

# ICC-ES Evaluation Report

**ESR-2579**

Reissued April 1, 2010

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**DIVISION: 03—CONCRETE**  
**Section: 03151—Concrete Anchoring****DIVISION: 04—MASONRY**  
**Section: 04081—Masonry Anchorage****DIVISION: 05—METALS**  
**Section: 05090—Metal Fastening****REPORT HOLDER:****ITW RAMSET**  
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[techsupport@ramset.com](mailto:techsupport@ramset.com)**EVALUATION SUBJECT:****TRAKFAST FASTENERS****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2009 *International Building Code*® (2009 IBC)
- 2009 *International Residential Code*® (2009 IRC)
- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 1997 *Uniform Building Code*™ (UBC)

**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, structural sand-lightweight concrete, steel decks filled with structural 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 A 510, 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 and Concrete-filled Steel Deck:**

Normal-weight and structural sand-lightweight concrete must conform to the requirements of the applicable code. The minimum concrete compressive strength at the time of fastener installation is noted in Tables 1 and 2. Fasteners must be placed through the steel deck into the structural sand-lightweight concrete in accordance with Table 2. Steel deck properties and configurations must be as described in Table 2 and Figure 1.

**3.3 CMUs:**

CMUs must be minimum 8-inch-thick (203 mm), normal-weight blocks conforming to ASTM C 90 (IBC and IRC); or Grade N, Type 1, blocks conforming to UBC Standard 21-4. Mortar must be minimum Type S mortar, complying with the applicable code.

**3.4 Steel Substrates:**

The steel must be structural steel complying with ASTM A 36, with a minimum yield strength,  $F_y$ , of 36 ksi (248 MPa) and thickness as noted in Table 4.

**4.0 DESIGN AND INSTALLATION****4.1 Design:**

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 and the stress increases described in Section 1612.3.2 of the UBC are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone. Except for fasteners used with architectural, electrical and mechanical components described in Section 13.1.4 of ASCE/SEI 7 (IBC and IRC) as exempt from seismic design requirements, use of fasteners to resist earthquake loads is outside the scope of this report.

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 structural 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:

$$(P_s/P_t) + (V_s/V_t) \leq 1$$

where:

- $P_s$  = Applied tension load, pounds (N).
- $P_t$  = Allowable tension load, pounds (N).
- $V_s$  = Applied shear load, pounds (N).
- $V_t$  = Allowable shear load, pounds (N).

**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 1 1/4 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. No cold joint exists between the slab and foundation below the track.
2. Tracks are not 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 Allowable tension and shear values are as noted in Tables 1 through 4. The stress increases and load reductions described in Section 1605.3.2 of the IBC and the stress increases described in Section 1612.3.2 of the UBC are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.

5.4 Calculations demonstrating that the applied loads are less than the allowable loads described in this report must be submitted to the code official for approval. The calculations are to be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is constructed.

5.5 The minimum concrete thickness must be three times the fastener embedment.

5.6 Except for fasteners used with architectural, electrical and mechanical components described in Section 13.1.4 of ASCE/SEI 7 (IBC and IRC) as exempt from seismic design requirements, use of fasteners to resist earthquake loads is outside the scope of this report.

5.7 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.

5.8 Use of fasteners is limited to dry, interior locations.

5.9 Use of fasteners in contact with preservative-treated or fire-retardant-treated wood is not permitted.

**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 2010.

**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 CONCRETE<sup>1,2,3</sup>**

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH			
				2,000 psi <sup>4</sup>		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.

<sup>1</sup>The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 33. Minimum concrete thickness is three times the fastener embedment into the concrete.

<sup>2</sup>The allowable shear and tension values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with accepted design criteria.

<sup>3</sup>The stress increases and load reductions described in IBC Section 1605.3 and the stress increases described in UBC Section 1612.3 are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

<sup>4</sup>For installations under the IBC and IRC, the concrete compressive strength,  $f'_c$ , at 28 days must be a minimum of 2,500 psi.

**TABLE 2—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN MINIMUM 3,000 psi STRUCTURAL SAND-LIGHTWEIGHT CONCRETE<sup>1,2</sup>**

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE <sup>3</sup> (inches)	INSTALLED IN CONCRETE		INSTALLED THROUGH METAL DECK4 (LOWER FLUTE)	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
0.109	<sup>5</sup> / <sub>8</sub>	6	6	35	55	30	205
0.109	<sup>3</sup> / <sub>4</sub>	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.

