



**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**

**Section: 06 05 23.13—Nails**

**REPORT HOLDER:**

**ASTROTECH STEELS PRIVATE LIMITED**

**EVALUATION SUBJECT:**

**NAILS**

**1.0 EVALUATION SCOPE**

**Compliance with the following codes:**

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012 and 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.

**Properties evaluated:**

- Bending yield strength
- Compliance with material requirements and tolerances of ASTM F1667.
- Compliance with prescriptive requirements of the IBC and IRC.
- Use in diaphragms and shear walls

**2.0 USES**

The Astrotech nails are used for engineered and prescriptive structural connections between wood members. Hardened nails are intended for use in connections of metal connectors (side plates) to wood.

**3.0 DESCRIPTION**

The Astrotech nails are sold under the brand names of Astrotech, AstroMach and AJFast. The nails have full round heads, offset heads or clipped heads and diamond points. The nails are formed from carbon steel wire, hardened carbon steel wire, or stainless steel wire. Nails formed from carbon steel and hardened carbon steel are available with a bright finish (nongalvanized), an electro-galvanized coating or a hot-dip galvanized coating. Nails with an electro-galvanized coating comply with ASTM A641, Class 1. Nails with a hot-dip galvanized

coating comply with ASTM A153, Class D. Both electro-galvanized and hot-dip galvanized nails comply with the requirements of Section 10.1 of ASTM F1667. Stainless steel nails are uncoated. See Table 1 for nail designations, dimensions, head styles, shank types, finishes, bending yield strength and packaging information. Dimensional tolerances conform to ASTM F1667.

**4.0 DESIGN AND INSTALLATION**

**4.1 Design:**

**4.1.1 Engineered Structural Connections:**

**4.1.1.1 Lateral Design:** The Astrotech nails with a nominal diameter of 0.099 inch or larger (2.51 mm) comply with the requirements of IBC Section 2303.6 and may be used in lateral connections designed in accordance with the ANSI/AWC National Design Specification (NDS), using the design bending yield strengths and the nail diameters shown in Table 1. Convert lateral design values determined in accordance with the NDS from lbf to N by multiplying by 4.45. The reference lateral design values for Astrotech nails with a nominal diameter of 0.092 inch (2.33 mm) or less have been determined through testing, and are noted in Table 2.

**4.1.1.2 Withdrawal Design:** The reference withdrawal design values for Astrotech nails with a nominal diameter of 0.092 inch (2.33 mm) or less have been determined through testing, and are noted in Table 2.

The reference withdrawal design values for bright or galvanized Astrotech carbon steel nails with a nominal diameter of 0.099 inch (2.51 mm) or larger must be determined in accordance with the NDS.

For stainless steel Astrotech nails with a nominal diameter of 0.099 inch (2.51 mm) or larger, the reference withdrawal design value must be determined in accordance with the 2018 NDS for all editions of the IBC.

Convert withdrawal design values determined in accordance with the NDS from lbf/inch to N/mm by multiplying by 0.175.

**4.1.1.3 Pull-through Design:** For the full round head nails, the reference head pull-through design values must be determined in accordance with Section 12.2.5 of the 2018 NDS. Reference head pull-through design values for the other nails are outside the scope of this report.

**4.1.2 Engineered Diaphragms and Shear Walls:** The Astrotech nails listed in Table 3 comply with the

requirements of IBC Section 2303.6 and head area requirements defined in the ICC-ES Acceptance Criteria for Nails (AC116) and are equivalent to the code-prescribed nails listed in Table 3 for use in engineered diaphragms and shear walls designed in accordance with the AWC Special Design Provisions for Wind and Seismic (SDPWS) which is referenced in the IBC.

**4.1.3 Prescriptive Framing Connections:** The bright or galvanized Astrotech carbon steel nails with a nominal diameter of 0.099 inch or larger (2.51 mm) comply with the requirements of IBC Section 2303.6 and may be used in framing connections where the nail type and size is prescribed in IBC Table 2304.10.2 (2018 and 2015 IBC Table 2304.10.1; 2012 and 2009 IBC Table 2304.9.1) or IRC Table R602.3(1), as applicable.

**4.1.4 Prescriptive Attachment of Sheathing:** The Astrotech nails listed in Table 3 comply with the requirements of IBC Section 2303.6 and head area requirements defined in AC116, and are equivalent to the code-prescribed nails listed in Table 3 for attachment of sheathing to wood framing in accordance with IBC Table 2304.10.2 (2018 and 2015 IBC Table 2304.10.1; 2012 and 2009 IBC Table 2304.9.1) or IRC Tables R602.3(1) and R602.3(3), as applicable.

