ICC-ES Evaluation Report

ESR-2122

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

REPORT HOLDER:

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EVALUATION SUBJECT:

STANLEY BOSTITCH® METAL PLATE CONNECTOR (MCN) NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 *International Building Code®* (2009 IBC)
- 2009 *International Residential Code®* (2009 IRC)
- 2006 *International Building Code®* (2006 IBC)
- 2006 *International Residential Code®* (2006 IRC)

Property evaluated:

Structural

2.0 USES

Stanley® BOSTITCH® Metal Plate Connector (MCN) nails are generally used to fasten metal connectors to lumber, wood, and engineered wood materials in designed structural connections. They can also be used in wood-to-wood structural and nonstructural connections and to fasten other engineered materials to wood and engineered wood products.

3.0 DESCRIPTION

3.1 General:

The MCN nails are formed from plain steel wire and have diamond-shaped points, smooth shanks and 0.283-inch-diameter (7.2 mm) full-round flat heads. Five nail sizes (shank diameter by length) are recognized in this report: 0.131 by $1^1/_2$ inches (3.3 by 38 mm); 0.148 by $1^1/_2$ inches (3.8 by 38 mm); 0.131 by 2½ inches (3.3 mm by 64 mm); 0.148 by 2½ inches (3.8 by 64 mm); and 0.162 by $2^1/_2$ inches (4.1 mm by 64 mm). The MCN nails may be heat-treated and may be either bright (nongalvanized) or coated with mechanically deposited zinc in accordance with ASTM B 695, Class 40.

Nails having a 0.131-inch-diameter (3.3 mm) smooth shank have a minimum average bending yield strength of 100,000 psi (689 MPa); and nails having a 0.148-inch-diameter (3.8 mm) or a 0.162-inch-diameter (4.1 mm) shank have a minimum average bending yield strength of 90,000 psi (620 MPa). The nails recognized in this report conform to the dimensional tolerances specified in ASTM F 1667. The nails are collated into paper or plastic strips.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The nominal design values in this report are for normal duration of load and dry conditions of use [less than 19 percent moisture (16 percent moisture for engineered wood)]. The nominal reference design values in this report must be multiplied by applicable adjustment factors referenced in the National Design Specification (NDS) to obtain the allowable nail design values. Reference design values are not limited to those specified in Tables 1 and 2 of this report. Designs using other side-plate thicknesses, side-plate metals, and wood materials are permitted provided the analysis is in compliance with the NDS. Design values of one wood species group or engineered wood product are also applicable to other species groups or engineered wood products having the same or higher dowel bearing strength, F_e, or specific gravity. Design of metal parts must comply with Section 10.2.3 of the NDS.

4.1.2 Lateral Loads: Typical reference lateral design values, *Z*, for single shear, metal side-plate connections are shown in Table 1. The tabulated values are calculated from the yield mode equations in the NDS, Section 11.3, and provide design loads for the MCN nails used with metal side plates complying as ASTM A 653 SS designation, Grade 33; as ASTM A 1011, SS designation, Grade 33; and as ASTM A 36 with minimum tensile strength of 58,000 psi (400 MPa).

4.1.3 Withdrawal Loads: Reference withdrawal design values, *W*, for single nails inserted into the side grain of sawn lumber or perpendicular to the veneers or strands of structural composite lumber are shown in Table 2. The MCN nails may be used in dimensional lumber and engineered wood products (structural composite lumber) other than those shown in Table 2, and design values may be established by using the withdrawal equation given in Section 11.2. of the NDS. The method of establishing withdrawal equivalence for structural composite lumber must be in accordance with ASTM D 5456, Section A2.6.

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4.2 Installation:

The nails must be installed with appropriate tools, such as Stanley® BOSTITCH® MCN nail tools or manual tools. Installation requirements must comply with the applicable code and the NDS.

5.0 CONDITIONS OF USE

The Stanley® BOSTITCH® Metal Plate Connector (MCN) 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 identified and installed in accordance with this report and the manufacturer's published installation instructions. If there is a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.2 Fasteners used in chemically treated wood, such as preservative-treated or fire-retardant-treated wood, must comply with the requirements in Section 2304.9.5 of the 2009 and 2006 IBC or Section R317.3 of the 2009 IRC, or Section R319.3 of the 2006 IRC. Use of the MCN nails described in this report in chemically treated wood is beyond the scope of this report.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Nails and Spikes (AC116), dated October 2006.

7.0 IDENTIFICATION

The nails are packaged in cartons bearing labels with the manufacturer's name (Stanley Fastening Systems, L.P.); brand name (BOSTITCH); nail description (type, length, and shank diameter); minimum average bending yield strength, F_{yb}; and the evaluation report number (ESR-2122).

The head of each nail is identified by one of the marks noted in Table 3, depending on nail size. Nongalvanized nails, and nails collated in plastic strips, are identified with Stanley Fastening Systems part numbers RH-MC13115-S, RH-MC14815-S, RH-MC13125-S, RH-MC14825-S, and RH-MC16225-S. Nails with a mechanically deposited zinc coating are identified with Stanley Fastening Systems part numbers RH-MC13115GAL-S, RH-MC14815GAL-S, RH-MC13125GAL-S, RH-MC14825GAL-S, and RH-MC16225GAL-S. When the nails are collated in paper tape, the RH prefix and the suffix S are replaced by a PT and 1M, respectively. Bulk products are labeled B15131-MC, B25131-MC, B15148-MC, B25148-MC and B25162-MC. Bulk galvanized product numbers include the designation G in the product number.

