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DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

REPORT HOLDER:

MAX USA CORPORATION
257 EAST 2ND STREET
MINEOLA, NEW YORK 11501
www.maxusacorp.com

EVALUATION SUBJECT:

MAX USA CORPORATION POWER-DRIVEN FASTENERS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

Property evaluated:

Structural

2.0 USES

Max USA V5 and W8 pins and W8-H nails are used for general fastening of building components to normal-weight concrete. The W8-H nails are also used to attach naturally durable wood sill plates to concrete foundations. The fasteners are alternatives to cast-in-place anchors described in IBC Sections 1911 and 1912 and UBC Section 1923.1. The fasteners may be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 Fasteners

3.1.1 Pins: Max USA pins are collated, straight, smooth-shank pins manufactured from SWRCH48K steel complying with JIS G3507, have a core hardness of Rockwell C46-50, and have an electroplated galvanized zinc finish. The pins are available in V5 and W8 styles, which have 0.098-inch-diameter (2.5 mm) and 0.150-inch-diameter (3.8 mm) shanks, respectively, and lengths to achieve embedment depths noted in Table 1 of this report. The head diameters of the pins are as noted in Table 1.

3.1.2 Nails: Max USA nails are collated, straight, smooth-shank nails manufactured from SWRCH48K steel complying with JIS G3507, have a core hardness of Rockwell C46-50, and have an electroplated galvanized zinc finish. The nails are available in a W8-H style, which has a shank diameter of 0.150 inch (3.8 mm), a head diameter of 0.303 inch (7.7 mm), and lengths to achieve embedment depths noted in Table 1.

3.2 Concrete:

Normal-weight concrete must comply with IBC Section 1905, IRC Section R404.2.2, or UBC Section 1903, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Allowable tension (pullout) and shear values for MaxUSA fasteners driven into normal-weight concrete are shown in Table 1, and are for use in allowable stress design. The stress increases and load reductions described in IBC Section 1605.3, and the stress increases described in UBC Section 1612.3, must not be allowed for wind loads acting alone or combined with vertical loads. No adjustment is allowed for vertical loads acting alone. Seismic load resistance is outside the scope of this report, except as permitted in Section 4.1.3 for wood sill plate applications, and when fasteners are used under the IBC and IRC for attachment of architectural, electrical and mechanical components as described in the exceptions to Section 13.1.4 of ASCE/SEI 7-05, Minimum Design Loads for Buildings and Other Structures (American Society of Civil Engineers/Structural Engineering Institute).

Allowable loads for fasteners installed into concrete and subjected to combined shear and tension loads are permitted to be calculated by the following equation:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1$$

where:

P_s = Applied service tension load, pounds (N).

P_t = Allowable service tension load, pounds (N).

V_S = Applied service shear load, pounds (N).

V_t = Allowable service shear load, pounds (N).

4.1.2 Wood to Concrete: Lateral design values must be determined in accordance with Part II of the ANSI/AF&PA NDS-05 (IBC) or Part 12 of the ANSI/NFoPA NDS-91 (UBC), as applicable, with fasteners of equal or greater diameters. The wood element is the side member. The fastener bending yield strength must be the value noted for nails in the NDS-05 or NDS-91, as applicable, based on fastener diameter.

4.1.3 Sill Plate to Foundation Connections:

4.1.3.1 General: The use of the W8-H nails to attach wood sill plates to the perimeter of concrete foundations must be under the following conditions:

1. No cold joint exists between the slab and foundation, below the sill plate.
2. The sill plate is not installed on slabs supported by concrete-block foundation walls.

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3. Wood sill plates consist of naturally durable wood (non-preservative-treated wood; non-fire-retardant-treated wood).

4.1.3.2 Design: The use of fasteners to attach wood sill plates to concrete is limited under the IBC and IRC to Seismic Design Category A and B, and under the UBC to Seismic Zones 0, 1, 2 and 3. The allowable fastener spacings must be based on an engineering analysis, using the allowable loads for W8-H (Sill Plate Anchorage) nails described in Table 1 of this report.

