



● Compliance to International Codes
● Compliance to State/Regional Codes

ICC-ES Evaluation Report

ESR-4807

Issued December 2022

This report is subject to renewal December 2023.

DIVISION: 13 00 00—SPECIAL CONSTRUCTION
Section: 13 48 53—Manufactured Seismic Control Components

REPORT HOLDER:

QUAKEHOLD INDUSTRIAL, INC.

EVALUATION SUBJECT:

QUAKEHOLD SEISMIC RESTRAINT FASTENING SYSTEMS

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

For evaluation of compliance with codes adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architects, see the [ESR-4807 CBC Supplement](#).

For evaluation of compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see the [ESR-4807 LABC Supplement](#).

Properties evaluated:

- Structural
- Durability

2.0 USES

The QuakeHold Seismic Restraint Fastening Systems are used to restrain stainless steel nonstructural components, as defined in ASCE 7 Chapter 13, from seismic forces, by attachment to walls or floors.

3.0 DESCRIPTION

3.1 General: The QuakeHold Seismic Restraint Fastening Systems, depicted as installed, in Figures 1 through 4, include the four product kits described below.

3.1.1 QuakeHold Ratchet Strap Kit: The Quakehold ratchet strap kit is an assembly utilizing a securing strap of nylon and polyester webbing, steel corner brackets secured in place with adhesive pads, a steel ratchet, and stainless steel anchor brackets. The kit is installed so that the

securing strap runs vertically up one side, across the top, and partially back down the other side of the equipment. A steel ratchet is provided along the securing strap on one side of the equipment to allow the strap to be tightened after installation. Steel corner brackets are to be secured to the top edges of the equipment with adhesive pads to guide the path of the securing strap. Stainless steel anchor brackets are provided at the ends of the strap to allow them to be secured to the floor structure with an anchor or lag bolt, to be designed by others. See Figure 1.

3.1.2 QuakeHold Seatbelt Kit: The QuakeHold Seatbelt Kit is an assembly utilizing a 3M Very High Bond (VHB) Type 4945 adhesive pad, a stainless steel bracket, securing strap of nylon and polyester webbing with a seatbelt buckle and a stainless steel anchor bracket. The kit is installed so that the securing strap runs horizontally on the equipment, with one end the strap secured to the equipment with the stainless steel bracket adhered to the equipment with an adhesive pad, and the other end of the strap secured to a wall or horizontal element with a stainless steel anchor bracket with anchorage designed by others. The seatbelt buckle is provided along the strap to allow it to be secured after installation. See Figure 2.

3.1.3 QuakeHold Thumb Lock Kit: The QuakeHold Thumb Lock Kit is an assembly utilizing 3M Very High Bond (VHB) Type 4945 adhesive pads and a thumb lock Lexan connector with a securing strap of polyester webbing. The kit is installed so that the strap runs vertically on the equipment(s), with thumb lock Lexan connectors on both ends. The thumb locks are then secured to the equipment(s) and/or base with adhesive pads. The thumb locks can be installed at 0°, 45° and 90° angles. See Figure 3.

3.1.4 QuakeHold Cable Bracket Kit: The QuakeHold Cable Bracket Kit is an assembly utilizing a 3M Very High Bond (VHB) Type 4945 adhesive pad, stainless steel bracket for the adhesive pad, stainless steel cable with swages, threaded quick link and a stainless steel anchor bracket. The kit is installed so the cable runs vertically on the equipment, with the stainless steel bracket on one end secured to the equipment with an adhesive pad, the cable looped to the stainless steel bracket hole and lopped to a threaded quick link connected to a stainless steel anchor bracket on the other end, secured to the floor structure with an anchor or lag bolt to be designed by others. See Figure 4.

3.2 Materials: The product kits contain the following parts, as applicable to the kits. See Figure 5 for part images.

3.2.1 Stainless Steel Brackets: The brackets are manufactured from 304 stainless steel and are available in the following sizes:

- 1) Part #C005: 12 ga. L-bracket, with dimensions $2\frac{1}{8}$ inches (54 mm) tall by $1\frac{1}{16}$ in (27 mm) deep by $2\frac{5}{8}$ inches (67 mm) wide, with an attachment hole for threaded quick link and a mounting hole for a $\frac{1}{2}$ inch (13 mm) diameter anchor, as applicable.
- 2) Part #C004: 16 ga. bent plate bracket, with dimensions $6\frac{1}{4}$ inches (159 mm) tall by 1 inch (25 mm) deep by 4 inches (102 mm) wide, with an attachment hole for wire, and used with adhesive pads.
- 3) Part #R004: 12 ga. L-bracket with dimensions $2\frac{5}{8}$ inches (67 mm) tall by $1\frac{1}{16}$ inches (27 mm) deep by 2 inches (51 mm) wide, with an attachment hole for straps and a mounting hole for a $\frac{1}{2}$ inch (13 mm) diameter anchor, as applicable

