ACCEPTANCE CRITERIA FOR PREFABRICATED WOOD SHEAR PANELS

AC130

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PREFACE

Evaluation reports issued by ICC Evaluation Service, Inc. (ICC-ES), are based upon performance features of the International family of codes and other widely adopted code families, including the Uniform Codes, the BOCA National Codes, and the SBCCI Standard 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.

Similar provisions are contained in the Uniform Codes, the National Codes, and the Standard Codes.

This acceptance criteria has been issued to provide all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the ICC-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from the previous edition, a solid vertical line (❙) in the margin within the criteria indicates a technical change, addition, or deletion from the previous edition. A deletion indicator (➜) is provided in the margin where a paragraph has been deleted if the deletion involved a technical change. This criteria may be further revised as the need dictates.

ICC-ES may consider alternate criteria, provided the report applicant submits valid 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. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria 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 an evaluation report, if the product, material, or type 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 unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

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ACCEPTANCE CRITERIA FOR PREFABRICATED WOOD SHEAR PANELS

1.0 INTRODUCTION

1.1 Purpose: The purpose of this criteria is to provide procedures for recognition of lateral (seismic and wind) racking loads on prefabricated wood shear panels in ICC-ES, Inc., evaluation reports. These reports consider the panels as alternatives to those described in the 2006 *International Building Code*® (IBC) and the 1997 *Uniform Building Code*™ (UBC). The reason for this criteria is the absence of referenced standards in the IBC that can be used to establish code compliance for prefabricated wood shear panels. Bases of this criteria are IBC Section 104.11 and UBC Section 104.2.8.

1.2 Scope:

1.2.1 This criteria applies to prefabricated wood shear-resisting wall assemblies used in conjunction with wood wall framing to resist lateral, vertical, and transverse loads. The scope is limited to assemblies in which a wood-based sheathing or structural composite lumber (SCL) material is the primary mechanism resisting in-plane shear loads, and wood-based material is designed to be the gravity load resisting elements. The prefabricated wood shear resisting wall assembly is configured in such a manner that their gravity load-carrying capacity is not compromised by the cyclic in-plane shear load tests of the prefabricated wood shear panels required in Section 5.0 of this criteria.

1.2.2 Prefabricated wood shear-resisting wall panels that exhibit failure modes that compromise the gravity load-carrying capacity of the vertical boundary members of the prefabricated panels, such as buckling of vertical load-carrying members, during the in-plane cyclic-lateral load tests required in Section 5.0 of this criteria, are specifically excluded from the scope of this acceptance criteria.

1.2.3 Panels with height-width ratios exceeding limits in Table 2305.3.4 of the IBC or Table 23-II-G of the UBC, may be permitted when these panels are qualified under this criteria.

1.3 Panel Justification:

1.3.1 All panels shall be justified by racking load tests as described in Section 5. Justification by this method limits panel use to sizes and materials used in the tests.

➜ **1.3.2** Justification for the ability of the panels to resist vertical and transverse loads (out-of-plane) is beyond the scope of this criteria. Nevertheless, substantiating data, in the form of calculations and/or load tests, must be submitted for these type of loads. Information regarding vertical and transverse load capacity will be included in the evaluation report.

1.4 Codes and Referenced Standards:

1.4.1 2006 *International Building Code*® (IBC), International Code Council.

1.4.2 1997 *Uniform Building Code*™ (UBC).

1.4.3 ASCE 7–05, Minimum Design Loads for Buildings and Other Structures, including Supplement No. 1 and excluding Chapter14 and Appendix 11A; American Society of Civil Engineers.

1.4.4 ASCE 16–95, Standard for Load and Resistance Factor Design (LRFD) for Engineered Wood Construction, American Society of Civil Engineers.

1.4.5 AF&PA NDS–05, National Design Specification® (NDS®) for Wood Construction with 2005 Supplement, American Forest & Paper Association.

1.4.6 ASTM E 2126-07, Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Walls for Buildings, ASTM International.

1.5 Definitions:

1.5.1 Prefabricated Assembly: A prefabricated assembly is a structural unit, the integral parts of which have been built up or assembled prior to incorporation in the building.

