ICC-ES Evaluation Report

ESR-4511

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DIVISION: 03 00 00 – CONCRETE **Section: 03 15 00 – Concrete Accessories** **03 16 00 – Concrete Anchors** **DIVISION: 26 00 00 – ELECTRICAL** **26 05 29 – Hangers and Supports for Electrical Systems**	**REPORT HOLDER:** **CELO FIJACIONES S.L.**	**EVALUATION SUBJECT:** **XHA NAILS AND ACCESSORIES**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021 and 2018 *International Building Code®* (IBC)
- 2024, 2021 and 2018 *International Residential Code®* (IRC)

Property evaluated:

Structural

2.0 USES

The XHA Nails and Accessories addressed in this report are used to fasten architectural and electrical components, such as ceiling wire and conduit, to normalweight concrete base material, in redundant applications. These are applications where multiple XHA Nails and their accessories support elements that are capable of redistributing the load to neighboring PAFs, in the event of a PAF failure. The nails are alternatives to the cast-in-place anchors described in IBC Section 1901.3 for placement in concrete. For structures regulated under the IRC, the nails may be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

The XHA Nails and accessories are packaged separately. The XHA Nails are collated for use in the gas powered tool recommended by the report holder. The accessory is placed on the nose of the tool, in accordance with the report holder's published instructions, and the nail is fastened through the accessory into the supporting concrete.

3.2 XHA Nails:

The XHA Nails are power-actuated fasteners (PAFs) which have a stepped shank design with dimensions shown in Table 1. See Figure 1 for an image of the nails. The nails are formed from carbon steel and are hardened and galvanized in accordance with the report holder's quality documentation.

3.3 Accessories:

The accessories that have been evaluated for installation with the XHA Nails are manufactured from materials complying with the report holder's quality documentation. These have a thickness under the head of the XHA nail of no more than 0.32 inch (8 mm). See Table 2 for designations, images, materials and additional descriptions of the evaluated accessories.

3.4 3.4 Concrete:

Normalweight concrete must comply with IBC Chapter 19 or IRC Section R402.2, as applicable. The minimum concrete compressive strength at the time of fastener installation must be as noted in the applicable allowable load tables.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Allowable Loads: See Table 3 for allowable loads for CELO accessories installed with XHA Nails. The allowable loads are for the complete assembly of XHA nail and CELO accessory, based on testing which simulated load being applied by the cable, conduit or similar component. Design of the number and location of nail/accessory assemblies must take into account the need for redundancy, and the ability of the supported cabling, conduit or other similar component to redistribute the load to neighboring XHA Nails in the event of a nail failure. The design values are for accessories installed where the service temperature is not expected to exceed 104°F (40°C).

4.1.2 Combined Loading: For XHA Nails with ABT, TBB or UT accessories, subject 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).

4.1.3 Seismic Considerations: When subjected to seismic loads, the XHA Nails and accessories may be used as follows:

1. The nails 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. The nails 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 nails/accessory assembly does not exceed the lesser of 90 lbf (400 N) or the applicable allowable load in Table 3.

4.2 Installation:

The XHA Nails must be installed with a gas powered fastening tool in accordance with the report holder's recommendations. The fastening procedures must comply with the manufacturer's published installation instructions. These instructions must be available on the jobsite at all times during product installation.

The nail size, minimum spacing and minimum edge distances must comply with Table 3. The nails must not be installed until the concrete has reached the designated compressive strength. The minimum concrete thickness must be three times the nail length, unless otherwise noted.

Each XHA Nail must be checked for a setting failure in accordance with the report holder's installation instructions for each accessory type. In the event of a setting failure, a new (never fired) replacement XHA Nail and accessory must be installed at a minimum of 4 inches (100 mm) away from the original attempt.

5.0 CONDITIONS OF USE:

The XHA Nails and Accessories 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 XHA Nails and accessories must be manufactured and identified in accordance with this report.

5.2 Nail installation must comply with this report and the report holder's published installation instructions. In the event of conflict between this report and the published installation instructions, the more restrictive requirements govern.

5.3 Refer to Section 4.1.3 for seismic considerations.

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

5.5 Use of fasteners is limited to dry, interior locations, which include exterior walls which are protected by an exterior wall envelope.

5.6 The XHA Nails and accessories are manufactured under quality control programs 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 (24), published April 2025.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4511) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, packages of the nails are identified with the product name (XHA), and the nail length. Packages of accessories are identified with the applicable accessory designation shown in Table 2.

7.3 The report holder's contact information is the following:

CELO FIJACIONES S.L.
ROSELLO 7
CASTELLAR DEL VALLES, 08211
SPAIN
+34 715 83 83
www.celofixing.es

TABLE 1—XHA NAIL DESCRIPTIONS

FASTENER MODEL NUMBER	SHANK TYPE	SHANK DIAMETERS (inch)	NOMINAL HEAD DIAMETER (inch)	NOMINAL LENGTH [inches (mm)]
XHA27	Stepped	0.118 above step 0.102 below step	0.246	1 (27)
XHA32				$1^1/_4$ (32)
XHA38				$1^1/_2$ (38)

For SI: 1 inch = 25.4 mm.

FIGURE 1—XHA NAIL

TABLE 2—XHA NAIL ACCESSORIES

ACCESSORY DESIGNATION	PRODUCT IMAGE	MATERIAL	PRIMARY USE	PRODUCT VARIATIONS	SIZE EVALUATED
ABT		Polyamide	Support of tubes and conduit	Clamping Range, Color (Grey, Black or White)	25-32
TBB		Polyamide	Supports components by means of cable ties inserted through openings.	Color (grey, black)	n/a
UT		HDPE	Support of tubes and pipes	Diameter	25
WSC		Polyamide	Support of multiple cables	none	n/a
WDC		Polyamide	Support of multiple cables	none	n/a

TABLE 3—ALLOWABLE LOADS FOR XHA NAILS DRIVEN THROUGH CELO ACCESSORIES INTO NORMALWEIGHT CONCRETE[1,2]

CELO ACCESSORY	APPLICABLE XHA NAILS	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	ALLOWABLE LOADS (lbf)					
Concrete Compressive Strength:				**2,500 psi**		**4,000 psi**		**6,000 psi**	
Load Direction:				**Tension**	**Shear**	**Tension**	**Shear**	**Tension**	**Shear**
ABT	XHA27 XHA32 XHA38	4	$3^1/_4$	12	5.2	16	6.8	21	8.6
TBB				12	4.5	16	6.1	16	7.7
UT				1.1	1.0	1.1	1.0	1.1	1.0
WSC				1.7	n/a	2.4	n/a	2.7	n/a
WDC				6.1	n/a	6.1	n/a	6.1	n/a

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

[1]The nails must not be driven until the concrete has reached the designated minimum compressive strength.
[2]The nails may be used for static load conditions and for the seismic load conditions described in Section 4.1.3, as applicable. The tabulated allowable loads apply to both static and seismic load conditions.