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RESEARCH REPORT: RR 25304  
(CSI # 03150)

Expire: November 1, 2014  
Issued Date: November 1, 2012  
Code: 2011 LABC

**GENERAL APPROVAL** – Renewal - Powers Powder Actuated Fasteners, Ceiling Clip Assemblies and Sill Plate Anchorage.

**DETAILS**

1. The above products shall not be used to resist seismic loads, except for fasteners used with architectural, electrical, and mechanical components described in Section 13.1.4 of ASCE7-05.
2. Load values per Tables 1, 2, 3, 4, 5, and 6 of the attachments are approved for design purposes.
3. The fasteners are manufactured in several lengths to accommodate various thicknesses of material being fastened to the surface of the concrete, steel or concrete masonry. The fasteners shall be of such length to give at least the tabulated minimum embedment through the steel or into the concrete.
4. Fasteners shall be installed in accordance with manufacturer's instructions, a copy of which shall be available at each job site.
5. The allowable values listed in the attached report and tables are for the fasteners only. Connected members shall be checked for their capacity.
6. No increase is permitted in the tabulated allowable load values for short duration loading.

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## **DISCUSSION**

The report is in compliance with 2011 Los Angeles Building Code.

The approval is based on tests.

The fasteners are designed to be installed by means of a powder actuated tool. The low velocity tool uses a captive piston which drives the fastener into concrete or steel. The following types of fastening tools are available depending upon the fastener being used and the receiving base material. The fastening tools consist of models P1000, P2201, P7201, P35s, P3500, PA 3500, P3801, PA351, P60 and Sniper.

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.

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.

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Attachments: Tables 1-6 (4 Pages)

**Table 1 - Allowable Loads of Fasteners Embedded in Normal Weight Concrete<sup>1,2,3</sup>**

Fastener Description	Shank Dia. (in.)	Embedment Depth (in.)	f'c = 2000 psi		f'c = 3000 psi		f'c = 4000 psi		f'c = 4500 psi	
			Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)
.300 Head Drive Pin 8mm Head Drive Pin ¼-20 Threaded Stud	0.145	⅜	40	60	67	100	67	100	67	100
		¾	40	60	67	100	67	100	67	100
		1	70	140	84	137	89	170	89	183
		1¼	70	140	84	137	89	170	89	183
⅜" Head Drive Pin	0.172	1¼	115	225	145	260	145	260	145	260
		1½	185	305	228	305	228	305	228	305
⅜"-16 Threaded Stud	0.205	1	95	155	125	165	165	215	165	215
		1¼	170	219	170	219	210	320	210	320
		1⅝	230	275	275	325	290	395	290	395

**Notes:**

1. The fasteners shall not be driven into concrete until design strength of concrete has been attained.
2. Fasteners shall not be installed closer than 3 inches to the edge of any concrete nor shall they be closer than 3 inches on center.
3. Interpolation between concrete strengths is acceptable.

**Table 2 - Allowable Loads of Fasteners Embedded in Lightweight Concrete<sup>1,2,3</sup>**

Fastener Description	Shank Dia. (in.)	Embedment Depth (in.)	f'c = 3500 psi		Through Deck <sup>4</sup> and Metal Track	
			Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)
.300 Head Drive Pin 8mm Head Drive Pin ¼-20 Threaded Stud	0.145	¾	74	80	50	175
		1	74	129	65	185
		1¼	74	165	65	185
		1½	140	195	115	190
⅜" Head Drive Pin	0.172	1¼	90	210	85	250
		1½	165	220	115	260
⅜"-16 Threaded Stud	0.205	1	125	170	70	180
		1¼	185	285	90	245

**Notes:**

1. The fasteners shall not be driven into concrete until design strength of concrete has been attained.
2. Fasteners shall not be installed closer than 3 inches to the edge of any concrete nor shall they be closer than 3 inches on center.
3. Interpolation between concrete strengths is acceptable.
4. The fasteners must be installed through the underside of the steel deck pan (between the ribs). The deck must be a minimum No. 20 gauge, with a minimum of 3½ inches of concrete topping.

