

ICC-ES Evaluation Report

ESR-2579

Reissued April 2017

This report is subject to renewal April 2019.

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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

REPORT HOLDER:

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EVALUATION SUBJECT:

TRAKFAST FASTENERS

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)†~~

†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

TrakFast power-driven fasteners are used for general fastening of building components, such as cold-formed steel framing members, to uncracked normal-weight concrete, sand-lightweight concrete, steel decks filled with sand-lightweight concrete, concrete masonry units (CMUs) and steel base materials.

3.0 DESCRIPTION

3.1 TrakFast Fasteners:

The fasteners are manufactured from steel complying with ASTM A510, grades 1060 or 1062, and austempered to a Rockwell “C” core hardness of 52-56. All fasteners have a straight, smooth shank with a diameter of 0.109 inch (2.77 mm), and a head diameter of 0.25 inch (6.4 mm). Fasteners for installation into concrete have either a black

oxide or a zinc-plated finish. Fasteners for installation into steel and concrete masonry have a zinc-plated finish. The fasteners are supplied in collated strips.

3.2 Concrete Substrate Materials:

3.2.1 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 Table 1.

3.2.2 Lightweight Concrete: Lightweight concrete must be sand-lightweight complying with IBC Chapter 19. The minimum concrete compressive strength at the time of fastener installation is noted in Table 2.

3.2.3 Steel Deck Panels: Steel deck panels must conform to a code-referenced material standard, with the minimum thickness and minimum yield strength noted in Table 2. See Figure 1 for panel configuration requirements.

3.2.4 Concrete Masonry Units: CMUs must be minimum 8-inch-thick (203 mm), normal-weight blocks conforming to ASTM C90. Mortar must be minimum Type S mortar, complying with the applicable code.

3.2.5 Structural Steel: Structural steel used in supports must comply with the minimum strength requirements of ASTM A36, and must have a thickness as noted in Table 4.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Allowable Loads: The allowable shear and tension (pullout) values in Tables 1 through 4 are for use in allowable stress design, and are for fasteners driven into the materials specified in the tables. The stress increases and load reductions described in Section 1605.3.2 of the IBC are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.

Allowable shear and tension values for TrakFast fasteners driven into uncracked normal-weight concrete are shown in Table 1. Allowable shear and tension values for fasteners driven into sand-lightweight concrete, with or without metal deck, are shown in Table 2. Allowable shear and tension values for fasteners driven into CMUs are shown in Table 3. Allowable shear and tension values for fasteners driven into steel are shown in Table 4.

Allowable loads for fasteners subjected to combined shear and tension forces are determined by the following formula:

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

where:

- p = 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).

Unless otherwise noted, allowable loads apply to the connection of the fastener to the base material only. Design of the connection to the attached material must comply with the applicable requirements of the IBC.

4.1.2 Seismic Considerations:

4.1.2.1 Use with Structural Components: Resistance to seismic loads is outside the scope of this report. Therefore, the suitability of the TrakFast fasteners for use with structural components that are subjected to seismic loads is outside the scope of this report.

4.1.2.2 Use with Nonstructural Components: Seismic load resistance is outside the scope of this report, except when use is with architectural, mechanical and electrical components described in Section 13.1.4 of ASCE 7 and as follows:

- Concrete base materials: The fasteners installed in concrete 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 shown in Tables 1 and 2, as applicable.
- Steel base materials: The fasteners installed in steel may be used 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 Table 4.
- Interior, nonstructural walls: For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the power-driven fasteners described in Section 3.1 may be used to attach steel tracks 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 are 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, 2 and 4, as applicable.

4.2 Installation:

The fasteners must be installed with a power fastening tool in accordance with ITW Ramset recommendations. The fastening procedures must comply with ITW Ramset's published installation instructions. These instructions must be available on the jobsite at all times during installation.

The fasteners must be installed with the fastener penetration, spacing and edge distances specified in this report. Concrete thickness must be a minimum of three times the fastener penetration. Face shell thickness of CMUs must be a minimum of 1¹/₄ inches (32 mm). Fasteners must not be installed into concrete until the concrete has reached the specified compressive strength. Installation is limited to dry, interior environments.

Attachment of cold-formed steel tracks to the perimeter of concrete is allowed under the following conditions:

1. Cold joints must not exist between the slab and foundation below the track.
2. Cold-formed steel tracks must not be installed on slabs supported by concrete block foundation walls.

5.0 CONDITIONS OF USE

The TrakFast fasteners 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 are manufactured and identified in accordance with this report.
- 5.2 Fastener installation complies with this report and the ITW Ramset published installation instructions. In the event of conflict between this report and ITW Ramset published installation instructions, this report governs.
- 5.3 Calculations demonstrating that the applied loads are less than the allowable loads described in Section 4.1.1 must be submitted to the code official for approval. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is constructed.
- 5.4 The minimum concrete thickness must be three times the fastener embedment.
- 5.5 See Section 4.1.2 for seismic considerations.
- 5.6 The use of fasteners is limited to installation in uncracked concrete or masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.
- 5.7 Use of fasteners is limited to dry, interior locations.
- 5.8 Use of fasteners in contact with preservative-treated or fire-retardant-treated wood is outside the scope of this report.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements (AC70), dated February 2013.

