



ICC-ES Evaluation Report ESR-1799

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

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

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

DIVISION: 09 00 00—FINISHES
Section: 09 22 16.23—Fasteners

REPORT HOLDER:

ITW RAMSET

ADDITIONAL LISTEE:

ITW BRANDS

EVALUATION SUBJECT:

POWER-ACTUATED FASTENERS AND CEILING CLIP ASSEMBLIES

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012, 2009 and 2006 *International Residential Code*® (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see [ESR-1799 LABC and LARC Supplement](#).

For evaluation for compliance with codes adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see [ESR-1799 CBC and CRC Supplement](#).

Property evaluated:

Structural

2.0 USES

The 1500 Series, SP Series Power Point, and TE Series fasteners are power-actuated fasteners (PAFs) used for fastening of building components to normalweight concrete, sand-lightweight concrete, sand-lightweight concrete filled

steel deck panels, concrete masonry and structural steel substrates. The fasteners are used as alternatives to the cast-in-place concrete anchors described in IBC Section 1901.3 (2012 IBC Section 1908; 2009 and 2006 IBC Section 1911) for placement in concrete; the embedded anchors described in Section 8.1.3 of TMS 402, referenced in Section 2107 of the IBC (Section 2.1.4 of TMS 402, referenced in Section 2107 of the 2012, 2009 and 2006 IBC); and to the welds and bolts used to attach to steel, described in IBC Sections 2204.1 and 2204.2. For structures regulated under the IRC, the fasteners may also be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

SDC, SPC and TEC ceiling clip assemblies are used to attach wire for suspended ceilings to the supporting structure above. The ceiling clip assemblies are used as alternatives to cast-in-place concrete anchors described in IBC Section 1901.3 (2012 IBC Section 1908; 2009 and 2006 IBC Section 1911); and may also be used in structures regulated under the IRC where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

See Table 1A in this report for shank descriptions fastener dimensions, coating information and applicable base materials. The fasteners are available in various lengths to achieve embedment depths as noted in Tables 2 through 9. See Table 10 for a correlation of products between ITW Ramset and ITW Brands.

3.2 1500 Series Fasteners:

The 1500 series fasteners are manufactured from steel complying with ASTM A510, Grade 1060 or 1062, and austempered to a Rockwell “C” core hardness of 52 to 56 for smooth-shank fasteners and 54 to 56 for knurled-shank fasteners.

The 1500 series fasteners have a nominal shank diameter of 0.145 inch (3.7 mm) and a nominal head diameter of 0.3 inch (7.6 mm). All of the 1500 series fasteners have a zinc-plated finish, except for the smooth-shank 1506B fasteners, which has a black oxide finish.

3.3 SP Series Power Point Fasteners:

The SP Series Power Point fasteners are straight or stepped shank series fasteners manufactured from steel wire complying with ASTM A510, Grade 1060 or 1062, and austempered to a Rockwell “C” hardness of 55 to 56.

The SP Series Power Point fasteners have a head diameter of 0.3 inch (7.62 mm). Fasteners having nominal shank lengths of $\frac{7}{8}$ inch and less have a smooth, straight, nominally 0.150-inch diameter shank. Fasteners having a nominal shank length of 1 inch or longer have a smooth, stepped shank with a nominally 0.150-inch diameter shank at the tapered end and a nominally 0.180-inch diameter shank at the headed end. The SP Series Power Point fasteners have a zinc-plated finish.

3.4 True Embedment (TE) Series Fasteners:

The TE series fasteners are straight and tapered shank fasteners manufactured from steel wire complying with ASTM A510, Grade 1070, and austempered to a Rockwell "C" hardness of 55 to 58.

The TE series fasteners have a head diameter of 0.32 inch (8.1 mm). The smooth shank fasteners have a tapered point and a nominal straight shank diameter of 0.157 inch. The knurled fasteners have a straight shank with a nominal diameter of 0.157 inch. The TE series fasteners have a zinc-plated finish.

3.5 Ceiling Clip Assemblies:

The ceiling clip assemblies are comprised of a power-actuated fastener with a premounted steel clip. See Figure 4. See Table 1B for descriptions and applicable allowable load tables.

3.5.1 SDC100 and SDC125 Ceiling Clip Assemblies:

The fasteners used in the SDC100 and SDC125 ceiling clip assemblies are 1500 series, smooth, straight shank fasteners, described in Section 3.2, with shank lengths of 1 inch and $1\frac{1}{4}$ inches (25.4 and 31.7 mm), respectively. The clip angles have a 120-degree angle between the legs of the clip and are manufactured from $\frac{3}{4}$ -inch-wide steel strips conforming to ASTM A653 FS Type B and having a base-metal thickness of 0.074 inch (1.88 mm). One leg of the clip is $\frac{29}{32}$ inch long (23 mm) and the opposite leg is $\frac{3}{4}$ inch long (19.1 mm). The fasteners are inserted through a dimple formed in the longer leg of the clip angle. The other leg has a hole with a nominal diameter of 0.335 inch (8.5 mm) through which the ceiling wire is attached.

3.5.2 SPC78 and SPC114 Ceiling Clip Assemblies:

The fasteners used in the SPC78 and SPC114 ceiling clip assemblies are SP series Power Point smooth, straight shank fasteners, described in Section 3.3, with shank lengths of $\frac{7}{8}$ inch and $1\frac{1}{4}$ inches (22 and 31.7 mm), respectively. The clip angles have a 90-degree angle between the legs of the clips and are manufactured from $\frac{3}{4}$ -inch-wide (19.1 mm), No. 14 gage [0.0747 inch (1.90 mm) base-metal thickness], steel strips conforming to ASTM A653 CS Type B. One leg of the clip is 1 inch long (25.4 mm) and the opposite leg is $\frac{3}{4}$ inch long (19.1 mm). The fasteners are inserted through an eyelet which is inserted through the hole in the 1-inch-long (25.4 mm) leg of the clip. The eyelet is manufactured from 5052-0 grade aluminum having a thickness of 0.032 inch (0.81 mm). The $\frac{3}{4}$ -inch-long (19.1 mm) leg has a hole with a nominal diameter of 0.313 inch (8.0 mm) through which the ceiling wire is attached.

