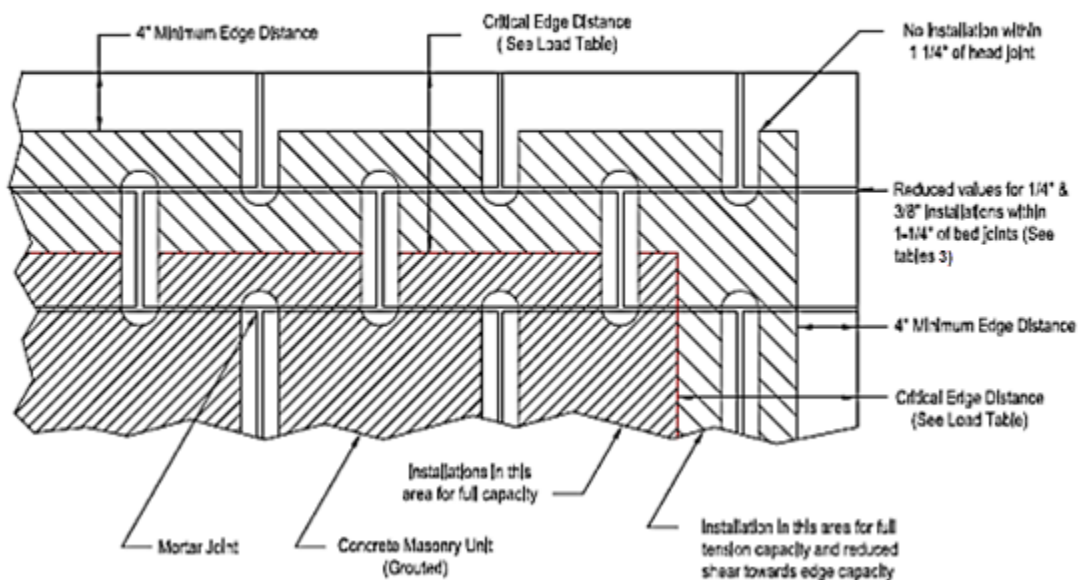


FIGURE 7—ACCEPTABLE LOCATIONS (SHADED AREAS) FOR HILTI KH-EZ, KH-EZ SS316, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, KH-EZ C SS316 AND KH-EZ CRC ANCHORS IN GROUT-FILLED CONCRETE MASONRY

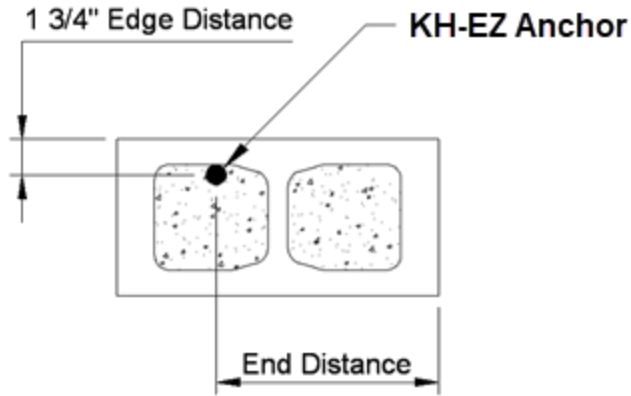


FIGURE 8—EDGE AND END DISTANCES FOR THE KH-EZ, KH-EZ CRC AND KH-EZ SS316 ANCHORS INSTALLED IN THE TOP OF CMU MASONRY WALL CONSTRUCTION

