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RESEARCH REPORT: RR 25548
(CSI # 03150)

BASED UPON ICC ES EVALUATION
LEGACY REPORT NO.ER-5878

REEVALUATION DUE DATE:
May 1, 2005

GENERAL APPROVAL - Powers Tapper Concrete Screw Anchors.

DETAILS

The above assemblies and products are approved when in compliance with the description, use, identification and findings of Legacy Report No.ER-5878 dated January 1, 2004 of the ICC Evaluation Service, Incorporated. The report, in its entirety, is attached and made part of this general approval.

The parts of Report No. ER-5878 which are excluded on the attached copy have been modified by the Los Angeles Building Department.

The approval is subject to the following conditions:

1. Anchors shall not be used in resisting earthquake and wind loads.
2. Anchors shall be identified by labels on the packaging indicating the manufacturer's name, anchor type, diameter and length.
3. Anchors are limited to non fire-resistive construction.
4. Calculations demonstrating that applied loads comply with this report shall be prepared by a licensed engineer or architect registered in the State of California.

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Powers Fasteners, Inc.
Re: Powers Tapper Concrete Screw Anchors.

DISCUSSION

The approval is based on tests.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revisions to the report must be submitted to this Department, with appropriate fee, for review in order to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

YEUAN CHOU, Chief
Engineering Section

VC:elem
RR25548/wp8.0
R04/20/04
5A1/2103.4

Attached: ICC ES Evaluation Legacy Report No. ER-5878 (3 Pages)

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Legacy report on the 1997 Uniform Building Code™, the 2000 International Building Code® and the 2000 International Residential Code®

DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

POWERS TAPPER CONCRETE SCREW ANCHORS

POWERS FASTENERS, INC.
2 POWERS SQUARE
NEW ROCHELLE, NEW YORK 10801

1.0 SUBJECT

Powers Tapper concrete screw anchors.

2.0 DESCRIPTION

2.1 General:

The Powers Tapper concrete screw anchors are threaded, self-tapping screw-type anchors with slotted hex-washer heads, flanged hex heads, phillips flat or trim countersunk heads. See Figure 1 for screw anchor styles. The screw anchors are manufactured with nominal 3/16-, 1/4- and 3/8-inch (4.8, 6.4 and 9.5 mm) shank diameters, and are available in lengths to achieve embedment depths as noted in Table 3 of this report. The 3/16-inch-diameter (4.8-mm) screw anchors are made from carbon steel complying with AISI 1022, are case-hardened and have a Perma-Seal coating. The 1/4-inch-diameter (6.4-mm) screw anchors are made from either carbon steel complying with AISI 1022, that is case-hardened and coated with the Perma-Seal coating, or from Type 304 stainless steel. The 3/8-inch-diameter (9.5-mm) screw anchors are made from carbon steel complying with AISI 1022, that is case-hardened, and zinc plated in accordance with ASTM B 633, Type III.

The concrete screw anchors are alternatives to cast-in-place anchors described in Section 1923.1 of the 1997 Uniform Building Code™ (UBC), and Section 1912 of the 2000 International Building Code® (IBC). The screw anchors may also be used where an engineered design is submitted in accordance with Section R301.1.2 of the 2000 International Residential Code® (IRC).

2.2 Design:

Allowable tension and shear loads are noted in Table 3 of this report. Allowable loads for the screw anchors when subjected to combined shear and tension loads are determined by the following equation:

(Ps/Pt) + (Vs/Vt) ≤ 1

where:

- Ps = Applied service tension load.
Pt = Service tension loads in Table 3.
Vs = Applied service shear load.
Vt = Service shear loads in Table 3.

Use of the screw anchors to resist vibratory loads, such as those present in supports for reciprocating engines and cranes, and moving loads due to vehicles, is beyond the scope of this report.

2.3 Installation:

The screw anchors are for installation in predrilled holes in normal-weight concrete having a minimum thickness of 1.5 times the screw anchor embedment. Screw anchors must not be installed until the concrete has reached the minimum designated concrete strength. A pilot hole must be drilled into the concrete using a carbide-tipped drill bit supplied with each box of Powers Tapper concrete screw anchors. Drill bit diameters for pilot holes with corresponding screw anchor diameters are shown in Table 1. Holes must be drilled a minimum of 1/4 inch (6.4 mm) deeper than the desired embedment, using a rotary hammer drill. Dust and debris must be removed from the drilled hole with compressed air, and the screw anchor is driven into the hole to the desired embedment using a drill, set to rotation only, with an attached, manufacturer-supplied installation tool and drive socket. The minimum anchor spacing and edge distance is 16 times the screw anchor diameter, with no adjustment factors permitted.

2.4 Special Inspection:

Continuous special inspection as noted in UBC Section 1701 (for the UBC) or IBC Section 1704 (for the IBC and IRC) shall be provided when required by Table 3. The special inspector must inspect and verify the fastener type, fastener dimensions, concrete type, concrete compressive strength, drill bit size, fastener spacing, edge distances and fastener embedment.

For fasteners installed without special inspection, the applicable tension loads noted in Table 3 are to be used.

2.5 Identification:

Powers Tapper concrete screw anchor containers are marked with the product name (Tapper) and catalog number, the

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Powers Fasteners name and address, the screw anchor diameter and length, the evaluation report number (~~ER-5878~~) and the name of the inspection agency (CEL Consulting). In addition, a length code, in accordance with Table 2, appears on the head of each anchor.

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Concrete and Masonry (AC106), dated October 2003, including reports of static tension and shear tests; and a quality control manual.

