ICC EVALUATION SERVICE

ICC Evaluation Service, Inc.
Los Angeles Business/Regional Office
5360 Workman Mill Road
Whittier, CA 90601
tel: 562.699.0543
fax: 562.695.4694
www.icc-es.org

April 30, 2009

TO: **PARTIES INTERESTED IN EVALUATION REPORTS ON STRUCTURAL WOOD-BASED PRODUCTS**

SUBJECT: Proposed Revisions to the Acceptance Criteria for Structural Wood-Based Products, Subject AC47-0609-(KS/JS),

Hearing Information:
Wednesday, June 3, 2009
8:00 a.m.
DoubleTree Hotel
808 South 20th Street
Birmingham, Alabama 35205
(800) 222-8733

Dear Madam or Sir:

ICC-ES has received an application for recognition of a laminated veneer bamboo (LVB) type of product. It is proposed that the following revisions be made to the subject criteria to accommodate the new product:

1. Revise Section 1.2 to add: “For purposes of this criteria, laminated veneer bamboo (LVB) is considered to be a wood-based product.”

2. Add a new Section 3.7 on Laminated Veneer Bamboo (LVB).

3. Add a new Section 3.7.1. In addition to other information and data requirements noted in this criteria, the following shall apply to LVB:

   3.7.1.1 Creep and duration of load (DOL) testing shall be conducted in accordance with ASTM D6815.

   3.7.1.2 Dimensional stability testing shall be in accordance with Section 5.3.2.1-a of PS 2.

   3.7.1.3 Lateral edge nail durability testing shall be conducted in accordance with Section 6.8.2 of ASTM D5456 -05a.

3.7.1.4 Thickness swell testing shall be conducted in accordance with Section 6.9.1 of ASTM D5456-05a.

3.7.1.5 Adhesives shall be tested in accordance with the alternative method noted in Section 4.2 of ASTM D5456.

3.7.1.6 Tests shall be conducted to verify that the specified spacing of nails of various diameters is adequate to prevent splitting. Details of the test shall be discussed with the ICC-ES staff prior to the test's being conducted.

Comments are requested on whether the additional testing noted in proposed Section 3.7.1 of the subject criteria is appropriate for the LVB.

A copy of the current AC47 with the proposed changes is enclosed.

You are cordially invited to submit written comments on agenda items, or to attend the Evaluation Committee hearing and present verbal comments. If you wish to contribute to the hearing, please note the following:

1. Written comments that are received by the Los Angeles business/regional office by **May 19, 2009,** will be forwarded to the committee prior to the hearing, and will be posted on the ICC-ES web site shortly after the comment deadline.

2. Written comments received up to ten days before the meeting, and staff memos responding to comments, will be posted to the web site on **May 29, 2009**.

3. ICC-ES is no longer providing printed copies at the meeting of proposed acceptance criteria, staff memos or public comments. These documents will be available on a limited number of CDs at the meeting, for uploading to computers; and ICC-ES will make arrangements with the hotel business center to have hard copies available for photocopying.

4. Written comments that miss the deadline noted in item (1), above, will only be available at the meeting if you provide 35 copies, collated, stapled, and three-hole punched, either at the meeting itself or to the Los Angeles business/regional office by **May 29, 2009**.

5. If you plan to speak for more than 15 minutes, or offer a visual presentation lasting longer, you should notify ICC-ES staff as far as possible in advance. There will be a computer, projector, and screen available at the meeting for anyone wishing to make a visual presentation, and presentations in most cases will need to be in PowerPoint format. Also, ICC-ES will need to be provided with your presentation at least a half-hour before the start of the relevant meeting session (morning or afternoon) on either a CD or a flash card.

6. If you have any special needs related to a presentation, you should contact ICC-ES staff well in advance of the meeting.

7. Any visual aids for viewing at committee meetings (charts, overhead transparencies, slides, videos, electronic presentations, etc.) will be permitted only if a copy is provided to ICC-ES, before the presentation, in a medium that can be retained with other records of the meeting.

8. Any materials submitted for committee consideration are considered nonconfidential and available for public discussion, as noted in Section 2.7 of the ICC-ES Rules of Procedure for the Evaluation Committee.

9. Prior to the meeting, you should refrain from trying to communicate directly with committee members about agenda items, either verbally or in writing. Committee members reserve the right to refuse such communications.

Your cooperation with these guidelines is much appreciated, as is your interest in the deliberations of the Evaluation Committee. If you have any question, please contact the undersigned at (800) 423-6587, extension 3721, or Jason Smart, Senior Evaluation Specialist, at extension 5250. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,

Kurt Stochlia
Vice-President, External Operations

KS/gh

Enclosures

cc: Evaluation Committee

ICC EVALUATION SERVICE, INC.,
RULES OF PROCEDURE FOR THE EVALUATION COMMITTEE

1.0 PURPOSE

The purpose of the Evaluation Committee is to monitor the work of ICC-ES, in issuing evaluation reports; to evaluate and approve acceptance criteria on which evaluation reports may be based; and to sponsor related changes in the applicable codes.

2.0 MEETINGS

2.1 The Evaluation Committee shall schedule meetings that are open to the public in discharging its duties under Section 1, subject to Section 3.

2.2 All scheduled meetings shall be publicly announced.

2.3 Two-thirds ($^2/_3$) of the voting Evaluation Committee members shall constitute a quorum. A majority vote of members present is required on any action.

