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RESEARCH REPORT: RR 22668  
(CSI # 03 16 00; 05 05 23)

BASED UPON ICC ES EVALUATION  
REPORT NO. ESR-1799

REEVALUATION DUE  
DATE: September 1, 2018  
Issued Date: May 1, 2017  
Code: 2014 LABC

## **GENERAL APPROVAL – Reevaluation - Ramset Power-Driven Fasteners**

### **DETAILS**

When in compliance with the use, description, design, installation, conditions of use, and identification of Evaluation Report No.1799, reissued June 2016, by the ICC-ES Evaluation Services, Incorporated, the report, in its entirety, is attached and made part of this general approval.

The parts of Report No.ESR-1799 which are excluded on the attached copy have been removed by the Los Angeles City Building Department as not being included in this approval.

### **The approval is subject to the following conditions:**

1. The fasteners shall not be used to resist seismic loads, except when used with architectural, electrical and mechanical components as described in Section 13.1.4 of ASCE 7-10, and as follows:
  - a) Concrete base materials: The ITW Ramset 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 or the published allowable load shown in Tables 1, 2, 5, and 6 of the attached ICC-ES ESR-1799 evaluation report, as applicable.

RR 22668  
Page 1 of 3

- b) Steel base materials: The ITW Ramset fasteners installed in steel may be used where the service load on any individual fastener does not exceed the lesser of 250 lbf or the published allowable load shown in Table 3 and 4 of the attached ICC-ES ESR-1799 evaluation report, as applicable..
- c) For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the ITW Ramset power-driven fasteners 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 shall be no more than 90 pounds when attaching to concrete; or 250 pounds when attaching to steel. Substantiating calculations shall 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 1 through 4 of the attached ICC-ES evaluation report, as applicable. The design load on the fastener must not exceed the allowable load shown in Tables 1 through 4 of the attached ICC-ES ESR-1799 evaluation report, as applicable.
2. Shear values for fasteners in concrete are for connections of steel to concrete. Allowable bearing stresses for the steel material being connected shall not be exceeded.
  3. The minimum concrete thickness shall be three times the fasteners embedment in concrete, except where noted otherwise in this report.
  4. For working values in steel, the fasteners shall have sufficient length so that the entire pointed portion of the shank pierces the steel plate, except where noted otherwise in the tables of the attached evaluation report.
  5. The allowable values listed in the attached report and tables are for the fasteners only. Connected members shall be checked for their capacity (which may govern).
  6. Use of the low velocity fasteners to the metal deck, the fasteners shall be installed through the metal deck and into the concrete at the upper or lower flute as designated in the table. The fastener must be a minimum of 1 1/8 inches from the edge of the deck web and 4 inches from the end of the deck. The minimum fastener spacing is 4 inches.
  7. No increase is permitted in the tabulated allowable load values for short duration loading.
  8. The fasteners shall be installed per the manufacturer's instructions, a copy of which shall be available at each job site.

ITW Ramset

RE: Ramset Power-Driven Fasteners, Power Point Fasteners and Angle Clip

9. The containers of the fasteners shall be labeled with the ITW Ramset company name, the fastener product name, length, catalog number, and quantity, the evaluation report number (ESR-1799); and the manufacturing date and lot number. In addition, all of the fasteners, except the 1600 W series fasteners, shall be identified by the letter "R" stamped into the fastener head.

## DISCUSSION

The report is in compliance with the 2014 Los Angeles City Building Code.

The approval is based on tests in accordance with ICC-ES Acceptance Criteria for Fasteners Power-driven in to Concrete, Steel and Masonry Elements (AC70), dated October 2006.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revisions to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

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Attachment: ICC ES Report No. ESR-1799 (9 Pages)

**ICC-ES Evaluation Report****ESR-1799**

Reissued June 2016

*This report is subject to renewal June 2017.*[www.icc-es.org](http://www.icc-es.org) | (800) 423-6587 | (562) 699-0543

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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**  
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[brandscs@itwbrands.com](mailto:brandscs@itwbrands.com)**EVALUATION SUBJECT:****RAMSET AND DUO-FAST POWER-ACTUATED  
FASTENERS AND CEILING CLIP ASSEMBLIES****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2012, 2009 and 2006 *International Building Code*® (IBC)
- \* ■ 2012, 2009 and ~~2006~~ *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

