



February 28 2008

TO: PARTIES INTERESTED IN EVALUATION REPORTS ON PROPRIETARY WOOD PRESERVATIVE SYSTEMS

SUBJECT: Revisions to the Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance, Subject AC326-0208-R1

Dear Madam or Sir:

Enclosed is a copy of the subject revised acceptance criteria approved by the ICC-ES Evaluation Committee on February 6, 2008, effective March 1, 2008. The committee approved the following revisions:

1. Based on recommendations by an industry task group, revisions were made to Section 4.6 to provide correlation with the revisions to AC257 approved by the committee in October 2007 as Subject AC257-1007-R3. Section 4.6.2 was revised to clarify that fasteners with proprietary corrosion-resistant methods must be tested and evaluated in accordance with AC257. Section 4.6.1 was revised to clarify that coupon testing is used to evaluate fasteners not covered in Section 4.6.2 and metals and coatings for use in contact with preservative-treated wood.
2. Test procedure AWWA E 23 was added as an alternative test procedure for AWWA E 14. Sections 1.3.2, 4.2, A4.4.2, B4.4.1, and D4.4.2 were revised to add the test procedure, which has been approved by APWA in their 2007 AWWA Book of Standards.

Evaluation reports issued on or after the effective date noted above, and falling within the scope of this criteria, will be required to comply with the enclosed edition of the criteria. Evaluation reports issued prior to the effective date may be in compliance either with the enclosed acceptance criteria or with the previous edition. Evaluation reports based on a superseded version of an acceptance criteria must be brought into compliance with the most recent edition at the time the reports are reissued. Therefore, applicants should submit data verifying compliance at the time they apply for re-examination.

If you have any questions, please contact Michael O'Reardon, P.E., at (800) 423-6587, extension 5685. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,

A handwritten signature in black ink that reads 'Kurt Stochlia'.

Kurt Stochlia, P.E.
Vice President

KS/raf

Enclosure

cc: Evaluation Committee



ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

AC326

Approved February 2008

Effective March 1, 2008

Previously approved October 2007, May 2006, October 2005

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 PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

1.0 INTRODUCTION

1.1 Purpose: The purpose of this criteria is to establish common requirements for proprietary wood preservative treatments of wood, in accordance with the applicable EPA labeling, to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2006 *International Building Code*® (IBC), the 2006 *International Residential Code*® (IRC), the BOCA® *National Building Code/1999* (BNBC), the 1999 *Standard Building Code*® (SBC), and the 1997 *Uniform Building Code*™ (UBC). The bases of recognition are IBC Section 104.11, IRC Section R104.11, BNBC Section 106.4, SBC Section 103.7 and UBC Section 104.2.8. Applicable code sections for locations requiring preservative-treated wood for fungal decay and/or termite resistance are Section 2304.11 of the IBC, Sections R319 and R320 of the IRC, Section 2304 of the SBC, Section 2311 of the BNBC and Section 2306 of the UBC. Applicable code sections for fasteners in preservative-treated wood are Section 2304.9.5 of the IBC, Section R319.3 of the IRC, Section 2306.3 of the SBC, Section 2311.3.3 of the BNBC and Section 2304.3 of the UBC.

The reason for the development of this criteria is to allow evaluation of a proprietary wood preservative for resistance to decay and termites, since Section 2304.11 of the IBC and Sections R319 and R320 of the IRC do not provide test methods and performance requirements for documenting resistance to decay and termites.

1.2 Scope: This acceptance criteria covers common requirements for proprietary wood preservative systems. The proprietary wood preservatives are used to treat sawn lumber, timbers, plywood, poles and posts. The treated wood use is defined in the specific acceptance criteria, or an Appendix of this criteria and/or evaluation report covering the specific proprietary wood preservative system. Materials complying with this criteria are suitable for locations requiring preservative-treated wood for fungal decay and/or termite resistance.

1.3 Codes and Referenced Standards: Where standards are referenced in this criteria, these standards shall be applied consistently with the code upon which compliance is based. The criteria or appendix covering the proprietary wood preservative shall list additional standards required for product evaluation.

1.3.1 Codes:

1.3.1.1 2006 *International Building Code*® (IBC), International Code Council.

1.3.1.2 2006 *International Residential Code*® (IRC), International Code Council.

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

1.3.1.4 1999 *Standard Building Code*® (SBC).