3.5.3 TEC100 Ceiling Clip Assemblies: The fastener used in the TEC100 ceiling clip assemblies is the TE series smooth shank fastener, described in Section 3.4, with a shank length of 1 inch (25.4 mm). The clip angle and eyelet are the same as for the SPC78 and SPC114 ceiling clip assemblies described in Section 3.5.2.

3.6 Substrate Materials:

3.6.1 Structural Steel: Structural steel used in supports must comply with the minimum requirements of ASTM A36

(see Table 5), ASTM A572 Grade 50 or ASTM A992 (see Table 6), and must have thicknesses as noted in Table 5 or 6.

3.6.2 Concrete: Normalweight and sand-lightweight concrete must comply with IBC Chapter 19 or IRC Section R402.2, as applicable. The minimum concrete compressive strength at the time of fastener installation must be as noted in applicable allowable load table.

3.6.3 Steel Deck Panels: Steel deck panels must conform to a code-referenced material standard, with the minimum thickness and minimum yield strength and specified tensile strength noted in Tables 4 and 9. See Figure 1 for panel configuration requirements.

3.6.4 Concrete Masonry: Concrete Masonry Units (CMUs) must be minimum 8-inch-thick, normal weight blocks conforming to ASTM C90. Mortar must be Type S mortar complying with ASTM C270. Grout must be coarse grout complying with ASTM C476.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Selection of fasteners must take into consideration the applicable base material and the length of the fastener. The minimum fastener length must be determined as follows:

- Unless otherwise noted, for installation into concrete, concrete-filled steel deck panels, concrete masonry and steel base materials, the minimum effective shank length shown in Table 1A must equal or exceed the sum of the thickness of the attached material and the minimum embedment depth (penetration) shown in the applicable tables in this report.
- For installation through steel base materials, the minimum effective shank length shown in Table 1A must equal or exceed the sum of the following: the thickness of the attached material, the thickness of the base material and the required point penetration shown in the applicable tables in this report.

4.1.2 Allowable Loads: The applicable allowable shear and tension load tables for the fasteners and ceiling clip assemblies driven into different base materials may be determined by referencing Tables 1A and 1B. The most critical applied loads, excluding seismic load effects, resulting from the load combinations in Section 2.4 of ASCE 7-16/S1 (referenced in 2021 IBC Section 1605.1) or 2021 IBC Section 1605.2 (Section 1605.3.1 or 1605.3.2 of the 2018, 2015, 2012 IBC) must not exceed the allowable loads described in this section. For fasteners which are subjected to seismic loads, see Section 4.1.5 for additional information.

The allowable shear and tension (pullout) values in the tables of this report are for use in allowable stress design (ASD). The allowable loads apply to the interaction between the fasteners and the specified base materials only, and limit states such as pull-over and lateral bearing, which are governed by the properties of attached materials, are outside the scope of this report. Design of the connection to the attached material must comply with the applicable requirements of the IBC. When designing the connection of wood members to the base material, the bending yield strength of the PAFs can be assumed to be the same as that of a nail with the same shank diameter. The stress increases and load reductions described in 2021 IBC Section 1605.2 (2018, 2015, 2012 and 2009 IBC Section 1605.3) are not allowed.

4.1.3 Combined Loading: For fasteners subjected to both shear and tension loads, compliance with the following interaction equation must be verified:

$$(\rho/P_a) + (v/V_a) \leq 1$$

where:

- ρ = Actual applied tension load on fastener, lbf (N).
- P_a = Allowable tension load for the fastener, lbf (N).
- v = Actual applied shear load on fastener, lbf (N).
- V_a = Allowable shear load for the fastener, lbf (N).

4.1.4 Steel-to-steel Connections: When the fasteners listed in Tables 5 and 6 are used in connections of two steel elements in accordance with Section J5 of AISI S100 (Section E5 of AISI S100-12 for the 2015, 2012 and 2009 IBC), connection capacity must be determined in accordance with Sections 4.1.4.1 and 4.1.4.2, as applicable.

4.1.4.1 Connection Strength - Tension: To determine tensile connection strength in accordance with Section J5.2 of AISI S100 (Section E5.2 of AISI S100-12), the fastener tension strength, pull-out strength and pull-over strength must be known. These characteristics must be determined as follows:

- **PAF Tensile Strength:** The allowable fastener tension strengths must be calculated in accordance with Section J5.2.1 of AISI S100 (Section E5.2.1 of AISI S100-12) using a value of 260,000 psi for F_{uh} .
- **Pull-out Strength:** See Table 5 or 6, as applicable, for available pull-out strength.
- **Pull-over Strength:** The available pull-over strengths must be calculated in accordance with Section J5.2.3 of AISI S100 (Section E5.2.3 of AISI S100-12).

4.1.4.2 Connection Strength - Shear: To determine shear connection strength in accordance with Section J5.3 of AISI S100 (Section E5.3 of AISI S100-12), the fastener shear strength, bearing and tilting strength, pull-out strength in shear, net section rupture strength and shear strength limited by edge distance must be known. These characteristics must be determined as follows:

- **PAF Shear Strength:** The allowable fastener shear strengths must be calculated in accordance with Section J5.3.1 of AISI S100 (Section E5.3.1 of AISI S100-12) using a value of 260,000 psi for F_{uh} .
- **Bearing and Tilting Strength:** The available bearing and tilting strengths must be calculated in accordance with Section J5.3.2 of AISI S100 (Section E5.3.2 of AISI S100-12).
- **Pull-out Strength in Shear:** The available pull-out strength in shear must be the applicable allowable shear strength from Table 5 or 6, as applicable, or must be calculated in accordance with Section J5.3.3 of AISI S100 (Section E5.3.3 of AISI S100-12).
- **Net Section Rupture Strength and Shear Strength Limited by Edge Distance:** The net section rupture strength must be determined in accordance with Section J5.3.4 of AISI S100 (Section E5.3.4 of AISI S100-12) and the shear strength limited by edge distance must be determined in accordance with Section J5.3.5 of AISI S100 (Section E5.3.5 of AISI S100-12).