3.2.2 Steel Ratchet (Part #R001): The 2 inches (51 mm) steel ratchet is zinc plated Type II per ASTM-B633 and rated for 10,000 lbs. (44.5 kN). max break strength.

3.2.3 Steel Corner Bracket (Part #R005): ASTM A36 steel, 0.140 inch (3.6 mm) thick corner bracket, with dimensions 2 inches (51 mm) tall by 2 inches (51 mm) deep by 6 inches (152 mm) wide.

3.2.4 Cable (Part #C001): The stainless steel cable is $\frac{3}{16}$ inch (4.8 mm) diameter 7x19 AISI 304, with a rated 3,700 lbs. (16.5 kN) max break strength. The cable is looped at the ends and secured with a swage. Cable length from loop ends is 8 inches (203 mm).

3.2.5 Swage (Part #C002): The swage is $\frac{3}{16}$ in. (4.8 mm) oval dual sleeve, made out of plated copper.

3.2.6 Seatbelt Buckle (Part #S001): The seatbelt buckle accommodates a 2 inches (51 mm) wide strap, and it's rated for a minimum 2,200 lbs. (9.8 kN) break strength. Maximum opening force is 13.5 lbs. (0.06kN).

3.2.7 Quick Link (Part #C003): The Quick Link is a threaded $\frac{5}{16}$ inch (8 mm) dia. zinc piece that connects the wire rope with a stainless steel bracket.

3.2.8 Securing Straps: The securing straps and related products are available as follows:

- 1) Part #R002: Polyester webbing product, used with the Seatbelt Buckle or Steel Ratchet, with a 6,000 lbs. (26.7 kN) break strength. The width varies between 1.8 inches (46 mm) to 2 inches (51 mm) with a thickness between 0.043 inch (1.1 mm) to 0.050 inch (1.3 mm).
- 2) Part #R003: Nylon thread for webbing used for sewing of polyester straps.
- 3) Part #T002: Thermoplastic coated, punched polyester webbing product with a 1000 lbs. (4.5 kN) break strength, used with Thumb lock T6. The width varies between 0.94 inch (24 mm) to 1.010 inch (26 mm) and thickness between 0.058 inch (1.5 mm) to 0.062 inch (1.6 mm). The length is 8 inches (203 mm) and holes are 0.187 inch (4.75 mm) diameter spaced at 0.563 inch (14.3 mm).

3.2.9 Thumb lock T6 (Part #T001): 2 inches (51 mm) by 3 inches (76 mm) Lexan connector.

3.2.10 Adhesive Pads (Part #S002): 3M VHB 4945 adhesive tape, with a 0.045 inch (1.14 mm) thickness, cut and sized as applicable per Quakehold specifications.

4.0 DESIGN AND INSTALLATION

4.1 Design: Design of the QuakeHold Seismic Restraint Fastening Systems must conform with the IBC, ASCE/SEI 7 Chapter 13 and this report. Seismic loading of the equipment to be restrained must be determined in accordance with ASCE/SEI 7 Equation 13.3-1. The allowable strength of the QuakeHold Seismic Restraint Fastening Systems must be the least of the following: (1) the design strength determined in accordance with this report taking into account the allowable seismic loads of the QuakeHold Seismic Restraint Fastening Systems provided in Table 1 and 2 resisting seismic tension forces, or (2) the design strength of its end attachment and the design strength of the supporting structure, which are project specific and must be designed by the registered design professional.

4.2 Installation: Installation of the QuakeHold Seismic Restraint Fastening Systems must follow QuakeHold installation instructions. The dead load of the equipment must be supported independently of the QuakeHold Seismic Restraint Fastening Systems. Equipment surfaces must be cleaned in accordance with Quakehold installation instructions and allowed to dry before application the adhesive pads.

4.3 Inspection: Periodic special inspections as noted in Section 1704 and 1705 of the IBC for field fabrication must be conducted, including cleaning of the equipment surface prior to application of the adhesive pads and field cutting of nylon webbing in accordance with the QuakeHold Seismic Restraint Fastening Systems installation instructions.