1.3.1.5 1997 *Uniform Building Code*™ (UBC).

1.3.2 American Wood-Preservers' Association (AWPA) Standards:

1.3.2.1 2007 American Wood-Preservers' Association (AWPA) Book of Standards®.

1.3.2.2 AWPA A12-06®, Wood Densities for Preservative Retention Calculations.

1.3.2.3 AWPA E1-06®, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

1.3.2.4 AWPA E7-07®, Standard Method of Evaluating Wood Preservative by Field Tests with Stakes.

1.3.2.5 AWPA E9-06®, Standard Field Test for the Evaluation of Wood Preservatives to be Used in Non-soil Contact.

1.3.2.6 AWPA E10-06®, Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures.

1.3.2.7 AWPA E11-06®, Standard Method of Determining the Leachability of Wood Preservatives.

1.3.2.8 AWPA E12-94®, Standard Method of Determining Corrosion of Metals in Contact with Treated Wood.

1.3.2.9 AWPA E14-07®, Standard Method of Evaluating Wood Preservatives in a Soil Bed.

1.3.2.10 AWPA E16-07®, Standard Field Test for Evaluation of Wood Preservatives to Be Used out of Ground Contact: Horizontal Lap-Joint Method.

1.3.2.11 AWPA E18-06®, Standard Field Test for Evaluation of Wood Preservatives Intended for Use in Category 3B Applications: Exposed, Out of Ground Contact, Uncoated Ground Proximity Decay Method.

1.3.2.12 AWPA E20-06®, Standard Method for Determining the Leachability of Wood Preservatives in Soil contact.

1.3.2.13 AWPA E22-06®, Standard Accelerated Laboratory Method for Testing the Efficacy of Preservatives Against Wood Decay Fungi Using Compression Strength.

1.3.2.14 AWPA E23-07®, Standard for Accelerated Method of Evaluating Wood Preservatives in Soil Contact

1.3.2.15 AWPA M2-07®, Standard for Inspection of Wood Products Treated with Preservatives.

1.3.2.16 AWPA M4-06®, Standard for the Care of Preservative-Treated Wood Products.

1.3.2.17 AWPA T1-07®, Use Category System: Processing and Treatment Standard.

1.3.2.18 AWPA U1-07®, Use Category System: User Specification for Treated Wood.

1.3.3 ASTM International Standards:

1.3.3.1 ASTM D 143-94(2007), Standard Test Methods for Small Clear Specimens of Timber.

1.3.3.2 ASTM D 1758-06, Standard Test Method of Evaluating Wood Preservatives by Field Tests with Stakes.

1.3.3.3 ASTM D 3345-74 (1999), Standard Test Method for Laboratory Evaluation of Wood and Other Cellulosic Materials for Resistance to Termites.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

1.3.3.4 ASTM D 4442-92 (2003), Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.

1.3.3.5 ASTM D 4444-92 (2003), Standard Test Method for Use and Calibration of Hand-held Moisture Meters.

1.3.4 American Forest & Paper Association Standard:

1.3.4.1 NDS-05, National Design Specification (NDS) for Wood Construction, with 2005 Supplement.

1.3.5 European Committee on Standardization (CEN) Standards:

1.3.5.1 EN 84:1997, Accelerated Ageing of Treated Wood Prior to Biological Testing—Leaching Process.

1.3.5.2 EN 113:1996, Test Method for Determining the Protective Effectiveness Against Wood Destroying Basidiomycetes Determination of the Toxic Values.

1.3.5.3 EN 252:1989, Field Test Method for Determining the Relative Protective Effectiveness of Wood Preservatives in Ground Contact.

1.3.5.4 EN 330:1993 E, Field Test Method for Determining the Relative Protective Effectiveness of a Wood Preservative for Use under a Coating and Exposed Out-of-Ground Contact: L-joint Method.

1.4 Definitions:

1.4.1 Proprietary Wood Preservative System: A wood preservative system that is defined in another ICC-ES acceptance criteria or an appendix of this criteria that covers specific requirements for the wood preservative not covered in this criteria.

1.4.2 Preservative-treated Wood: Wood treated with the proprietary wood preservative shall be referred to using a proprietary trade name noted in the ICC-ES evaluation report on the preservative system. The wood shall be treated in accordance with an approved quality control manual.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information concerning material specifications, thickness, size and the treating process.