<sup>1</sup>The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 33. Minimum concrete thickness is three times the fastener embedment into the concrete.

<sup>2</sup>The allowable shear and tension values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with accepted design criteria.

<sup>3</sup>For fasteners installed through metal deck, the fastener must be installed through the lower flutes of the deck with minimum edge distances of <sup>1</sup>/<sub>8</sub> inches from the edge of the metal deck and 4 inches from the end of the deck. See Figure 1.

<sup>4</sup>The allowable values are applicable to fasteners installed through the underside of a steel deck at the ribs and into minimum 3,000 psi structural sand-lightweight concrete. See Figure 1. The steel deck must have a minimum base-metal thickness of 0.034 inch and shall conform to ASTM A 653 SS Grade 40. For ASTM A 653 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)<sup>1,2,3</sup>**

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

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

<sup>1</sup>The allowable shear and tension values are only for the fasteners in the CMU. Members connected to the concrete masonry must be investigated in accordance with accepted design criteria.

<sup>2</sup>CMUs must conform to ASTM C 90, normal weight (IBC and IRC), or UBC Standard 21-4, Grade N, Type 1. Mortar must conform to the requirements of IBC Section 2103.8, IRC Section R607.1, or UBC Table 21-A, as Type S, cement-lime mortar.

<sup>3</sup>Face shell thickness of the CMUs must be a minimum of <sup>1</sup>/<sub>4</sub> inches.

**TABLE 4—ALLOWABLE TENSION AND SHEAR VALUES FOR TRAKFAST FASTENERS INSTALLED IN ASTM A 36 STEEL<sup>1</sup>**

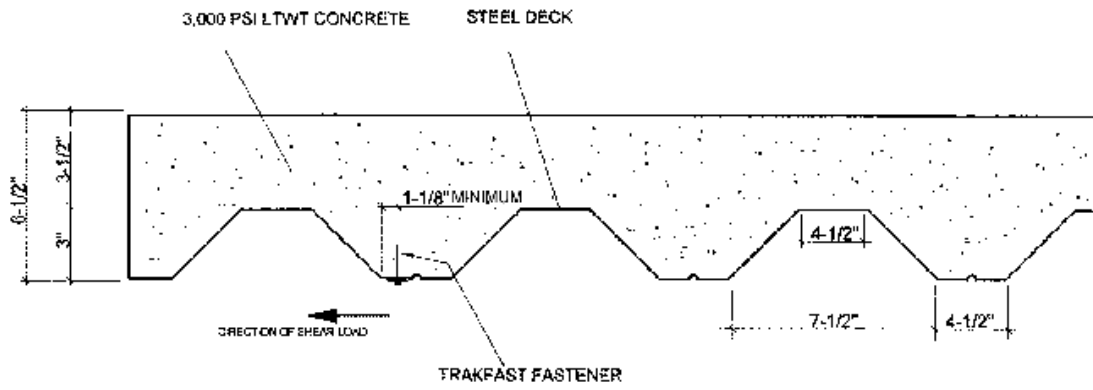
FASTENER PART NUMBER	SHANK DIAMETER (inch)	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)					
				<sup>3</sup> / <sub>16</sub> <sup>2</sup>		<sup>1</sup> / <sub>4</sub> <sup>2</sup>		<sup>3</sup> / <sub>8</sub> <sup>3</sup>	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear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

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

<sup>1</sup>The allowable shear and tension values are only for the fasteners in steel. Members connected to the steel must be investigated in accordance with accepted design criteria.

<sup>2</sup>Fasteners installed in <sup>3</sup>/<sub>16</sub>- and <sup>1</sup>/<sub>4</sub>-inch-thick steel must penetrate the steel such that the shank pierces the steel and protrudes 0.16 and 0.10 inch, respectively.

<sup>3</sup>Fasteners must have 0.32-inch fastener penetration when installed into <sup>3</sup>/<sub>8</sub>-inch-thick steel.



SECTION - COMPOSITE DECK - NO SCALE

For SI: 1 inch = 25.4 mm.

FIGURE 1—TRAKFAST FASTENER INSTALLATION LOCATION IN COMPOSITE DECK