

ACCEPTANCE CRITERIA FOR WOOD SCREWS USED IN HORIZONTAL DIAPHRAGMS, VERTICAL SHEAR WALLS AND BRACED WALLS

AC120

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PREFACE

Evaluation reports issued by ICC Evaluation Service, LLC (ICC-ES), are based upon performance features of the International family of codes. (Some reports may also reference older code families such as the BOCA National Codes, the Standard Codes, and the Uniform Codes.) Section 104.11 of the *International Building Code*® reads as follows:

The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

This acceptance criteria has been issued to provide interested parties with guidelines for demonstrating compliance with performance features of the codes referenced in the criteria. The criteria was developed through a transparent process involving public hearings of the ICC-ES Evaluation Committee, and/or on-line postings where public comment was solicited.

New acceptance criteria will only have an “approved” date, which is the date the document was approved by the Evaluation Committee. When existing acceptance criteria are revised, the Evaluation Committee will decide whether the revised document should carry only an “approved” date, or an “approved” date combined with a “compliance” date. The compliance date is the date by which relevant evaluation reports must comply with the requirements of the criteria. See the ICC-ES web site for more information on compliance dates.

If this criteria is a revised edition, a solid vertical line (|) in the margin within the criteria indicates a change from the previous edition. A deletion indicator (→) is provided in the margin where any significant wording has been deleted.

ICC-ES may consider alternate criteria for report approval, provided the report applicant submits data demonstrating that the alternate criteria are at least equivalent to the criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. ICC-ES retains the right to refuse to issue or renew any evaluation report, if the applicable product, material, or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause injury or unreasonable damage.

NOTE: The Preface for ICC-ES acceptance criteria was revised in July 2011 to reflect changes in policy.

Acceptance criteria are developed for use solely by ICC-ES for purpose of issuing ICC-ES evaluation reports.

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1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for recognition of wood screws in ICC Evaluation Service, LLC (ICC-ES), evaluation reports under the 2009 and 2006 *International Building Code*[®] (IBC) and the 2009 and 2006 *International Residential Code*[®] (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11.

The reason for this criteria is that the codes do not address the use of wood screws to attach wood structural panels to wood framing in the horizontal diaphragms, shear walls and braced walls identified in Section 1.2 of this criteria.

1.2 Scope: This criteria is applicable to wood screws used as alternate fasteners to the code-prescribed nails for horizontal wood diaphragms, wood shear walls, and braced walls consisting of wood structural panels that are applied directly to sawn lumber wood framing. The screws shall be limited to directly substitute for the nail size, type, penetration and installation pattern permitted as specified in the codes as noted below, except when supplementary data described in Section 4.1.4 justifies greater allowable loads, different fastener spacing, or less screw penetration than what is prescribed for nails in the following code sections:

1.2.1 2009 IBC: Sections 2305.1, 2305.2 (SDPWS Sections 4.2 and C4.2, Table C4.2.2D), 2305.3 (SDPWS Sections 4.3 and C4.3, Table C4.2.2D), 2306.2.1, 2306.3, 2307.1, 2308.9.3 (item 3), and 2308.9.3.1 and 2308.9.3.2.

1.2.2 2006 IBC: Sections 2305.2, 2305.3, 2306.3.1, 2306.3.2, 2306.4.1, 2307.1, 2308.9.3 (item 3), 2308.9.3.1 and 2308.9.3.2.

1.2.3 2009 IRC: Sections R503.2.3, R602.10.1 (Method WSP), R602.10.2, R602.10.3.2, R602.10.3.3 and R803.2.3, Tables R602.3 (1) and R602.10.2 (Methods WSP, ABW, and PFH).

1.2.4 2006 IRC: Sections R503.2.3, R602.10.3 (item 3), R602.10.6, and R803.2.3, Tables R602.3 (1) and R602.10.1 (Method 3).

1.3 Codes and Referenced Standards: Where standards are referenced in this criteria, the standards shall be applied consistently with the code (IBC or IRC) upon which compliance of the fastener is based.

1.3.1 2009 and 2006 *International Building Code*[®] (IBC), International Code Council.

1.3.2 2009 and 2006 *International Residential Code*[®] (IRC), International Code Council.

1.3.3 ANSI/AF&PA National Design Specification (NDS) for Wood Construction with Supplement, 2005 edition, American Forest & Paper Association.

