ICC-ES Evaluation Report

ESR-2036*

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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: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

POWERS FASTENERS, INC.
2 POWERS LANE
BREWSTER, NEW YORK 10509
(800) 524-2344
www.powers.com
engineering@powers.com

EVALUATION SUBJECT:

POWERS TRAK-IT FASTENERS FOR CONCRETE, MASONRY AND STEEL

ADDITIONAL LISTEE:

MAX COMPANY, LTD.
6-6 NIHONBASHI-HAKAZAKI-CHO
CHOU-KU, TOKYO
JAPAN
+(03) 3669-8131

PRODUCT NAME: MAX CONCRETE PINS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 *International Building Code*® (IBC)
- 2009 *International Residential Code*® (IRC)
- 2006 *International Building Code*® (2006 IBC)*
- 2006 *International Residential Code*® (2006 IRC)*
- 2003 *International Building Code*® (2003 IBC)*
- 2003 *International Residential Code*® (2003 IRC)*
- 1997 *Uniform Building Code*™ (UBC)*

*Codes indicated with an asterisk are addressed in Section 8.0.

Property evaluated:

Structural

2.0 USES

Powers Trak-It fasteners and Max Concrete Pins are smooth-shank drive pins designed to attach cold-formed steel tracks to a variety of base materials, including normal-weight concrete, structural lightweight concrete, concrete masonry units, steel, and metal decking with structural lightweight concrete fill.

The fasteners are alternatives to cast-in-place anchors described in IBC Section 1911 and 1912 for placement in concrete; the embedded anchors described in Section 2.1.4 of TMS 402/ACI 530/ASCE 5 (which is referenced in IBC Section 2107); and the bolts used to attach materials to steel described in IBC Section 2204.2. The fasteners may also be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 Trak-It Fasteners:

The fasteners are manufactured from steel complying with ASTM A 510, Grade 1060 to 1065, austempered to a Rockwell C51-55.

The fasteners are collated into plastic strips of ten fasteners each, and are available in various lengths. Fasteners with a $^3/_4$-inch (19.1 mm) length have a 0.102-inch (2.6 mm) diameter and a black oxide finish. Fasteners with 1-, $1^1/_4$-, and $1^1/_2$-inch (25.4, 31.7 and 38 mm) lengths have a 0.102-inch (2.6 mm) diameter and are zinc-plated. Fasteners with a $^1/_2$-inch (12.7 mm) length are zinc-plated and have a stepped shank with diameters of 0.102 and 0.120 inch (2.6 and 3 mm). References in this report to Trak-It fasteners are also applicable to Max Concrete Pins.

3.2 Normal-weight Concrete:

Normal-weight concrete must be of stone-aggregate and comply with Section 1905 of the IBC or Section 402.2 of the IRC, as applicable. The minimum concrete compressive strength at the time of fastener installation is noted in Table 1.

3.3 Structural Lightweight Concrete:

Structural lightweight concrete must be sand-lightweight and must comply with Section 1905 of the IBC. The minimum concrete compressive strength at the time of fastener installation is noted in Table 2.

3.4 Concrete Masonry Units (CMUs):

CMUs must be minimum 8-inch-thick (203 mm), normal-weight blocks conforming to ASTM C 90. Mortar must comply with ASTM C 270 Type M or S mortar, in accordance with IBC Section 2103.8 and IRC Section R607, as applicable.

3.5 Steel Deck Panels:

Steel deck panel properties must be as described in the footnotes of Table 3 and Table 4 and Figure 1 of this report.

3.6 Steel Substrates:

Structural steel must comply with the minimum requirements of ASTM A 36 or A 572, Grade 50, as shown in Tables 4 and 5.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The allowable tension (pullout) and shear service loads for the fasteners installed in accordance with this report are listed in Tables 1 through 5. Earthquake load resistance is beyond the scope of this report. The stress increases and load reductions described in IBC Section 1605.3 are not allowed for wind loads acting alone or when combined with other loads. No stress increase or applied load reduction is allowed for vertical loads acting alone. Allowable loads for anchors subjected to combined tension and shear forces are determined by the following equation:

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

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).

4.2 Installation:

The fasteners are installed with a power-actuated fastening tool in accordance with Powers' recommendations. Fastener embedment, spacing, edge distance, and base-material requirements are shown in Tables 1 through 5. Installation is limited to dry, interior environments. For installation in concrete and CMUs, the fasteners must not be driven until the base materials have reached the tabulated compressive strength.

4.3 Connections of Drywall Tracks to Foundation:

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 the foundation below the track.
2. No track is installed on slabs supported by masonry foundation walls.