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**Table 3 - Ceiling Clips in Concrete<sup>1,2,3</sup>**

Normal Weight Concrete											
Fastener Description	Shank Dia. (in.)	Embedment Depth (in.)	f'c = 2000 psi			f'c = 3000 psi			f'c = 4500 psi		
			Tension (lb.)	45° (lb.)	Shear (lb.)	Tension (lb.)	45° (lb.)	Shear (lb.)	Tension (lb.)	45° (lb.)	Shear (lb.)
Ceiling Clips - Standard	0.145	¾ 1	40	40	75	65	57	70	70	57	145
			50	65	120	85	75	125	90	125	160
Ceiling Clips - Economy	0.145	¾ 1	30	30	75	40	65	95	70	100	145
			55	45	170	55	80	150	105	125	150
Ceiling Clips - Ladd Pin	0.152	1½	80	70	100	95	105	140	135	125	160

Light Weight Concrete														
Fastener Description	Shank Dia. (in.)	Embed. Depth (in.)	f'c = 3000 psi			Through Deck <sup>4</sup> and Metal Track			f'c = 4000 psi			Through Deck <sup>4</sup> and Metal Track		
			Tension (lb.)	45° (lb.)	Shear (lb.)	Tension (lb.)	45° (lb.)	Shear (lb.)	Tension (lb.)	45° (lb.)	Shear (lb.)	Tension (lb.)	45° (lb.)	Shear (lb.)
Ceiling Clips - Standard	0.145	¾ 1	50	50	55	35	35	125	55	50	60	40	35	135
			60	70	100	45	70	125	65	80	105	50	75	135
Ceiling Clips - Economy	0.145	¾ 1	35	50	55	35	45	135	40	55	60	40	45	136
			55	90	120	60	50	135	60	95	130	65	50	136
Ceiling Clips - Ladd Pin	0.152	1½	90	105	140	55	75	125	100	115	155	60	85	135

**Notes:**

1. The fasteners shall not be driven into concrete until design strength of concrete has been attained.
2. Fasteners shall not be installed closer than 3 inches to the edge of any concrete nor shall they be closer than 3 inches on center.
3. Interpolation between concrete strengths is acceptable.
4. The fasteners must be installed through the underside of the steel deck pan (between the ribs). The deck must be a minimum No. 20 gauge, with a minimum of 3½ inches of concrete topping.

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**Table 4**  
**Allowable Loads of Fasteners Embedded in Concrete Through Foundation Sill Plates<sup>1,2,3</sup>**

Fastener Description	Shank Dia. (in.)	Embed. Depth (in.)	f'c ≥ 2000 psi		
			Tension (lb.)	Shear Perpendicular to Concrete Edge (lb.)	Shear Parallel to Edge (lb.)
.300 Head Drive Pin 8 mm Head Drive Pin	0.145	1½	125	135	150
¾" Head Drive Pin	0.172	1½	120	120	145

**Notes:**

1. Fasteners shall be installed into concrete foundation with a minimum of 2 inches edge distance.
2. Fasteners shall not be installed closer than 3 inches on center.
3. All walls shall have fasteners placed at 6 inches from ends of sill plates.

**Table 5**  
**Allowable Loads for Fasteners Embedded in Concrete Masonry Units<sup>1</sup> with f'm = 1500 psi or higher**

Fastener Description	Shank Dia. (in.)	Embed. Depth (in.)	Hollow		Grouted			
			Face		Face		Mortar Joint	
			Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)
.300 Head Drive Pin 8mm Head Drive Pin ¼-20 Threaded Stud	0.145	1	35	95	65	115	55	120
¾" Head Drive Pin	0.172	1	---	---	95	105	---	---
¾-16 Threaded Stud	0.205	1	20	85	110	185	135	130

**Notes:**

1. Concrete Masonry Units are typical 8 x 8 x 16 meeting the requirements of ASTM C90, Grade N, lightweight block.

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**Table 6 - Allowable Loads of Fasteners Embedded in A36 Steel<sup>2</sup>**

Fastener Description	Shank Dia. (in.)	Shank Type	1/8" Thick		3/16" Thick		1/4" Thick		3/8" Thick	
			Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)	Tension (lb.)	Shear (lb.)
.300 Head Drive Pin	0.145	Knurled	110	200	149	275	189	350	189	350
8mm Head Drive Pin		Smooth	60	420	90	605	130	600	240	525
1/4-20 Threaded Stud	0.145	Knurled	97	445	165	555	215	660	255	750
3/8" Head Drive Pin	0.172	Knurled	175	525	295	815	310	716	330	860
		Smooth	95	540	150	740	180	780	300	845
3/8-16 Threaded Stud	0.205	Knurled	110	555	270	1090	375	1620	---	---
Ceiling Clips - Standard <sup>1</sup>	0.145	Smooth	105	240	110	218	110	218	110	218
Ceiling Clips - Economy <sup>1</sup>	0.145	Smooth	95	260	106	246	106	246	106	246
Ceiling Clips - Ladd <sup>1</sup>	0.152	Smooth	120	240	117	234	117	234	117	234

**Notes:**

1. For 45° application, use allowable tension values.
2. Fasteners shall not be installed closer than 1/2 inch to the edge of steel nor shall they be closer than 1 1/2 inch on center.