5.0 CONDITIONS OF USE

The QuakeHold Seismic Restraint Fastening Systems described in this report comply with, or are a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The QuakeHold Seismic Restraint Fastening Systems are limited to resisting seismic forces of nonstructural components only. The registered design professional must consider other load requirements as set forth in the applicable codes.

5.2 The QuakeHold Seismic Restraint Fastening Systems must be used in interior conditions only and must not be exposed to sunlight or UV radiation such as next to exterior windows.

5.3 The following items are beyond the scope of this report:

5.3.1 Cold-formed steel strut channels, wall studs and screw fasteners for connection of the QuakeHold Seismic Restraint Fastening Systems to the supporting wall structure.

5.3.2 Effects of reduced or elevated temperatures and fatigue performance of the QuakeHold Seismic Restraint Fastening Systems; use with vibrating equipment; resistance to impact, shock; use in outdoor applications, corrosive environments and corrosion protection. For the QuakeHold Seatbelt Kit, vertical earthquake induced forces.

5.4 General Seismic Design Criteria: The seismic design must comply with Sections 13.1 and 13.2 of ASCE/SEI 7, with the exception of Section 13.2.2, which is not within the scope of this report.

5.5 Seismic Design Force: The structural design must comply with Section 13.3.1 of ASCE/SEI 7 for seismic design force requirements, including both horizontal and vertical (upward and downward) seismic force components.

- 5.6 Seismic Relative Displacement: The structural design must comply with Section 13.3.2 of ASCE/SEI 7 for seismic relative displacement.
- 5.7 Requirements for Attachments: The attachments defined in Section 5.3.1 must comply with Section 13.4 of ASCE/SEI 7. Consideration must be given to prying effects resulting from assembly geometry.
- 5.8 Requirements for Nonstructural Components: The architectural components must comply with Section 13.5 of ASCE/SEI 7. The mechanical and electrical components must comply with Section 13.6 of ASCE/SEI 7.

6.0 EVIDENCE SUBMITTED

- 6.1 Quality control manual.
- 6.2 Report of static and cyclic/simulated seismic load tests.
- 6.3 Report of durability tests.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4807) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, the QuakeHold Seismic Restraint Fastening Systems packaging is labeled with the report holder’s address, phone number and product kit designation.
- 7.3 The report holder’s contact information is the following:

QUAKEHOLD INDUSTRIAL, INC.
1399 SPECIALY DRIVE
VISTA, CALIFORNIA 92081
(760)295-0234
www.quakeholdindustrial.com

TABLE 1—ULTIMATE AND ALLOWABLE LOADS FOR QUAKEHOLD SEISMIC RESTRAINT FASTENING SYSTEMS⁴

System	Ultimate Seismic Load (lbf) ¹	Allowable Seismic Load (lbf) ²	Displacement at Ultimate Seismic Load (in.)	Stiffness (lbf/in.) ³
QuakeHold Ratchet Strap Kit	2329	466	1.240	486
QuakeHold Seatbelt Kit	996	199	3.108	836
QuakeHold Thumb lock Kit (0 degrees) ⁵	362	72	1.766	273
QuakeHold Thumb lock Kit (45 degrees) ⁵	204	41	0.702	364
QuakeHold Thumb lock Kit (90 degrees) ⁵	165	33	0.597	308
QuakeHold Cable Bracket Kit	1754	351	0.507	2531

For SI: 1 in. = 25.4 mm; 1 lbf = 4.4 N.

- 1. The ultimate seismic load is the average tested load at failure of at least three specimens, where the average after cyclic loading is greater than 90% of the average ultimate static load.
- 2. Allowable Seismic Loads are Ultimate Seismic Loads divided by a Safety Factor of 5.
- 3. Stiffness determined at 40% of the ultimate static test load.
- 4. The values are based on kits attached to stainless steel surfaces.
- 5. For orientation of Thumb lock Kit, see Figure 3. Diagonal Side View for 45 degrees installation, and Side View for 0 degree installation.