4.1.5 Seismic Considerations: When subjected to seismic loads, the fasteners may be used as follows:

1. The fasteners may be used for attachment of nonstructural components listed in Section 13.1.4 of

ASCE 7, which are exempt from the requirements of ASCE 7.

2. **Concrete Base Materials:** The fasteners installed in concrete base materials may be used to support acoustical tile or lay-in panel suspended ceiling systems, distributed systems and distribution systems where the service load on any individual fastener does not exceed the lesser of 90 lbf (400 N) or the published allowable load in Tables 2, 3, 4, 8, and 9, as applicable.
3. **Steel Base Materials:** The fasteners installed in steel may be used for attaching nonstructural components where the service load on any individual fastener does not exceed the lesser of 250 lbf (1112 N) or the published allowable load shown in Tables 5 and 6, as applicable.
4. **Interior, Nonstructural Walls:** For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the power-actuated fasteners described in Section 3.0 may be used to attach steel track to concrete or steel in all Seismic Design Categories. In Seismic Design Categories D, E and F, the allowable shear load due to transverse pressure must be no more than 90 pounds (400 N) when attaching to concrete; or 250 pounds (1,112 N) when attaching to steel. Substantiating calculations must be submitted addressing the fastener-to-base-material capacity and the fastener-to-attached-material capacity. Interior nonstructural walls are limited to locations where bearing walls, shear walls or braced walls are not required by the approved plans. The design load on the fastener must not exceed the allowable load shown in Tables 2 through 6, as applicable.

4.2 Installation:

4.2.1 General: The fasteners must be installed in accordance with this report and the ITW Ramset or ITW Brands installation instructions. A copy of these instructions must be available on the jobsite at all times during installation.

A low-velocity, powder-actuated fastening tool, recommended by ITW Ramset or ITW Brands, must be used to install the fasteners. The fastener penetration, spacing and edge distances must be as noted in the tables of this report. For fasteners installed into concrete, the fasteners must not be driven until the concrete has reached the designated compressive strength.

4.2.2 Use with Treated Lumber: The fasteners described in Table 1 may be used in contact with fire-retardant-treated wood in dry, interior locations only, in accordance with IBC Section 2304.10.6.4 (2018 and 2015 IBC Section 2304.10.5.4, 2012 and 2009 IBC Section 2304.9.5.4) and ITW Ramset's recommendations. Use of fasteners in contact with preservative-treated wood or fire-retardant-treated wood in exterior applications is outside the scope of this report.

5.0 CONDITIONS OF USE

The power-actuated fasteners and ceiling clip assemblies described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** The fasteners must be manufactured and identified in accordance with this report.
- 5.2** Fastener installation complies with this report and ITW Ramset or ITW Brands published installation

instructions. In the event of a conflict between this report and the published installation instructions, the more restrictive requirements govern.

- 5.3 Calculations demonstrating that the applied loads are less than the maximum allowable loads described in this report must be submitted to the code official. 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.
- 5.4 For steel-to-steel connections that meet the applicability requirements of Section J5 of AISI S100 (Section E5 of AISI S100-12), calculations demonstrating that the available connection strength has been determined in accordance with Section J5 of AISI S100 (Section E5 of AISI S100-12) and Section 4.1.4 of this report, and equals to or exceeds the applied load, must be submitted to the code official. 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.
- 5.5 Refer to Section 4.1.5 for seismic considerations.
- 5.6 The minimum concrete thickness must be three times the fastener embedment in concrete, except where noted otherwise in this report.
- 5.7 The use of fasteners is limited to uncracked concrete or masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.
- 5.8 Installation must be limited to dry interior environments, which include exterior walls which are protected by an exterior wall envelope.
- 5.9 Refer to Section 4.2.2 regarding the use of fasteners in contact with preservative-treated or fire-retardant-treated.
- 5.10 The fasteners and ceiling clip assemblies addressed in this report are manufactured under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Power-actuated Fasteners Driven into Concrete, Steel and Masonry Elements (AC70), dated December 2019 (editorially revised January 2021).

7.0 IDENTIFICATION

7.1 The containers of the fasteners are labeled with the company name (ITW Ramset or ITW Brands); the brand name (Ramset, Duo-Fast or Tapcon), the fastener product name, length, catalog number, and quantity; the evaluation report number (ESR-1799); and the manufacturing date. In addition, the ITW Ramset 1500 series and SP series fasteners are identified by the letter “R” stamped into the fastener head, and the ITW Brands Duo-Fast and Tapcon1500 series and SP series fasteners have a semi-circle stamped on the fastener head. The ITW Ramset TE Series fasteners have the nominal length marked on the fastener head. See Figure 3.