1.3.4 ANSI/AF&PA Special Design Provisions for Wind and Seismic (SDPWS), 2008 edition, American Forest & Paper Association.

1.3.5 ANSI/ASME Standard B18.6.1-1981 (reaffirmed 1997), Wood Screws (Inch Series), American Society of Mechanical Engineers.

1.3.6 ASTM D1037-06a, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials, ASTM International.

1.3.7 ASTM D1761-06, Standard Test Methods for Mechanical Fasteners in Wood, ASTM International.

1.3.8 ASTM D2395-07a^{e1}, Standard Test Methods for Specific Gravity of Wood and Wood-Based Materials, ASTM International.

1.3.9 ASTM D2915-03, Standard Practice for Evaluating Allowable Properties for Grades of Structural Lumber, ASTM International.

1.3.10 ASTM D4442-07, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials, ASTM International.

1.3.11 ASTM D4444-08, Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters, ASTM International.

1.3.12 ASTM F1575-03, Standard Test Method for Determining Bending Yield Moment of Nails, ASTM International.

1.3.13 ASTM F1667-05, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples, ASTM International.

1.3.14 ICC-ES Acceptance Criteria for Prefabricated Wood Shear Panels (AC130), dated October 2009 (editorially revised March 2010).

1.4 Definitions: The definitions in the codes and standards referenced in Section 1.3, and the additional terms below, shall apply:

1.4.1 Types of Wood Structural Panels: The types of wood structural panels shall be either oriented strand board (OSB) or plywood, as described in Section 2302 of the IBC and Section R202 of the IRC.

1.4.2 Grades of Wood Structural Panels: The grades of wood structural panels shall include Structural I, Sheathing and Single-Floor, as described in Chapter 4 of the SDPWS.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Description: Complete information concerning material specifications, diameters (head, shank, major and minor), length, thread type (cut or rolled), and profile of the screws.

2.1.2 Installation Instructions: Installation details and limitations.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the screws. Where practical with respect to available space on the fastener head, each fastener shall be identified by the manufacturer's identifying mark or logo and the length designation. Each container of fasteners shall have a label noting the evaluation report holder's name and address, the evaluation report number, and the fastener size.

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2.1 Testing Laboratories: Testing laboratories shall comply with Section 2.0 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

2.2 Reports of Tests: Test reports shall comply with AC85.

2.3 Product Sampling: Sampling of the fasteners for tests under this criteria shall comply with Section 3.2 of AC85.

3.0 FASTENER SPECIFICATIONS

3.1 Materials shall conform to a national industry standard.

3.2 Wood screw design shall conform to ANSI/ASME Standard B18.6.1 (1981), except when the differences between the characteristics of the wood screw and the requirements of the standard are identified.

3.3 Code-prescribed common nails shall conform to dimensions listed in ASTM F1667, Table 15, for Type 1, Style 10 common nails.

4.0 GENERAL REQUIREMENTS AND TEST METHODS

4.1 General:

4.1.1 Wood screws are permitted as alternates to the code-prescribed nails used in horizontal wood diaphragms, vertical wood shear wall assemblies and braced walls consisting of wood structural panels that are applied directly to solid-sawn framing specified in the applicable code sections described in Section 1.2 (Scope), provided the conditions of acceptance prescribed in Sections 4.3 through 4.7, and Section 4.8, as applicable, are satisfied. The required tests are prescribed in Sections 4.1.1.1 and 4.1.1.2, and 4.1.4 if applicable, and the evaluation report recognitions are outlined in Sections 4.1.2 and 4.1.3, which are further clarified in Section 6.0.

4.1.1.1 Minimum Test Requirements: Side-by-side comparative tests shall be performed using the code-prescribed nails and the alternate directly substituted wood-screw fasteners. The comparison testing shall consist of lateral strength and stiffness testing, pull-through and pull-out withdrawal testing, and installation testing, as described in Sections 4.2 through 4.7 of this criteria.

4.1.1.2 Testing for High Seismic Design Categories: For vertical shear walls and braced walls assigned to Seismic Design Category C, D, E or F (for the IBC) and C, D₀, D₁, or D₂ (for the IRC), in addition to the testing prescribed in Sections 4.2 through 4.7, full-scale shear wall comparative cyclic-load testing in accordance with Section 4.8 of this criteria is required.