**Property evaluated:**

Structural

**2.0 USES**

Ramset and Duo-Fast 1500, 1600 W, TE Series fasteners and SP Series Power Point fasteners are used for general fastening of building components to normal-weight

concrete, sand-lightweight concrete, sand-lightweight concrete filled steel deck panels, concrete masonry and structural steel substrates. The fasteners are used as alternatives to cast-in-place concrete anchors described in 2012 IBC Section 1908 (2009 and 2006 IBC Section 1911) for placement in concrete; to the embedded anchors described in Section 2.1.4 of TMS 402/ACI 530/ASCE 5 (which is referenced in IBC Section 2107); and to the welds and bolts used to attach to steel, described in IBC Sections 2204.1 and 2204.2. The fasteners may also be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

Ramset 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 2012 IBC Section 1908 (2009 and 2006 IBC Section 1911); and may also be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

**3.0 DESCRIPTION****3.1 General:**

See the tables in this report for shank descriptions and nominal shank diameters. The fasteners are available in various lengths to achieve embedment depths as noted in Tables 1 through 8.

**3.2 Ramset and Duo-Fast 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 and 1508B fasteners, which have a black oxide finish. The 1506B and 1508B fasteners are limited to installation in normal-weight concrete.

**3.3 Ramset 1600 W Series Fasteners:**

The 1600 W series fasteners are manufactured from steel wire complying with ASTM A510, Grades 1060 or 1062, and austempered to Rockwell "C" core hardness of 52 to 56 for smooth-shank fasteners and 54 to 56 for knurled-shank fasteners.

The 1600 series fasteners have a nominal shank diameter of 0.145 inch and <sup>1</sup>/<sub>4</sub>-20 threads on the end of the

fasteners to be used with a nut and washer. The 1600 W series fasteners have a zinc-plated finish.

#### 3.4 Ramset and Duo-Fast 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.

#### 3.5 Ramset and Duo-Fast 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.

#### 3.6 Ramset Ceiling Clip Assemblies:

Ramset ceiling clip assemblies are comprised of a power-actuated fastener with a premounted steel clip. See Figure 4.

##### 3.6.1 SDC 100 and SDC 125 Ceiling Clip Assemblies:

The fasteners used in the SDC 100 and SDC 125 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.

##### 3.6.2 SPC 78 and SPC 114 Ceiling Clip Assemblies:

The fasteners used in the SPC 78 and SPC 114 ceiling clip assemblies are SP series Power Point smooth, straight shank fasteners, described in Section 3.4, 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.

**3.6.3 TEC100 Ceiling Clip Assemblies:** The fastener used in the TEC100 ceiling clip assemblies is the TE series

smooth shank fastener, described in Section 3.5, with a shank length of 1 inch (25.4 mm). The clip angle and eyelet are the same as for the SPC 78 and SPC 114 ceiling clip assemblies described in Section 3.6.2.

#### 3.7 Substrate Materials:

**3.7.1 Structural Steel:** Structural steel used in supports must comply with the minimum requirements of ASTM A36 (see Table 4), ASTM A572 Grade 50 or ASTM A992 (see Table 5), and must have thicknesses as noted in Table 4 or 5.

**3.7.2 Normal-weight Concrete:** Normal-weight concrete must be stone-aggregate and comply with IBC Chapter 19 or IRC Section R402.2, as applicable. The minimum concrete compressive strength at the time of fastener installation is noted in Tables 1 and 7.

**3.7.3 Sand-lightweight Concrete:** Sand-lightweight concrete must comply with IBC Chapter 19. The minimum concrete compressive strength at the time of fastener installation is noted in Tables 2, 3 and 8.

**3.7.4 Steel Deck Panels:** Steel deck panels must conform to a code-referenced material standard, with the minimum thickness and minimum yield strength noted in Tables 3 and 8. See Figure 1 for panel configuration requirements.