7.0 IDENTIFICATION

Containers of fasteners are identified with the manufacturer's name (ITW Ramset), the product name (TrakFast), the fastener catalog number and length, quantity, the manufacturing date and the evaluation report number (ESR-2579). In addition, each fastener is identified by the letter "R" stamped into the fastener head.

TABLE 1—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN UNCRACKED NORMAL-WEIGHT CONCRETE¹

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH			
				2,000 psi ²		4,000 psi	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
0.109	5/8	4	3 ³ / ₁₆	60	55	55	95
0.109	3/4	4	3 ³ / ₁₆	60	80	55	115

For SI: 1 lbf = 4.448 N, 1 inch = 25.4 mm, 1 psi = 6.895 kPa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C33. Minimum concrete thickness is three times the fastener embedment into the concrete.

²For installations under the IBC and IRC, the concrete compressive strength, f'_c , at 28 days must be a minimum of 2,500 psi [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1].

TABLE 2—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN MINIMUM 3,000 psi SAND-LIGHTWEIGHT CONCRETE¹

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE ² (inches)	INSTALLED IN CONCRETE		INSTALLED THROUGH METAL DECK ³ (LOWER FLUTE)	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
0.109	5/8	6	6	35	55	30	205
0.109	3/4	6	6	80	100	40	235

For SI: 1 lbf = 4.448 N, 1 inch = 25.4 mm, 1 psi = 6.895 kPa, 1 ksi = 6.895 Mpa.

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C33. Minimum concrete thickness is three times the fastener embedment into the concrete.

²For fasteners installed through steel deck, the fastener must be installed through the lower flutes of the steel deck with minimum edge distances of 1¹/₈ inches from the edge of the steel deck and 4 inches from the end of the deck. See Figure 1.

³The allowable values are applicable to fasteners installed through the underside of a steel deck at the ribs and into minimum 3,000 psi sand-lightweight concrete [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1]. See Figure 1. The steel deck must have a minimum base-metal thickness of 0.034 inch and conform to ASTM A653 SS Grade 40. For ASTM A653 SS Grade 33 deck with a yield strength of 33 ksi, the tabulated shear values must be multiplied by 0.68. For steel decks having a yield strength of 38 ksi, tabulated shear values must be multiplied by 0.78.

TABLE 3—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN CONCRETE MASONRY UNITS (CMUs)^{1,2}

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	HOLLOW CMU (ANY LOCATION)	
				Tension (lbf)	Shear (lbf)
0.109	5/8	6	5	35	50

For SI: 1 lbf = 4.448 N, 1 inch = 25.4 mm.

¹CMUs must conform to ASTM C90, normal weight. Mortar must conform to the requirements of IBC Section 2103.8, or IRC Section R607.1, as Type S, cement-lime mortar.

²Face shell thickness of the CMUs must be a minimum of 1¹/₄ inches.

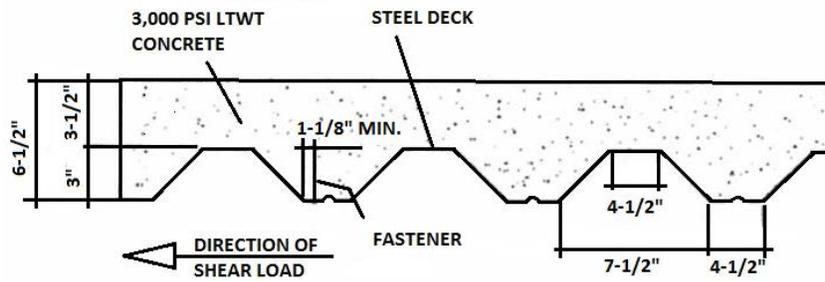
TABLE 4—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN ASTM A36 STEEL

FASTENER PART NUMBER	SHANK DIAMETER (inch)	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)					
				³ / ₁₆ ¹		¹ / ₄ ¹		³ / ₈ ²	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
FPP012	0.109	1	¹ / ₂	195	292	223	278	181	186

For SI: 1 lbf = 4.448 N, 1 inch = 25.4 mm.

¹Fasteners installed in ³/₁₆- and ¹/₄-inch-thick steel must penetrate the steel such that the shank pierces the steel and protrudes 0.16 and 0.10 inch, respectively.

²Fasteners must have 0.32-inch fastener penetration when installed into ³/₈-inch-thick steel.



SECTION – COMPOSITE DECK – NO SCALE

For SI: 1 inch = 25.4 mm.

FIGURE 1—TRAKFAST FASTENER INSTALLATION LOCATION IN COMPOSITE DECK