2.1.2 Installation Instructions: Installation details and limitations, fastener materials, and treater's quality control manual.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the preservative-treated lumber and plywood, and the specified chemicals used by the treaters. Identification provisions shall include the evaluation report number and the name or logo of the accredited inspection agency.

2.1.3.1 Each piece of lumber or plywood shall be legibly branded with, marked with, or otherwise have affixed a label in accordance with Section 2303.1.8.1 of the IBC, which shall include the following additional information:

a. ICC-ES evaluation report number for the proprietary wood preservative.

b. The phrase "This retention level is not suitable for exposure to Formosan termites," unless testing showing efficacy at retentions specified in the quality control manual is submitted.

c. The phrase "Decking Use Only," if applicable.

2.1.3.2 When lumber 1 inch (25.4 mm) or less in thickness and 4 inches (102 mm) or less in width, or lumber which is 36 inches (914 mm) or less in length, has been bundled, only one brand or mark as defined in Section 2.1.3.1 is required on the exterior surface of the bundle.

2.1.4 Field Treatment Description: Any deviations from the methods, materials and procedures for treatment of cuts and holes due to field work required by AWPA M4 shall be described.

2.2 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.

2.3 Test Reports: Test reports shall comply with AC85.

2.4 Product Sampling:

2.4.1 Test samples shall be prepared and/or obtained under the supervision of an accredited inspection agency, and verification shall be provided to the testing agency regarding the authenticity of the samples.

2.4.2 Existing samples in long-term (multiple-year) testing may be accepted provided an accredited inspection agency reviews all records on sample preparation and identification and provides verification of the authenticity of these samples to the testing agency.

2.4.3 The testing agency shall be provided: (a) a written description of the sample preparation and treating method; (b) a report on the treating solution analysis, including the analytical method used; and (c) the preservative retentions achieved during the impregnation stage.

3.0 PRESERVATIVE TREATMENT PROCESS

3.1 General: The treating process shall be under a quality control program established by the evaluation report applicant and an independent inspection agency. The procedures outlined in the approved quality control manual shall be used by the treaters and by independent ICC-ES-recognized inspection agencies at treating facilities, distribution points, and jobsites.

3.2 Treatment Standards:

3.2.1 Wood Preservative: The treated wood shall be defined in another acceptance criteria per Section 1.4, and applicable analytical procedures shall be given in the proprietary wood preservative acceptance criteria.

3.2.2 Material: Wood species and material to be treated with the proprietary wood preservative shall be noted in the criteria for the proprietary wood preservative.

3.2.3 Physical Quality: Lumber or plywood shall be free from decay. The product shall meet all requirements of the marked grade, except that incising marks, raised grain and further checking of the surface beyond the grade description, and size variation due to wetting, are permitted. All wood products to be treated with the wood preservative

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

shall achieve the appropriate moisture content before treatment, to allow for proper penetration of the preservative into the wood. Moisture content readings shall be taken with an electrical-resistance needle-type moisture meter in accordance with ASTM D 4444. In case of dispute, the ASTM oven-dry method (ASTM D 4442, Method A) shall be used. When the preservative-treated lumber or plywood is specified to be dry after treatment, the moisture content shall be 19 percent or less for lumber and 15 percent or less for plywood. If the wood moisture content is extremely low (approximately 0 to 5%), electrical resistance needle-type moisture meters shall not be used.

3.2.4 Incising: Incising shall be used for difficult-to-treat wood if needed to meet the penetration requirements as defined in Section 3.4 of this criteria. For “Decking Use Only” material, two edges and one face shall be incised if needed to meet the penetration requirements as defined in Section 3.4 of this criteria.

3.3 Treatment Process: A proprietary treating process, described in the approved quality control manual submitted to ICC-ES by the applicant for the evaluation report, shall be used by the applicant and approved treaters specified as additional listees in the evaluation report.

3.4 Results of Treatment: Retention and penetration of wood preservative solutions in treated lumber, timber and plywood shall be in accordance with the approved quality control manual, submitted to ICC-ES by the applicant for the evaluation report.

3.4.1 Sampling Method: All lumber, timbers, and plywood shall be bored using the applicable methods outlined in AWWA Standard M2.