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

ITW RAMSET
Brand name: Ramset
155 HARLEM AVENUE
GLENVIEW, ILLINOIS 60025
(800) 848-5611
www.ramset.com
techsupport@itwccna.com

7.3 The Additional Listee’s contact information is the following:

ITW BRANDS
Brand names: Duo-Fast, Tapcon
155 HARLEM AVENUE, N3E
GLENVIEW, ILLINOIS 60025
(847) 489-2726
brandscs@itwbrands.com

TABLE 1A—FASTENER DESCRIPTIONS AND APPLICATIONS

| FASTENER ¹ | | SHANK TYPE | SHANK DIAMETER (inch) | HEAD DIAMETER (inch) | MAXIMUM POINT LENGTH (inch) | MINIMUM EFFECTIVE SHANK LENGTH (inch) | FASTENER COATING | APPLICABLE BASE MATERIAL | APPLICABLE LOAD TABLES |
|----------------------------|-------------------------|------------------------------|-----------------------|----------------------|-----------------------------|---|-------------------------|--------------------------|------------------------|
| 1500 Series | 1506B | Smooth, straight | 0.145 | 0.300 | 0.280 | Designated shank length – 0.03 inch (2.84 inch for 1524 fastener) | Black Oxide | Concrete | 2 |
| | 15## | | | | | | Zinc | Concrete | 2, 3 |
| | | 1503K | | | Knurled, straight | 0.300 | Designated shank length | Zinc | Conc.-filled deck |
| SP Powerpoint Series | SP12 SP58 SP34 | Smooth, straight | 0.150 | 0.300 | 0.335 | Designated shank length | Zinc | Concrete | 2 |
| | | | | | | | | Steel | 5, 6 |
| | SP100 SP114 SP178 | Smooth, stepped | 0.150/0.180 | 0.300 | 0.335 | Designated shank length | Zinc | Concrete | 2, 3 |
| | | | | | | | | Conc.-filled deck | 4 |
| True Embedment (TE) Series | TE## | Smooth, straight and tapered | 0.157 | 0.320 | 0.40 | Shank length + 1/16 inch | Zinc | Concrete | 2, 3 |
| | | | | | | | | Conc.-filled deck | 4 |
| | TE## | Knurled, straight | 0.157 | 0.320 | 0.30 | Shank length | Zinc | Steel | 7 |

For SI: 1 inch = 25.4 mm.

¹## denotes numbers used in fastener designation.

TABLE 1B—CEILING CLIP ASSEMBLY DESCRIPTIONS AND APPLICATIONS

| ASSEMBLY | FASTENER | CLIP DESCRIPTION | CLIP MATERIAL & FINISH | APPLICABLE BASE MATERIAL | APPLICABLE LOAD TABLES |
|----------|----------|--|----------------------------|--------------------------|------------------------|
| SDC100 | 1508 | 0.074 inch thick, 120° clip angle 0.335 inch diameter hole | Carbon steel, zinc coating | Concrete | 8 |
| SDC125 | 1510 | | | Conc.-filled deck | 9 |
| SPC78 | SP78 | 0.074 inch thick, 90° clip angle 0.313 inch diameter hole | Carbon steel, zinc coating | Concrete | 8 |
| SPC114 | SP114 | | | Conc.-filled deck | 9 |
| TEC100 | TE100 | 0.074 inch thick, 90° clip angle 0.313 inch diameter hole | Carbon steel, zinc coating | Concrete | 8 |
| | | | | Conc.-filled deck | 9 |

For SI: 1 inch = 25.4 mm.

TABLE 2—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN NORMALWEIGHT CONCRETE¹

| PART NUMBER SERIES | NOMINAL SHANK DIAMETER (inch) | SHANK DESCRIPTION | MINIMUM EMBEDMENT DEPTH (inches) | MINIMUM SPACING (inches) | MINIMUM EDGE DISTANCE (inches) | ALLOWABLE LOADS (lbf) | | | | | |
|--------------------|-------------------------------|-------------------|----------------------------------|--------------------------|--------------------------------|--------------------------------|-------|----------|-------|----------|-------|
| | | | | | | Concrete Compressive Strength: | | | | | |
| | | | | | | 2500 psi | | 4000 psi | | 6000 psi | |
| Load Direction: | | | | | | Tension | Shear | Tension | Shear | Tension | Shear |
| 1500 | 0.145 | Smooth-straight | 3/4 1 1 1/4 1 1/2 | 5.1 | 3.2 | 50 | 66 | 100 | 104 | — | — |
| | | | | | | 152 | 166 | 157 | 182 | — | — |
| | | | | | | 159 | 265 | 179 | 267 | — | — |
| | | | | | | 154 | 340 | 209 | 342 | — | — |
| SP | 0.150 | Smooth-straight | 3/4 | 5.1 | 3.2 | — | — | 150 | 105 | 81 | 82 |
| SP | 0.150/0.180 | Smooth-stepped | 1 1 1/4 1 1/2 | 5.1 | 3.5 | 154 | 200 | 243 | 175 | 189 | 210 |
| | | | | | | 207 | 230 | 298 | 218 | 213 | 305 |
| | | | | | | — | — | 384 | 391 | 239 | 594 |
| TE | 0.157 | Smooth-tapered | 3/4 1 1 1/4 | 5.1 | 2.75 | 71 | 116 | 71 | 116 | 109 | 117 |
| | | | | | | 197 | 216 | 258 | 216 | 214 | 383 |
| | | | | | | 264 | 283 | 377 | 317 | 415 | 349 |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness must be three times the fastener embedment into the concrete.

TABLE 3—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE¹

| PART NUMBER SERIES | NOMINAL SHANK DIAMETER (inch) | SHANK DESCRIPTION | MINIMUM EMBEDMENT DEPTH (inches) | MINIMUM SPACING (inches) | MINIMUM EDGE DISTANCE (inches) | ALLOWABLE LOADS (lbf) | |
|--------------------|-------------------------------|-------------------|----------------------------------|--------------------------|--------------------------------|-----------------------|-------|
| | | | | | | Tension | Shear |
| 1500 | 0.145 | Smooth-straight | 3/4 1 1 1/4 1 1/2 | 4 | 3.2 | 167 | 179 |
| | | | | | | 200 | 228 |
| | | | | | | 333 | 400 |
| | | | | | | 391 | 410 |
| SP | 0.150/0.180 | Smooth-stepped | 1 1 1/4 1 1/2 | 4 | 3.5 | 226 | 250 |
| | | | | | | 329 | 377 |
| | | | | | | 406 | 380 |
| TE | 0.157 | Smooth-tapered | 3/4 1 1 1/4 1 1/2 | 5.1 | 3.0 | 152 | 159 |
| | | | | | | 325 | 347 |
| | | | | | | 358 | 437 |
| | | | | | | 466 | 478 |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness must be three times the fastener embedment into the concrete, unless noted otherwise.