4.1.2 Diaphragm and Shear Wall Performance Requirements: Horizontal diaphragms (including prescriptive roof and floor WSP sheathing installations prescribed in the IRC) and vertical shear walls constructed with the wood screws that directly substituted for the code-prescribed nails shall have the same allowable shear capacities, LRFD factored shear capacities and predicted deflections as those specified in the applicable code sections described in Section 1.2 (Scope). The evaluation report shall identify those specific horizontal diaphragms and shear walls constructions by reference to the

applicable tables and sections described in Section 1.2 of this criteria and identify the screws that are to be directly substituted for the corresponding code-prescribed nails.

4.1.3 Braced Wall Performance Requirements: Braced walls constructed with wood screws that directly substitute for the code-prescribed nails, for attaching wood structural panels applied directly to wood framing, shall be equivalent to those braced walls specified in the applicable code sections described in Section 1.2 (Scope). The braced walls shall include gypsum wall board installed on the side of the wall opposite the wood structural panels, as prescribed in 2009 IRC Section R602.10.2.1. The evaluation report shall identify those braced wall constructions by reference to the applicable tables and sections described in Section 1.2 of this criteria, and identify the screws that are to be directly substituted for the corresponding code-prescribed nails.

4.1.4 Testing for Special Recognition: Full-Scale horizontal diaphragm and vertical shear wall testing is required if the evaluation report recognition includes any of the following: (a) allowable load capacities of the assemblies constructed with the wood screws greater than those prescribed by the code; (b) different fastener spacing than that prescribed in the code for assemblies constructed with nails; or (c) screw with less penetration than the minimum, code-prescribed nail penetration described in Section 4.2.4. A qualification test plan shall be submitted to the ICC-ES prior to commencement of testing.

4.2 Specimen Sampling and Preparation:

4.2.1 Wood Material and Moisture Content: The comparative tests shall be conducted using the same species of sawn lumber (Douglas fir-larch or southern pine, compliant with Section 2303.1.1 of the IBC) and wood structural panel type, grade and thickness (compliant with Section 2303.1.4 of the IBC) for which recognition is sought, with the exception that recognition can be applied to both rated sheathing and Structural I panels if rated sheathing panels are used in the tests in lieu of Structural I grade panels. Analogously, recognition can be applied to both Douglas fir-larch and southern pine if Douglas fir-larch lumber is used in the tests in lieu of southern pine lumber. If recognition is sought for lumber other than Douglas fir-larch or southern pine, as permitted by footnote "a" of IBC Tables 2306.2.1(1), 2306.2.1(2) and 2306.3, the lumber with the lowest specific gravity shall be tested. The lumber framing and wood structural panels shall be conditioned in accordance with Section 9 of ASTM D1761 to reach an equilibrium moisture content of 10 to 14 percent prior to assembling of the test specimens. The moisture content of the wood samples shall be determined in accordance with ASTM D4442 or ASTM D4444.

4.2.2 Test Specimen Construction: Test specimens for comparative tests between code-prescribed common nails and alternate wood screws, consisting of wood structural panels and wood framing members, shall be made from the same units of wood structural panels and wood framing members that are end-matched or otherwise deemed to be similar. This same panel and framing member requirement shall be confirmed through visual assessment, and comparison of moisture content and specific gravity of the corresponding panel and wood

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framing materials, of the nail and screw specimens, respectively. The specific gravity of the wood framing materials shall be determined in accordance with ASTM D2395. Nail penetration into framing member for comparative tests shall be based on the full length of the code-prescribed common nail minus the sheathing panel thickness.

4.2.3 Number of Test Specimens: For tests prescribed in Section 4.3, a minimum of 15 specimens for each fastener configuration, which includes each combination of fastener material, type, and diameter, shall be tested. A test specimen configuration, for tests prescribed under Sections 4.4 through 4.6, shall consider each combination of the following parameters: wood panel type, grade, thickness; wood framing species, and the lowest specific gravity, if applicable, as identified in Section 4.2.1; and fastener material, type, size and penetration into framing, as applicable. For tests prescribed in Sections 4.4 through 4.6, the number of test specimens for each configuration shall be determined in accordance with ASTM D2915, equation 1. Testing for each configuration under Sections 4.4 through 4.6, shall be based on a minimum sample size of 15, randomly chosen specimens and a target of 5 percent precision with a 75 percent confidence for the mean capacity, or a minimum sample size 10, randomly chosen, specimens and a target of 5 percent precision with a 95 percent confidence for the mean capacity. For the purpose of determining sample size, the mean peak strength value, described in Section 4.4, shall be used to derive the specimen mean value and the corresponding standard deviation value. The sample size need not exceed 30 specimens for each configuration.