**3.7.5 Concrete Masonry:** The CMUs must be 8-inch-thick, normal weight blocks conforming to ASTM C90. Mortar must be Type S mortar complying with IBC Section 2103. Grout must be coarse grout complying with IBC Section 2103.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 Allowable Loads:** The most critical applied loads, excluding seismic load effects, resulting from the load combinations in IBC Section 1605.3.1 or 1605.3.2 must not exceed the allowable loads described in this section. For fasteners which are subjected to seismic loads, see Section 4.1.3 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 connection of the fasteners to 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. The stress increases and load reductions described in IBC Section 1605.3, must not be allowed for wind loads acting alone or combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

The allowable shear and tension values for the Ramset and Duo-Fast fasteners driven into normal-weight concrete are shown in Table 1. Allowable shear and tension values for these fasteners driven into sand-lightweight concrete are shown in Table 2. Allowable shear and tension values for these fasteners driven into sand-lightweight concrete filled steel deck panels are shown in Table 3. Allowable shear and tension values for these fasteners driven into steel are shown in Tables 4 and 5. Allowable shear and tension values for these fasteners driven into concrete masonry are shown in Table 6.

The allowable shear and tension values for the ceiling clip assemblies installed in normal-weight concrete are shown in Table 7. Allowable shear and tension values for the ceiling clip assemblies installed through steel deck

panels and into the sand-lightweight concrete fill of the metal steel deck panel are shown in Table 8.

The allowable loads for fasteners subjected to combined shear and tension loads must be determined using the following equation:

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

where:

- $\rho$  = Actual tension load, lbf (N).
- $P_a$  = Allowable tension load, lbf (N).
- $v$  = Actual shear load, lbf (N).
- $V_a$  = Allowable shear load, lbf (N).

**4.1.2 Wood to Steel or Concrete:** Reference lateral design values for nails, determined in accordance with Part 11 and Table 11N of the ANSI/AWC NDS, are applicable to Ramset fasteners of equal or greater diameters. The wood element must be considered to be the side member. The fastener bending yield strength used in determination of the connection capacity is allowed to be taken as the value noted in the footnotes to Table 11N of the NDS, based on the shank diameter of the Ramset fastener.

Under the 2012 and 2009 IBC and IRC, the fasteners may be used in contact with fire-retardant-treated wood in dry, interior locations only, in accordance with IBC Section 2304.9.5.4, IRC Section R317.3.4 and ITW Ramset's recommendations. Use of fasteners in contact with preservative-treated wood or in contact with fire-retardant-treated wood in exterior applications is outside the scope of this report.

\* Under the 2006 IBC and IRC, use of fasteners in contact with preservative-treated wood or fire-retardant-treated wood is outside the scope of this report.

**4.1.3 Seismic Considerations:** The fasteners are recognized for use when subjected to seismic loads as follows:

1. The Ramset and Duo-Fast fasteners may be used with 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 1, 2, 3, 7, and 8, 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 4 and 5, 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 1 through 5, as applicable.

#### 4.2 Installation:

The fasteners must be installed in accordance with this report and the ITW Ramset 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 - Duo-Fast, must be used to install the fasteners. The fastener penetration, spacing and edge distances must be as noted in the tables of this report.

#### 5.0 CONDITIONS OF USE

The ITW Ramset and ITW Brands - Duo-Fast 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 - Duo-Fast published installation instructions. In the event of a conflict between this report and the published installation instructions, this report governs.
- 5.3 Calculations demonstrating that the applied loads are less than the maximum allowable loads described in Section 4.1.1 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 Refer to Section 4.1.3 for seismic considerations.
- 5.5 The minimum concrete thickness must be three times the fastener embedment in concrete, except where noted otherwise in this report.
- 5.6 The use of fasteners is limited to uncracked concrete. Cracking occurs when  $f_t > f_r$  due to service loads or deformations.
- 5.7 Installation must be limited to dry interior environments, which include exterior walls which are protected by an exterior wall envelope.
- 5.8 Refer to Section 4.1.2 regarding the use of fasteners in contact with preservative-treated or fire-retardant-treated.

#### 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 April 2015.

#### 7.0 IDENTIFICATION

The containers of the fasteners are labeled with the company name (ITW Ramset or ITW Brands - Duo-Fast); 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, the ITW Brands - DUO-FAST 1500 series and SP series fasteners have a semi-circle stamped on the fastener head and the TE Series fasteners have the nominal length marked on the fastener head. See Figure 3.