2.4 In the absence of the nonvoting chairman-moderator, Evaluation Committee members present shall elect an alternate chairman from the committee for that meeting. The alternate chairman shall be counted as a voting committee member for purposes of maintaining a committee quorum and to cast a tie-breaking vote of the committee.

2.5 Minutes of the meetings shall be kept.

2.6 An electronic audio record of meetings shall be made by ICC-ES; no other audio, video, electronic or stenographic recordings of the meetings will be permitted. Visual aids (including, but not limited to, charts, overhead transparencies, slides, videos, or presentation software) viewed at meetings shall be permitted only if the presenter provides ICC-ES before presentation with a copy of the visual aid in a medium which can be retained by ICC-ES with its record of the meeting and which can also be provided to interested parties requesting a copy. A copy of the ICC-ES recording of the meeting and such visual aids, if any, will be available to interested parties upon written request made to ICC-ES together with a payment as required by ICC-ES to cover costs of preparation and duplication of the copy. These materials will be available beginning five days after the conclusion of the meeting but will no longer be available after one year from the conclusion of the meeting.

2.7 Parties interested in the deliberations of the committee should refrain from communicating, whether in writing or verbally, with committee members regarding agenda items. All written communications and submissions regarding agenda items should be delivered to ICC-ES. All such written communications and submissions shall be considered nonconfidential and available for discussion in open session of an Evaluation Committee meeting, and shall be delivered at least ten days before the scheduled Evaluation Committee meeting if they are to be forwarded to the committee. Materials delivered to ICC-ES at least ten days before the scheduled meeting will be posted on the ICC-ES web site (www.icc-es.org) prior to the meeting. After this time, parties wishing to submit materials for consideration by the Evaluation Committee must deliver a sufficient number of copies as directed by ICC-ES. Consideration of materials not received by ICC-ES at least ten days before the meeting is at the discretion of the Evaluation Committee. Following the meeting, ICC-ES will make all materials considered by the Evaluation Committee available on the web site for a maximum period of one year following the meeting. The committee reserves the right to refuse recognition of communications which do not comply with the provisions of this section.

3.0 CLOSED SESSIONS

Evaluation Committee meetings shall be open except that the chairman may call for a closed session to seek advice of counsel.

4.0 ACCEPTANCE CRITERIA

4.1 Acceptance criteria are established by the committee to provide a basis for issuing ICC-ES evaluation reports on products and systems under codes referenced in Section 2.0 of the Rules of Procedure for Evaluation Reports. They also clarify conditions of acceptance for products and systems specifically regulated by the codes.

Acceptance criteria may involve a product, material, method of construction, or service. Consideration of any acceptance criteria must be in conjunction with a current and valid application for an ICC-ES evaluation report, an existing ICC-ES evaluation report, or as otherwise determined by the Evaluation Committee.

4.2 Procedure:

4.2.1 Proposed acceptance criteria shall be developed by the ICC-ES staff and discussed in open session with the Evaluation Committee during a scheduled meeting, except as permitted in Section 5.0 of these rules.

4.2.2 Proposed acceptance criteria shall be available to interested parties at least 30 days before discussion at the committee meeting.

4.2.3 The committee shall be informed of all pertinent written communications received by ICC-ES.

4.2.4 Attendees at Evaluation Committee meetings shall have the opportunity to speak on acceptance criteria listed on the meeting agenda, to provide information to committee members.

4.3 Approval of acceptance criteria shall be as specified in Section 2.3 of these rules.

4.4 Actions of the Evaluation Committee may be

appealed in accordance with the ICC-ES Rules of Procedure for Appeal of Acceptance Criteria or the ICC-ES Rules of Procedure for Appeals of Evaluation Committee Technical Decisions.

5.0 COMMITTEE BALLOTING FOR ACCEPTANCE CRITERIA

5.1 Acceptance criteria may be issued without a public hearing following a 30-day public comment period and a majority vote for approval by the Evaluation Committee when, in the opinion of ICC-ES staff, one or more of the following conditions have been met:

1. The subject is nonstructural, does not involve life safety, and is addressed in nationally recognized standards or generally accepted industry standards.

2. The subject is a revision to an existing acceptance criteria that requires a formal action by the Evaluation Committee, and public comments raised were resolved by staff with commenters fully informed.

3. Other acceptance criteria and/or the code provide precedence for the revised criteria.

5.2 Negative votes must be based upon one or more of the following, for the ballots to be considered valid and require resolution:

a. *Lack of clarity*: There is insufficient explanation of the scope of the acceptance criteria or insufficient description of the intended use of the product or system; or the acceptance criteria is so unclear as to be unacceptable. (The areas where greater clarity is required must be specifically identified.)

b. *Insufficiency*: The criteria is insufficient for proper evaluation of the product or system. (The provisions of the criteria that are in question must be specifically identified.)

c. *The subject of the acceptance criteria is not within the scope of the applicable codes*: A report issued by ICC-ES is intended to provide a basis for approval under the codes. If the subject of the acceptance criteria is not regulated by the codes, there is no basis for issuing a report, or a criteria. (Specifics must be provided concerning the inapplicability of the code.)

d. *The subject of the acceptance criteria needs to be discussed in a public hearings*. The committee member requests additional input from other committee members, staff or industry.