4.2.4 Fastener Installation and Penetration: The fasteners shall be driven flush with the face of the sheathing material and shall be installed in accordance with the manufacturer's installation instructions for wood screws and Section 11.1.5 of the NDS for nails. The minimum penetration of the screws, for comparative tests and for recognition in the evaluation report, shall be the same as those prescribed for nails in the applicable code provisions described in Section 1.2 of this criteria: which are 1.25 inches (31.7 mm), 1.375 inches (35 mm) and 1.5 inches (38 mm) for 6d, 8d and 10d common nails, respectively; except when less penetration is qualified by full-scale specimen (diaphragm/shear wall) testing in accordance with Section 4.1.4. In any case, the screw minimum penetration shall comply with NDS Section 11.1.4.6. The screw penetrations for comparative tests, in accordance with Sections 4.4 through 4.7, and Section 4.8 if applicable, shall be the same as those for which recognition is sought in the evaluation report.

4.3 Bending Yield Strength:

4.3.1 The bending yield strength shall be determined for the nails and screws used in comparative testing, and the tests shall be in accordance with ASTM F1575 and the following: (1) The 5 percent diameter bending yield strength of the screws shall be defined by the section at the minor thread diameter. (2) The screws shall be placed on the cylindrical bearing points for testing so that the transition zone between shank and thread is as close as possible to the midpoint between the bearing points, with the load applied at the transition or in the threaded section. (3) The screw's designation, overall length, length

of thread, minor thread diameter, and bending yield strengths shall be recorded

4.3.2 The screws shall have an average bending yield strength equal to or greater than the average bending yield strength of the nails. In addition, the bending yield strength of the nails shall be equal to or greater than the bending yield strength for the nail specified in the NDS and IBC Section 2303.6. The average bending yield strength of the tested screws shall not exceed the specified bending yield strength by more than 10 percent.

4.4 Lateral Testing:

4.4.1 Comparative tests for fastener lateral resistance and fastener slip shall be in accordance with ASTM D1761. Test specimens shall be constructed in accordance with Section 4.2 and the load shall be applied in the direction parallel to the face grain of the wood structural panel and parallel to the grain of the framing lumber.

4.4.2 The nail and wood screw lateral strength and slip tests shall be used to determine the contribution of the fastener to the diaphragm or shear wall strength and deflection. Load-slip curves shall be derived from the load and lateral movement measurements taken during testing of the nail and wood screw test specimens prepared and sampled in accordance with Section 4.2 of this criteria.

4.4.3 Average values of fastener slip, e_n (inches) from the load-slip curves for the wood screw and code-prescribed nail shall be compared. The slip for the wood screw shall not be greater than that of the code-prescribed nail at a load per fastener, V_n , corresponding to 1.4 times the ASD seismic load level of the shear wall or diaphragm as follows: $V_n = (1.4)(v_s)(1/2)(s/12)$ where v_s is the seismic nominal unit shear capacity from SDPWS and s is the boundary spacing of fasteners in inches (see SDPWS Example C4.2.2-1). The V_n shall be evaluated for each combination of v_s and s for which recognition is sought.

4.4.4 Using the average of the peak load values, the strength of the wood screw connection shall be equal to or greater than that of the corresponding comparatively tested nail connection.

4.5 Withdrawal Test:

4.5.1 Comparative tests of fastener pullout capacity shall be in accordance with ASTM D1761 on nail and screw samples that are sampled and prepared in accordance with Section 4.2 of this criteria.

4.5.2 The average capacity of the wood screw fasteners to resist pullout forces shall be equal to or greater than that of the corresponding comparatively tested nails.

4.6 Pull-through Test:

4.6.1 Comparative tests of fastener pull-through capacity shall be by means of a test setup in which the fasteners installed in the wood structural sheathing are pulled through the sheathing. Testing shall be in accordance with ASTM D1037, and with modification for wood screws, as necessary. Nailed and wood screw connected test specimens for each type, grade and thickness of wood structural sheathing for which recognition is sought shall be prepared and sampled in accordance with Section 4.2 of this criteria.