1.5.2 Prefabricated Wood Shear Panels (PWSP): Prefabricated assemblies (with wood-based elements and hold-down devices) designed and constructed to resist in-plane shear loads in walls.

1.5.3 Wood Shear-resisting Frame (WSRF): An assembly defined by one or more PWSP connected at the top to a horizontal beam having a known length and stiffness.

2.0 BASIC INFORMATION

2.1 Testing Laboratories: Testing laboratories shall comply with 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 Test Reports: Test reports shall comply with AC85.

2.3 Product Sampling: Components of the test assemblies shall be sampled in accordance with either Section 3.1 or 3.2 of AC85 as applicable.

3.0 PANEL DESCRIPTION

The panel description shall include the following information:

3.1 Dimensions: The width, height and length for each panel type.

3.2 Shear-resisting Material: The primary shear-resisting element of the prefabricated wood shear panels shall be either wood-based structural-use sheathing or SCL material that complies with a current evaluation report, a national product standard, the applicable code, or otherwise be justified to the satisfaction of ICC-ES. The material shall be clearly identified to determine compliance.

3.3 Wood-based Framing: When the primary shear-resisting element of the prefabricated wood shear panels is wood-based structural-use sheathing, the panels shall be fabricated with wood-based framing members complying with the following:

3.3.1 Framing material shall be minimum net $1^1/_2$ inches (38.1 mm) by 3 inches (76.2 mm), depending upon end use application.

3.3.2 Sawn lumber framing members shall comply with the applicable grading standards referenced in the code.

3.3.3 Proprietary wood-based material framing members, such as structural composite lumber, shall comply with applicable sections of the ICC-ES Acceptance Criteria for Wood-based Studs (AC202), and shall be recognized in a current ICC-ES evaluation report.

3.4 Connections: Connections shall be detailed or adequately described. Fasteners shall be properly specified, including fastener type, size, length and location. Panels shall be constructed with fasteners having approved values. Where no fastener values are recognized by the applicable code, data described in the ICC-ES Acceptance Criteria for Nails and Spikes (AC116) or the ICC-ES Acceptance Criteria for Alternate Dowel-type Threaded Fasteners (AC233) is required, as applicable. When used, independent hold-down devices shall be currently recognized in an ICC-ES evaluation report or shall comply with the ICC-ES Acceptance Criteria for Hold-downs (Tie-downs) Attached to Wood Members (AC155). Results of the hold-down tests shall be used in the analysis of the PWSP.

4.0 MISCELLANEOUS PANEL INFORMATION

4.1 Field-cutting of Panels: Field-cutting the panels for wall openings is not permitted except as noted in Section 4.3.

4.2 Field Modification for Framing Members: Holes and notches may be installed in the panels at predetermined locations only. Testing shall include the appropriate size and location of hole(s) and notch(es) as intended for the end use. Holes are not permitted to be greater in diameter than 40 percent of the framing member width, and notches are not permitted to be greater than 25 percent of the framing member width. The ICC-ES evaluation report shall state the limitations for hole and notch sizes and locations ascertained by testing.

4.3 Field Modification for Sheathing: Field modification of sheathing will be permitted for field cutting only at predetermined locations. Testing shall include the appropriate size and location of hole(s) and notch(es) as intended for end use. The ICC-ES evaluation report shall state the limitations for hole and notch sizes and locations ascertained by testing.

4.4 Structural Field Connections: Structural connections between the wall and the structure, made in the field at the time of installation, shall be consistent with the intent of this criteria and necessary for installation of the walls. If there is a field-installed structural header that forms a part of the structural wall system to resist lateral forces (other than simply acting as a collector), and this header is composed of solid sawn lumber (not an engineered wood product), then documentation must be provided to the building official to show that the moisture content of the sawn lumber header is less than 19 percent at the time of installation.