3.4.2 Retention by Assay:

3.4.2.1 Retention: Retentions shall be as specified in the approved quality control manual submitted to ICC-ES by the applicant for the evaluation report. The minimum retention values for specific species and uses shall be shown in the ICC-ES evaluation report. Retentions done by assay shall be determined using the analytical standards specified in Section 3.7 of this criteria.

3.4.2.2 Assay Zones: Assay zones shall be the same as shown in AWWA standards for similar wood species and products. Material permitted by the proprietary wood preservative criteria that is clearly marked “Decking Use Only” shall have an assay zone of 0.0 to 0.2 inch (0 to 5 mm).

3.4.2.3 Standard Density for Assay Calculation (AWWA Standard A 12):

3.4.2.3.1 Lumber or Timbers:

- Douglas fir—28 pcf (448 kg/m³)
- Hem-fir—24 pcf (384 kg/m³)
- Patula pine—32 pcf (512 kg/m³)
- Ponderosa pine—24 pcf (384 kg/m³)
- Radiata pine—26 pcf (420 kg/m³)
- Red pine—26 pcf (416 kg/m³)
- Redwood—22 pcf (350 kg/m³)

- Scots pine: Germany—30 pcf (480 kg/m³)
- Scots pine: Sweden—26 pcf (416 kg/m³)
- Southern pine—32 pcf (512 kg/m³)
- Western hemlock—26 pcf (416 kg/m³)
- Western red cedar—19 pcf (310 kg/m³)

3.4.2.3.2 Plywood:

- Southern pine—33 pcf (528 kg/m³)
- Western—33 pcf (528 kg/m³)
- Douglas fir—33 pcf (528 kg/m³)

3.4.3 Penetration: The appropriate AWWA penetration requirements for the wood species treated with preservatives, as shown in Table 1, shall apply to the preservative-treated wood products.

3.5 Drying after Treatment: Preservative-treated wood may be kiln-dried after treatment or if wetted during transit or storage. When preservative-treated lumber or plywood is specified to be dry after treatment, moisture content shall be 19 percent or less for lumber and 15 percent or less for plywood.

3.6 Marking: Each piece of material shall be marked with the applicable mark illustrated in the quality control manual for production of the preservative-treated wood. The licensed treater shall not mix marked material and unmarked material in the same package.

3.7 Analysis Standards: For preservative-treated wood, the analytical procedures described in the proprietary wood preservative acceptance criteria or an appendix of this criteria shall be used.

4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the proprietary wood preservative system shall be documented by testing. The testing and performance requirements listed in this criteria document treated wood used in the following exposure conditions: contact with ground (AWWA UC4A, AWWA UC4B), above ground weather-exposed (AWWA UC3B) and above ground damp but not in contact with liquid water (AWWA UC2). Use categories are further defined in AWWA Standard U1. Testing and performance shall be noted in the proprietary wood preservative acceptance criteria or appendices of this criteria for the product uses and exposure conditions. Testing shall be in accordance with AWWA, ASTM and CEN standards and test procedures listed in this criteria, the proprietary wood preservative criteria or the appendices to this criteria, and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section 2.4 of this criteria. The following documentation (Sections 4.1 to 4.8) is needed to substantiate the performance characteristics of the wood-preservative products for the listed use category:

4.1 Laboratory Tests: The testing indicated in Sections 4.1.1 and 4.1.2 of this criteria shall be performed for use categories UC2, UC3B, UC4A and UC4B.

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended levels of the wood preservative for the products and uses indicated in this criteria.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

4.1.1 Soil block testing in accordance with either AWPA E10, E22 or agar block testing in accordance with CEN EN 113.

4.1.2 Termite testing in accordance with AWPA E1 or ASTM D 3345. The product shall demonstrate resistance to subterranean termites. The testing shall consider Formosan termites unless these are excluded in the evaluation report (see Section 6.3 of this criteria).

4.2 Simulated Field Tests: Soil bed exposure testing in accordance with AWPA E14, or E23 may be submitted for evaluation of use categories UC4A and UC4B.

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended level of wood preservative for the products and uses listed in this criteria.