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4.6.2 The average peak load of the wood screw test results shall be equal to or greater than that of the corresponding comparatively tested nails.

4.7 Installation Tests:

4.7.1 The wood screw installation tests shall demonstrate that the wood screw can be installed with the same edge and end distance and spacing as noted in the codes for nails for which the screws are to be directly substituted. For each screw material, type, size and penetration, the wood screw installation tests shall be conducted on a minimum of two replicate specimens that consist of the type, grade and thickness of wood structural panels and the species, specific gravity (as clarified in Section 4.2.1 of this criteria) and size (as prescribed in IBC Tables 2306.2.1(1), 2306.2.1(2) and 2306.3) of framing lumbers for which recognition is sought. Each combination of screw, panel and lumber, defined above, constitutes a test configuration, which requires two replicate test specimens. Each test specimen of each test configuration shall be constructed with and evaluated using a minimum of 15 fasteners per specimen. Wood screws shall be installed flush with the sheathing material face and into the wood framing member at the minimum spacing and edge distances specified in the code tables. The wood screw shall be installed perpendicular to the grain of both the sheathing and the wood framing member.

4.7.2 A visual inspection of the connection shall be made after the wood screws are driven into the framing material. The installation of the screws must not result in splitting of the sheathing material or framing.

4.8 In-plane Cyclic-load Shear Wall Tests:

4.8.1 The shear wall specimens shall be tested and the corresponding data analyzed in accordance with Section 4.8.2, with the conditions of acceptance as described in Section 4.8.3.

4.8.2 The comparative tests shall be conducted in accordance with AC130, Sections 5.1 through 5.1.2.1, inclusive, on shear wall specimens with the sheathing fastened with code-prescribed nails (benchmark test specimens) and shear wall specimens with the sheathing fastened directly with the screws (alternate fastener test specimens).

4.8.2.1 Three or more replicate wall tests, described in AC130, Section 5.1 (item 4), shall constitute a shear wall test. For each shear wall test, identified as A1 through F2 in Table 1 of this criteria, tests shall be conducted on both benchmark specimens and alternate fastener specimens, with shear wall assembly aspect ratios (height-to-length ratios) of both 1:1 and 3.5:1, except as noted in footnotes 3 and 4 of the Table 1.

4.8.2.2 For each shear wall test, data shall be analyzed in accordance with Section 5.1.3 of AC130, including determination of the following performance parameters (for both benchmark specimens and the alternate screw specimens): ASD design load ($F_{ASD-Benchmark}$ and $F_{ASD-Alternate}$), LRFD design load ($F_{LRFD-Benchmark}$ and $F_{LRFD-Alternate}$), the lateral displacement at ASD design load level ($\Delta_{ASD-Benchmark}$ and $\Delta_{ASD-Alternate}$), the ultimate displacement described in Section 5.2.2 of AC130 ($\Delta_{U-Benchmark}$ and $\Delta_{U-Alternate}$).

4.8.3 For each shear wall test (with both benchmark specimen test and the corresponding comparative alternate fastener specimen test) described in Section 4.8.2 of this criteria, the mean value or the lowest test value, as described in AC130 Section 5.1 (item 4), for each shear wall, describing the wall seismic resistance, shall comply with the following requirements:

$$F_{ASD-Alternate} \geq F_{ASD-Benchmark}$$

$$\Delta_{U-Alternate} \geq \Delta_{U-Benchmark}$$

$$\frac{\Delta_{U-Alternate}}{\Delta_{ASD-Alternate}} \geq \frac{\Delta_{U-Benchmark}}{\Delta_{ASD-Benchmark}}$$

5.0 QUALITY CONTROL

5.1 Information as required by the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted and shall include sufficient detail to provide verification that the manufactured fasteners comply with the evaluation report, and are consistent with the fasteners used in the qualifying tests.

5.2 A qualifying inspection shall be conducted at each manufacturing facility in accordance with the requirements of the ICC-ES Acceptance Criteria for Inspections and Inspection Agencies (AC304).

5.3 For wood screws complying with ANSI/ASME B18.6.1 (see Section 3.2), an annual inspection shall be conducted at each manufacturing facility in accordance with AC304.