TABLE 4—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED THROUGH METAL DECK INTO MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE¹

| PART NUMBER SERIES | NOMINAL SHANK DIAMETER (inch) | SHANK DESCRIPTION | MINIMUM EMBEDMENT DEPTH (inches) | MINIMUM SPACING (inches) | ALLOWABLE LOADS (lbf) | | | | | | | |
|--------------------|-------------------------------|-------------------|----------------------------------|--------------------------|--|-----|--|-----|-------------|-----|-------------|---|
| | | | | | 3-INCH DEEP W TYPE STEEL DECK ^{2,3} | | 1 1/2-INCH DEEP B TYPE STEEL DECK ^{4,5} | | Lower Flute | | Lower Flute | |
| Deck Type: | | | | | Lower Flute | | Upper Flute | | Lower Flute | | | |
| Fastener Location: | | | | | Tension | | Shear | | Tension | | Shear | |
| Load Direction: | | | | | Tension | | Shear | | Tension | | Shear | |
| 1500 | 0.145 | Smooth-straight | 3/4 | 4 | 76 | 260 | - | - | - | - | - | - |
| | | | 1 | | 134 | 265 | | | | | | |
| | | | 1 1/4 | | 157 | 269 | | | | | | |
| | | | 1 1/2 | | 233 | 346 | | | | | | |
| SP | 0.150/0.180 | Smooth-stepped | 1 | 4 | 119 | 336 | - | - | - | - | - | - |
| | | | 1 1/4 | | 175 | 372 | | | | | | |
| | | | 1 1/2 | | 179 | 426 | | | | | | |
| TE | 0.157 | Smooth-tapered | 3/4 | 5.1 | 106 | 265 | 131 | 261 | 154 | 307 | | |
| | | | 1 | | 152 | 327 | 156 | 273 | 138 | 265 | | |
| | | | 1 1/4 | | 164 | 330 | - | - | - | - | | |
| | | | 1 1/2 | | 238 | 448 | - | - | - | - | | |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness must be three times the fastener embedment into the concrete, unless noted otherwise.

²The fastener must be installed through the lower flutes of the metal deck with a minimum edge distance of 1 1/8 inches from the edge of the steel deck web and 4 inches (5.1 inches for TE fasteners) from the end of the deck. Concrete thickness above the deck must be a minimum of 3 1/2 inches (2 1/4 inches for TE fasteners). See Figure 1 of this report.

³The steel deck must be configured as shown in Figure 1, have a minimum base-metal thickness of 0.035 inch, and have a minimum yield strength of 50 ksi and a minimum tensile strength of 65 ksi.

⁴The fastener must be installed through the upper or lower flutes of the metal deck at the center of the flute and a minimum of 5.1 inches from the end of the deck. Concrete thickness above the deck must be a minimum of 2 1/4 inches. See Figure 2 of this report.

⁵The steel deck must be configured as shown in Figure 2, have a minimum base-metal thickness of 0.035 inch, and have a minimum yield strength of 50 ksi and a minimum tensile strength of 65 ksi.

TABLE 5—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN ASTM A36 STEEL¹

| PART NUMBER SERIES | NOMINAL SHANK DIAMETER (inch) | TYPE OF SHANK | MINIMUM SPACING (inches) | MINIMUM EDGE DISTANCE (inches) | ALLOWABLE LOADS (lbf) | | | | | | | | | | | |
|-------------------------|-------------------------------|---------------|--------------------------|--------------------------------|-----------------------|-----|-------|-----|----------------------|-----|------------------|------------------|----------------------|------------------|-------|--|
| | | | | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | ≥3/4 | | | |
| Steel Thickness (inch): | | | | | Tension ⁴ | | Shear | | Tension ⁴ | | Shear | | Tension ⁴ | | Shear | |
| Load Direction: | | | | | Tension ⁴ | | Shear | | Tension ⁴ | | Shear | | Tension ⁴ | | Shear | |
| 1500 (excluding 1506B) | 0.145 | Smooth | 1 | 1/2 | 81 | 373 | 181 | 273 | 397 | 489 | 243 ² | 277 ² | — | — | | |
| 1500K | 0.145 | Knurled | 1 | 1/2 | 296 | 636 | 584 | 659 | 680 | 730 | 253 ² | 293 ² | — | — | | |
| SP | 0.150 | Smooth | 1 | 1/2 | 385 | 662 | 445 | 477 | 393 | 574 | 948 ⁴ | 597 | 234 ² | 356 ² | | |
| TE | 0.157 | Knurled | 1 | 1/2 | 323 | 606 | 562 | 673 | 934 | 820 | 603 ⁴ | 766 | 343 ³ | 496 ³ | | |

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

¹Except where noted otherwise in this table, the allowable load values shown are for fastenings that have the entire pointed end of the fastener driven through the steel plate.

²Fastener penetration into steel must be a minimum of 7/16 inch.

³Fastener penetration into steel must be a minimum of 3/8 inch.

⁴For steel-to-steel connections designed in accordance with Section 4.1.4, the tabulated allowable load may be increased by a factor of 1.25, and the design strength may be taken as the tabulated allowable load multiplied by a factor of 2.0.