TABLE 1—REFERENCE LATERAL DESIGN VALUES, Z[1,2] (pounds), FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS USED WITH METAL SIDE-PLATES[3]

NAIL SIZE (inches)	SPECIES GROUP OF MAIN MEMBER (Specific Gravity[4])		
	Southern Pine (0.55)	Douglas Fir–Larch (0.50)	Spruce-Pine-Fir (0.42)
ASTM A 653, SS designation, Grade 33, No. 10 Gage Side Plate			
0.131 × $1^1/_2$ (or $2^1/_2$)	126	117	102
0.148 × $1^1/_2$ (or $2^1/_2$)	149	138	120
0.162 × $2^1/_2$	172	160	139
ASTM A 653, SS Designation, Grade 33, No. 20 Gage Side Plate			
0.131 × $1^1/_2$ (or $2^1/_2$)	102	94	81
0.148 × $1^1/_2$ (or $2^1/_2$)	123	114	98
0.162 × $2^1/_2$	148	136	117
ASTM A 1011, SS Designation, Grade 33, No. 3 Gage and No. 7 Gage Side Plates			
0.131 × $1^1/_2$ (or $2^1/_2$)	144	133	114
0.148 × $1^1/_2$ (or $2^1/_2$)	175	161	138
0.162 × $2^1/_2$	204	188	165
ASTM A 36, No. 3 Gage Side Plate			
0.131 × $1^1/_2$ (or $2^1/_2$)	146	134	114
0.148 × $1^1/_2$ (or $2^1/_2$)	176	162	138
0.162 × $2^1/_2$	211	194	170

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

[1]Lateral design values are for normal loads and must be multiplied by all applicable adjustment factors in the NDS.
[2]Lateral design values are based on: F_{yb} = 100,000 psi (689 MPa) for 0.0131-inch-diameter (3.4 mm) nails; F_{yb} = 90,000 psi (620 MPa) for 0.148-inch-diameter (3.8 mm) nails and 0.162-inch-diameter (4.1 mm) nails.
[3]Base-metal thickness for No. 3 gage is 0.2391 inch (6.1 mm); base-metal thickness for No. 7 gage is 0.1793 inch (4.55 mm); base-metal thickness for No. 10 gage is 0.1345 inch (3.4 mm); base-metal thickness for No. 20 gage is 0.0358 inch (0.91 mm); dowel bearing capacity (F_{es}) for ASTM A 653, Grade 33 (Nos. 10 and No. 20 gage), is 61,850 psi (426 MPa); dowel bearing strength for ASTM A 1011, SS designation, Grade 33, No. 7 gage is 71,500 psi (493 MPa); dowel bearing capacity of ASTM A 36, No. 3 gage is 87,000 psi (599 MPa). Capacities of other configurations may be determined with appropriate engineering calculation using NDS Section 11.
[4]Assigned specific gravity of sawn lumber per the NDS or equivalent specific gravity for structural composite lumber as determined by ASTM D 5456.

TABLE 2—REFERENCE WITHDRAWAL DESIGN LOADS, *W*[1,2] (pounds per inch of penetration), FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS

WOOD SPECIES GROUP	SPECIFIC GRAVITY[3]	MCN NAIL SHANK DIAMETER (inch)		
		0.131	0.148	0.162
Southern pine	0.55	41	46	50
Douglas fir–larch	0.50	32	36	40
Spruce-pine-fir	0.42	21	23	26

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

[1]Tabulated withdrawal design loads are per inch of penetration into side grain of the main member.
[2]Normal duration of load. Values may be adjusted for duration of load as prescribed in the applicable code.
[3]Assigned specific gravity of sawn lumber per the NDS or equivalent specific gravity for structural composite lumber as determined by ASTM D 5456.

TABLE 3—NAIL HEAD MARKINGS FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS

HEAD IDENTIFICATION	NAIL SIZE (inches)
B1	$0.131 \times 1^1/_2$
B2	$0.131 \times 2^1/_2$
B3	$0.148 \times 1^1/_2$
B4	$0.148 \times 2^1/_2$
B5	$0.162 \times 2^1/_2$

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

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ESR-2122 Supplement

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EVALUATION SUBJECT:

STANLEY BOSTITCH® METAL PLATE CONNECTOR (MCN) NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2007 *Florida Building Code—Building*
- 2007 *Florida Building Code—Residential*

Properties evaluated:

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the Stanley® BOSTITCH® Metal Plate Connector (MCN) nails described in Sections 2.0 through 7.0 of the master report ESR-2122 comply with the 2007 *Florida Building Code—Building* and the 2007 *Florida Building Code—Residential*, when designed and installed in accordance with the master report.

For products falling under Florida Rule 9B-72, 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 on March 1, 2012.

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