4.0 FINDINGS

That the Powers Tapper concrete screw anchors described in this report comply with the 1997 *Uniform Building Code*TM, ~~the 2000 *International Building Code*[®] and the 2000 *International Residential Code*[®]~~, subject to the following conditions:

- 4.1 Screw anchors are identified and installed in accordance with this report and the manufacturer's instructions.
- 4.2 Allowable service static tension and shear loads are as set forth in Table 3 and Section 2.2 of this report.
- 4.3 Calculations demonstrating that the applied loads are less than the allowable loads described in this report, must be submitted to the building official for approval.
- 4.4 Screw anchors are not permitted for use in conjunction with fire-resistive construction.

4.5 Special inspection, when required by Section 2.4 in this report, is provided as noted in Section 2.4 of this report.

4.6 Zinc-plated and Perma-Seal coated, carbon steel screw anchors are limited to installation in dry, interior locations. Use of stainless steel screw anchors is permitted in exterior-exposure or damp environments.

4.7 Use of screws to resist wind or seismic loads is beyond the scope of this report.

4.8 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of screw anchors subjected to fatigue or shock loading is unavailable at this time, the use of these screw anchors under these conditions is beyond the scope of this report.

4.9 Since an ICC-ES acceptance criteria for evaluating the performance of screw anchors in cracked concrete is unavailable at this time, the use of screw anchors is limited to installation in uncracked concrete. Cracking occurs when $f_t > f_r$, due to service loads or deformations.

4.10 The screw anchors are manufactured in New Rochelle, New York, under a quality control program with inspections by CEL Consulting (AA-639).

This report is subject to re-examination in one year.

TABLE 1—TAPPER SCREW ANCHOR DRILL BIT SIZES

SCREW ANCHOR DESCRIPTION	DRILL BIT DIAMETER RANGE (inch)
³ / ₁₆ -inch-diameter, carbon steel, Perma-Seal coated	0.168 - 0.175
¹ / ₄ -inch-diameter, carbon steel, Perma-Seal coated	0.202 - 0.204
³ / ₈ -inch-diameter, carbon steel, zinc-plated	0.260 - 0.268
¹ / ₄ -inch-diameter, stainless steel	0.215 - 0.216

For SI: 1 inch = 25.4 mm.

TABLE 2—FASTENER LENGTH IDENTIFICATION

FASTENER LENGTH (inches)	CODE
1 ¹ / ₄	□
1 ³ / ₄	A
2, 2 ¹ / ₄	B ¹
2 ³ / ₄	C
3, 3 ¹ / ₄	D
3 ³ / ₄	E
4	F
5	H
6	J

For SI: 1 inch = 25.4 mm.

¹For installations of the ¹/₄-inch-diameter, 2¹/₄-inch-long, carbon steel screw anchor without special inspection, the building official must presume that the ¹/₄-inch-diameter, 2-inch-long, carbon steel screw anchor was installed.

**TABLE 3—ALLOWABLE TENSION AND SHEAR VALUES FOR TAPPER SCREW ANCHORS
INSTALLED IN NORMAL-WEIGHT CONCRETE^{1,2}**

SCREW ANCHOR DIAMETER (inch)	SCREW ANCHOR MATERIAL AND COATING (AS APPLICABLE)	MINIMUM EMBEDMENT ³ (inches)	ALLOWABLE TENSION (pounds)						ALLOWABLE SHEAR ⁶ (pounds)
			With Special Inspection ⁴			Without Special Inspection ⁵			
			Concrete Strength, f'_c (psi)			Concrete Strength, f'_c (psi)			
			2000	3000	4000	2000	3000	4000	
3/16	Carbon steel, Perma-Seal coated	1	90	90	90	45	45	45	175
		1 1/2	180	215	255	90	110	130	230
		1 3/4	295	335	375	150	170	190	235
1/4	Carbon steel, Perma-Seal coated	1	155	210	265	80	105	130	205
		1 1/2	250	325	405	125	160	200	355
		1 3/4	405	420	435	200	210	220	370
1/4	Stainless steel	1	125	150	175	60	75	90	295
		1 1/2	285	305	330	140	150	165	335
		1 3/4	360	380	395	180	190	200	410
3/8	Carbon steel, zinc-plated	1	175	180	190	90	90	95	240
		1 1/2	275	330	385	140	165	190	495
		1 3/4	340	415	490	170	210	245	580

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

¹The tabulated values are for screw anchors installed in normal-weight concrete having the designated compressive strength at the time of anchor installation.

²The tabulated values are applicable for screw anchors installed at a minimum spacing between screw anchors of 16 times the screw anchor diameter, and an edge distance, also, of 16 times the screw anchor diameter.

³The embedment depth is the distance from the concrete surface to the embedded end of the screw anchor. The minimum concrete thickness is 1 1/2 times the screw anchor embedment depth.

⁴These values are applicable only when the screw anchors are installed with special inspection in accordance with Section 2.4 of this report.

⁵These values are applicable when the screw anchors are installed without special inspection.

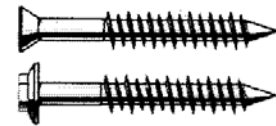
⁶These values are applicable to screw anchors installed in normal-weight concrete having a minimum compressive strength of 2,000 psi at the time of anchor installation.



**3/16" and 1/4" diameter
Perma-Seal™ coated
Carbon Steel TAPPER®**



**1/4" diameter Type 304
Stainless Steel TAPPER®**



**3/8" diameter Zinc Plated
Carbon Steel TAPPER®**

FIGURE 1—POWERS TAPPER SCREW ANCHOR STYLES