4.5 Weather Protection: Prefabricated wood shear panels used on weather-exposed surfaces, as defined in IBC Section 202, shall be provided with a weather-resistant exterior wall envelope complying with IBC Section 1403.2. Prefabricated wood shear panels used on weather-exposed surfaces, as defined in UBC Section 224, shall be protected by a weather-resistive barrier and an approved wall covering material.

5.0 PANEL LOAD TESTS

5.1 In-plane Cyclic Shear Load Tests: In order to comply with AC130, cyclic shear tests in accordance with the *Standard Method of Cyclic (Reversed) Test for Shear Resistance of Framed Walls for Buildings*, by the Structural Engineers Association of Southern California (SEAOSC), dated August 1, 1996 (revised January 20, 1997), are required, with the following modifications to the SEAOSC document:

1. Section 1.3 of SEAOSC is deleted and replaced by Section 2.1 of these criteria.

2. Section 5.2 of SEAOSC is deleted.

3. Section 5.4 of SEAOSC is supplemented by the following statement: Extrapolation of test results to other panels is not permitted. Interpolation of test results is permitted if the wall is of identical material and the aspect (height/length) ratio falls between the aspect ratios of the known tests being used for interpolation. Additionally, interpolation of test results is not permitted unless it is performed using the shape of a best fit curve as defined from the data points of at least three series of tests at differing aspect ratios

4. Section 7.1 of SEAOSC is replaced by the following statements: Three tests of each type are required. To apply the average result, none of the results shall vary by more than 15 percent from the average of the three. Otherwise, the lowest test value is used. The average result based on a minimum of five tests may also be used, whatever the variations.

5. Section 7.4 of SEAOSC is supplemented by the following statement: If the panel has not failed at the end of 450% of FME, then additional cycles shall be added at 100% FME increments as needed.

6. As an acceptable alternative to Section 7.3 and 7.4 of SEAOSC, prefabricated shear panels shall be tested according to the CUREE procedures described in Figure 1 and Table 1 of this criteria. For Table 1 and Figure 1, Δ shall not exceed 2.5% of the panel height. If the panel has not failed at the end of the 40 cycles of Table 1, then additional cycles shall be added. Each progressive primary cycle added shall include an increase of 0.5Δ over the previous primary cycle. Two trailing cycles shall follow each primary cycle added with a magnitude 75% of the primary cycle. Appendix A provides additional guidance on this alternative test procedure.

7. Section 8 of SEAOSC is nonmandatory.

8. Horizontal wall displacement during cyclic-load testing (SEAOSC–SPD or CUREE) need not exceed the minimum of the following: (a) a displacement corresponding to 80 percent post-peak strength; (b) a displacement corresponding to the peak strength if the ratio of the displacement at peak strength to the displacement at ASD design load is equal to or greater than 11; or (c) a displacement corresponding to 6 percent of the wall height.

5.1.1 General: The testing and reporting shall comply with Section 2.0 of these criteria. No substitution of materials is allowed unless permitted by ICC-ES.

5.1.2 Test Setup: In order to comply with AC130, cyclic shear tests in accordance with Section 5.1 of these criteria shall be conducted on support conditions reflective of the intended use, i.e., rigid or flexible.

5.1.2.1 Foundation-On-Grade: Walls intended to be installed on a foundation-on-grade condition shall be tested on a rigid base.

5.1.2.2 First Floor Raised Floor: Walls intended to be installed on the first floor of a structure with a crawl space foundation shall be tested by placing the walls over a representative floor system constructed on a rigid base.

5.1.2.3 Second Floor: Walls intended to be installed over the second floor of a structure shall be tested by placing the wall on a representative floor system constructed over a representative wall system, all of which is supported by a rigid base.

5.1.2.4 Representative Systems: A floor or wall system shall be considered representative if it is constructed in such a way that the stiffness and strength are similar to that which is expected to be encountered in typical usage. The use of less than full height stud systems under the second floor platforms, and the use of floors constructed with short members, is acceptable. Qualifying the wall performance for all floor framing alternatives is not required. Secondary connections required to transfer shear and overturning through the floor system shall also be constructed with materials and methods typical for the end use. The representative floor/wall systems, as well as the materials and methods for shear and overturning continuity, shall be fully detailed in the test report. Additionally, the ICC-ES evaluation report shall specify these details or other equivalent details.

