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ESR-2036

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DIVISION: 05 00 00—METALS
SECTION: 05 05 23—METAL FASTENINGS
DIVISION: 09 00 00—FINISHES
SECTION: 09 22 16.23—FASTENERS

REPORT HOLDER:

DEWALT

701 EAST JOPPA ROAD
TOWSON, MARYLAND 21286

EVALUATION SUBJECT:

TRAK-IT® FASTENERS IN CONCRETE, MASONRY AND STEEL (DEWALT / POWERS)

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EVALUATION SUBJECT:

TRAK-IT® FASTENERS IN CONCRETE, MASONRY AND STEEL (DEWALT / POWERS)

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)

Property evaluated:

Structural

2.0 USES

Trak-It fasteners are used to attach cold-formed steel tracks to base materials of normalweight concrete, lightweight concrete, concrete masonry units (CMUs), structural steel, and steel deck with lightweight concrete fill.

The fasteners are alternatives to cast-in-place anchors described in 2015 IBC Section 1901.3 (2012 IBC Section 1908; 2009 and 2006 IBC Section 1911 and 1912) for placement in concrete; the embedded anchors described in Section 8.1.3 of TMS 402-13, referenced in Section 2107 of the 2015 IBC (Section 2.1.4 of TMS 402-11, -08, -05, referenced in Section 2107 of the 2012, 2009 and 2006 IBC) for placement in masonry; and the welds and bolts used to attach materials to steel described in IBC Sections 2204.1 and 2204.2, respectively. For structures regulated under the IRC, 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 Trak-It fasteners are power-actuated fasteners (PAFs) manufactured from steel complying with ASTM A510, Grade 1060 to 1065, and austempered to a Rockwell C51-55 core hardness. The fasteners are collated into plastic strips. Product names for the report holder and the additional listees are presented in Table 1 of this report.

The fasteners have straight or stepped smooth shanks. See Table 2 for shank type, fastener dimensions, coating and applicable base materials. Maximum point length is the maximum specified length from the tip of the fastener to the location where the diameter of the shank becomes constant. Minimum effective shank length is the minimum specified length from the underside of the fastener head to the tip of the fastener.

3.2 Concrete:

Normalweight and sand-lightweight concrete must comply with Chapter 19 of the IBC or Section R402.2 of the IRC, as applicable. The minimum concrete compressive strength at the time of fastener installation must be as noted in Tables 3 and 4, as applicable.

3.3 Concrete Masonry Units (CMUs):

CMUs must be minimum 8-inch-thick (203 mm), normal-weight blocks conforming to ASTM C90.

3.4 Steel Deck Panels:

Steel deck panel properties must be as described in the footnotes to Table 4 and deck configuration must be as shown in Figure 1.

3.5 Steel Substrates:

Structural steel must comply with the minimum requirements of ASTM A36 or A572, Grade 50, and have a thickness as shown in Tables 6 and 7, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Selection of fasteners must take into consideration the applicable base material and the length of the fastener. The minimum fastener length must be determined as follows:

- For installation into concrete, concrete-filled steel deck panels, CMU and steel base materials, the minimum effective shank length shown in Table 2 must equal or exceed the sum of the thickness of the attached material and the minimum embedment depth (penetration) shown in the applicable tables in this report.
- For installation through steel base materials, the minimum effective shank length shown in Table 2 must equal or exceed the sum of the following: the thickness of the attached material, the thickness of the base material and the required point penetration shown in the applicable tables in this report.

4.1.2 Allowable Loads: The applicable allowable load tables for the Trak-It fasteners driven into different base materials may be determined by referencing Table 2.

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. For fasteners which are subjected to seismic loads, see Section 4.1.5 for additional information. The stress increases and load reductions described in IBC Section 1605.3 are not allowed.

The allowable tension (pullout) and shear loads listed in this report apply only to the connection of the fasteners to the base materials. Other limit states applicable to the design of a connection, such as fastener pull-through (pull-over) and lateral bearing on the attached material, which are governed by the properties of the attached material, are outside the scope of this report. Design of the connection to the attached material must comply with the applicable requirements of the IBC.

4.1.3 Combined Loading: For fasteners subjected to both tension and shear loads, compliance with the following interaction equation must be verified:

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

where:

p = Actual applied tension load on fastener, lbf (N).

P_a = Allowable tension load on fastener, lbf (N).

v = Actual applied shear load on fastener, lbf (N).

V_a = Allowable shear load on fastener, lbf (N).