**4.1.5 Prescriptive Use with Metal Connectors:** The Astrotech nails may be used where nails of the same material and dimension and the same or lesser bending yield strength are prescribed in an ICC-ES evaluation report on the metal connector.

#### 4.2 Installation:

The nails must be installed in accordance with this report, the report holder's published installation instructions, the approved plans, if applicable, and the applicable prescriptions in the code.

The nails described in this report are packaged for use in power tools recommended by the report holder. Individual nails may be manually driven.

Edge distances, end distances, and spacing must be sufficient to prevent splitting of the wood. Installation must be in accordance with the applicable requirements of NDS Section 12.1.6 (2012 NDS Section 11.1.6 for the 2012 IBC and IRC, 2005 NDS Section 11.1.5 for the 2009 IBC and IRC).

Hot-dip galvanized nails and stainless steel nails may be used in preservative-treated and fire-retardant-treated wood in accordance with IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5; 2012 and 2009 IBC Section 2304.9.5) and IRC Section R317.3.

## 5.0 CONDITIONS OF USE

The Astrotech nails 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 nails must be installed in accordance with this report; the report holder's published installation instructions; the approved plans, if applicable; and the applicable provisions of the code. In the case of a conflict amongst these documents, the most restrictive requirements govern.
- 5.2 Use of the carbon steel and hardened carbon steel nails with a bright finish in chemically treated wood, such as pressure-, preservative-, or fire-retardant-treated wood, or in exterior or exposed conditions, is not permitted. Use of the carbon steel and hardened carbon steel electro-galvanized nails in chemically treated wood or in exterior or exposed conditions is outside the scope of this report.
- 5.3 The nails are manufactured under a quality control program with inspections by ICC-ES.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Nails (AC116), dated March 2018 (editorially revised February 2021).

## 7.0 IDENTIFICATION

- 7.1 Packages of nails are identified by the brand name (Astrotech, AstroMach or AJFast), the nail description (shank type, diameter, length and finish/coating; the word "hardened" for hardened nails) and the evaluation report number (ESR-3507).
- 7.2 The report holder's contact information is the following:

**ASTROTECH STEELS PRIVATE LIMITED**  
**1335 CANNON ROAD, SECTOR 36, SRI CITY SEZ**  
**SATYAVEDU MANDAL, CHITTOOR DISTRICT**  
**ANDHRA PRADESH 517588**  
**INDIA**  
**+91 44 43009061**  
[www.astrotechsteels.com](http://www.astrotechsteels.com)