TABLE 6—ALLOWABLE LOADS FOR FASTENERS INSTALLED IN ASTM A572 GRADE 50 OR ASTM A992 STEEL¹ (lbf)

| PART NUMBER SERIES | NOMINAL SHANK DIAMETER (inch) | TYPE OF SHANK | MINIMUM SPACING (inch) | MINIMUM EDGE DISTANCE (inch) | ALLOWABLE LOADS (lbf) | | | | | | | | | |
|-------------------------|-------------------------------|---------------|------------------------|------------------------------|-------------------------|-------|----------------------|-------|------------------|------------------------------|------------------|-----------------------------|------------------|-----------------------------|
| | | | | | Steel Thickness (inch): | | | | | ³ / ₁₆ | | ¹ / ₄ | | ³ / ₈ |
| Load Direction: | | | | | Tension ⁴ | Shear | Tension ⁴ | Shear | Tension | Shear | Tension | Shear | Tension | Shear |
| 1500K (excluding 1506B) | 0.145 | Knurled | 1 | ¹ / ₂ | 260 | 499 | 579 | 725 | 383 ² | 595 ² | — | — | — | — |
| SP | 0.150 | Smooth | 1 | ¹ / ₂ | 356 | 569 | 554 | 637 | 604 ⁴ | 602 | 814 ³ | 820 ³ | 243 ⁴ | 381 ⁴ |
| TE | 0.157 | Knurled | 1 | ¹ / ₂ | 442 | 676 | 630 | 662 | 760 ⁴ | 725 | 582 ⁴ | 532 | 311 ² | 467 ² |

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

¹Except where noted otherwise in this table, the allowable load values shown are for fastenings that have the entire pointed end of the fasteners driven through the steel plate.

²Fastener penetration into the steel must be a minimum of ³/₈ inch.

³Fastener penetration into the steel must be a minimum of ¹/₂ inch.

⁴Fastener penetration into the steel must be a minimum of ⁷/₁₆ inch.

⁵For steel-to-steel connections designed in accordance with Section 4.1.4, the tabulated allowable load may be increased by a factor of 1.25, and the design strength may be taken as the tabulated allowable load multiplied by a factor of 2.0.

TABLE 7—ALLOWABLE LOADS FOR FASTENERS DRIVEN INTO CONCRETE MASONRY UNITS^{1,2}

| PART NUMBER SERIES | SHANK DIAMETER (inch) | MINIMUM EMBEDMENT (inch) | ALLOWABLE LOADS (lbf) | | | | | | | | | |
|--------------------|-----------------------|--------------------------|-------------------------|--------------------|---------------------------|--------------------|-------------------------|--------------------|---------------------------|--------------------|------------------------------------|--------------------|
| | | | HOLLOW UNGROUTED CMU | | | | | GROUT-FILLED CMU | | | | |
| Masonry Type: | | | Face Shell ³ | | Mortar Joint ⁴ | | Face Shell ³ | | Mortar Joint ⁴ | | Top of Grouted Cell ^{3,6} | |
| Fastener Location: | | | Tension | Shear ⁷ | Tension | Shear ⁵ | Tension | Shear ⁷ | Tension | Shear ⁵ | Tension | Shear ⁷ |
| Load Direction: | | | Tension | Shear ⁷ | Tension | Shear ⁵ | Tension | Shear ⁷ | Tension | Shear ⁵ | Tension | Shear ⁷ |
| TE | 0.157 | 1 | 33 | 100 | 42 | 68 | 139 | 145 | 91 | 127 | 165 | 171 |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.4 N.

¹See Section 3.6.4 for CMU, mortar and grout requirements.

²Fasteners must be installed a minimum of 5.1 inches from the end of the wall.

³Fasteners must be installed at the center of the CMU cell. No more than one fastener may be installed in an individual CMU cell.

⁴Applicable to fasteners installed in the horizontal mortar joint (bed joint). Minimum fastener spacing must be 5.1 inches.

⁵Allowable shear load value applies to load applied perpendicular to the mortar joint.

⁶Fastener must be installed vertically at the top, center of grouted cell.

⁷Shear load can be in any direction perpendicular to the axis of the fastener.

TABLE 8—ALLOWABLE TENSION AND SHEAR VALUES FOR CEILING CLIP ASSEMBLIES INSTALLED IN NORMALWEIGHT CONCRETE¹

| PART NUMBER | NOMINAL SHANK DIAMETER (inch) | MINIMUM EMBEDMENT DEPTH (inches) | MINIMUM SPACING (inches) | MINIMUM EDGE DISTANCE (inches) | ALLOWABLE LOADS (lbf) | | | |
|--------------------------------|-------------------------------|----------------------------------|--------------------------|--------------------------------|-----------------------|-------|----------|-------|
| | | | | | 4000 psi | | 6000 psi | |
| Concrete Compressive Strength: | | | | | Tension | Shear | Tension | Shear |
| Load Direction: | | | | | Tension | Shear | Tension | Shear |
| SDC100 | 0.145 | ⁷ / ₈ | 4 | 3.2 | 115 | 120 | — | — |
| SDC125 | 0.145 | ¹ / ₈ | 4 | 3.2 | 130 | 167 | — | — |
| SPC78 | 0.150 | ³ / ₄ | 5.1 | 3.2 | 155 | 188 | 150 | 153 |
| SPC114 | 0.150/0.180 | ¹ / ₈ | 5 | 3.5 | 127 | 226 | 169 | 300 |
| TEC100 | 0.157 | ⁷ / ₈ | 5.1 | 3.5 | 207 | — | — | — |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness must be three times the fastener embedment into the concrete.