4.1.4 Steel-to-steel Connections: When the Trak-It fasteners listed in Tables 6 and 7 are used in connections of two steel elements in accordance with Section E5 of AISI S100-12, connection capacity must be determined in accordance with Sections 4.1.4.1 and 4.1.4.2, as applicable.

4.1.4.1 Connection Strength - Tension: To determine tensile connection strength in accordance with Section E5.2 of AISI S100-12, the fastener tension strength, pull-out strength and pull-over strength must be known. These characteristics must be determined as follows:

- **PAF Tensile Strength:** The available tension strengths must be calculated in accordance with Section E5.2.1 of AISI S100-12 using a value of 260,000 psi for F_{uh}.
- **Pull-out Strength:** See Tables 6 and 7 for available pull-out strength, as applicable.
- **Pull-over Strength:** The available pull-over strengths must be calculated in accordance with Section E5.2.3 of AISI S100-12.

4.1.4.2 Connection Strength - Shear: To determine shear connection strength in accordance with Section E5.3 of AISI S100-12, the fastener shear strength, bearing and tilting strength, pull-out strength in shear, net section rupture strength and shear strength limited by edge distance must be known. These characteristics must be determined as follows:

- **PAF Shear Strength:** The available shear strengths must be calculated in accordance with Section E5.3.1 of AISI S100-12 using a value of 260,000 psi for F_{uh}.
- **Bearing and Tilting Strength:** The available bearing and tilting strengths must be calculated in accordance with Section E5.3.2 of AISI S100-12.
- **Pull-out Strength in Shear:** The available pull-out strength in shear must be the applicable allowable shear strength from Tables 6 and 7, as applicable, or must be calculated in accordance with Section E5.3.3 of AISI S100-12.
- **Net Section Rupture Strength and Shear Strength Limited by Edge Distance:** The net section rupture strength must be determined in accordance with Section E5.3.4 of AISI S100-12 and the shear strength limited by edge distance must be determined in accordance with Section E5.3.5 of AISI S100-12.

4.1.5 Seismic Considerations: The Trak-It fasteners are recognized for seismic loads as follows:

1. The fasteners may be used for attachment of 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 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 3 and 4, as applicable.
3. 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 Tables 6 and 7, as applicable.
4. For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the 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 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 established in this report for the concrete or steel base material.

4.2 Installation:

The fasteners must be installed with a power-actuated fastening tool in accordance with DEWALT's recommendations. The fasteners must be installed in accordance with the report holder's published installation instructions. A copy of these instructions must be available on the jobsite at all times during fastener installation.

Fastener size, minimum embedment depth or penetration, minimum spacing and edge distances must comply with Tables 3 through 7, as applicable. For fasteners installed into concrete, the fasteners must not be driven until the concrete has reached the designated compressive strength noted in the applicable table.

5.0 CONDITIONS OF USE

The Trak-It 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 and identified in accordance with this report.

5.2 The fasteners must be installed in accordance with this report and the manufacturer's published installation instructions. In the event of a conflict between the instructions in this report and the manufacturer's published installation instructions, the more restrictive requirements govern.

5.3 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.

5.4 For steel-to-steel connections that meet the applicability requirements of Section E5 of AISI S100-12, calculations demonstrating that the available connection strength has been determined in accordance with Section E5 of AISI S100-12 and Section 4.1.4 of this report, and equals or exceeds the applied load, 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.

5.5 Unless otherwise noted, concrete thickness must be a minimum of three times the embedment depth of the fastener.

5.6 The use of fasteners in concrete or masonry is limited to installation in uncracked concrete or masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.

5.7 The use of the fasteners in this report is limited to installation in dry, interior environments, which include exterior walls which are protected by an exterior wall envelope.

5.8 See Section 4.1.5 for seismic considerations.

5.9 The products addressed in this report are manufactured under a quality control program with inspections by ICC-ES.

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 February 2016.

7.0 IDENTIFICATION

The fasteners are identified by a "P" stamped onto the head of the fastener. Packages bear one of the company names set forth in Table 1, the product name, the fastener length and diameter, and the evaluation report number (ESR-2036).