5.3 An Evaluation Committee member, in voting on an acceptance criteria, may only cast the following ballots:

- Approved
- Approved with Comments
- Negative: Do Not Proceed

6.0 COMMITTEE COMMUNICATION

Direct communication between committee members, and between committee members and an applicant or concerned party, with regard to the processing of a particular acceptance criteria or evaluation report shall take place only in a public hearing of the Evaluation Committee. Accordingly:

6.1 Committee members receiving an electronic ballot should respond only to the sender (staff). Committee members who wish to discuss a particular matter with other committee members, before reaching a decision, should ballot accordingly and bring the matter to the attention of ICC-ES staff, so the issue can be placed on the agenda of a future committee meeting.

6.2 Committee members who are contacted by an applicant or concerned party on a particular matter that will be brought to the committee will refrain from private communication and will encourage the applicant or concerned party to forward their concerns through the ICC-ES staff in writing, and/or make their concerns known by addressing the committee at a public hearing, so that their concerns can receive the attention of all committee members.■

Effective March 18, 2008

ICC EVALUATION SERVICE

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR STRUCTURAL WOOD-BASED PRODUCTS

AC47

Proposed April 2009

Previously approved October 2006, October 2004, February 2004, June 2003,September 1997, May 1995, September 1995

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.

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 proposed in this document, and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria proposed in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise meet the applicable performance requirements 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 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.

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

PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR STRUCTURAL WOOD-BASED PRODUCTS

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish minimum requirements for recognition of structural wood based products in evaluation reports under Sections 104.11 and 2303.1.9 of the 2006 *International Building Code*® (IBC), Sections 106.4 and 2303.4 of the BOCA® *National Building Code*/1999 (BNBC), Section 103.7 of the 1999 *Standard Building Code*© (SBC) and Section 104.2.6 of the 1997 *Uniform Building Code*™ (UBC). Chapters 5, 6 and 8 of the 2006 *International Residential Code*® (IRC) are applicable to the structural wood-based product covered in this criteria.

The criteria utilizes ASTM D 5456 and AC202 as the basis for recognition of the structural wood-based products.

1.2 Scope: The structural wood-based products are used as an alternative to sawn lumber for wall, floor and roof structural members. The structural wood-based products covered by this criteria are limited to solid rectangular members or hollow members of varying shapes fabricated from solid rectangular laminations.

For purposes of this criteria, laminated veneer bamboo (LVB) is considered to be a wood-based product.

~~Structural wood-based products are limited to structural composite lumber defined in ASTM D 5456 and the products described in Sections 3.4, 3.5 and 3.6 in this criteria.~~

1.3 Codes and Reference Standards:

1.3.1 2006 *International Building Code*® (IBC), International Code Council.

1.3.2 2006 *International Residential Code*® (IRC), International Code Council.

1.3.3 BOCA® *National Building Code*/1999 (BNBC).

1.3.4 1999 *Standard Building Code*© (SBC).

1.3.5 1997 *Uniform Building Code*™ (UBC).

1.3.6 ASTM D 2559-04, Standard Specification for Adhesive for Structural Laminated Wood Products for Use under Exterior (Wet Use) Exposure Conditions, ASTM International.

1.3.7 ASTM D 3737-04, Standard Practice for Establishing Stresses for Structural Laminated Timber (Glulam), ASTM International.

1.3.8 ASTM D 5456-03, Standard Specification for Evaluation of Structural Composite Lumber Products, ASTM International.

1.3.9 ASTM D 5764-97a, Standard Test Method for Evaluating Dowel-Bearing Strength of Wood and Wood-based Products, ASTM International.

1.3.10 ASTM D 6815-02a, Standard Specification for Evaluation of Duration of Load and Creep Effects of Wood and Wood-Based Products, ASTM International.

1.3.11 AF&PA NDS-05, Wood Construction and Supplement, American Forest and Paper Association.

1.3.12 Department of Commerce Voluntary Product Standard PS 2-92.

1.3.13 ICC-ES Acceptance Criteria for Test Reports and Product Sampling (AC85).

1.3.14 ICC-ES Acceptance Criteria for Wood-based Rim Board Products (AC124).

1.3.15 ICC-ES Acceptance Criteria for Wood-based Studs (AC202).

1.3.16 ICC-ES Acceptance Criteria for Quality Control Manuals (AC10).

1.4 Definition: Structural wood-based products are limited to structural composite lumber defined in ASTM D 5456 and the products described in Sections 3.4, 3.5 , 3.6 and 3.7 in this criteria.

2.0 BASIC INFORMATION

2.1 Testing Laboratories, Reports of Tests and Product Sampling:

2.1.1 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.

2.1.2 Test reports shall comply with AC85. All reports shall be issued by an accredited testing laboratory. Tests conducted at a manufacturer's facility shall be under the control of and witnessed by an accredited testing laboratory. The manufacturer's test facility is considered a subcontractor of the accredited laboratory. The accredited laboratory shall ensure that the relevant requirements of Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports are fulfilled.

2.1.3 Specimen Sampling Methods: Specimen sampling methods shall comply with Section 3.1 of AC85 and Section 6.2 of ASTM D 5456.

2.1.4 Specimen Description: Measured dimensions shall be recorded for each specimen in accordance with the degree of accuracy specified in the ASTM standards. Additionally, statements are needed indicating whether specimens were produced in accordance with the minimum requirements of the approved quality control manual.

2.1.5 Test Results: In addition to the requirements noted in ASTM D 5456, the failure mode for each specimen shall be described.

2.1.6 Test Conclusions: Test results shall be limited to species, thickness of veneers or laminations and grade of veneers or laminations used in specimens tested, unless additional data is submitted which justifies extrapolation of test results to a range of material composition.