**TABLE 9—ALLOWABLE TENSION AND SHEAR VALUES FOR CEILING CLIP ASSEMBLIES
INSTALLED IN MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE FILLED STEEL DECK PANEL** ^{1,2,3}

| PART NUMBER | NOMINAL SHANK DIAMETER (inch) | MINIMUM EMBEDMENT DEPTH (inches) | MINIMUM SPACING (inches) | ALLOWABLE LOADS (lbf) | | | |
|--|-------------------------------|----------------------------------|--------------------------|-----------------------|-------------------|---------------------|-------------------|
| | | | | Lower Flute Tension | Lower Flute Shear | Upper Flute Tension | Upper Flute Shear |
| Fastener Installation Location and Loading Condition: | | | | | | | |
| SDC100 | 0.145 | 7/8 | 4 | 67 | 237 | 104 | 310 |
| SDC125 | 0.145 | 1 1/8 | 4 | 94 | 276 | 106 | 319 |
| SPC78 | 0.150 | 7/8 | 4 | 59 | 202 | 84 | 324 |
| SPC114 | 0.150/0.180 | 1 1/8 | 4 | 157 | 272 | 180 | 334 |
| TEC100 | 0.157 | 7/8 | 5.1 | 88 | — | — | — |

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

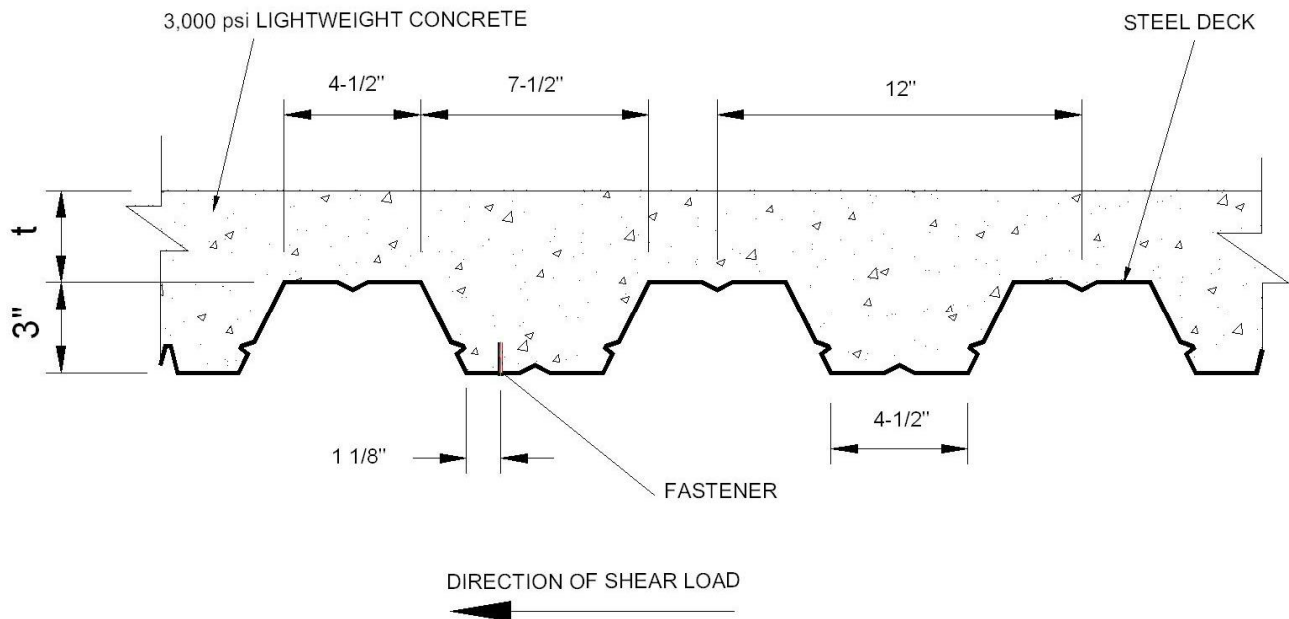
¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness above the deck must be a minimum of 3 1/2 inches (2 1/4 inches for TEC fasteners).

²For fasteners installed through steel deck, the fastener must be installed through and into the upper or lower flute of the deck with a minimum edge distance of 1 1/8 inches from the edge of the steel deck and 4 inches (5.1 inches for TE fasteners) from the end of the deck panel.

³The steel deck panel must be configured as shown in Figure 1 and have a minimum base-metal thickness of 0.035 inch and minimum yield strength of 50 ksi and a minimum tensile strength of 65 ksi.

TABLE 10—CORRELATION OF PRODUCTS

| ITW RAMSET | ITW BRANDS |
|--------------------------------|---|
| Ramset 1500 Series | Duo-Fast 1500 Series, Tapcon 1500 Series |
| Ramset SP Series | Duo-Fast SP Series, Tapcon SP Series |
| Ramset True Embedment Series | — |
| Ramset Ceiling Clip Assemblies | — |



For SI: 1 inch = 25.4 mm.

See Tables 4 and 9.

t = 3 1/2" for 1500 and SP Series Fasteners (See Table 4)

t = 3 1/2" for SDC100, SDC125, SPC78, and SPC114 (See Table 9)

t = 2 1/4" for TE Series Fasteners (See Tables 4 and 9)