**TABLE 1—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS  
INSTALLED IN NORMAL-WEIGHT CONCRETE<sup>1</sup> (lbf)**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	SHANK DESCRIPTION	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH (psi)					
						2000 psi		4000 psi		6000 psi	
						Tension	Shear	Tension	Shear	Tension	Shear
1500 and 1600 W	0.145	Smooth-straight	<sup>3</sup> / <sub>4</sub>	5.1	3.2	50	66	100	104	—	—
			1			152	166	157	182	—	—
			<sup>1</sup> / <sub>4</sub>			159	265	179	267	—	—
			<sup>1</sup> / <sub>2</sub>			154	340	209	342	—	—
SP	0.150	Smooth-straight	<sup>3</sup> / <sub>4</sub>	5.1	3.2	—	—	150	105	81	82
SP	0.150/0.180	Smooth-stepped	1	5.1	3.5	154	200	243	175	189	210
			<sup>1</sup> / <sub>4</sub>			207	230	298	218	213	305
			<sup>1</sup> / <sub>2</sub>			—	—	384	391	239	594
TE	0.157	Smooth-tapered	<sup>3</sup> / <sub>4</sub>	5.1	2.75	71	116	71	116	109	117
			1			197	216	258	216	214	383
			<sup>1</sup> / <sub>4</sub>			264	283	377	317	415	349
			<sup>1</sup> / <sub>2</sub>			—	—	—	—	—	—

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

<sup>1</sup>The 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 2—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS  
INSTALLED IN MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE<sup>1</sup>**

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

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

<sup>1</sup>The 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 3—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED THROUGH METAL DECK INTO MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE<sup>1</sup>**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	SHANK DESCRIPTION	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	3-INCH DEEP W TYPE STEEL DECK <sup>2,3</sup>		1 1/2-INCH DEEP B TYPE STEEL DECK <sup>4,5</sup>			
							Upper Flute		Lower Flute	
					Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
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.

<sup>1</sup>The 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.

<sup>2</sup>The 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.

<sup>3</sup>The 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 49.5 ksi.

<sup>4</sup>The 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.

<sup>5</sup>The 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 53.5 ksi.

**TABLE 4—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN ASTM A36 STEEL<sup>1</sup> (lbf)**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	TYPE OF SHANK	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	STEEL THICKNESS (inch)									
					3/16		1/4		3/8		1/2		≥3/4	
					Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
1500 and 1600W	0.145	Smooth	1	1/2	81	373	181	273	397	489	243 <sup>2</sup>	277 <sup>2</sup>	—	—
1500K and 1600WK	0.145	Knurled	1	1/2	296	636	584	659	680	730	253 <sup>2</sup>	293 <sup>2</sup>	—	—
SP	0.150	Smooth	1	1/2	385	662	445	477	393	574	948	597	234 <sup>2</sup>	356 <sup>2</sup>
TE	0.157	Knurled	1	1/2	323	606	562	673	934	820	603	766	343 <sup>3</sup>	496 <sup>3</sup>

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

<sup>1</sup>Except 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.

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

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

**TABLE 5—ALLOWABLE LOADS FOR FASTENERS INSTALLED IN ASTM A572 GRADE 50 OR ASTM A992 STEEL<sup>1</sup> (lbf)**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	TYPE OF SHANK	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)									
					3/16		1/4		3/8		1/2		≥3/4	
					Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
1500K and 1600WK	0.145	Knurled	1	1/2	260	499	579	725	383 <sup>2</sup>	595 <sup>2</sup>	—	—	—	—
SP	0.150	Smooth	1	1/2	356	569	554	637	604	602	814 <sup>3</sup>	820 <sup>3</sup>	243 <sup>4</sup>	381 <sup>4</sup>
TE	0.157	Knurled	1	1/2	442	676	630	662	760	725	582	532	311 <sup>2</sup>	467 <sup>2</sup>

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

<sup>1</sup>Except 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.

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

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

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

**TABLE 6—ALLOWABLE LOADS FOR FASTENERS DRIVEN INTO CONCRETE MASONRY UNITS<sup>1,2</sup>**

PART NUMBER SERIES	SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	HOLLOW UNGROUTED CMU				GROUT-FILLED CMU					
			Face Shell <sup>3</sup>		Mortar Joint <sup>4</sup>		Face Shell <sup>3</sup>		Mortar Joint <sup>4</sup>		Top of Grouted Cell <sup>3,6</sup>	
			Tension (lbf)	Shear <sup>7</sup> (lbf)	Tension (lbf)	Shear <sup>5</sup> (lbf)	Tension (lbf)	Shear <sup>7</sup> (lbf)	Tension (lbf)	Shear <sup>5</sup> (lbf)	Tension (lbf)	Shear <sup>7</sup> (lbf)
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.