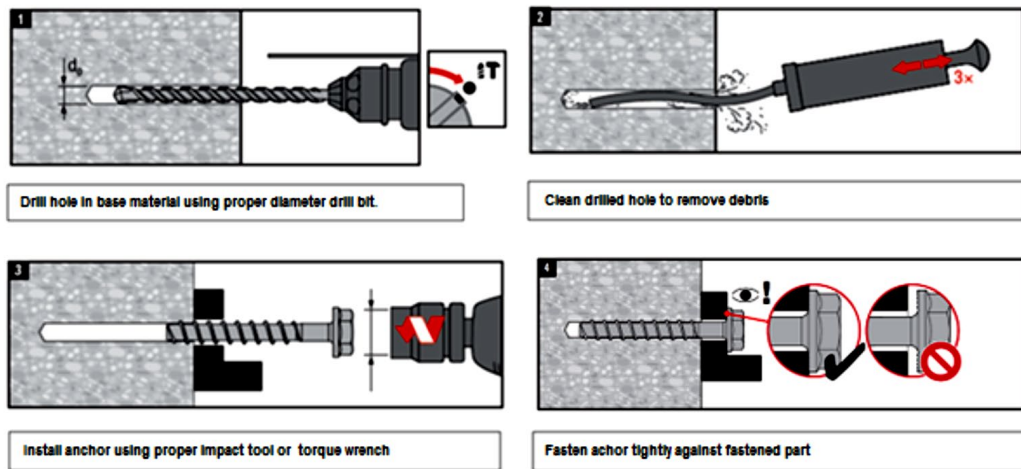


FIGURE 9—INSTALLATION INSTRUCTIONS—HILTI KH-EZ, KH-EZ CRC AND KH-EZ SS316

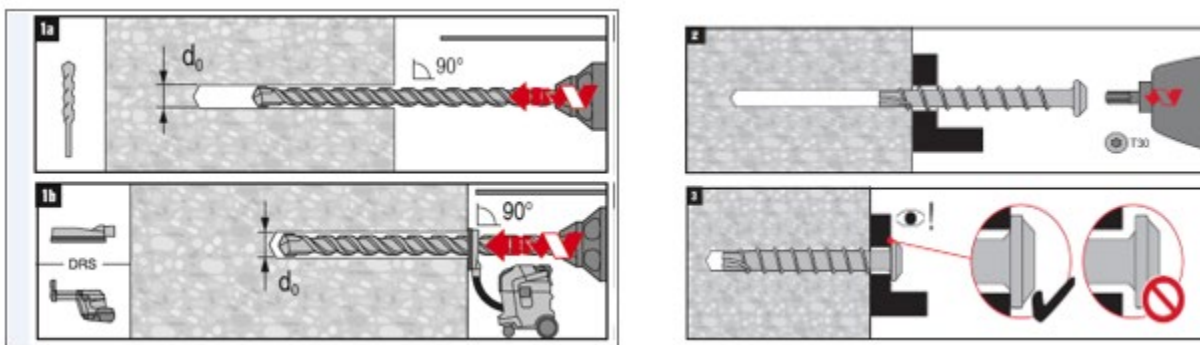


FIGURE 10—INSTALLATION INSTRUCTIONS – HILTI KH-EZ P, KH-EZ PM AND KH-EZ PL

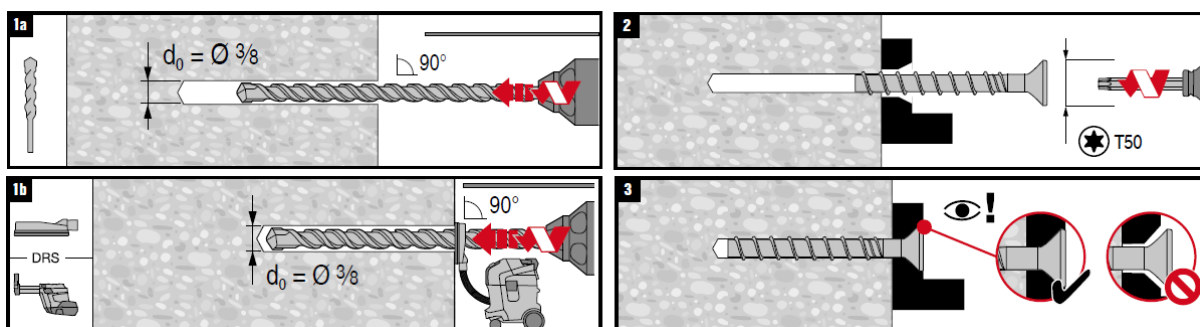


FIGURE 11—INSTALLATION INSTRUCTIONS – HILTI KH-EZ C AND KH-EZ C SS316

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

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, AND KH-EZ CRC CARBON STEEL SCREW ANCHORS AND KH-EZ SS316 AND KH-EZ C SS316 STAINLESS STEEL SCREW ANCHORS FOR USE IN MASONRY

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors in masonry, described in ICC-ES evaluation report [ESR-3056](#), 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:

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

2.0 CONCLUSIONS

The Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors in masonry, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3056](#), comply with LABC Chapter 21, and LARC, and are subject to the conditions of use described in this report.

3.0 CONDITIONS OF USE

The Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-3056](#).
- The design, installation, conditions of use and identification of the anchors are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-3056](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The allowable design values listed in the evaluation report and tables are for the connection of the anchors to the masonry substrate. 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 2020-071.

This supplement expires concurrently with the evaluation report, reissued October 2022.

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

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, AND KH-EZ CRC CARBON STEEL SCREW ANCHORS AND KH-EZ SS316 AND KH-EZ C SS316 STAINLESS STEEL SCREW ANCHORS FOR USE IN MASONRY

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors in grout-filled masonry, described in ICC-ES evaluation report ESR-3056, 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 Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors in grout-filled masonry, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-3056, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in the ICC-ES evaluation report ESR-3056 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 Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C, and KH-EZ CRC carbon steel screw anchors and KH-EZ SS316 and KH-EZ C SS316 stainless steel screw anchors in grout-filled masonry have also been found to be in compliance with the High-velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*, with the following conditions:

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

This supplement expires concurrently with the evaluation report, reissued October 2022.