4.2 Installation:

A compressed air fastening tool, recommended by Max USA, must be used to install the fasteners. The fastening procedures must comply with the fastener manufacturer's published installation instructions. The fasteners must be installed with the minimum embedment depth, spacing and edge distances specified in Table 1 of this report. The concrete must have a thickness of at least three times the fastener penetration. The fasteners must not be driven until the concrete has reached the designated compressive strength as specified in Table 1 of this report. Installation is limited to dry, interior environments. For wood sill plate connections, the W8-H nail, with a minimum $^3/_4$-inch-diameter (19 mm), No. 16 gage [0.06-inch-thick (1.5 mm)], corrosion-resistant washer, must be used.

5.0 CONDITIONS OF USE

The Max USA 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 Fasteners must be installed in accordance with this report and Max USA published installation instructions. In the event of a conflict between this report and the Max USA published installation instructions, this report governs.

5.2 Allowable loads must be in accordance with Section 4.1 of this report.

Calculations demonstrating that the applied loads are less than the maximum allowable loads described in this report 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.

5.3 The fasteners are limited to installation in normal-weight concrete having a thickness of at least three times the fastener embedment.

5.4 Fasteners must not be used to attach preservative-treated wood or fire-retardant-treated wood to concrete.

5.5 Installation is limited to dry, interior environments.

5.6 Seismic load resistance is outside the scope of this report, except as noted in Section 4.1.3.2 of this report.

5.7 Use is limited to uncracked concrete. Cracking occurs when $f_t > f_t$ due to service loads or deformations.

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 October 2006.

7.0 IDENTIFICATION

The containers of the fasteners are labeled with the Max USA Corporation company name; the fastener product name and code (pins have a CP-C designation in the product code; nails have a CCP designation in the product code), length, catalog number and quantity; the evaluation report number (ESR-2042); and the manufacturing date and lot number. In addition, all of the fasteners are identified by the letter "M" stamped into the fastener head as follows:

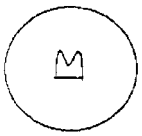

TABLE 1—ALLOWABLE TENSION AND SHEAR VALUES FOR FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE[1,2,3,4] (pounds)

FASTENER TYPE	FASTENER DESCRIPTION	SHANK DIAMETER (inch)	HEAD DIAMETER (inch)	MINIMUM EMBEDMENT DEPTH (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH (psi)			
							2,000		4,000	
							Tension	Shear	Tension	Shear
Pin	V5	0.098	0.246	$^3/_4$	4	$3^3/_{16}$	106	156	64	86
	W8	0.150	0.315	$^3/_4$	4	$3^3/_{16}$	75	62	74	67
	W8	0.150	0.315	1	4	$3^3/_{16}$	153	245	175	268
Nail	W8-H	0.150	0.303	$^3/_4$	4	$3^3/_{16}$	85	79	106	108
	W8-H	0.150	0.303	1	4	$3^3/_{16}$	227	249	117	244
	W8-H (sill plate anchorage)	0.150	0.303	1	— [5]	$1^3/_4$	131	93	—	—

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

[1]The fasteners must not be driven until the concrete has reached the designated compressive strength. Concrete aggregate shall comply with ASTM C 33. Minimum concrete thickness is three times the fastener embedment into the concrete.
[2]The allowable shear and tension values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with accepted design criteria.
[3]The stress increases and load reductions described in IBC Section 1605.3, and the stress increases described in UBC Section 1612.3, are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.
[4]Earthquake load resistance is outside the scope of this report, except as noted in Section 4.1.3.2 of this report.
[5]The spacing requirements for the W8-H nail, when used for sill plate anchorage, must be based on an engineering design, as described in Section 4.1.3 of this report. The W8-H nail must be installed with a minimum $^3/_4$-inch-diameter (19 mm), No. 16 gage [0.06-inch-thick (1.5 mm)], corrosion-resistant washer.