5.1.2.5 Initial Pretension of Overturning Restraint: If perpendicular-to-grain stress is involved in transferring overturning forces produced by the wall to the foundation, then the overturning restraint device pretension shall not exceed 500 pounds (2,225 N). If overturning restraint device tension is not being monitored, then nuts securing the device against uplift shall be tightened to a condition of finger tight plus a $^1/_8$ turn.

5.1.2.6 System Effects: If the assembly is defined as a WSRF, then tests of systems including structural members representative of in-service conditions shall be performed. Tests used to qualify allowable strengths shall be based on the minimum assembly stiffness that will be recognized for the application. Headers selected for testing shall have a stiffness that defines the lower bound of the range recognized for the application.

5.1.2.7 Load Beam: To the extent practicalble, the load beam shall be minimized with regard to its mass, length, and stiffness. The load beam shall not contribute to the strength and stiffness of the tested assembly.

5.1.2.8 Prefabricated Shear Panels: When the primary shear-resisting element of the prefabricated wood shear panels is wood-based structural-use sheathing, the sheathing shall not bear on the top or bottom fixtures of the test frame.

5.1.2.9 Anchor Bolts: The strength and stiffness of anchor bolts shall be representative of the anchor bolts used in actual field construction as recommended by the manufacturer.

5.1.2.10 Shrinkage Effects: For prefabricated wood shear panels installed on wood framing, the effects of shrinkage shall be considered.

5.1.3 Panel Analysis—2006 IBC Allowable Loads:

5.1.3.1 Allowable Stress Design: The Allowable Stress Design (ASD) load for the test sample shall be the lesser of the allowable loads based on a drift limit or strength limit, determined as follows:

5.1.3.1.1 Drift Limit (Seismic): The ASD load which satisfies the drift limit requirements of Section 12.8.6 of ASCE 7 as referenced in IBC Section 1613.1 shall be computed as follows:

(a) Maximum inelastic response displacement, δ_x, shall be defined as either the inelastic drift limit defined in Section 12.12.1 and Table 12.12-1 of ASCE 7, or the mean displacement at the Strength Limit State of the tested wall assemblies, Δ_{SLS}, whichever is smaller.

(b) Using δ_x determined above and the assigned C_d factor(see Section 5.2.1), the Strength Design (LRFD) level response displacement, δ_{xe}, shall be calculated based on formula (12.8-15) of ASCE 7, assuming an importance factor, I, equal to 1.0. For other importance factors, δ_{xe} shall be adjusted accordingly.

(c) From the first-cycle backbone curve of the cyclic-load testing, the force corresponding to δ_{xe} shall be determined. This corresponds to a Strength-level factored resistance.

(d) The strength-level factored resistance shall be converted to an ASD level resistance by multiplying it by 0.7 for use with the load combinations of Section 1605.3 of the IBC.

(e) The drift corresponding to the ASD resistance load derived in item (d) shall be derived from the first-cycle backbone curve and included in the evaluation report.

5.1.3.1.2 Drift Limit (Wind): The ASD load shall be equal to the load derived from the first-cycle backbone curve at a deflection of $^H/_{180}$, where H is equal to the the height of the tested assembly.

5.1.3.1.3 Strength Limit (Wind and Seismic): The ASD load based on the strength of the PWSP and WSRF shall be derived by dividing the ultimate test loads, as determined by Section 5.1 of this acceptance criteria, by a factor of safety of 2.5 for seismic forces and 2.0 for wind forces. The drift corresponding to this allowable load capacity shall be derived from the first-cycle backbone curve.

5.1.3.2 Load and Resistance Factor Design: The values from the test may be used as the adjusted reference resistance (D') values when used in accordance with Section 14.3.3 of the NDS. The adjusted reference resistance (D') value is not permitted to exceed the ASD load determined in accordance with Section 5.1.3.1 of this criteria by a factor of 1/0.7.