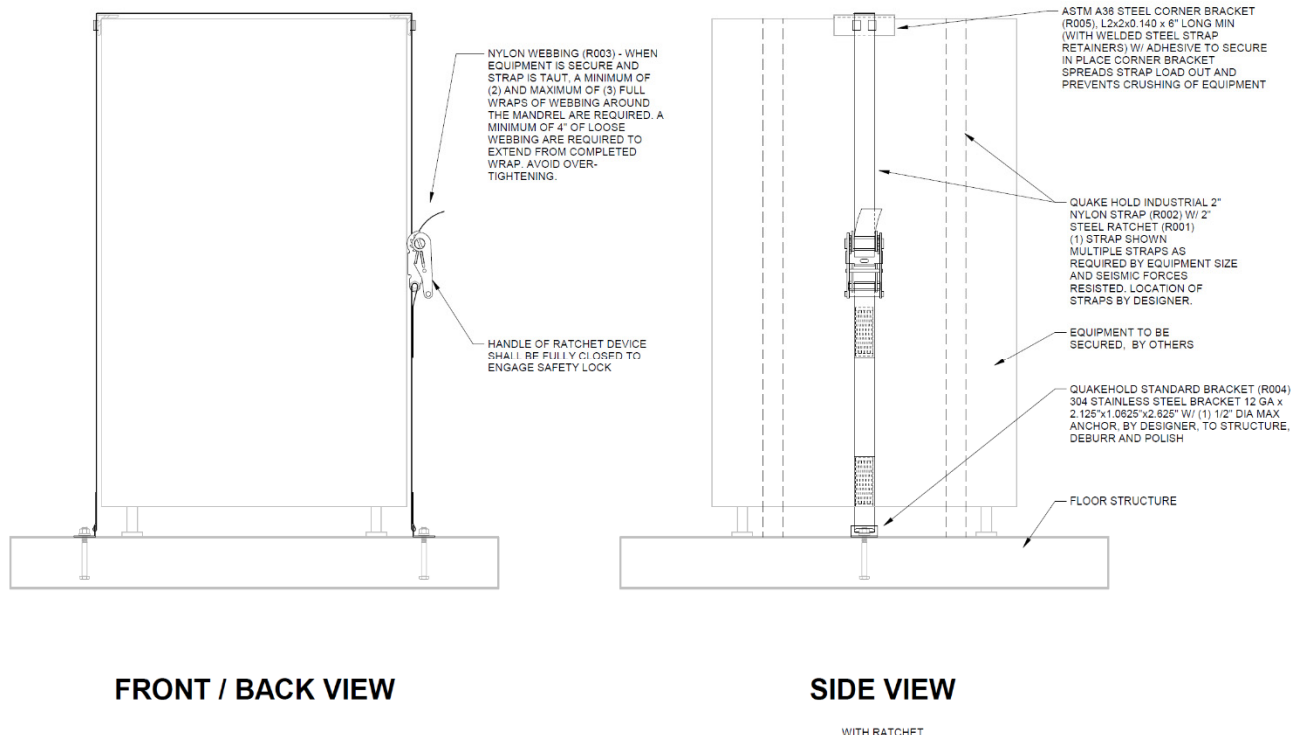


FIGURE 1— QUAKEHOLD RATCHET STRAP KIT

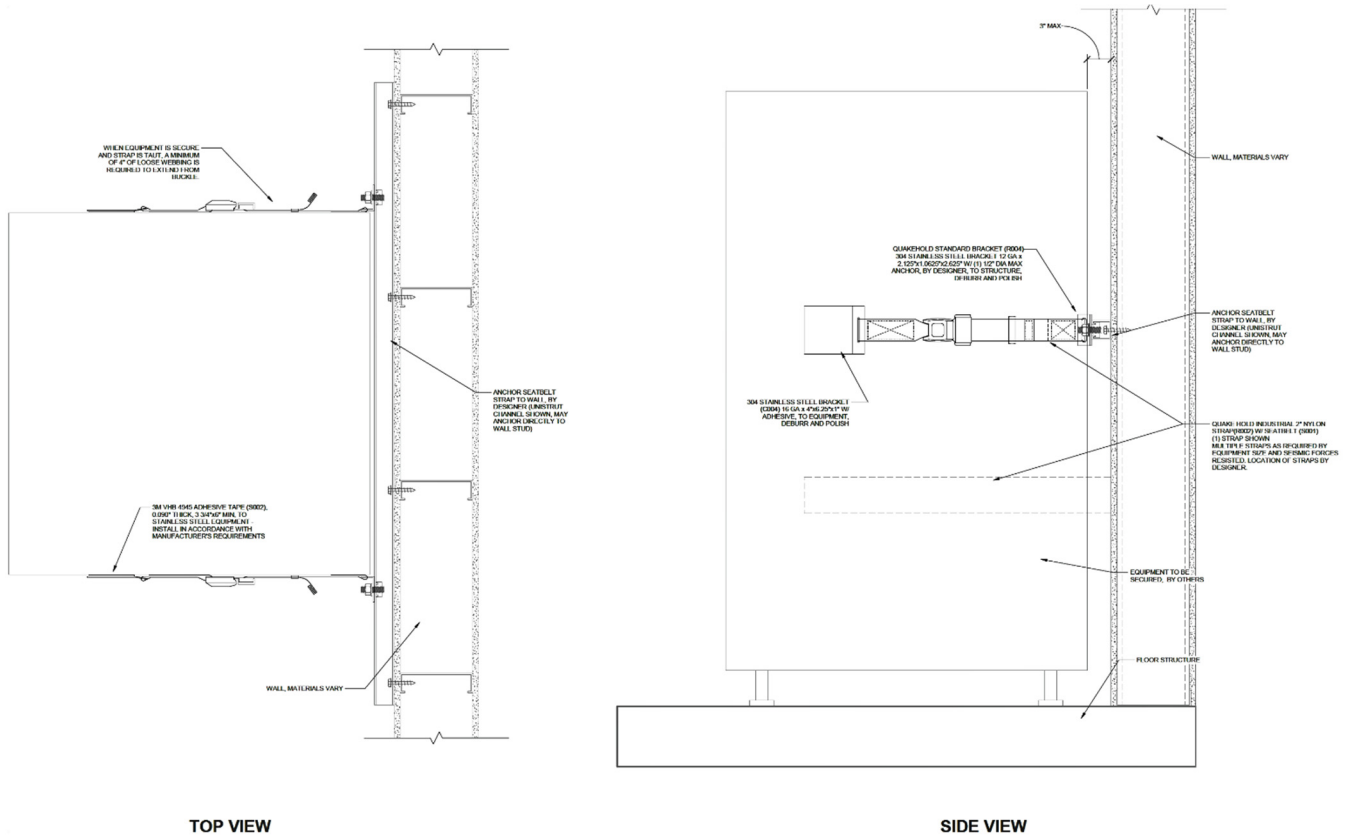


