ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

DIVISION: 05—METALS
Section: 05090—Metal Fastenings

REPORT HOLDER:

ITW RAMSET
700 HIGH GROVE BOULEVARD
GLENDALE HEIGHTS, ILLINOIS 60139
www.ramset.com

EVALUATION SUBJECT:

RAMSET T3 POWER DRIVEN FASTENERS

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

Property evaluated:

Structural

2.0 USES

Ramset T3 power-driven fasteners are used to fasten building components such as light-gage cold-formed steel framing to normal-weight concrete, structural sand-lightweight concrete, structural sand-lightweight concrete filled steel decks, concrete masonry units (CMUs) and steel base materials.

3.0 DESCRIPTION

3.1 General:

Ramset T3 power-driven fasteners are manufactured from steel complying with ASTM A 510, grade 1060, and austempered to a Rockwell C52-56 core hardness. All fasteners have a straight smooth shank with a 0.125-inch (3.2 mm) nominal diameter. Fasteners for installation into concrete have either a black oxide or a zinc-plated finish. Fasteners for installation into steel and CMUs must have a zinc-plated finish. The T3 series fasteners are available in lengths to achieve embedment depths as noted in the tables of this report.

3.2 Concrete:

Normal-weight and structural sand-light-weight concrete shall conform to IBC Section 1905, IRC Section R402.2 or UBC Section 1903, as applicable. The minimum concrete compressive strength at the time of fastener installation is noted in the tables of this report. Fasteners must be placed through the steel deck into 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 Concrete Masonry Units (CMUs):

CMUs must be minimum 8-inch blocks conforming to ASTM C 90, Grade N and Type 1 (IBC or IRC), or to UBC Standard 21-4 (UBC). Mortar must be minimum Type N in accordance with Section 2103.8 of the IBC, Section R607 of the IRC or Section 2103.3 of the UBC. Concrete-masonry construction must have a minimum prism compressive strength f'_m of 1,500 psi (10.3 MPa) at the time of fastener installation. Grout must comply with Section 2103.12 of the IBC, Section R609.1.1 of the IRC or Section 2103.4 of the UBC.

3.4 Steel Substrates:

The steel must be structural steel with a minimum yield strength (F'_y) of 36 ksi (248 MPa) or 50 ksi (345 MPa) as noted in Tables 4 and 5 of this report, and a minimum thickness of $^3/_{16}$ inch (4.8 mm).

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The allowable shear and tension (pullout) values in the tables of this report 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 IBC Section 1605.3 and the stress increases described in UBC Section 1612.3 shall not be allowed for wind loads acting alone or combined with vertical loads. No adjustments are allowed for vertical loads acting alone. Seismic load resistance is outside the scope of this report, except for fasteners used under the IBC and IRC for attachment of architectural, electrical and mechanical components as described in the exceptions to Section 9.6.1 of ASCE/SEI 7-05, Minimum Design Loads for Buildings and Other Structures (American Society of Civil Engineers/Structural Engineering Institute).

Allowable shear and tension values for Ramset T3 fasteners driven into normal-weight concrete are shown in Table 1 of this report. Allowable shear and tension values for T3 fasteners driven into structural sand-lightweight concrete with or without metal deck are shown in Table 2. Allowable tension and shear values for T3 fasteners driven into CMUs are shown in Table 3. Allowable shear and tension values for T3 fasteners driven into steel are shown in Tables 4 and 5.

Allowable loads for T3 fasteners installed into concrete and subjected to combined shear and tension loads are permitted to be calculated by the following equation:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1$$

where:

P_s = Applied service tension load, pounds.

P_t = Allowable service tension load, pounds.

V_s = Applied service shear load, pounds.

V_t = Allowable service shear load, pounds.

4.1.2 Connection of Steel Stud Tracks to Foundation:

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

a. No cold joint exists between the slab and foundation below the track.

b. No track is installed on slabs supported by concrete block foundation walls.

4.2 Installation:

The fasteners are installed with a power fastening tool in accordance with ITW Ramset recommendations. The fastening procedures must comply with the fastener manufacturer's published installation instructions. The fasteners must be installed with the fastener penetration, spacing and edge distances specified in this report. Except as noted in Figure 1, concrete must have a thickness of at least three times the fastener penetration. Installation is limited to interior dry environments.

The fasteners must not be driven until the concrete has reached the designated strength.