5.1.4 Panel Analysis—1997 UBC Allowable Loads:

5.1.4.1 Allowable Stress Design (ASD): The ASD load for the test sample shall be the lesser of the allowable loads based on a drift limit or strength limit, determined as follows:

5.1.4.1.1 Drift Limit (Seismic): The ASD load which satisfies the drift limit requirements of UBC Section 1630.9.2 shall be computed as follows:

(a) Maximum inelastic response displacement, Δ_m, shall be defined as either the inelastic drift limit defined in UBC Section 1630.10.2, or the mean displacement at the Strength Limit State of the tested wall assemblies, Δ_{SLS}, whichever is smaller.

(b) Using Δ_m determined above and the assigned R factor, the Strength Design level response displacement, Δ_s, shall be calculated based on UBC equation 30-17.

(c) From the first-cycle backbone curve of the cyclic-load testing, the force corresponding to Δ_s shall be determined. This corresponds to a Strength-level factored resistance.

(d) In accordance with Section 1612.3 of the UBC, this Strength-level factored resistance shall then be divided by a factor of 1.4 to determine the appropriate ASD level resistance.

(e) The drift corresponding to the ASD resistance load derived in item (d) shall be derived from the first-cycle backbone curve and included in the evaluation report.

5.1.4.1.2 Drift Limit (Wind): The ASD load shall be equal to the load derived from the first-cycle backbone curve at a deflection of $^{H}/_{180}$, where H is equal to the the height of the tested assembly.

5.1.4.1.3 Strength Limit (Wind and Seismic): The ASD load based on the strength of the PWSP and WSRF shall be derived by dividing the ultimate test load, as determined by Section 5.1 of this acceptance criteria, by a factor of safety of 2.5 for seismic forces and 2.0 for wind forces. The drift corresponding to this allowable load capacity shall be derived from the first-cycle backbone curve.

5.1.4.2 Load and Resistance Factor Design: The values from the test may be used as the adjusted resistance (D') values when used in accordance with ASCE 16-95, Standard for Load and Resistance Factor Design (LRFD) for Engineered Wood Construction. The design load determined using this approach is not permitted to exceed the ASD load determined in accordance with Section 5.1.4.1 of this criteria multiplied by a factor of 1.4.

5.2 Seismic Design Compatibility with a Code-defined Seismic-force Resisting System:

5.2.1 Prefabricated wood shear panels may be used as components within a seismic-force resisting system consisting of light-framed load-bearing wood walls sheathed with wood-based structural-use panels rated for shear resistance, and be assigned the following response modification coefficient, R, system overstrength factor, Ω_0, and deflection amplification factor, C_d, provided compliance with the evaluation parameters specified in Sections 5.2.2, 5.2.3, and 5.2.4 is established:

IBC:

Response Modification Coefficient: $R = 6^1/_2$

System Overstrength Factor: $\Omega_0 = 3$

Deflection Amplification Factor: $C_d = 4$

UBC:

Response Modification Coefficient: $R = 5^1/_2$

System Overstrength Factor: $\Omega_0 = 2.8$

Deflection Amplification Factor: Not Applicable.

5.2.1.1 The evaluation parameters specified in Sections 5.2.2, 5.2.3, and 5.2.4 are based on data derived from testing using the CUREE protocol, and may be used for comparison with walls tested using either the SEAOSC (SPD) or CUREE test method. Test results from SPD and CUREE shall not be mixed for purposes of determining compliance to evaluation parameters specified in Sections 5.2.2, 5.2.3 and 5.2.4.

5.2.1.2 The evaluation procedure set forth in Section 5.2 is intended for determining equivalency of a specific set of seismic-design coefficients and factors (R, Ω_0, and C_d) only; it is not intended to negate the provisions for ASD load value derivation in other sections of this criteria.