5.0 CONDITIONS OF USE

The Trak-It fasteners and the Max Concrete Pins 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 identified and installed in accordance with this report and the manufacturer's instructions. In the event of a conflict between the instructions in this report and the manufacturer's instructions, this report governs.

5.2 Allowable tension and shear values must comply with Section 4.1 of this report. 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 must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is constructed.

5.3 Fasteners must be installed in concrete with a minimum thickness of three times the fastener penetration.

5.4 Allowable tension and shear values are as noted in Section 4.1. The stress increases 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.

5.5 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.

5.6 The use of the fasteners in this report is limited to installation in dry, interior environments.

5.7 Use of the fasteners to resist earthquake loads is outside the scope of this report, except when use is with architectural, electrical and mechanical components as described in Section 13.1.4 of ASCE/SEI 7.

5.8 Fasteners are limited to nonfire-resistance-rated construction unless appropriate data is submitted to demonstrate that anchor performance is maintained in fire-resistance-rated situations.

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 2011.

7.0 IDENTIFICATION

The fasteners are identified by a "P" stamped onto the head of the drive pin. Packages bear the company name (Powers Fasteners, Inc., or Max Company, Ltd.) and information that includes the fastener shank type, length and diameter, and the evaluation report number (ESR-2036).

8.0 OTHER CODES

8.1 Evaluation Scope:

In addition to the 2009 *International Building Code*® and the 2009 *International Residential Code*®, referenced in Section 1.0, the products in this report were evaluated for compliance with the requirements of the following codes:

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 2003 *International Building Code*® (2003 IBC)
- 2003 *International Residential Code*® (2003 IRC)
- 1997 *Uniform Building Code*™ (UBC)

8.2 Uses:

The fasteners are used to connect materials as described in Section 2.0. The fasteners are alternatives to the cast-in-place anchors described in 2006 IBC Sections 1911 and 1912; 2003 IBC Sections 1912 and 1913 and UBC Section 1923.1, for placement in concrete; the embedded anchors described in Section 2.1 of ACI 530 (which is referenced in 2006 and 2003 IBC Section 2107) for placement in grouted

masonry; and the bolts used to attach materials to steel, described in 2006 and 2003 IBC Section 2204.2. The fasteners may be used where an engineered design is submitted in accordance with 2006 or 2003 IRC Section R301.1.3.

8.3 Description:

8.3.1 Fasteners: See Section 3.1.

8.3.2 Concrete: See Sections 3.2 and 3.3. Under the UBC, concrete must conform to Section 1903.

8.3.3 Concrete Masonry Units (CMUs): CMUs must be 8-inch-thick (203 mm), normal weight blocks conforming to ASTM C 90 (2006 and 2003 IBC) or Grade N, Type 1, blocks conforming to UBC Standard 21-4 (UBC). Mortar must comply with ASTM C 270 Type S or M in accordance with the applicable code.

8.3.4 Steel Deck Panels: See Section 3.5.

8.3.5 Steel Substrates: See Section 3.6.

8.4 Design and Installation:

8.4.1 Design:

8.4.1.1 General: See Section 4.1 and Conditions of Use 8.5.1 and 8.5.2.

8.4.2 Installation: See Section 4.2.

8.5 Conditions of Use:

See Section 5.0 and the following:

8.5.1 Allowable tension and shear values are as noted in Tables 1 through 5. The stress increases and load reductions described in Section 1605.3 of the 2006 and 2003 IBC and the stress increases described in UBC Section 1612.3.2 are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.

8.5.2 Except for fasteners used with architectural, electrical and mechanical components as described in Section 13.1.4 of ASCE 7-05 (2006 IBC and 2006 IRC) or Section 9.6.1 of ASCE/SEI 7-02 (2003 IBC and 2003 IRC), use of fasteners to resist earthquake loads is outside the scope of this report.

8.6 Evidence Submitted:

Data in accordance with AC70, dated October 2006.

8.7 Identification:

See Section 7.0.

TABLE 1—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE[1,2]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH							
				2,000 psi		3,000 psi		4,000 psi		5,000 psi	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
0.102	3/4	4	3	80	25	70	25	55	30	45	30
0.102	7/8	4	3	85	25	70	25	50	30	35	30

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

[1]Fasteners must not be driven until the concrete has reached the tabulated compressive strength.
[2]Concrete thickness must be a minimum of 3 times the embedment depth of the fastener.
[3]The tabulated allowable load values are for the fastener only. Wood or steel members connected to the steel substrate must be investigated in accordance with accepted design criteria.
[4]The stress increases and load reductions described in Section 1605.3 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 adjustment is allowed for vertical loads acting alone.