2.1.7 Use of structural wood-based products for load bearing studs, shear wall and fire-resistive applications requires additional considerations beyond those noted in ASTM D 5456 and this criteria.

See AC202 for additional details involving load bearing studs and shear wall applications.

3.0 TEST PERFORMANCE AND ANALYSIS

3.1 General: Testing and analysis of data shall be in accordance with ASTM D 5456, to determine design values for bending strength and stiffness, tensile strength parallel to grain, compressive strength perpendicular to grain, compression parallel to grain and longitudinal shear strength, unless noted otherwise in this criteria.

3.2 Connections: Connection tests, in addition to those required in Section 3.2.1 and 3.2.2 of this criteria, must be conducted on each product having different wood species. In addition, each grade shall be tested unless recognition of fasteners is based on the tests of the lowest grade. Details of the test shall be discussed with the ICC-ES staff prior to commencing the tests.

3.2.1 Withdrawal Capacity of Nails: Withdrawal capacity testing and analysis must be in accordance with appropriate sections of Annex 2 to ASTM D 5456.

3.2.2 Lateral Load Capacity of Fasteners (Dowel Bearing Strength): For lateral load capacity of fasteners, dowel bearing strength tests shall be conducted in accordance with this section and ASTM D 5764. The analysis of data shall be in accordance with Annex A2 of ASTM D 5456.

3.3 Structural Composite Lumber (SCL): Structural composite lumber shall comply with ASTM D 5456 and the applicable sections in this criteria.

3.4 Alternative Strand Lumber:

3.4.1 Oriented Strand Lumber (OSL): Oriented strand lumber evaluated under this criteria is defined as a composite of wood strands with wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not exceed 0.25 inch and the average length shall be between 75 and 150 times the least dimension.

3.4.2 Steam-pressed Scrim Lumber (SPSL): Steam-pressed scrim lumber evaluated under this criteria is defined as a composite of wood scrims (matts of wood strands) obtained through crushing small-diameter logs and glued together in a steam-injection press so that the wood fibers are primarily oriented along the length of the member. The least dimension of the strands in the scrim shall not exceed $^3/_4$ inch (19 mm). The average length of the strand shall be greater than 20 times their least dimension.

3.4.3 In addition to the other information and data requirements noted in this criteria, the following shall apply to OSL and SPSL:

3.4.3.1 Creep and duration of load (DOL) testing shall be conducted in accordance with ASTM D 6815.

3.4.3.2 The material shall be tested in accordance with and meet the thickness swell requirements noted in Section 4.2 of AC124.

3.4.3.3 The material shall meet the bond durability requirements noted in Sections 5.5.3.1(b), 5.5.3.3 and 5.5.3.5 of PS-2.

3.4.3.4 Additional connection tests shall be conducted in accordance with Section 4.3 of AC124.

3.4.3.5 The adhesive shall comply with ASTM D 2559.

3.4.4 Triangular Strand Lumber (TSL): Triangular strand lumber is similar to SCL defined in ASTM D 5456, except that TSL is a composite of wood strands of substantially equilateral triangular cross section with the wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not be less than 0.25 inch (6.4 mm) and the average length shall be a minimum of 75 times the least dimension.

3.4.4.1 Creep and duration of load (DOL) testing shall be conducted in accordance with ASTM D 6815.

3.5 Advanced Engineered Lumber (AEL): Advanced engineered lumber evaluated under this criteria is defined as a composite of variable thickness using sawn wood laminations where the wide or narrow faces are laminated to produce solid or hollow members of varying shapes. Lamination thickness ranges from 0.10 inch (2.54 mm) to 2.0 inches (50.8 mm). The minimum beam depth for solid members shall be 6 inches (152 mm). The minimum depth beam for hollow members shall be 3 inches (76 mm). Structural glued laminated timber (glulam), manufactured in accordance with ANSI A190.1, American National Standard for Wood Products, Structural Glued Laminated Timber, and ASTM D 3737, is not considered as an AEL.

3.5.1 Compliance with the requirements noted in Sections 2.1, 3.1, 3.2 and 4.0 in this criteria, except as noted in Section 3.4.2, is required. Creep and DOL need to be addressed, either by tests (ASTM D 5456 or other test method acceptable to ICC-ES), or by analysis (current glulam practice).

3.5.2 Longitudinal shear strength shall be evaluated in accordance with ASTM D 3737, Annex 7, Test Setup and Data Analysis Procedure for Determining Horizontal Shear Stress by Full Scale Beam Tests.

3.5.3 An analysis and/or test data shall be submitted addressing possible issues such as web buckling and fastener penetration, resulting from joist hangers connecting to the side, or supported from the top of hollow members.

3.6 Proprietary Hardwood Used for Decking and Guardrail Systems: Solid sawn hardwood used for decking and guardrail systems may be evaluated under this criteria as a structural wood-based product.

3.6.1 Testing and analysis of data for bending strength, stiffness, longitudinal shear strength, moisture content and specific gravity shall be in accordance with ASTM D 5456.

3.6.2 Connections shall be designed in accordance with the NDS, using the average specific gravity. Adjustments for wet-service conditions shall be used if exposed to the weather.

3.7 Laminated Veneer Bamboo (LVB): The product is made from $^1/_4$-inch-thick (6.35 mm) bamboo strips edge-bonded together to form a mat, which is face-laminated to other mats of the LVB product.