TABLE 1—PRODUCT NAMES BY COMPANY

COMPANY NAME	PRODUCT NAME
DEWALT	Trak-It®
Powers Fasteners	Trak-It®
Max Company, Ltd.	Max Concrete Pins

TABLE 2—TRAK-IT FASTENERS

SHANK TYPE	SHANK DIAMETER[1] (inch)	HEAD DIAMETER (inch)	MAXIMUM POINT LENGTH (inch)	AVAILABLE LENGTHS (inch)	MINIMUM EFFECTIVE SHANK LENGTH (inch)	FASTENER COATING	APPLICABLE BASE MATERIAL	APPLICABLE LOAD TABLES
Straight, smooth	0.102	0.25	0.16	$^3/_4$	0.725	Black Oxide	Concrete Conc.-filled deck	3, 4
	0.102	0.25	0.16	1 to $1^1/_2$	Length - 0.025	Zinc	Concrete Conc.-filled deck CMU	3, 4, 5
Step, smooth	0.120 / 0.102	0.25	0.15	$^1/_2$	0.53	Zinc	Steel	6, 7

TABLE 3—ALLOWABLE LOADS FOR TRAK-IT FASTENERS DRIVEN INTO NORMALWEIGHT CONCRETE[1,2,3]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	ALLOWABLE LOADS (lbf)							
Concrete Compressive Strength:				2,000 psi		3,000 psi		4,000 psi		5,000 psi	
Load Direction:				Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
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 fasteners listed in the table above may be used for static load conditions and for the seismic load conditions described in Section 4.1.5, as applicable. The tabulated allowable loads apply to static load conditions. For seismic load conditions, the allowable loads must be limited in accordance with Section 4.1.5, Items 2 and 4, as applicable.

TABLE 4—ALLOWABLE LOADS FOR TRAK-IT FASTENERS DRIVEN INTO LIGHTWEIGHT CONCRETE AND LIGHTWEIGHT-CONCRETE-FILLED STEEL DECK[1,5]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE[3] (inches)	ALLOWABLE LOADS (lbf)								Minimum Required Concrete Topping Thickness Above Deck Panel (inches)
Fastener Location:				Installed Directly into Concrete[2]				Installed Through Lower Flute of Steel Deck into Concrete[4]				
Concrete Compressive Strength:				3,000 psi		3,500 psi		3,000 psi		3,500 psi		
Load Direction:				Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	
0.102	$^3/_4$	4	6	100	35	110	40	80	105	85	115	$3^1/_4$
0.102	$^7/_8$	4	6	110	45	120	50	85	120	90	130	$3^1/_4$

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 the tabulated compressive strength.
[2]For fasteners installed directly into concrete, the concrete thickness must be a minimum of three times the embedment depth of the fastener.
[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 steel deck panel must have a minimum base-metal thickness of 0.034 inch, a minimum yield strength, F_y, of 33,000 psi, a minimum tensile strength, F_u, of 45,000 psi, and conform to the profile shown in Figure 1. For fasteners installed through the steel deck into the concrete, the concrete fill must be at least $3^1/_4$ inches above the top of the ribs**.**
[5]The fasteners and assemblies listed in the table above may be used for static load conditions and for the seismic load conditions described in Section 4.1.5, as applicable. The tabulated allowable loads apply to static load conditions. For seismic load conditions, the allowable loads must be limited in accordance with Section 4.1.5, Items 2 and 4, as applicable.

TABLE 5—ALLOWABLE LOADS FOR TRAK-IT FASTENERS DRIVEN INTO THE FACE SHELL OF HOLLOW CONCRETE MASONRY UNITS[1,2,3]

SHANK DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inch)	MINIMUM END AND EDGE DISTANCE (inches)	ALLOWABLE LOADS (lbf)	
			Tension	Shear
0.102	$^7/_8$	$3^3/_4$	65	80

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

[1]Concrete masonry units must be normal weight units complying with ASTM C90. The minimum allowable nominal size of the CMU must be 8 inches high by 8 inches wide by 16 inches long, with a minimum,$1^1/_4$-inch-thick face shell thickness.
[2]Fasteners must be placed into unit face only. Only one PAF may be installed at each cell, and it must be a minimum of $1^1/_2$ inches from the mortar joints and $1^1/_2$ inches from the CMU web. Allowable loads for fasteners installed in mortar head and bed joints, or into the web of the CMU, are outside the scope of this report.
[3]The fasteners listed in the table above may be used for static load conditions and for the seismic load conditions described in Item 1 of Section 4.1.5.

TABLE 6—ALLOWABLE LOADS FOR TRAK-IT FASTENERS DRIVEN INTO ASTM A36 STEEL[1,4]

FASTENER TYPE	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	ALLOWABLE LOADS (lbf)							
Steel Thickness (inch):			$^3/_{16}$[2]		$^1/_4$[3]		$^3/_8$[3]		$^1/_2$[3]	
Load Direction:			**Tension**	**Shear**	**Tension**	**Shear**	**Tension**	**Shear**	**Tension**	**Shear**
$^1/_2$-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 ksi = 6.895 MPa.