TABLE 2—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN STRUCTURAL LIGHTWEIGHT CONCRETE[1,2]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE[3] (inches)	INSTALLED IN CONCRETE				INSTALLED THROUGH METAL DECK (Lower Flute)[4]			
				Concrete Compressive Strength				Concrete Compressive Strength			
				3,000 psi minimum		3,500 psi minimum		3,000 psi minimum		3,500 psi minimum	
				Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
0.102	3/4	4	6	100	35	110	40	80	105	85	115
0.102	7/8	4	6	110	45	120	50	85	120	90	130

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

[1]The fasteners must not be driven until the concrete has reached its design compressive strength.
[2]The allowable tension and shear values are for the fasteners only. Members connected to the concrete must be investigated in accordance with accepted design criteria.
[3]For fasteners installed through metal deck, minimum edge distance is 1 inch from the edge of the deck rib and 6 inches from the end of the deck.
[4]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 lightweight concrete. The steel deck panel must have a minimum base-metal thickness of 0.034 inch, a minimum yield strength, F_y, of 33,000 psi, and conform to the profile shown in Figure 1. Concrete fill must be at least $3^1/_4$ inches above the top of the ribs.

TABLE 3—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN CONCRETE MASONRY UNITS[1,2,3]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	HOLLOW CMU	
				Tension (lbf)	Shear (lbf)
0.102	$^{7}/_{8}$	4	$3^{3}/_{4}$	65	80

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

[1]The allowable tension and shear values are for the fasteners only. Members connected to the concrete masonry must be investigated in accordance with accepted design criteria.

[2]Concrete masonry units must comply with ASTM C 90 or UBC Standard 21-4, as applicable, as noted in Sections 3.4 and 8.3.3.

[3]Fasteners must be placed into unit face only. Face shell thickness of the concrete masonry units shall be $1^{1}/_{4}$ inches, minimum.

TABLE 4—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN ASTM A 36 STEEL[1]

FASTENER TYPE	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)							
			$^{3}/_{16}$[2]		$^{1}/_{4}$[3]		$^{3}/_{8}$[3]		$^{1}/_{2}$[3]	
			Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
$^{1}/_{2}$-inch-long step shank	1	$^{1}/_{2}$	130	120	115	120	115	120	110	120

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

[1]The allowable tension and shear values are for the fasteners only. Steel members connected to the steel must be investigated in accordance with accepted design criteria.

[2]Fasteners installed in $^{3}/_{16}$-inch-thick steel shall penetrate the steel such that the shank pierces the steel and protrudes $^{1}/_{8}$ inch.

[3]Fasteners installed in $^{1}/_{4}$-, $^{3}/_{8}$- and $^{1}/_{2}$-inch-thick steel must have a minimum embedment depth of $^{1}/_{4}$ inch.

TABLE 5—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN ASTM A 572 GRADE 50 STEEL[1]

FASTENER TYPE	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)					
			$^{1}/_{4}$[2]		$^{3}/_{8}$[2]		$^{1}/_{2}$[3]	
			Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
$^{1}/_{2}$-inch-long step shank	1	$^{1}/_{2}$	95	115	65	90	25	55

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

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

[2]Fasteners installed in $^{1}/_{4}$- and $^{3}/_{8}$-inch-thick steel must have a minimum embedment depth of $^{3}/_{16}$ inch.

[3]Fasteners installed in $^{1}/_{2}$-inch-thick steel must have a minimum embedment depth of $^{1}/_{8}$ inch.

TABLE 6—CROSS REFERENCE OF COMPANY NAMES TO PRODUCT NAMES

COMPANY NAME	PRODUCT NAME
Powers Fasteners, Inc.	Trak-It
Max Company, Inc.	Max Concrete Pins

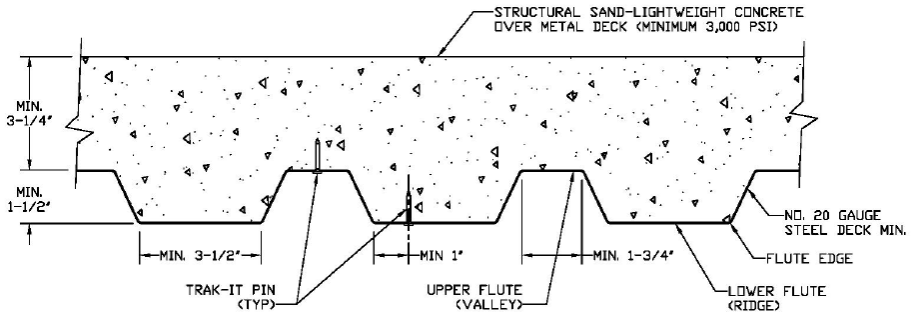

FIGURE 1—FASTENER INSTALLATION LOCATION ON COMPOSITE DECK