3.7.1 In addition to other information and data requirements noted in this criteria, the following shall apply to LVB:

3.7.1.1 Creep and duration of load (DOL) testing shall be conducted in accordance with ASTM D 6815.

3.7.1.2 Dimensional stability testing shall be in accordance with Section 5.3.2.1-a of PS 2.

3.7.1.3 Lateral edge nail durability testing shall be conducted in accordance with Section 6.8.2 of ASTM D5456.

3.7.1.4 Thickness swell testing shall be conducted in accordance with Section 6.9.1 of ASTM D 5456-05a.

3.7.1.5 In addition to complying with ASTM D 2559 the adhesives shall be tested in accordance with the alternative method noted in Section 4.2 of ASTM D 5456-05a.

3.7.1.6 Tests shall be conducted to verify that the specified spacing of nails of various diameters is adequate to prevent splitting. Details of the testing shall be discussed with ICC-ES staff prior to the tests' being conducted.

4.0 QUALITY CONTROL

4.1 Quality control shall comply with Sections 8, 9 and 10 of ASTM D 5456. The products shall be manufactured under a quality control program with inspections by an inspection agency accredited by the International Accreditation Service (IAS), or as otherwise acceptable to ICC-ES.

4.2 ~~A~~ Quality control ~~manual~~ documentation complying with the ICC-ES Acceptance Criteria for Quality Control Documentation ~~Manuals~~ (AC10) and Appendix A in this criteria shall be submitted.

4.3 Quality control documentation for laminated veneer bamboo shall include the specific specie and the location where the bamboo is harvested and other unique characteristics, including test requirements to ensure a consistent product.■

APPENDIX A

1.0 INTRODUCTION
The purpose of this appendix is to integrate an ISO 9000:2000 series Quality Management System with quality control programs currently being utilized by engineered wood products evaluation report holders.

1.1 Scope: This appendix establishes four different Quality Assurance Levels for a manufacturer using a documented Quality Management System. Level I requirements noted in Table 3.1 are set to coincide with the historical engineered wood industry practices and ICC-ES AC47 2003 requirements.

2.0 DEFINITIONS
Standard definitions for a Quality Management System are given in ISO 9000:2000. Definitions of terms specific to this document are given below.

2.1 Manufacturer: For the purpose of this document, a firm or corporation producing a product that complies with AC47. A manufacturer is considered to be an organization as defined in ISO 9000:2000.

2.2 Accredited Inspection Agency: A third-party inspection agency employing third party auditors complying with ISO/IEC Standard 17020 and accredited by the International Accreditation Service (IAS) or by an accreditation body that is a partner of IAS in a Mutual Recognition Arrangement (MRA).

2.3 Quality Manual: For the purpose of this document, a quality manual is a written document meeting the requirements of AC10 and AC47. The initial Quality Manual and all revisions shall be signed and dated by the TPTE and MTE.

2.4 Manufacturer Technical Expert (MTE):
A quality professional employed by the manufacturer who provides specific knowledge of or expertise on products covered under AC47 and has demonstrated competence in managing and implementing a quality management system.

2.5 Third-Party Technical Expert (TPTE):
A quality professional employed by the accredited inspection agency who provides specific knowledge of or expertise on products covered under AC47 and has demonstrated competence in managing a quality audit system.

2.6 Manufacturer Plant Technical Director (MPTD):
A quality professional employed by the manufacturer who has demonstrated competence in implementing a quality management system at the plant level.

2.7 Third Party Auditor (TPA):
A quality professional employed by the accredited inspection agency who has demonstrated competence in auditing a quality management system at the plant level.

2.8 Monthly Quality Report:
The monthly quality report shall contain a summary of product performance by grade or series with a comparison to requirements and a discussion of significant changes in raw materials or process.

3.0 QUALITY MANAGEMENT SYSTEM REQUIREMENTS:

3.1 The manufacturer shall establish and implement a quality management system that is fully documented per the requirements of Table 3.1. The documented quality management system shall describe the manufacturer's procedures and quality activities for ensuring that the products meet the specified requirements.

3.2 The manufacturer, in concert with an accredited inspection agency, shall prepare and submit to ICC-ES its documented quality manual, including a cross-reference matrix to the quality management system, ensuring that the data in Section 2 of AC10 and the written procedures noted in Section 4 of this acceptance criteria have been included.

3.3 The MPTD shall submit a monthly quality report to the TPTE and MTE.

3.4 The submitted quality management system shall be assigned a Level I, II, III or IV per the following requirements:

Table 3.1 Quality Assurance Levels I, II, III or IV Manufacturers

	Level I Manufacturer	Level II Manufacturer	Level III Manufacturer	Level IV Manufacturer
Quality Concept	Product Audit through Industry Standards	Product Audit through Industry Standards	ISO Compliant – Ready to Register (7)	ISO Registered (3)
Minimum Audit Frequency by TPA	12 / year	6 / year	4 / year	3,2 / year (4)
MTE and MPTD Education and Experience	Industry Experience	Per Section 4.0	Per Section 4.0	Per Section 4.0
Intra-Company Quality Audits at Every Plant by MTE (1),(2),(8)	N/A	N/A	1 / year	1 /year
Plant Quality Audit by MPTD (6), (8)	N/A	1 / year	1 / year	2 / year
Review of QA Test Results (9)	1 / year (MTE) Monthly (MPTD)	1 / year (MTE) Monthly (MPTD)	2 / year (MTE) Monthly (MPTD)	2 / year (MTE) Monthly (MPTD)
Quality Manual	Yes	Yes	Yes	Yes
Documentation per ISO 9001-2000	No	No	Yes	Yes
Quality Plan (5)	No	Yes	Included in ISO Documentation	Included in ISO Documentation
Monthly QC report by MPTD required	Yes	Yes	Yes	Yes

