

ICC-ES Report

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DIVISION: 03 00 00—CONCRETE**SECTION: 03 16 00—CONCRETE ANCHORS****DIVISION: 05 00 00—METALS****SECTION: 05 05 23—METAL FASTENINGS****DIVISION: 09 00 00—FINISHES****SECTION: 09 22 16.23—FASTENERS****REPORT HOLDER:****AEROSMITH FASTENING SYSTEMS****5621 DIVIDEND ROAD
INDIANAPOLIS, INDIANA 46241****EVALUATION SUBJECT:****AEROSMITH 5000 SERIES FASTENERS****Look for the trusted marks of Conformity!***"2014 Recipient of Prestigious Western States Seismic Policy Council
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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

DIVISION: 09 00 00—FINISHES
Section: 09 22 16.23—Fasteners

REPORT HOLDER:

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EVALUATION SUBJECT:

AEROSMITH 5000 SERIES FASTENERS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012, 2009, and 2006 *International Building Code*® (IBC)
- 2012, 2009, and 2006 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Property evaluated:

Structural

2.0 USES

Aerosmith 5000 Series fasteners are used for general fastening of building components to normal-weight concrete, sand-lightweight concrete sand-lightweight concrete filled steel deck panels and structural steel substrates. The fasteners are used as alternatives to cast-in-place anchors described in IBC Sections 1911 and 1912 for placement in concrete and to the welds and bolts used to attach to steel, described in IBC Sections 2204.1 and 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 General:

See the tables in this report for shank descriptions and nominal shank diameters. The fasteners are available in various lengths to achieve embedment depths as noted Tables 1 through 6.

3.2 Aerosmith 5000 Series Fasteners:

The 5000 series fasteners are manufactured from steel complying with ASTM A510, Grade 1060 or 1062, and austempered to a Rockwell “C” core hardness of 52 to 56 for smooth-shank fasteners and 54 to 56 for knurled-shank fasteners.

The 5000 series fasteners have a nominal shank diameter of 0.145 inch (3.7 mm) and a nominal head diameter of 0.3 inch (7.6 mm). All of the 5000 series fasteners have a zinc-plated finish.

3.3 Substrate Materials:

3.3.1 Structural Steel: Structural steel used in supports must comply with the minimum strength requirements of ASTM A36, ASTM A572 Grade 50 or ASTM A992, and must have thicknesses as noted in Table 3 or 4.

3.3.2 Normal-weight Concrete: Normal-weight concrete must be stone-aggregate and comply with IBC Chapter 19 or IRC Section R402.2, as applicable. The minimum concrete compressive strength at the time of fastener installation is noted in Table 1.

3.3.3 Sand-lightweight Concrete: Sand-lightweight concrete must comply with IBC Chapter 19. The minimum concrete compressive strength at the time of fastener installation is noted in Table 2.

3.3.4 Steel Deck Panels: Steel deck panels must conform to a code-referenced material standard, with the minimum thickness and minimum yield strength noted in Table 2. See Figure 1 for panel configuration requirements.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Allowable Loads: 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 base materials specified in the tables. Design of the connection to the attached material must comply with the applicable requirements of the IBC. The stress increases and load reductions described in IBC Section 1605.3, must not be allowed for wind loads acting alone or combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

The allowable shear and tension values for the Aerosmith fasteners driven into normal-weight concrete are shown in Table 1. Allowable shear and tension values for these fasteners driven into sand-lightweight concrete with or without a metal deck are shown in Table 2. Allowable shear and tension values for these fasteners driven into steel are shown in Tables 3 and 4.

The allowable loads for fasteners subjected to combined shear and tension loads must be determined using 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).

4.1.2 Wood to Steel or Concrete: Reference lateral design values for nails, determined in accordance with Part 11 and Table 11N of the ANSI/AF&PA NDS, are applicable to Ramset fasteners of equal or greater diameters. The wood element is the side member. The fastener bending yield strength is allowed to be taken as the value noted in the footnotes to Table 11N of the NDS, based on the shank diameter of the fastener.