FIGURE 2— QUAKEHOLD SEATBELT KIT

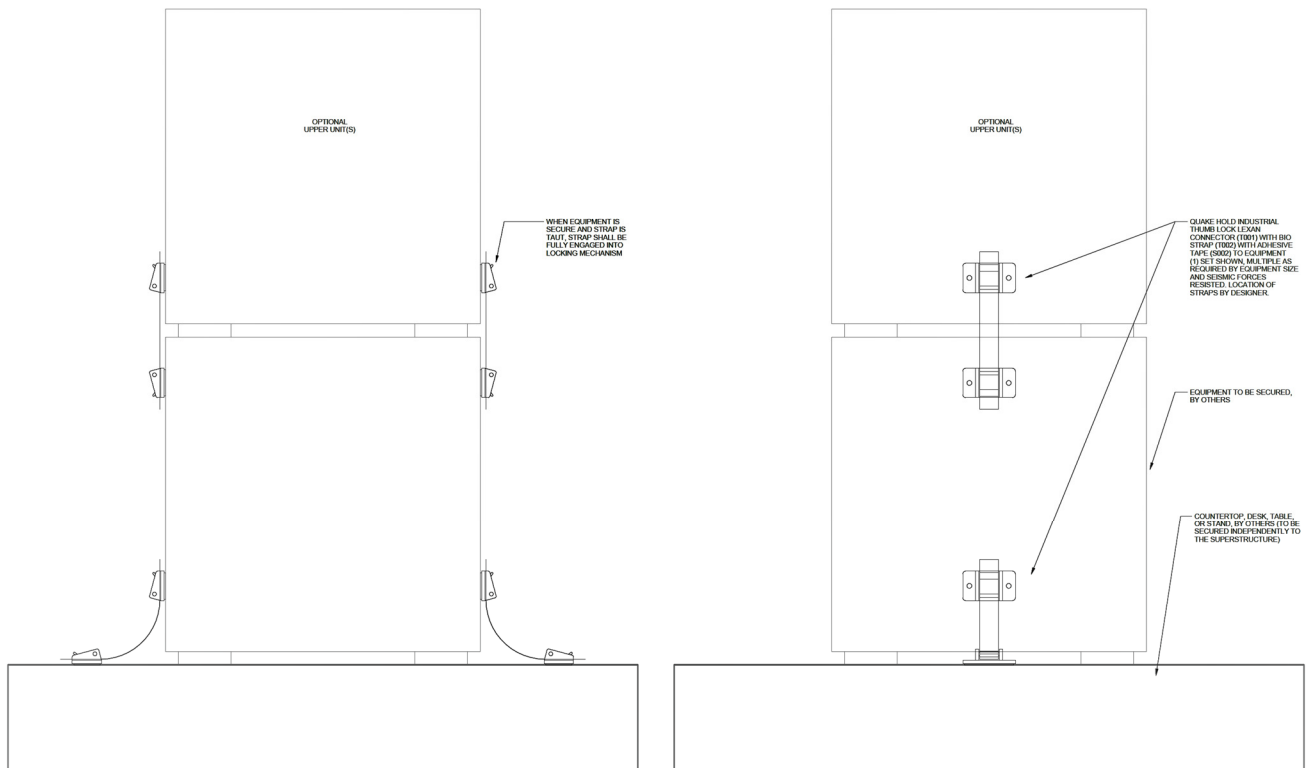


FIGURE 3— QUAKEHOLD