1 - Intra-company auditors can be from different plants. For companies with multiple plants, the MTE may designate a lead auditor that satisfies the education and experience requirements of an MTE. The MTE however, still retains the primary responsibility for the Quality Management System.
2 - External auditors may be contracted in cases where a company has only one plant.
3 To move from Level III to Level IV requires successful documentation under AC47 for a minimum of two years and ISO 9001:2000 certification. Additionally, requires an on site joint audit with third party auditor and ICC ES representative participation. Registration shall be conducted by an ISO-9001 Agency Registered by a Registrar accredited by an International Accreditation Forum (IAF) member accreditor or an ISO-9000 Registrar accredited by an IAF member accreditor.
4- Requires successful documentation and ISO registration for a minimum of two year for a move from three audits to two audits per year by the accredited inspection agency. Additionally, requires an on-site joint audit with third party auditor and participation of ICC ES representative.
5– A Quality Plan provides information beyond the Quality Manual and shall be verified per Section 3.5. It shall include revision-controlled documents, retrievable records and procedures defining the following:

-Product Identification and Traceability from raw materials to finished goods.
-Corrective and Preventative Action Process that can track / trend incidents of nonconforming product from identification through root cause analysis to resolution and closure.
-Internal auditing process to ensure that the procedures are being followed.

6 – The MPTD shall audit each element of the Quality Plan (Level II) or Quality Management System (Levels III and IV).
7 – Requires review of documentation by the Accredited Inspection Agency and the Manufacturer statement of self-certification.
8 - The Intra-Company Quality Audit by MTE and Plant Quality Audit by the MPTD are conducted separately.
9 – The MTE shall review QA test results per D5456, Section 10.6. See Sections 2.8 and 3.3 for MPTD requirements.

3.5 For Levels II, III and IV, the TPA shall verify conformity to the Quality Plan at each audit. For Levels III and IV, a senior-level TPA appointed by the TPTE shall audit the plant together with the TPA once each year.

3.6 Follow-up inspections: The manufacturer shall obtain the services of an IAS-accredited inspection agency, which is accredited for the specified discipline, to conduct inspections of the fabrication facility per the minimum inspection frequency specified in Table 3.1.

Table 3.2 Educational and Experience Requirements for Accredited Inspection Agency Personnel

Quality Level (1)	Level I	Level II	Level III	Level IV
Third Party Accreditation	IAS Accredited Inspection Agency	IAS Accredited Inspection Agency	IAS Accredited Inspection Agency	IAS Accredited Inspection Agency (2)
TPTE Education and Experience	Industry Experience	Per Section 4.0	Per Section 4.0	Per Section 4.0
TPA Education and Experience	Industry Experience	Per Section 4.0	Per Section 4.0	Per Section 4.0
Third party witness of Manufacturer manufacture / testing with TPA	Industry Experience, Able to Verify Compliance to Appropriate ASTM Standards	Same as Level I	Same as Level I	Same as Level I

1 – Table 3.1 for quality system elements.
2 - The third party shall be IAS Accredited. The organization that ISO registers the manufacturer (i.e. separate organization or IAS Accredited Agency) shall be either: a) ISO-9001 Registered by a Registrar accredited by an International Accreditation Forum (IAF) member accreditor or b) ISO-9000 Registrar accredited by an IAF member accreditor.

3.7 Audit by ICC-ES Representative: Prior to advancement to Level IV, the manufacturer is required to undergo an onsite assessment by an ICC-ES Representative. This audit will be conducted jointly with the accredited inspection agency. The purpose of this joint audit is to determine the manufacturer's compliance with the documented quality management system, and to assess the inspection procedures of the inspection agency. After the audit frequency has been established by ICC-ES representative any reductions in audit frequency by the third party (i.e. promotion from 3 to 2 audits / year) shall require an additional joint audit and appropriate documentation that the third party-inspection agency has reviewed and approved the revised quality management system. Documentation shall be retained on file by the third party agency and be available to ICC-ES upon request. ICC ES shall approve any ISO/Accredited Agency combination inspections.
3.7.1 Prior to advancement to Levels II or III, the manufacturer is required to undergo an assessment by the TPTE. The purpose of the assessment is to determine if the manufacturer's quality system meets the minimum requirements of the proposed Quality Assurance Level in Table 3.1. Documentation of the assessment shall be retained on file by the third party agency and be available to ICC-ES upon request.

3.8 Manufacturer Technical Expert (MTE) Responsibilities: The manufacturer shall appoint an MTE that reports directly to the highest level of authority within the business or operating unit of the organization. The MTE shall be capable of providing leadership within the quality organization in the following areas:

3.8.1 Development of organizational structure

3.8.2 Formulation of quality policies and procedures

3.8.3 Establishment of quality performance goals

3.8.4 Implementation of quality control tools and process control limits

3.8.5 Statistical analysis and qualitative assessment of process and product performance

3.8.6 Supplier assessment, certification, feedback and improvement

3.8.7 Follow-up on customer feedback or field complaints

3.8.8 Establish training and development programs for MPTD and other associates

3.8.9 Maintain the manufacturer's documented quality system.

3.8.10 Monitor the effective implementation of the manufacturer's documented quality system.

3.8.11 Assure that periodic internal audits are conducted and documented, and that corrective actions are implemented.

3.8.12 Assure that annual management reviews are conducted and documented to assure the adequacy and effectiveness of the quality system. Management reviews shall include a summary and a documented plan of action for improvement.