5.0 CONDITIONS OF USE

The ITW Ramset T3 power driven 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 must be manufactured, identified and installed in accordance with this report and ITW Ramset instructions. In the event of a conflict between this report and the ITW Ramset instructions, this report shall govern.

5.2 Allowable loads shall be in accordance with Section 4.1 of this report. Calculations demonstrating that the applied loads are less than the maximum allowable loads described in this report shall be submitted to the code official. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 The minimum concrete thickness shall be three times the fastener embedment, except where noted otherwise in this report

5.4 Seismic load resistance is outside the scope of this report, except as noted in Section 4.1.1.

5.5 Use shall be limited to uncracked concrete or masonry. Cracking occurs when $F_t > F_r$ due to service loads or deformations.

5.6 Use of fasteners in contact with preservative-treated or fire-retardant-treated wood is outside the scope of this report.

5.7 Installation must be limited to dry interior environments.

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 October 2006.

7.0 IDENTIFICATION

The containers of the fasteners shall be labeled with the Ramset name; length of the fastener, catalog number and quantity; the evaluation report number (ESR-1955); and the manufacturing date. In addition, all the fasteners shall be identified by the letter "R" stamped into the fastener head.

TABLE 1—ALLOWABLE TENSION AND SHEAR VALUES FOR T3 FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE[1,2,3,4] (pounds)

SHANK DIAMETER (inch)	MINIMUM EDGE DISTANCE (inches)	MINIMUM SPACING (inches)	MINIMUM EMBEDMENT DEPTH (inch)	MINIMUM CONCRETE COMPRESSIVE STRENGTH			
				2,000 psi		4,000 psi	
				Tension	Shear	Tension	Shear
0.125	3.2	4.0	$^5/_8$ $^3/_4$	83 107	109 156	78 104	80 195

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

[1]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.
[2]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.
[3]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.
[4]Earthquake load resistance is outside the scope of this report, except as noted in Section 4.1.1.

TABLE 2—ALLOWABLE TENSION AND SHEAR VALUES FOR T3 FASTENERS INSTALLED IN MINIMUM 3,000 psi STRUCTURAL SAND-LIGHTWEIGHT CONCRETE[1,2,3,4,5]

SHANK DIAMETER (inch)	MINIMUM EDGE DISTANCE (inches)	MINIMUM SPACING (inches)	MINIMUM EMBEDMENT DEPTH (inch)	INSTALLED INTO CONCRETE		INSTALLED INTO CONCRETE WITH STEEL DECK	
				Tension	Shear	Lower Flute Tension	Lower Flute Shear
0.125	3.2	4.0	$^5/_8$ $^3/_4$	84 108	108 173	72 93	242 288

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

[1]The fasteners mustl not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 330. Minimum concrete thickness is three times the fastener embedment into the concrete.
[2]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.
[3]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.
[4]For fasteners installed through steel deck, the fastener shall be installed though the lower flutes of the deck with a minimum edge distance of 2 inches from the edge of the steel deck and 4 inches from the end of the deck. See Figure 1 of this report.
[5]The steel deck must have a minimum base-metal thickness of 0.035 inch, a minimum yield strength of 38 ksi and a profile as noted in Figure 1.
[6]Earthquake load resistance is outside the scope of this report, except as noted in Section 4.1.1.

TABLE 3—ALLOWABLE TENSION AND SHEAR VALUES FOR T3 FASTENERS INSTALLED IN CONCRETE MASONRY UNITS (CMUs)[1,2,3]

SHANK DIAMETER (inch)	MINIMUM EDGE DISTANCE (inches)	MINIMUM SPACING (inches)	MINIMUM EMBEDMENT DEPTH (inch)	HOLLOW CONCRETE MASONRY UNITS (CMUs)			
				Face Shell[4]		Horizontal Mortar Joint[4]	
				Tension	Shear	Tension	Shear[5]
0.125	2	4	$^5/_8$	133	—	20	34

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

[1]The allowable shear and tension values are only for the fasteners in the concrete masonry units. Members connected to the concrete masonry unit must be investigated in accordance with accepted design criteria.
[2]Concrete masonry units conform to ASTM C 90, Grade N, Type 1.
[3]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.
[4]Fasteners are limited to the horizontal mortar joint or bed joint and cannot be installed in the head joint of the CMU wall construction.
[5]Value applies to loads applied both parallel to or perpendicular to the bed joint.
[6]Seismic load resistance is outside the scope of this report except as noted in Section 4.1.1.