5.2.2 The lower bound on the ratio of the displacement at the post-peak load to the displacement at the assigned ASD design load:

$$\frac{\Delta_U}{\Delta_{ASD}} \geq 11$$

where:

Δ_{ASD} = The displacement at the ASD design load developed in Section 5.1.3.1.1 (IBC) or Section 5.1.4.1.1 (UBC) of this criteria, as applicable.

Δ_U = The ultimate displacement taken from the backbone curve corresponding to an absolute load having no more than 20 percent strength degradation of the post-peak load data point (See Sections 3.2.6 and 3.2.12 of ASTM E 2126).

5.2.3 The minimum post-peak displacement shall be in accordance with the following:

$$\Delta_U \geq 0.028H$$

where:

H = The height of the prefabricated wall panel

Δ_U = The displacement taken as a post-peak point on the backbone curve with no more than 20 percent strength degradation (see Section 3.2.13 of ASTM E 2126).

5.2.4 The ratio of peak strength to the assigned ASD design load shall be in accordance with the following:

$$2.5 \leq \frac{P_{peak}}{P_{ASD}} \leq 5.0$$

where:

P_{peak} = The peak strength of the prefabricated wood shear panel.

P_{ASD} = The assigned ASD design load developed in accordance with Sections 5.1.3 or 5.1.4 of this criteria, as applicable.

The ratio of peak load capacity to ASD design capacity may exceed 5.0 provided the evaluation report includes a requirement that collectors and their connections, bearing and anchorage of the panel, and the lateral load path to the panel are designed in accordance with the special load combinations of Section 12.4.3 of ASCE 7, using E_m, where E_m is calculated using the test panel overstrength.

6.0 PANEL IDENTIFICATION

PWSPs and WSRFs shall bear the fabricator's name and address, the panel's product name and model number, evaluation report number, quality control agency name and other information deemed necessary by ICC-ES. The identification shall be visible after the panels are installed. Exterior panels must have the exterior face clearly identified.

7.0 QUALITY CONTROL

7.1 The products shall be manufactured under an approved quality control program with inspections by an inspection agency accredited by the International Accreditation Service (IAS) or as otherwise acceptable to ICC-ES.

7.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Control Documentation (AC10) shall be submitted.

7.3 When PWSPs and WSRFs are installed in jurisdictions governed by the IBC, periodic special inspections in Seismic Design Categories C, D, E, or F shall be provided for nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system, including connections of the PWSPs and WSRFs to drag struts and hold-downs, in accordance with IBC Section 1707.3.■

TABLE 1—CUREE BASIC LOADING HISTORY FOR PREFABRICATED SHEAR PANELS

CYCLE NO.	%Δ
123456	5.0 5.0 5.0 5.0 5.0 5.0
78910111213	7.5 5.6 5.6 5.6 5.6 5.6 5.6
14151617181920	10 7.5 7.5 7.5 7.5 7.5 7.5