3.8.13 Be familiar and demonstrate knowledge of codes and standards as applicable to the quality assurance program.

3.8.14 Be an employee of the manufacturer who reports quality information and decisions directly to the highest level of

authority within the business or operating unit of the organization.

3.9 Manufacturer Plant Technical Director (MPTD) Responsibilities: The manufacturer shall appoint an MPTD at each production facility who shall:

3.9.1 Understand the organizational structure

3.9.2 Implement the quality policies and procedures at the plant level

3.9.3 Monitor and report the plant quality performance to the MTE

3.9.4 Apply quality control tools and process control limits at the plant level

3.9.5 Collect and report information to provide a qualitative assessment of process and product performance

3.9.6 Collection information for supplier assessment, certification, feedback and improvement

3.9.7 Investigate customer feedback or field complaints

3.9.8 Participate in training and development programs

3.9.9 Maintain the manufacturer's documented quality system at the plant level

3.9.10 Be responsible for overall workmanship and for compliance to the documented procedures established by the manufacturer. Although inspections may be delegated to qualified personnel during the receipt and in-process stages of assembly, it is the responsibility of the MPTD to ensure that inspections are performed.

3.9.11 Be responsible for ensuring that incoming raw materials are properly identified and inspected for compliance with quality plans and specifications.

3.9.12 Be responsible for ensuring that the final QC test results can be traced back to the incoming raw materials, the quality assurance records and the responsible plant personnel.

3.9.13 Train and monitor performance of other personnel collecting process or product performance data.

3.9.14 Be an employee of the manufacturer that reports quality information directly to the MTE.

4.0 EDUCATION AND EXPERIENCE

4.1 Education and Experience of MTE, MPTD, TPTE or TPA
MTE and MPTD shall be identified in the Quality Manual on the basis of appropriate education, training and experience such that the individuals are competent to take full charge of their responsibilities in accordance with the requirements noted here and also as required by the accredited inspection agency.

4.1.1 The TPTE shall verify the education and experience, proof of professional ism and core knowledge of the MTE.

4.1.2 The MTE shall verify the education and experience, proof of professional ism and core knowledge of the MPTD.

4.2 Experience Waiver for Education
If an individual has completed a degree from an accredited college, university or technical school or certification by the American Society for Quality, part of the experience requirement will be waived as follows:

4.2.1 Diploma from technical or trade school or advanced degree from non-related field – one year waived

4.2.2 Associate degree in Forest & Wood Sciences, Engineering or a related field– two years waived

4.2.3 American Society for Quality (ASQ) certified Quality Improvement Associate, Quality Engineer, Reliability Engineer, Six Sigma Black Belt, or Quality Technician – two years waived

4.2.4 American Society for Quality (ASQ) certified Quality Auditor – three years waived

4.2.5 Bachelors degree in Forest & Wood Sciences, Engineering or a related field – four years waived

4.2.6 Master's or Doctorate degree in Forest & Wood Sciences, Engineering or a related field – five years waived

4.2.7 American Society for Quality (ASQ) certified Quality Manager – five years waived

4.2.8 Professional Engineer registration – ten years waived

4.3 Proof of Professionalism
The MTE, MPTD, TPTE and TPA shall demonstrate proof of professionalism in one of three ways:

4.3.1 Membership in ASQ, ASCE or one other trade association applicable to the product produced

4.3.2 Registration as a Professional Engineer

4.3.3 The signatures of two persons – either an accredited inspection agency, ASQ or trade association member which can verify that the individual is a qualified practitioner of the quality sciences.

4.4 Manufacturer Technical Expert (MTE)
The MTE shall meet the following minimum requirements:

4.4.1 Ten years of on-the-job experience in one or more areas of Sections 3.8 or 3.9 (see Education Experience Waiver, Section 4.2). A minimum of five years of this experience shall be in a decision-making position. “Decision-making” is defined as the authority to define, execute or control projects/ processes and to be responsible for the outcome. This may or may not include management or supervisory positions. Current or previous certification by the American Society for Quality (ASQ) as a Quality Auditor, Reliability Engineer, Software Quality Engineer, or Quality Engineer applies to job experience. On-the-job experience may be earned in accordance with the education requirements in Section 4.2.

4.4.2 The MTE shall demonstrate an adequate knowledge of core subjects by satisfying education requirements of Sections 4.2.5, 4.2.6 or a minimum of 25 Continuing Education Unit (CEU) or Recertification Unit (RU) credits (or equivalent hours of college education) from the list of topics in Sections 4.4.4 or 5.0. At least 15 CEU or RU credits shall come from the core knowledge topics in Section 5.3.3. A one-year grace period, beginning on the date of the job appointment, is permitted to acquire the appropriate number of credits while working in the MTE position.

4.4.3 The MTE shall demonstrate ongoing training by completing at least 4.5 RU credit every three years in accordance with Section 4.4.4.

Note: 4.5 credits, or 45 hours, is equivalent to 15 hours per year, which was considered as a typical benchmark for a Professional Engineer.