TABLE 1—ASTROTECH NAILS

NOMINAL DIAMETER (inch)	RANGE OF LENGTHS (inches)	HEAD STYLE <sup>1</sup>	NOMINAL HEAD DIAMETER (inch)	SHANK TYPE <sup>1</sup>	FINISH/ COATINGS <sup>2</sup>	SPECIFIED BENDING YIELD STRENGTH $F_{yb}$ (psi)	PACKAGING
0.083	1 - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.195	S, R, Sc	X, HD, EG, SS	See Footnote 3	Bulk, wire coil
0.086	1 - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.195	S, R, Sc	X, HD, EG, SS	See Footnote 3	Bulk, wire coil
0.092	1 - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.216	S, R, Sc	X, HD, EG, SS	See Footnote 3	Bulk, wire coil
0.099	1 <sup>1</sup> / <sub>8</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.238	S, R, Sc	X, HD, EG, SS	100,000	Bulk, wire coil
0.099	1 <sup>1</sup> / <sub>8</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.238	S, R, Sc	HX, HHD, HEG	130,000	Bulk, wire coil
0.113	1 <sup>1</sup> / <sub>4</sub> - 3	Full round	0.277	S, R, Sc	X, HD, EG, SS	100,000	Bulk, plastic strip, wire coil
0.113	1 <sup>1</sup> / <sub>4</sub> - 3	Full round	0.277	S, R, Sc	HX, HHD, HEG	130,000	Bulk, plastic strip, wire coil
0.113	2 - 2 <sup>1</sup> / <sub>2</sub>	Clipped	0.269	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.113	2 - 2 <sup>1</sup> / <sub>2</sub>	Clipped	0.269	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.113	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.258	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.113	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.258	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.120	2 <sup>1</sup> / <sub>4</sub> - 4	Full round	0.277	S, R, Sc	X, HD, EG, SS	100,000	Bulk, plastic strip, wire coil
0.120	2 <sup>1</sup> / <sub>4</sub> - 4	Full round	0.277	S, R, Sc	HX, HHD, HEG	130,000	Bulk, plastic strip, wire coil
0.120	2 <sup>3</sup> / <sub>4</sub> - 3 <sup>1</sup> / <sub>2</sub>	Clipped	0.277	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.120	2 <sup>3</sup> / <sub>4</sub> - 3 <sup>1</sup> / <sub>2</sub>	Clipped	0.277	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.120	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.258	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.120	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.258	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.131	1 <sup>1</sup> / <sub>2</sub> - 4	Full round	0.280	S, R, Sc	X, HD, EG, SS	100,000	Bulk
0.131	1 <sup>1</sup> / <sub>2</sub> - 4	Full round	0.280	S, R, Sc	HX, HHD, HEG	130,000	Bulk
0.131	1 <sup>1</sup> / <sub>2</sub> - 4	Full round	0.277	S, R, Sc	X, HD, EG, SS	100,000	Plastic strip, wire coil
0.131	1 <sup>1</sup> / <sub>2</sub> - 4	Full round	0.277	S, R, Sc	HX, HHD, HEG	130,000	Plastic strip, wire coil
0.131	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.287	S, R, Sc	X, HD, EG, SS	100,000	Paper tape 35 degree
0.131	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.287	S, R, Sc	HX, HHD, HEG	130,000	Paper tape 35 degree
0.131	3 - 3 <sup>1</sup> / <sub>2</sub>	Clipped	0.277	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.131	3 - 3 <sup>1</sup> / <sub>2</sub>	Clipped	0.277	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.131	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.260	S, R, Sc	X, HD, EG, SS	100,000	Paper tape, wire weld strip
0.131	2 - 3 <sup>1</sup> / <sub>2</sub>	Offset	0.260	S, R, Sc	HX, HHD, HEG	130,000	Paper tape, wire weld strip
0.135	1 <sup>1</sup> / <sub>2</sub> - 4	Full round	0.279	S, R, Sc	X, HD, EG	100,000	Bulk, plastic strip, wire coil
0.148	1 <sup>1</sup> / <sub>2</sub> - 6	Full round	0.307	S, R, Sc	X, HD, EG, SS	90,000	Bulk, plastic strip, wire coil
0.148	1 <sup>1</sup> / <sub>2</sub> - 6	Full round	0.307	S, R, Sc	HX, HHD, HEG	115,000	Bulk, plastic strip, wire coil
0.148	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.307	S, R, Sc	X, HD, EG, SS	90,000	Paper tape 35 degree
0.148	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.307	S, R, Sc	HX, HHD, HEG	115,000	Paper tape 35 degree
0.162	1 <sup>1</sup> / <sub>2</sub> - 6	Full round	0.332	S, R, Sc	X, HD, EG, SS	90,000	Bulk, plastic strip, wire coil
0.162	1 <sup>1</sup> / <sub>2</sub> - 6	Full round	0.332	S, R, Sc	HX, HHD, HEG	115,000	Bulk, plastic strip, wire coil
0.162	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.332	S, R, Sc	X, HD, EG, SS	90,000	Paper tape 35 degree
0.162	1 <sup>1</sup> / <sub>2</sub> - 2 <sup>1</sup> / <sub>2</sub>	Full round	0.332	S, R, Sc	HX, HHD, HEG	115,000	Paper tape 35 degree

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa,

<sup>1</sup>See Figure 1 for a description of the head styles. Shank styles: S = smooth; R = ring; Sc = screw.

<sup>2</sup>Finish/coatings: X = Bright (no zinc) carbon steel, EG = Electro-galvanized carbon steel, HD = Hot dipped galvanized carbon steel, HX = Hardened carbon steel nails with no coating, HEG = Hardened carbon steel nails with electro-galvanized coating; HHD = Hardened carbon steel nails with hot dip galvanized coating; SS = Stainless steel nails.

<sup>3</sup>Specified bending yield strengths are described in the manufacturer's approved quality documentation. The reference design values for these nails are not to be calculated in accordance with the NDS. See Table 2 for reference design values based on testing.

**TABLE 2—REFERENCE DESIGN VALUES FOR ASTROTECH NAILS WITH SHANK DIAMETERS LESS THAN 0.099 INCH<sup>1,2</sup>**

NAIL SIZE [NOMINAL DIAMETER x LENGTH (inch)]	LATERAL (lbf) <sup>3</sup>	WITHDRAWAL (lbf/in) <sup>4,5</sup>
0.083 x 2.5	39	6
0.086 x 2.5	46	9
0.092 x 2.5	46	10

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N.