TABLE 4—ALLOWABLE TENSION AND SHEAR VALUES FOR T3 FASTENERS INSTALLED IN ASTM A 36 STEEL[1,2,4]

SHANK DIAMETER (inch)	MINIMUM EDGE DISTANCE (inch)	MINIMUM SPACING (inch)	INSTALLED IN ASTM A 36 STEEL—STEEL THICKNESS					
			$^3/_{16}$ inch		$^1/_4$ inch		$^3/_8$ inch[3]	
			Tension	Shear	Tension	Shear	Tension	Shear
0.125	0.5	1.0	63	162	239	211	113	197

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

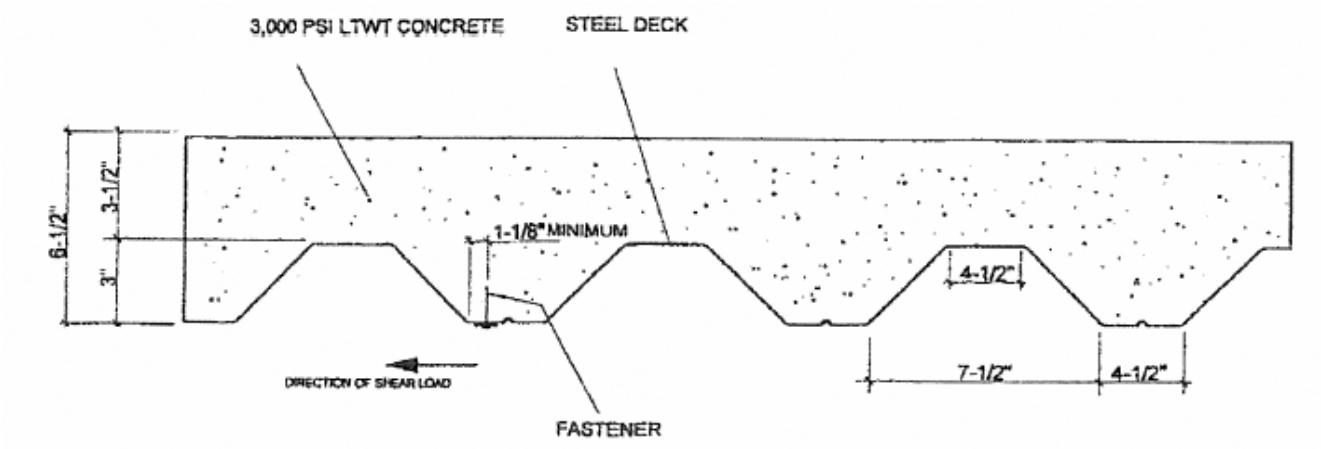
[1]Except where noted otherwise, the allowable load values shown are for fastenings that have the point end of the fastener driven through the steel base material.
[2]The allowable tension and shear values are only for fasteners in the steel. Members connected to the steel must be investigated in accordance with the accepted design criteria.
[3]Fastener penetration in $^3/_8$-inch steel is a minimum of 0.29 inch.
[4]Earthquake load resistance is outside the scope of this report, except as noted in Section 4.1.1.

TABLE 5—ALLOWABLE TENSION AND SHEAR VALUES FOR T3 FASTENERS INSTALLED IN ASTM A 572 GRADE 50 STEEL[1,2,4]

SHANK DIAMETER (inch)	MINIMUM EDGE DISTANCE (inch)	MINIMUM SPACING (inch)	INSTALLED IN ASTM A 572 GRADE 50 STEEL—STEEL THICKNESS					
			$^3/_{16}$ INCH		$^1/_4$ inch		$^3/_8$ inch[3]	
			Tension	Shear	Tension	Shear	Tension	Shear
0.125	0.5	1.0	103	222	147	119	147	112

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

[1]Except where noted otherwise, the allowable service load values shown are for fastenings that have the pointed end of the fastener driven through the steel base material.
[2]The allowable tension and shear values are only for fasteners in the steel. Members connected to the steel must be investigated in accordance with the accepted design criteria.
[3]Fastener penetration in $^3/_8$-inch steel is a minimum of 0.27 inch.
[4]Earthquake load resistance is outside the scope of this report, except as noted in Section 4.1.1.



SECTION—COMPOSITE DECK—NO SCALE

For **SI:** 1 inch = 25.4 mm.

FIGURE 1—FASTENER INSTALLATION LOCATION IN COMPOSITE DECK