THUMB LOCK KIT

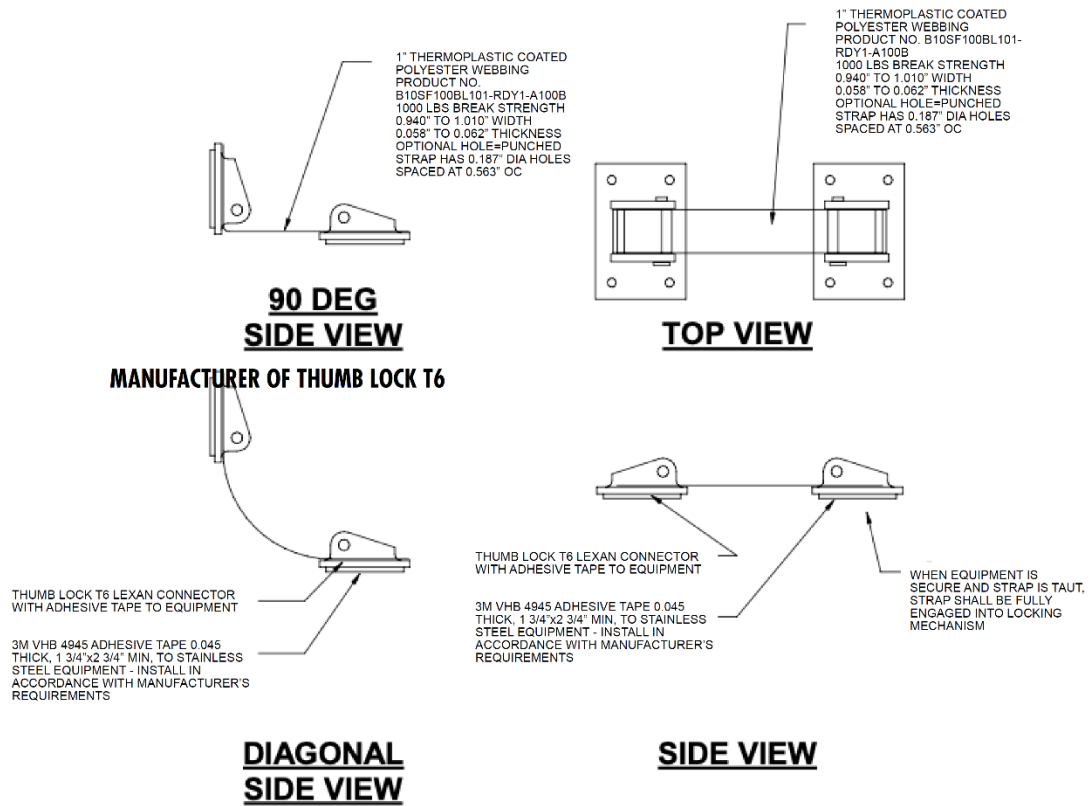


FIGURE 3— QUAKEHOLD THUMB LOCK KIT (continued)

