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ESR-3009

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DIVISION: 03 00 00—CONCRETE
SECTION: 03 16 00—CONCRETE ANCHORS
DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS

REPORT HOLDER:

JAACO CORPORATION

18080 NE 68TH STREET, SUITE C-130
REDMOND, WASHINGTON 98052

EVALUATION SUBJECT:

JAACO NAILPRO NP100S AND NP145S HARDENED BALLISTIC PINS

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

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

REPORT HOLDER:

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23307 LA PALMA AVENUE
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EVALUATION SUBJECT:

JAACO NAILPRO NP100S AND NP145S HARDENED BALLISTIC PINS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 *International Building Code*® (IBC)
- 2009 *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

The Jaaco NailPro NP100S and NP145S hardened ballistic pins are smooth-shank power-driven pins used to fasten building components, such as wood and steel, to normal-weight concrete. The pins are alternatives to the cast-in-place anchors described in IBC Sections 1911 and 1912 for placement in normal-weight concrete. The pins may be used in structures under the IRC where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 Pins:

Jaaco NailPro NP100S and NP145S hardened ballistic pins are nail-shaped fasteners with a round-shaped head. The pins are manufactured from steel wire coils complying with ASTM A510 Grade 1060 (UNS 10600) and are heat treated to provide core hardness on the Rockwell C scale of 52 to 55 HRC. The pins are either electrically zinc plated with chromate finish or mechanically zinc plated complying, respectively, with ASTM B633, Type II, SC 1, or ASTM B695, Type 1, Class 12. The NP100S and NP145S pins have a ballistic point with nominally 0.100- and 0.145-inch (2.54 and 3.66 mm) smooth shank diameters, respectively, and nominally 0.244- and 0.299-inch (6.20 and 7.60 mm) head diameters, respectively. The pins are available in lengths ranging from $^3/_4$ inch to $3^1/_2$ inches (19.1 and 90 mm), and also in collated wire coils, plastic sheet coils, and strips. Figures 1 and 2 show the typical smooth-shank pins and pin head marking.

3.2 Concrete:

The concrete must be uncracked, stone aggregate, normal-weight concrete complying with IBC Section 1905 or IRC Section R402.2, as applicable. The concrete must have a minimum compressive strength, f_c', of 2,500 psi (17.2 MPa) [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1] at 28 days.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Allowable Loads: Allowable tension and shear loads for the pins installed into normal-weight concrete, the required minimum embedment depths, the minimum spacing, and the minimum concrete edge distance are provided in Table 1. The tabulated allowable loads are for allowable stress design (ASD). The stress increases and load reductions described in IBC Section 1605.3 are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone. Allowable loads for pins subjected to combined tensile and shear forces, based on pin performance in concrete, must be determined by the following formula:

$$\frac{p}{P_a} + \frac{v}{V_a} \leq 1.0$$

where:

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

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

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

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

4.1.2 Wood to Concrete:

Reference lateral design values for nails with diameters less than or equal to the diameter of Jaaco power-driven pins, and with penetration into the main member of 10D, determined in accordance with Part 11 and/or Table 11N of ANSI/AF&PA NDS, are applicable to the Jaaco power-driven pins. The wood element must be taken as the side member. The pin bending yield strength must be taken as the value noted in the footnotes to Table 11N of the current ANSI/AF&PA NDS, based on the diameter of the pins.

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 pins 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 use is with architectural, mechanical and electrical components described in Section 13.1.4 of ASCE 7, and as follows:

- Concrete base materials: The Jaaco power-driven pins 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 Table 1.
- For interior, nonstructural walls that are not subject to sustained tension loads and are not a bracing application, the power-driven fasteners may be used to attach steel track to concrete 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. 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 base material.

4.2 Installation:

The Jaaco NailPro NP100S and NP145S hardened ballistic pins must be installed using pneumatic tools or gas-powered tools recommended by Jaaco Corporation or Pac Fast, in accordance with the manufacturer's published installation instructions. Pin shank diameters, pin minimum embedment depth, spacing and edge distance, and normal-weight concrete requirements are shown in Table 1.

5.0 CONDITIONS OF USE

The Jaaco NailPro hardened ballistic 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 pins are manufactured and identified in accordance with this report.

5.2 The pins must be installed in accordance with this report and Jaaco/Pac Fast published installation instructions. In the event of a conflict between this report and Jaaco/Pac Fast published installation instructions, the more restrictive governs.