4.4.4 One RU credit is equivalent to one CEU credit or ten hours of participation. Recertification units can be earned in the following areas:

4.4.4.1 Author or co-author of a published book or journal article

4.4.4.2 Reviewer of a published article or book

4.4.4.3 Participation in Standards Committees such as ASTM, ANSI, etc.

4.4.4.4 Participation in Trade Association Technical Committees or Conference Presentations

4.4.4.5 Participation in ICC ES or ICC ES approved technical meetings

4.4.4.6 Being an instructor or student within the topics of Section 5

4.5 Third-Party Technical Expert (TPTE)
The TPTE shall meet the following minimum requirements:

4.5.1 Ten years of on-the-job experience in one or more areas related to Quality Assurance in the wood products industry (see Education Experience Waiver, Section 4.2). A minimum of five years of this experience shall be in a decision-making position. “Decision-making” is defined as the authority to define, execute or control projects/ processes and to be responsible for the outcome. This may or may not include management or supervisory positions. Current or previous certification by the American Society for Quality (ASQ) as a Quality Auditor, Reliability Engineer, Software Quality Engineer, or Quality Engineer applies to job experience. On-the-job experience may be earned in accordance with the education requirements in Section 4.2.

4.5.2 The TPTE shall demonstrate an adequate knowledge of core subjects by satisfying education requirements of Sections 4.2.5, 4.2.6 or a minimum of 25 CEU or RU credits (or equivalent hours of college education) from the list of topics in Sections 4.4.4 or 5.0. At least 15 CEU or RU credits shall come from the core knowledge topics in Section 5.3.3. A one-year grace period, beginning on the date of the job appointment, is permitted to acquire the appropriate number of credits while working in the TPTE position.

4.5.3 The TPTE shall demonstrate ongoing training by completing at least 4.5 recertification units (RU) every three years in accordance with Section 4.4.4.

Note: 4.5 credits, or 45 hours, is equivalent to 15 hours per year, which was considered as a typical benchmark for a Professional Engineer.

4.6 Manufacturer Plant Technical Director (MPTD)
The MPTD shall meet the following minimum requirements:

4.6.1 Two years of on-the-job experience in one or more areas in Sections 3.9 (see Education Experience Waiver, Section 4.2). On-the-job experience may be earned in accordance with the education requirements in Section 4.2.

4.6.2 The MPTD shall demonstrate an adequate knowledge of core subjects by satisfying education requirements of Sections 4.2.2, 4.2.5, 4.2.6 or a minimum of 10 CEU or RU credits (or equivalent hours of college education) from the list of topics in Sections 4.4.4 or 5.0. At least 5 CEU or RU credits shall come from the core knowledge topics in Section 5.3.3. One year of experience beyond the minimum of three years may be substituted for one CEU or RU. A maximum of 5 credits may be obtained through additional experience served under the guidance of a MTE. A one-year grace period, beginning on the date of the job appointment, is permitted to acquire the appropriate number of credits while working in the MPTD position.

4.7 Third Party Auditor (TPA)
The TPA shall meet the following minimum requirements:

4.7.1 Three years of on-the-job experience in one or more areas related to Quality Assurance in the wood products industry (see Education Experience Waiver, Section 4.2). On-the-job experience may be earned in accordance with the education requirements in Section 4.2.

4.7.2 The TPA shall demonstrate an adequate knowledge of core subjects by satisfying education requirements of Sections 4.2.2, 4.2.5, 4.2.6 or a minimum of 12 CEU or RU credits (or equivalent hours of college education) from the list of topics in Sections 4.4.4 or 5.0. At least 6 CEU or RU credits shall come from the core knowledge topics in Section 5.3.3. One year of experience beyond the minimum of three years may be substituted for one CEU or RU. A maximum of 6 credits may be obtained through additional experience served under the supervision of a TPTE. A one-year grace period, beginning on the date of the job appointment, is permitted to acquire the appropriate number of credits while working in the TPA position.

5.0 Continuing Education Credits

5.1 The definition of one CEU credit is ten contact hours of participation in an organized continuing education / training experience under responsible, qualified direction and instruction. A contact hour is defined as a 60 minute clock hour of interaction between student and instructor.

5.2 If CEU credits are not offered for a given course, then recertification (RU) credits can be calculated. The instructor shall record the hours of interaction between the student and instructor and assign one RU credit for every ten hours of participation in training.

5.3 Topics

5.3.1 All ASQ certified courses are deemed acceptable for CEU credits.

5.3.2 Courses, conferences and seminars offered within the industry are deemed acceptable, provided CEU credits are offered.

5.3.3 The following list of topics is considered to be the core knowledge of the overall training program:

ICC Codes, Approvals, Evaluation and Building Official Acceptance
Role of the Third Party Agency and Internal Auditing
North American Wood Design (NDS, AITC, etc)
Structural versus Serviceability Requirements
ASTM or ANSI Product Standards
Grading Procedures for Base Materials
ASTM or ANSI Testing Procedures, Failure Modes
Third Party Witnessing and Report Requirements
Statistical Method Used to Assign Design Properties
Fastener Testing / Design
Preservative Treatment Effects on Product (if applicable)
Durability and Adhesive Test Requirements
Product Labeling and Traceability to Process
Business Corporate Quality Structure, Policies and Procedures
Business Quality Goals

Continuous Improvement and Innovation
Assessing Capability of Production Personnel
Procedures for Nonconforming Product or Base Materials
Application of ISO 9000 Standards to Quality Process
Auditing Procedures
Internal Auditing Procedures
ISO 17020 requirements
ISO/IEC 17025 requirements
Document Control and Record Keeping within the Organization
Fire Testing / Performance
(Other topics as approved by Accredited Inspection Agency or ICC ES)