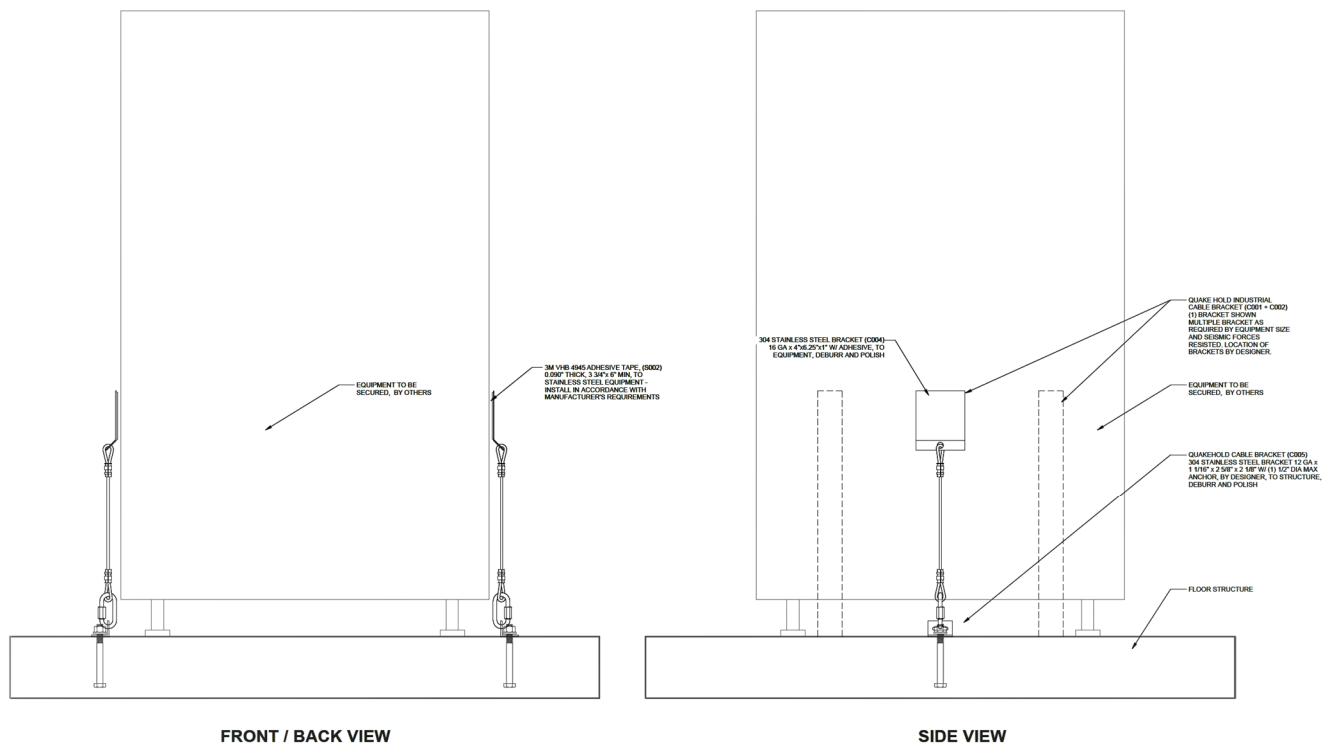


FIGURE 4— QUAKEHOLD CABLE BRACKET KIT



Part # R001
44627-11



Part # R002
8233 DK Gray



Part # R003
T-135



Part # R004
#3301



Part # R005



Part # S001
CA-0100E, CW-1211, CY-054A



Part # S002

4945




Part # T001
T6




Part # T002


LSH-100




Part # C001
S7188719C304



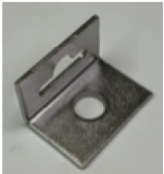
Part # C002
SLVZ03/16



Part # C003
LNKQZ5/16



Part # C004
14-10-S



Part # C005

#1301

FIGURE 5— QUAKEHOLD SEISMIC RESTRAINT FASTENING SYSTEMS PART NUMBERS

DIVISION: 13 00 00—SPECIAL CONSTRUCTION
Section: 13 48 53—Manufactured Seismic Control Components

REPORT HOLDER:

QUAKEHOLD INDUSTRIAL, INC.

EVALUATION SUBJECT:

QUAKEHOLD SEISMIC RESTRAINT FASTENING SYSTEMS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that QuakeHold Seismic Restraint Fastening Systems, described in ICC-ES evaluation report [ESR-4807](#), has 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)

2.0 CONCLUSIONS

The QuakeHold Seismic Restraint Fastening Systems, described in Sections 2.0 through 7.0 of the evaluation report [ESR-4807](#), comply with LABC Chapters 16 and 17, and is subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The QuakeHold Seismic Restraint Fastening Systems described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-4807](#) must be adhered to.
- The design, installation, conditions of use and identification of the QuakeHold Seismic Restraint Fastening Systems is in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-4807](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.