5.3 Allowable loads must be in accordance with Section 4.1. The stress increases and load reductions described in IBC Section 1605.3 are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.

5.4 Applied tension and shear loads must not exceed the allowable loads described in 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 to be constructed.

5.5 The use of the pins is limited to installation in uncracked concrete. Cracking occurs when the extreme fiber tension stress in concrete, f_t, is greater than the modulus of rupture of concrete, f_r, due to service loads or deformations.

5.6 The minimum normal-weight concrete thickness must be a minimum of three times the pin embedment depth.

5.7 The use of the pins is limited to dry, interior environments.

5.8 When the pins are used in contact with wood, the wood must be naturally durable wood.

5.9 Refer to Section 4.1.3 for seismic considerations.

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 Jaaco NailPro hardened ballistic-point pins are identified by a pin head marking as shown in Figure 2. Each carton and packaging unit of pins described in this report must be identified by a label bearing the name and address of the report holder (Jaaco Corporation) or the additional listee (Pac Fast, Inc.); the product trade name as indicated in Table 2 of this report; the model number (NP100S or NP145S); the nominal pin diameter and length; and the ICC-ES evaluation report number (ESR-3009).

TABLE 1—ALLOWABLE TENSION AND SHEAR LOAD VALUES FOR PINS INSTALLED IN NORMAL-WEIGHT CONCRETE (lbf)[1,2,3]

FASTENER	SHANK DIAMETER (in.)	MINIMUM EMBEDMENT DEPTH (in.)	MINIMUM SPACING (in.)	MINIMUM EDGE DISTANCE (in.)	CONCRETE COMPRESSIVE STRENGTH, f'_c (psi)	
					2,500	
					Tension	Shear
NP100S	0.100	$^3/_4$	4	3.2	125	60
NP145S	0.145	1	4	3.2	145	125

For **SI:** 1 inch = 25.4 mm, 1 lb_f = 4.48 N, 1 psi = 6,895 Pa.

[1]Pins must not be driven until the normal-weight concrete has reached the minimum compressive strength of 2,500 psi [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1].
[2]Normal-weight concrete thickness must be a minimum of three times the pin embedment depth.
[3]The tabulated allowable load values are for the fastener in the concrete only. Materials connected to the normal-weight concrete must be investigated for compliance with applicable code in accordance with referenced design criteria, for both lateral resistance and fastener pull-through.

TABLE 2—COMPANY NAME/PRODUCT TRADE NAME CROSS-REFERENCE

COMPANY NAME	PRODUCT TRADE NAME
Jaaco Corporation	NailPro
Pac Fast Inc.	Preferred Fasteners

FIGURE 1—JAACO NAILPRO HARDENED BALLISTIC PINS: NP100S (LEFT) and NP145S (RIGHT)

FIGURE 2—JAACO NAILPRO HARDENED BALLISTIC PIN HEAD MARK

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ESR-3009 FBC Supplement

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EVALUATION SUBJECT:

JAACO NAILPRO NP100S AND NP145S HARDENED BALLISTIC PINS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Jaaco NailPro NP100S and NP145S hardened ballistic pins, recognized in ICC-ES master report ESR-3009, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2010 *Florida Building Code—Building*
- 2010 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Jaaco NailPro NP100S and NP145S hardened ballistic pins, described in Sections 2.0 through 7.0 of the master evaluation report ESR-3009, comply with the *2010 Florida Building Code—Building* and the *2010 Florida Building Code—Residential*, provided the design and installation are in accordance with the *International Building Code®* (IBC) provisions noted in the master report and the following conditions apply:

Design wind loads must be based on Section 1609 of the *2010 Florida Building Code—Building* or Section 301.2.1.1 of the *2010 Florida Building Code—Residential*, as applicable.

Load combinations must be in accordance with Section 1605.2 or Section 1605.3 of the 2010 *Florida Building Code—Building*, as applicable.

The modifications to ACI 318 as shown in IBC Sections 1908.1.9 and 1908.1.10, and as noted in IBC Section 1912.1, do not apply to the 2010 *Florida Building Code*.

Use of the Jaaco NailPro NP100S and NP145S hardened ballistic pins for compliance with the High-Velocity Hurricane Zone provisions of the *2010 Florida Building Code—Building* and the 2010 *Florida Building Code—Residential* 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 February 2016.