<sup>1</sup>Reference design values are average ultimate loads divided by a safety factor, in accordance with testing requirements of AC116, which must be adjusted in accordance with Section 11.3 of the NDS (Section 10.3 of the 2012 and 2005 NDS for the 2012 and 2009 IBC, respectively).

<sup>2</sup>Values apply to carbon steel and hardened carbon steel nails with a bright finish, an electrogalvanized coating or a hot-dip galvanized coating, and stainless steel nails. Values apply to nail shank types of smooth shank, ring shank and screw shank.

<sup>3</sup>Reference lateral load values are based on the following: main member specific gravity = 0.40, main member moisture content between 10 and 14 percent, main member thickness = 2 inches; side member specific gravity = 0.40, side member moisture content between 10 and 14 percent, side member thickness = <sup>25</sup>/<sub>32</sub> inch.

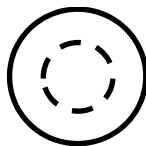
<sup>4</sup>Reference withdrawal load values are based on the following: member specific gravity = 0.40, member moisture content between 10 and 14 percent, nail end distance = 1.5 inches, and nail edge distance = 0.75 inch.

<sup>5</sup>Tabulated withdrawal reference design values are in pounds per inch of nail penetration into side grain of wood member.

**TABLE 3—ASTROTECH NAILS FOR USE IN ENGINEERED DIAPHRAGMS AND SHEAR WALLS AND PRESCRIPTIVE SHEATHING ATTACHMENT**

NAIL TYPE AND SIZE PRESCRIBED IN THE CODE	ASTROTECH NAIL DESCRIPTION
6d common (2" x 0.113")	2 to 2 <sup>3</sup> / <sub>8</sub> " x 0.113"; full round head; smooth; X, HD, EG, HX, HHD or HEG
8d common (2 <sup>1</sup> / <sub>2</sub> " x 0.131")	2 <sup>1</sup> / <sub>2</sub> " to 3" x 0.131"; full round head; smooth; X, HD, EG, HX, HHD or HEG
10d common (3" x 0.148")	3" to 3 <sup>1</sup> / <sub>2</sub> " x 0.148"; full round head; smooth; X, HD, EG, HX, HHD or HEG

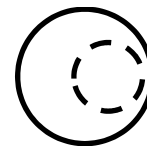
For SI: 1 inch = 25.4 mm.



Full Round



Clipped



Offset

**FIGURE 1—NAIL HEAD STYLES**

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

Section: 06 05 23.13—Nails

## REPORT HOLDER:

ASTROTECH STEELS PRIVATE LIMITED

## EVALUATION SUBJECT:

NAILS

## 1.0 REPORT PURPOSE AND SCOPE

## Purpose:

The purpose of this evaluation report supplement is to indicate that Astrotech nails, described in ICC-ES evaluation report ESR-3507, have also been evaluated for compliance with the codes noted below.

## Applicable code editions:

- 2019 *California Building Code* (CBC)
- 2019 *California Residential Code* (CRC)

## 2.0 CONCLUSIONS

## 2.1 CBC:

The Astrotech nails, described in Sections 2.0 through 7.0 of evaluation report ESR-3507, comply with CBC Chapter 23, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 23, as applicable.

**2.1.1 OSHPD:** The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

**2.1.2 DSA:** The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

## 2.2 CRC:

The Astrotech nails, described in Sections 2.0 through 7.0 of evaluation report ESR-3507, comply with CRC Chapters 5, 6, 7, 8 and 9, provided the design and installation are in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued March 2020 and revised August 2021.

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 23.13—Nails**

**REPORT HOLDER:**

ASTROTECH STEELS PRIVATE LIMITED

**EVALUATION SUBJECT:**

NAILS

**1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that Astrotech nails, described in ICC-ES evaluation report ESR-3507, have also been evaluated for compliance with the codes noted below.

**Applicable code editions:**

- 2020 *Florida Building Code—Building*
- 2020 *Florida Building Code—Residential*

**2.0 CONCLUSIONS**

The Astrotech nails, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-3507, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*. The design requirements must be determined in accordance with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-3507 for the 2018 *International Building Code*® (IBC) meet the requirements of the *Florida Building Code—Building* and *Florida Building Code—Residential*, as applicable.

Use of the Astrotech nails for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated, and is outside the scope of this evaluation report.

For products falling under Florida Rule 61G20-3, 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 evaluation report, reissued March 2020 and revised August 2021.