CYCLE NO.	%Δ
21222324	20151515
25262728	30232323
293031	403030
323334	705353
353637	1007575
383940	150113113

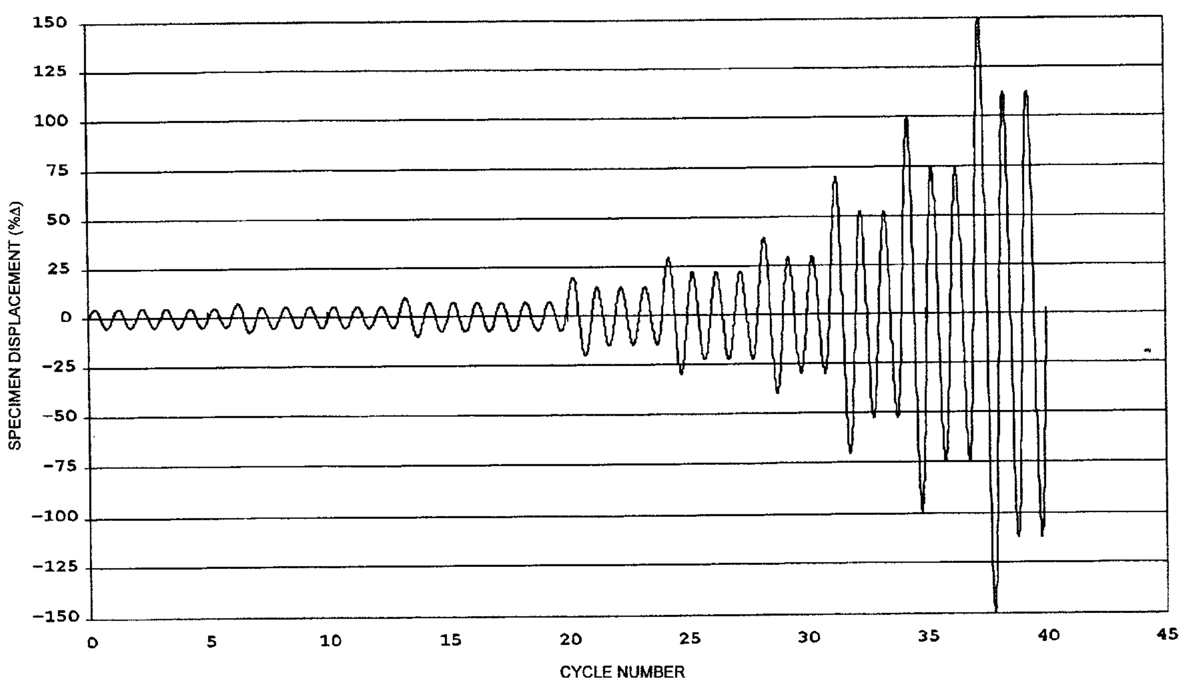

FIGURE 1—CUREE BASIC LOADING HISTORY FOR PREFABRICATED SHEAR PANELS

APPENDIX A

METHOD OF CONDUCTING PANEL LOAD TESTS PER CUREE BASIC LOADING PROTOCOL

Section 5.1.5, Table 1 and Figure 1 are intended to provide an alternative loading protocol to the sequential phase displacement (SPD) loading protocol specified in *Standard Method of Cyclic (Reversed) Test for Shear Resistance of Framed Walls for Buildings*, by the Structural Engineers Association of California (SEAOSC). The alternative loading protocol was developed as part of the CUREE/Caltech Woodframe project (Krawinkler et at., 2000, Sections 1.1, 1.3, and 1.4, and Figure 1).

The basic loading protocol was developed "based on results of nonlinear dynamic analysis of representative hysteretic systems subjected to sets of ordinary . . . ground motions." The process of development the loading protocol had an intended objective that testing would be representative of the seismic demands imposed on components for (1) Ordinary ground motions that represent design events envisioned by present code and (2) Multiple earthquakes occurring in the lifetime of the structure." (Krawinkler et al., 2000) The objectives of the development of the CUREE protocol are consistent with the scope of AC130.

The specimen fabrication "should be configured so that the specimen boundary conditions and load application simulate in-situ conditions as closely as possible." (Krawinkler et al., 2000) Therefore, specimen fabrication, test setup, and instrumentation, shall follow *Standard Method of Cyclic (Reversed) Test for Shear Resistance of Framed Walls for Buildings*, by the Structural Engineers Association of California (SEAOSC), with the modifications outlined in Section 5.1 of this acceptance criteria.

The CUREE loading protocol is based upon a percentage of ultimate deformation capacity of monotonic tests. The monotonic tests shall be conducted with similar boundary conditions to the cyclic tests. The loading protocol for the monotonic tests shall follow ASTM Standard E 564.

References

1. American Society for Testing and Materials, 2000. Standard Practice for Static Load Tests for Shear Resistance of Framed Walls for Buildings, E 564-95. West Conshohocken, Pennsylvania.

2. H. Krawinkler, F. Parisi, L. Ibarra, A Ayoub, and R. Medina, 2000. *Development of a Testing Protocol for Woodframe Structures*, Report W-02 covering Task 1.3.2, CUREE/Caltech Woodframe Project. Consortium of Universities for Research in Earthquake Engineering (CUREE), Richmond, California.