<sup>1</sup>See Section 3.7.5 for CMU, mortar and grout requirements.

<sup>2</sup>Fasteners must be installed a minimum of 5.1 inches from the end of the wall.

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

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

<sup>5</sup>Allowable shear load value applies to load applied perpendicular to the mortar joint.

<sup>6</sup>Fastener must be installed vertically at the top, center of grouted cell.

<sup>7</sup>Shear load can be in any direction perpendicular to the axis of the fastener.

**TABLE 7—ALLOWABLE TENSION AND SHEAR VALUES FOR CEILING CLIP ASSEMBLIES INSTALLED IN NORMAL-WEIGHT CONCRETE<sup>1</sup> (lbf)**

PART NUMBER	NOMINAL SHANK DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH			
					4000 psi		6000 psi	
					Tension	Shear	Tension	Shear
SDC100	0.145	<sup>7</sup> / <sub>8</sub>	4	3.2	115	120	—	—
SDC125	0.145	1 <sup>1</sup> / <sub>8</sub>	4	3.2	130	167	—	—
SPC78	0.150	<sup>3</sup> / <sub>4</sub>	5.1	3.2	155	188	150	153
SPC114	0.150/0.180	1 <sup>1</sup> / <sub>8</sub>	5	3.5	127	226	169	300
TEC100	0.157	<sup>7</sup> / <sub>8</sub>	5.1	3.5	207	—	—	—

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

<sup>1</sup>The 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 8—ALLOWABLE TENSION AND SHEAR VALUES FOR CEILING CLIP ASSEMBLIES INSTALLED IN MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE FILLED STEEL DECK PANEL<sup>1,2,3</sup> (lbf)**

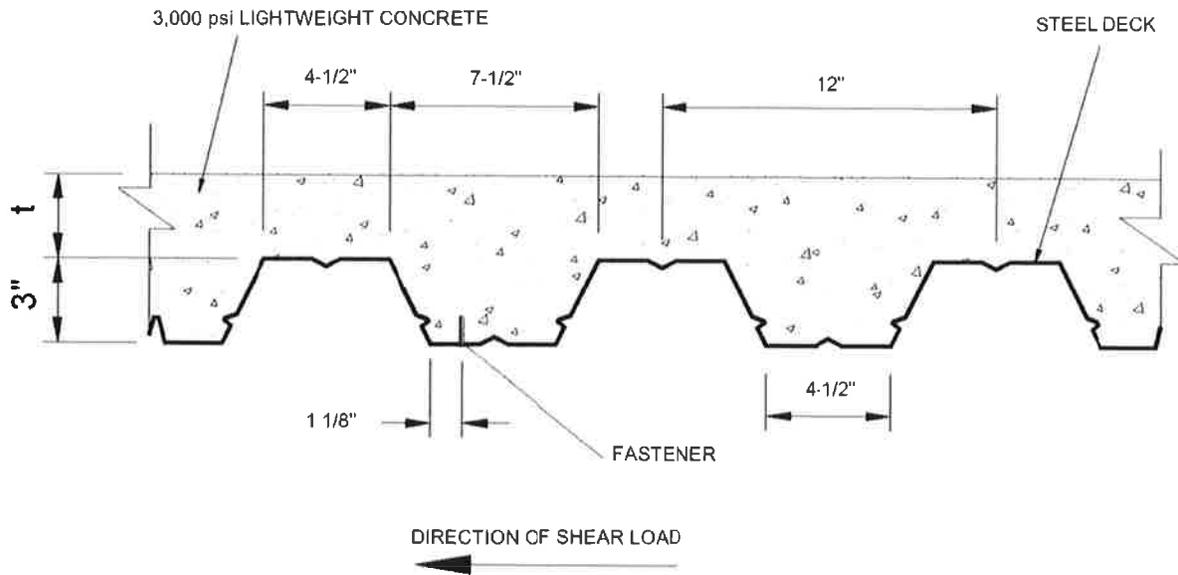
PART NUMBER	NOMINAL SHANK DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	FASTENER INSTALLATION LOCATION AND LOADING CONDITION			
				Lower Flute Tension	Lower Flute Shear	Upper Flute Tension	Upper Flute Shear
SDC100	0.145	<sup>7</sup> / <sub>8</sub>	4	67	237	104	310
SDC125	0.145	1 <sup>1</sup> / <sub>8</sub>	4	94	276	106	319
SPC78	0.150	<sup>7</sup> / <sub>8</sub>	4	59	202	84	324
SPC114	0.150/0.180	1 <sup>1</sup> / <sub>8</sub>	4	157	272	180	334
TEC100	0.157	<sup>7</sup> / <sub>8</sub>	5.1	88	—	—	—