Under the 2012 and 2009 IBC and IRC, the fasteners may be used in contact with fire-retardant-treated wood in dry, interior locations only, in accordance with IBC Section 2304.9.5.4, IRC Section R317.3.4 and Aerosmith recommendations. Use of fasteners in contact with preservative-treated wood or in contact with fire-retardant-treated wood in exterior applications is outside the scope of this report.

Under the 2006 IBC and IRC, use of fasteners in contact with preservative treated wood or fire-retardant treated wood is outside the scope of this report.

4.1.3 Seismic Considerations:

4.1.3.1 Use with Structural Components: Resistance to seismic loads is outside the scope of this report. Therefore, the suitability of the fasteners for use with structural components that are subjected to seismic loads is outside the scope of this report.

4.1.3.2 Use with Nonstructural Components: Seismic load resistance is outside the scope of this report, except when used with architectural, mechanical and electrical components described in Section 13.1.4 of ASCE 7, and as follows:

- **Concrete Base Materials:** The fasteners installed in concrete base materials 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 1 and 2, as applicable.
- **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 3 and 4, as applicable.
- **Interior, Nonstructural Walls:** For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the power-driven fasteners described in Section 3.0 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 are 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 shown in Tables 1 through 4, as applicable.

4.2 Installation:

The fasteners must be installed in accordance with this report and the Aerosmith Fastening Systems installation instructions. A copy of these instructions must be available on the jobsite at all times during installation.

A pneumatic fastening tool, recommended by Aerosmith Fastening Systems, must be used to install the fasteners. The fastener penetration, spacing and edge distances must be as noted in the tables of this report.

5.0 CONDITIONS OF USE

The Aerosmith Fastening Systems Brand 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** Fastener installation complies with this report and Aerosmith Fastening Systems published installation instructions. In the event of a conflict between this report and the published installation instructions, this report governs.
- 5.3** Calculations demonstrating that the applied loads are less than the maximum allowable loads described in Section 4.1.1 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.
- 5.4** Refer to Section 4.1.3 for seismic considerations.
- 5.5** The minimum concrete thickness must be three times the fastener embedment in concrete, except where noted otherwise in this report.
- 5.6** The use of fasteners is limited to uncracked concrete. Cracking occurs when $f_t > f_r$ due to service loads or deformations.
- 5.7** Installation must be limited to dry interior environments.
- 5.8** Refer to Section 4.1.2 regarding the use of fasteners in contact with preservative-treated or fire-retardant-treated.

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 2013.

7.0 IDENTIFICATION

The containers of the fasteners must be labeled with the company name Aerosmith Fastening Systems; the fastener product name, length, catalog number, and quantity; the evaluation report number (ESR-3453); and the manufacturing date. In addition, the head of each fastener must feature a logo symbol as shown in Figure 2.

7.1.1.1 See Section 4.1.3

**TABLE 1—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS
INSTALLED IN NORMAL-WEIGHT CONCRETE¹ (lbf)**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	SHANK DESCRIPTION	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH (psi)					
						2000 psi		4000 psi		6000 psi	
						Tension	Shear	Tension	Shear	Tension	Shear
5000	0.145	Smooth-straight	$\frac{3}{4}$	5.1	3.2	50	66	100	104	—	—
			1			152	166	157	182	—	—
			$1\frac{1}{4}$			159	265	179	267	—	—
			$1\frac{1}{2}$			154	340	209	342	—	—

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

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1]. Minimum concrete thickness must be three times the fastener embedment into the concrete.

**TABLE 2—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS
INSTALLED IN MINIMUM 3000 psi SAND-LIGHTWEIGHT CONCRETE¹ (lbf)**

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	SHANK DESCRIPTION	MINIMUM EMBEDMENT DEPTH (inches)	MINIMUM SPACING (inches)	FASTENER INSTALLED THROUGH STEEL DECK INTO CONCRETE ^{2,3}		FASTENER INSTALLED INTO CONCRETE		
					Tension	Shear	Minimum Edge Distance (inches)	Tension	Shear
5000	0.145	Smooth-straight	$\frac{3}{4}$	4	76	260	3.2	167	179
			1		134	265		200	228
			$1\frac{1}{4}$		157	269		333	400
			$1\frac{1}{2}$		233	346		391	410

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

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1]. Minimum concrete thickness must be three times the fastener embedment into the concrete, unless noted otherwise.