This supplement expires concurrently with the evaluation report, issued December 2022.

DIVISION: 13 00 00—SPECIAL CONSTRUCTION
Section: 13 48 53—Manufactured Seismic Control Components

REPORT HOLDER:

QUAKEHOLD INDUSTRIAL, INC.

EVALUATION SUBJECT:

QUAKEHOLD SEISMIC RESTRAINT FASTENING SYSTEMS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the QuakeHold Seismic Restraint Fastening Systems, described in ICC-ES evaluation report ESR-4807, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2022 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of the State Architect (DSA), see Sections 2.1 and 2.2 below.

2.0 CONCLUSIONS

The QuakeHold Seismic Restraint Fastening Systems, described in Sections 2.0 through 7.0 of the evaluation report ESR-4807, comply with CBC Chapter 16 and 17, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report, and the additional requirements of the CBC Sections 16 and 17, as applicable.

2.1 OSHPD:

The QuakeHold Seismic Restraint Fastening Systems, described in Sections 2.0 through 7.0 of the evaluation report ESR-4807, comply with CBC Chapters 16 and 17 and its amendments, and Chapters 16A and 17A, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report, and the additional requirements in Sections 2.1.1 and 2.1.2 of this supplement:

2.1.1 Conditions of Use:

1. All loads applied shall be determined by a registered design professional and shall comply with applicable loads from CBC Chapter 16 and its amendments, and Chapter 16A. In addition, Section 13.1.4 of ASCE/SEI 7-16 shall be revised in accordance with CBC Section 1617A.1.18 [OSHPD 1, 2, 4 & 5].
2. The Seismic Design Category must be determined in accordance with the exception under 1613.2.5 [OSHPD 1R, 2 & 5]
3. The component importance factors for nonstructural components shall be determined in accordance with Section 1613.4 [OSHPD 1R, 2 & 5]
4. Special Certification for Designated Seismic Systems as required by Section 13.2.2 of ASCE/SEI 7-16 is not within the scope of this supplement.

2.1.2 Special Inspection Requirements: Periodic special inspection is required, in accordance with Section 1705.1.1 [OSHPD 1R, 2 & 5], or Section 1705A.1.1 [OSHPD 1 & 4] of the CBC, as applicable. In addition, special inspection is required for special seismic certification for designated seismic systems in accordance with amended Sections 1705.13.4, 1705.14.3.1 [OSHPD 1R, 2, and 5] and Sections 1705A.13.4, 1705A.14.3.1 [OSHPD 1 & 4] of the CBC, as applicable. Statement of special inspections shall follow the additional requirements of Section 1704.3.2 [OSHPD 1R, 2 & 5] or Section 1704A.3.2 [OSHPD 1 & 4] of the CBC.

2.2 DSA:

The QuakeHold Seismic Restraint Fastening Systems, described in Sections 2.0 through 7.0 of the evaluation report ESR-4807, complies with CBC amended Sections in Chapter 16, and Chapters 16A and 17A, provided the design and installation are in accordance with the 2021 *International Building Code*[®] (IBC) provisions noted in the evaluation report, and the additional requirements in Sections 2.2.1 and 2.2.2 of this supplement:

2.2.1 Conditions of Use:

1. All loads applied shall be determined by the registered design professional and shall comply with applicable loads from CBC amended sections in Chapter 16 and Chapter 16A. In addition, Section 13.1.4 of ASCE/SEI 7-16 shall be revised in accordance with CBC Section 1617.11.15 [DSA-SS/CC] and Section 1617A.1.18 [DSA-SS], as applicable.
2. The earthquake loads must be determined in accordance with Section 1617.9 [DSA-SS/CC]
3. Special Certification for Designated Seismic Systems as required by Section 13.2.2 of ASCE/SEI 7-16 is not within the scope of this supplement.

2.2.2 Special Inspection Requirements: Periodic special inspection is required, in accordance with Section 1705A.1.1 [DSA-SS & DSA-SS/CC] of the CBC. In addition, special inspection is required for special seismic certification for designated seismic system in accordance Section 1705A.13.4 [DSA-SS & DSA-SS/CC] of the CBC, as applicable. Statement of special inspections shall follow the additional requirements of Section 1704A.3.2 of the CBC [DSA-SS & DSA-SS/CC].

This supplement expires concurrently with the evaluation report, issued December 2022.