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

<sup>1</sup>The 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<sup>1</sup>/<sub>2</sub> inches (2<sup>1</sup>/<sub>4</sub> inches for TEC fasteners).

<sup>2</sup>For 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<sup>1</sup>/<sub>8</sub> inches from the edge of the steel deck and 4 inches (5.1 inches for TE fasteners) from the end of the deck panel.

<sup>3</sup>The 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 49.5 ksi.



For SI: 1 inch = 25.4 mm.

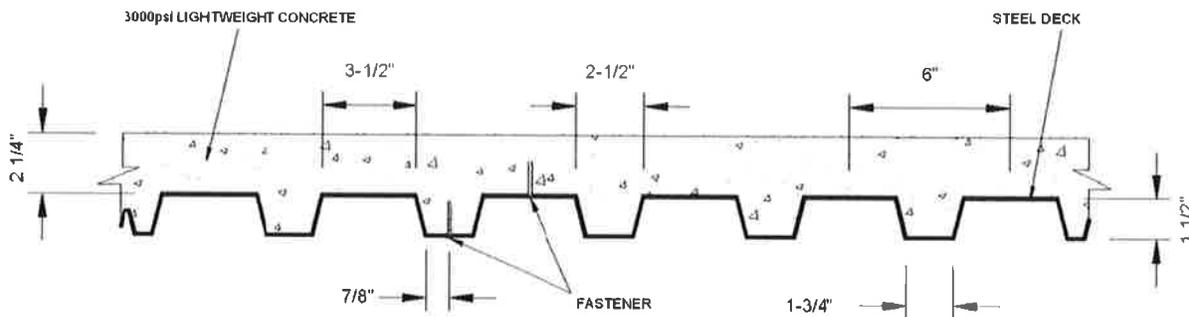
See Tables 2 and 6.

$t = 3\frac{1}{2}$ " for 1500 and SP Series Fasteners (See Table 3)

$t = 3\frac{1}{2}$ " for SDC100, SDC125, SPC78, and SPC114 (See Table 8)

$t = 2\frac{1}{4}$ " for TE Series Fasteners (See Tables 3 and 8)

**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**



TE FASTENERS



ITW RAMSET



ITW BRANDS - DUO-FAST

FIGURE 3—FASTENER MARKING



SDC



SPC

FIGURE 4—RAMSET CEILING CLIP ASSEMBLIES

**ICC-ES Evaluation Report****ESR-1799 CBC and CRC Supplement**

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[www.ramset.com](http://www.ramset.com)  
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The purpose of this evaluation report supplement is to indicate that Ramset and Duo-Fast PowerActuated Fasteners and Ceiling Clip Assemblies, recognized in ICC-ES master evaluation report ESR-1799, have also been evaluated for compliance with the codes noted below.

**Applicable code editions:**

- 2013 *California Building Code* (CBC)
- 2013 *California Residential Code* (CRC)

**2.0 CONCLUSIONS****2.1 CBC:**

The Ramset and Duo-Fast PowerActuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the master evaluation report ESR-1799, comply with CBC Chapters 19, 19A, 22, and 22A, provided the design and installation are in accordance with the 2012 *International Building Code*® provisions noted in the master report and the additional requirements of CBC Chapters 19, 19A, 22 and 22A, as applicable.

**2.2 CRC:**

The Ramset and Duo-Fast PowerActuated Fasteners and Ceiling Clip Assemblies, described in Sections 2.0 through 7.0 of the master evaluation report ESR-1799, comply with the CRC, provided the design and installation are in accordance with the 2012 *International Residential Code*® provisions noted in the master report.

This supplement expires concurrently with the master report, reissued June 2016.