²For fasteners installed through steel deck, the fastener must be installed through the lower flutes of the metal deck with a minimum edge distance of $1\frac{1}{8}$ inches from the edge of the steel deck web and 4 inches from the end of the deck. Concrete thickness above the deck must be a minimum of $3\frac{1}{2}$ inches. See Figure 1 of this report.

³The steel deck must be configured as shown in Figure 1, have a minimum base-metal thickness of 0.035 inch, and have a minimum yield strength of 49.5 ksi.

TABLE 3—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN ASTM A36 STEEL¹ (lbf)

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	TYPE OF SHANK	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	STEEL THICKNESS (inch)									
					³ / ₁₆		¹ / ₄		³ / ₈		¹ / ₂		³ / ₄	
					Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
5000	0.145	Smooth	1	¹ / ₂	81	373	181	273	397	489	243 ²	277 ²	—	—
1500K	0.145	Knurled	1	¹ / ₂	296	636	584	659	680	730	253 ²	293 ²	—	—

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

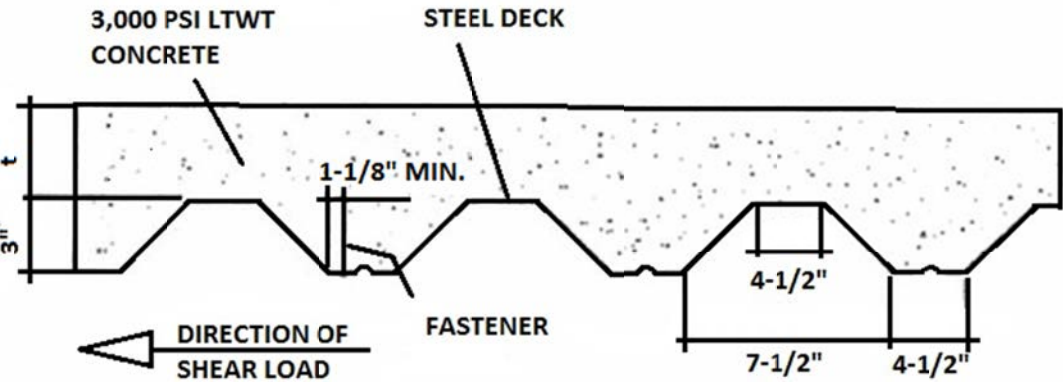
¹Except where noted otherwise in this table, the allowable load values shown are for fastenings that have the entire pointed end of the fastener driven through the steel plate.
²Fastener penetration into steel must be a minimum of ⁷/₁₆ inch.

TABLE 4—ALLOWABLE LOADS FOR FASTENERS INSTALLED IN ASTM A572 GRADE 50 OR ASTM A992 STEEL¹ (lbf)

PART NUMBER SERIES	NOMINAL SHANK DIAMETER (inch)	TYPE OF SHANK	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	STEEL THICKNESS (inch)									
					³ / ₁₆		¹ / ₄		³ / ₈		¹ / ₂		³ / ₄	
					Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
5000	0.145	Knurled	1	¹ / ₂	260	499	579	725	383 ²	595 ²	—	—	—	—

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

¹Except where noted otherwise in this table, the allowable load values shown are for fastenings that have the entire pointed end of the fasteners driven through the steel plate.
²Fastener penetration into the steel must be a minimum of ³/₈ inch.



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

FIGURE 1—FASTENER INSTALLATION LOCATION IN SAND-LIGHTWEIGHT CONCRETE FILLED STEEL



AEROSMITH 5000 SERIES HEAD STAMP

FIGURE 2—FASTENER MARKING