5.4 For wood screws that do not comply with ANSI/ASME B18.6.1 (see Section 3.2), the screws shall be manufactured under an approved quality program with inspections by an inspection agency accredited by the International Accreditation Service (IAS) or otherwise acceptable to ICC-ES.

6.0 EVALUATION REPORT RECOGNITION

The evaluation report shall include the following:

6.1 Basic wood screw information required by Section 2.1, including product description, installation instructions, and packaging and identification.

6.2 Information concerning fastener substitution in horizontal diaphragms, vertical shear walls and braced walls, based on applicable sections of this criteria, including Sections 4.1.2 and 4.1.3. Information shall include but is not limited to: wood panel type, grade, and thickness; wood framing species and specific gravities; screw type, size and penetration into framing; and fastener spacing; allowable shear capacities of the horizontal diaphragms and shear walls constructed with wood screws; and fastener slip, e_n , at 1.4 times the ASD seismic load level of the shear wall or diaphragm.

6.3 A statement that "Fasteners must be installed in accordance with the manufacturer's written installation instructions and this report. In case of conflict between this report and the manufacturer's installation instructions, this report governs."

6.4 A condition of use indicating that the wood structural panels used on weather-exposed surfaces defined in Section 202 of the IBC or Section R703 of the

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IRC, must be protected by a weather-resistant exterior wall envelope.

6.5 Under the 2009 IBC, a statement that special inspections are required in accordance with IBC Sections 1704.6, 1705.3, 1705.4, 1706.2 and 1707.3, unless exempted by IBC Sections 1705.3, 1706.1 and 1707.1, as applicable. When special inspections are required, a statement of special inspections must be submitted to the code official in accordance with IBC Section 1705.

6.6 Under the 2006 IBC, a statement that special inspections are required in accordance with IBC Sections

1704.6, 1705.3, 1705.4 and 1707.3, unless exempted by IBC Sections 1705.3, and 1707.1, as applicable. When special inspections are required, a statement of special inspections must be submitted to the code official in accordance with IBC Section 1705.

6.7 A statement that “Use of screws to resist combined shear and uplift from wind in accordance with SDPWS Section 4.4 is outside the scope of this report.”

6.8 A statement that “This evaluation report does not address fastener corrosion when the fastener is installed in chemically treated wood.” ■

TABLE 1—MATRIX OF IN-PLANE CYCLIC-LOAD SHEAR WALL TEST SPECIMENS^{1,2}

| PANEL GRADE | MINIMUM NOMINAL PANEL THICKNESS (inch) | MINIMUM FASTENER PENETRATION IN FRAMING (inches) | PANELS APPLIED DIRECTLY TO FRAMING | | |
|------------------------|--|--|--|--|-----------------|
| | | | Nails that are to be substituted by the screws | Fastener Spacing at Panel Edges (inches) | |
| | | | | 6 | 2 |
| Structural I sheathing | $\frac{5}{16}$ | $1\frac{1}{4}$ | 6d | A1 ³ | A2 ³ |
| | $\frac{3}{8}$ | $1\frac{3}{8}$ | 8d | B1 | B2 |
| | $\frac{15}{32}$ | $1\frac{1}{2}$ | 10d | C1 | C2 |
| Sheathing-rated | $\frac{5}{16}$ or $\frac{1}{4}$ | $1\frac{1}{4}$ | 6d | D1 | D2 |
| | $\frac{3}{8}$ | $1\frac{3}{8}$ | 8d | E1 | E2 |
| | $\frac{15}{32}$ | $1\frac{1}{2}$ | 10d | F1 ⁴ | F2 ⁴ |

For SI: 1 inch = 25.4 mm.

1. Refer to 2009 IBC Table 2306.3 and SDPWS Table 4.3A for additional information.
2. Refer to Sections 4.8.1 through 4.8.3 for testing requirements.
3. Testing on specimens identified as A1 and A2 is not required provided recognition of screw-connected shear walls with the combination of sheathing (Structural I, $\frac{5}{16}$ inch thick) and fastener (equivalent to 6d nail, $1\frac{1}{4}$ -inch penetration) is not sought by the evaluation report applicant.
4. Testing on specimens identified as F1 and F2 is not required provided recognition of screw connected shear walls with the combination of sheathing (sheathing rated, $\frac{15}{32}$ inch thick) and fastener (equivalent to 10d nail, $1\frac{1}{2}$ -inch penetration) is not sought by the evaluation report applicant.