[1]Steel base material must have minimum yield and tensile strengths (F_y and F_u) equal to 36 ksi and 58 ksi, respectively.
[2]Fasteners installed in $^3/_{16}$-inch-thick steel must 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.
[4]The fasteners listed in the table above may be used for static load conditions and for the seismic load conditions described in Section 4.1.5, as applicable. The tabulated allowable loads apply to static load conditions. For seismic load conditions, the allowable loads must be limited in accordance with Section 4.1.5, Items 3 and 4, as applicable.

TABLE 7—ALLOWABLE LOADS FOR TRAK-IT FASTENERS INSTALLED IN ASTM A572 GRADE 50 STEEL[1,4]

FASTENER TYPE	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	ALLOWABLE LOADS (lbf)					
Steel Thickness (inch):			$^1/_4$[2]		$^3/_8$[2]		$^1/_2$[3]	
Load Direction:			**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 ksi = 6.895 MPa.

[1]Steel base material must have minimum yield and tensile strengths (F_y and F_u) equal to 50 ksi and 65 ksi, respectively.
[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.
[4]The fasteners listed in the table above may be used for static load conditions and for the seismic load conditions described in Section 4.1.5, as applicable. The tabulated allowable loads apply to static load conditions. For seismic load conditions, the allowable loads must be limited in accordance with Section 4.1.5, Items 3 and 4, as applicable.

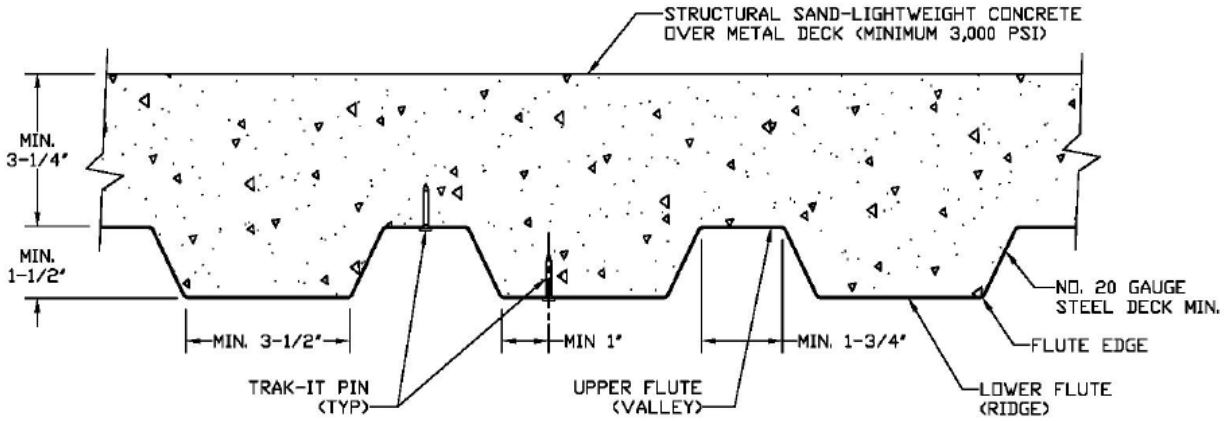

FIGURE 1—FASTENER INSTALLATION LOCATION ON COMPOSITE DECK

ICC-ES Evaluation Report

ESR-2036 FBC Supplement

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EVALUATION SUBJECT:

TRAK-IT® FASTENERS IN CONCRETE, MASONRY AND STEEL (DEWALT / POWERS)

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Trak-It fasteners, recognized in ICC-ES master report ESR-2036, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2014 *Florida Building Code—Building* (FBC-B)
- 2014 *Florida Building Code—Residential* (FBC-R)

2.0 CONCLUSIONS

The Trak-It fasteners**,** described in Sections 2.0 through 7.0 of the master evaluation report ESR-2036, comply with the FBC-B and FBC-R, provided the design and installation are in accordance with the 2012 *International Building Code®* provisions noted in the master report and the following conditions:

1. Design wind loads must be based on Section 1609 of the FBC-B or Section 301.2.1.1 of the FBC-R, as applicable.
2. Load combinations must be in accordance with Section 1605.2 or Section 1605.3 of the FBC-B, as applicable.

Use of the Trak-It fasteners in accordance with the High-Velocity Hurricane Zone provisions of the FBC-B and FBC-R has not been evaluated, and is outside the scope of this evaluation report.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

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