FIGURE 1—FASTENER INSTALLATION LOCATION IN SAND-LIGHTWEIGHT CONCRETE FILLED 3-INCH DEEP STEEL DECK

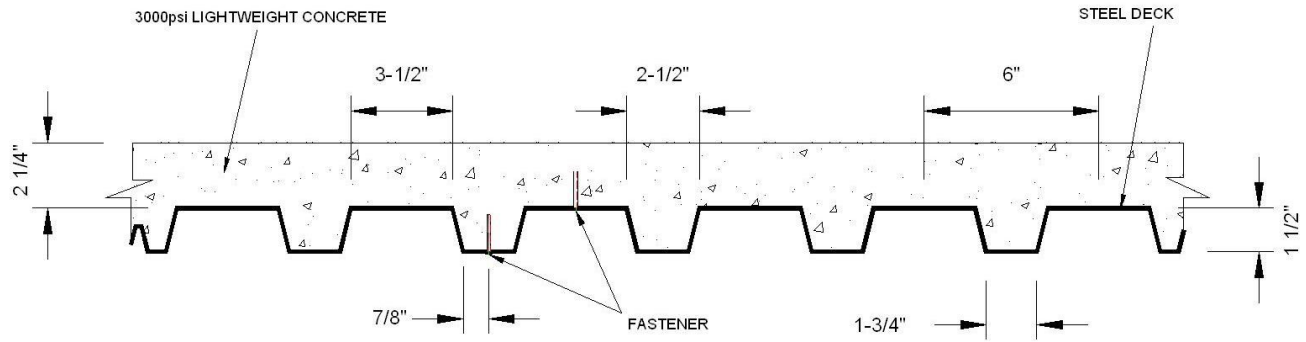
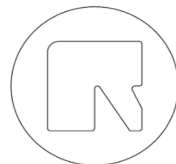


FIGURE 2—FASTENER INSTALLATION LOCATION IN SAND-LIGHTWEIGHT CONCRETE FILLED 1 1/2-INCH DEEP STEEL DECK



ITW RAMSET TE FASTENERS



ITW RAMSET



ITW BRANDS DUO-FAST and TAPCON

FIGURE 3—FASTENER MARKING



SDC



SPC

FIGURE 4—ITW RAMSET CEILING CLIP ASSEMBLIES

DIVISION: 03 00 00—CONCRETE

Section: 03 16 00—Concrete Anchors

DIVISION: 04 00 00—MASONRY

Section: 04 05 19.16—Masonry Anchors

DIVISION: 05 00 00—METALS

Section: 05 05 23—Metal Fastenings

DIVISION: 09 00 00—FINISHES

Section: 09 22 16.23—Fasteners

REPORT HOLDER:

ITW RAMSET

EVALUATION SUBJECT:**POWER-ACTUATED FASTENERS AND CEILING CLIP ASSEMBLIES****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Power-Actuated Fasteners and Ceiling Clip Assemblies, described in ICC-ES evaluation report [ESR-1799](#), 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 Power-Actuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the evaluation report [ESR-1799](#), comply with the LABC Chapters 19, 21, 22 and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Power-Actuated Fasteners and Ceiling Clip Assemblies described in this evaluation report must comply with all the following conditions:

- All applicable sections in the evaluation report [ESR-1799](#).
- The design, installation, conditions of use and identification of the Powder-Actuated Fasteners and Ceiling Clip Assemblies are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-1799](#).
- 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 strength values listed in the evaluation report are for the connection of the fasteners or ceiling clip assemblies to normalweight concrete, and sand-lightweight concrete over metal decks. The connection between the fasteners/ceiling clip assemblies and the connected members must be checked for capacity (which may govern).

This supplement expires concurrently with the evaluation report, reissued June 2023.

DIVISION: 03 00 00—CONCRETE

Section: 03 16 00—Concrete Anchors

DIVISION: 04 00 00—MASONRY

Section: 04 05 19.16—Masonry Anchors

DIVISION: 05 00 00—METALS

Section: 05 05 23—Metal Fastenings

DIVISION: 09 00 00—FINISHES

Section: 09 22 16.23—Fasteners

REPORT HOLDER:

ITW RAMSET

EVALUATION SUBJECT:**POWER-ACTUATED FASTENERS AND CEILING CLIP ASSEMBLIES****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Power-Actuated Fasteners and Ceiling Clip Assemblies, described in ICC-ES evaluation report ESR-1799, have also been evaluated for compliance with the codes noted below.

Applicable code editions:■ 2019 *California Building Code* (CBC)

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

■ 2019 *California Residential Code* (CRC)**2.0 CONCLUSIONS****2.1 CBC:**

The Power-Actuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the evaluation report ESR-1799, comply with CBC Chapters 19, 21 and 22, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17, 19, 21 and 22, as applicable.

2.1.1 OSHPD:

The Power-Actuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the evaluation report ESR-1799, comply with CBC amended Chapters 19, 21 and 22 [OSHPD 1R, 2 & 5], and Chapters 19A, 21A and 22A [OSHPD 1 & 4], provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements in Sections 2.1.1.1 and 2.1.1.2 of this supplement:

2.1.1.1 Verification Test Requirements: The installation verification test loads, frequency, and acceptance criteria shall be in accordance with Section 1901.3.4 [OSHPD 1R, 2 & 5] or 1910A.5 [OSHPD 1 & 4] of the CBC, as applicable.

2.1.1.2 Conditions of Use: Power actuated fastener in seismic shear application shall be in accordance with Section 1901.3.1 [OSHPD 1R, 2 & 5] or Section 1617A.1.20 [OSHPD 1 & 4].

2.1.2 DSA:

The Power-Actuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the evaluation report ESR-1799, comply with CBC amended Chapters 19, 21 and 22 [DSA-SS/CC] and Chapters 19A, 21A and 22A [DSA-SS], provided the design and installation are in accordance with the 2018 *International Building Code*[®] (IBC) provisions noted in the evaluation report and the additional requirements in Sections 2.1.2.1 and 2.1.2.2 of this supplement:

2.1.2.1 Verification Test Requirements: The installation verification test loads, frequency, and acceptance criteria shall be in accordance with Section 1909.2.7 [DSA-SS/CC] or 1910A.5 [DSA-SS] of the CBC, as applicable.

2.1.2.2 Conditions of Use: Power actuated fastener in seismic shear application shall be in accordance with Section 1617A.1.20 [DSA-SS].

2.2 CRC:

The Power-Actuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the evaluation report ESR-1799, comply with the CRC, provided the design and installation are in accordance with the 2018 *International Residential Code*[®] provisions noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued June 2023.