4.3 Field Tests: Field testing shall be conducted at a location with very heavy termite infestation as shown in Figure 2603.8 of the IBC, Figure R301.2(6) of the IRC or Hilo, Hawaii, and decay probability as shown on AWPA Decay Hazard Zone 5 or equivalent. Alternatively, a minimum of two field tests shall be conducted in distinctly different geographical locations. One of those locations shall be in AWPA Decay Hazard Zone 4 or 5. Field testing shall be a minimum of three years in duration. Aboveground field testing for use category UC3B shall be in accordance with one of the following sections: ground proximity (Section 4.3.1), lap joint (Section 4.3.2) or L-joint (Section 4.3.3). Ground-contact field stake testing for use categories UC4A and UC4B shall be in accordance with Section 4.3.4. All testing shall be conducted on uncoated specimens.

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended levels of the wood preservative for the products and uses listed in this criteria. Results from the tests shall be accepted as valid provided that the nominal mean rating of the joint surfaces for the untreated controls is beyond the midpoint of the rating scale for that test procedure.

4.3.1 Ground proximity testing in accordance with AWPA E18.

Alternate: Ground proximity testing equivalent to AWPA E18, modified to promote termite attack. The testing shall consider Formosan termites unless these are excluded in the evaluation report (see Section 6.3 of this criteria).

4.3.2 Lap joint testing in accordance with AWPA E16.

4.3.3 L-joint testing in accordance with AWPA E9 or EN330.

4.3.4 Field stake tests in accordance with either AWPA E7, ASTM D 1758 or EN 252 shall demonstrate performance for ground contact.

4.4 Preservative Permanence: Testing indicated in Section 4.4.1 for use categories UC4A, UC4B and UC3B shall be performed. Testing indicated in Section 4.4.2 for use categories UC4A and UC4B shall be performed for ground-contact use. Testing indicated in Sections 4.4.3 for use category UC3B shall be performed for aboveground unprotected use.

Conditions of Acceptance: Testing shall demonstrate levels of wood preservative for the products and uses indicated in this criteria.

4.4.1 Laboratory leaching testing in accordance with either AWPA E10, AWPA E11 or CEN EN 84.

4.4.2 Depletion from ground-contact stake specimens tested in accordance with AWPA E7 or EN 252.

Alternate: Laboratory testing in accordance with AWPA E 20 may be provided.

4.4.3 Depletion from specimens tested in accordance with either AWPA E18, AWPA E9 or AWPA E16 for aboveground use as specified in the proprietary wood preservative criteria.

4.5 Effects on Wood Properties: Static bending strength testing in accordance with ASTM D 143 shall be performed for all use categories.

Conditions of Acceptance: The testing shall document the MOE and MOR strength retention of the product and the use of load duration factors under Section 2.3 of the NDS.

Alternate: As an alternate to testing, an independent engineering analysis based on standardized strength testing may be submitted. The analysis shall be signed, sealed and dated by the responsible engineer.

4.6 Corrosion: Testing indicated in Sections 4.6.1 and 4.6.2 shall be performed for all AWPA use categories applicable to the building codes that are listed in the evaluation report.

4.6.1 Corrosion of metal coupons by treated wood testing in accordance with AWPA E12, with a minimum of 10 replicates per metal.

Conditions of Acceptance: The testing shall document the types of fasteners (other than fasteners with proprietary corrosion-resistant methods as covered in Section 4.6.2), coatings and metals (such as joist hanger material) that are used with the wood preservative; e.g., stainless steel, hot dip galvanized, zinc polymers, carbon steel, aluminum, red brass, bronze, copper, and any other fasteners, coatings and metals to be specified by the report applicant.

For treatment chemical tests, a corrosion rating relative to the CCA/hot-dip galvanized treatment shall be calculated and reported for each metal and shall be a ratio of the mean corrosion rating of the treatment chemical to the mean corrosion rating of the CCA/hot-dip galvanized control.

Meaningful functional differences determined from both statistical and practical considerations shall be provided in accordance with Section 4.8. This will include statements regarding confidence levels and differences between positive controls and untreated controls.

4.6.2 Fasteners with proprietary corrosion-resistant methods for use in preservative-treated wood shall be installed in treated wood samples in accordance with the fastener manufacturer's installation instructions and shall be tested for corrosion in accordance with AC257.

Conditions of Acceptance: The conditions of acceptance shall be in accordance with AC257.

4.7 Treatment Testing: Reports on treatment trials documenting retention and penetration specification values for each species or species group of lumber or plywood to be listed in the proposed evaluation report.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

4.8 Analysis of Test Documentation: Test data provided in accordance with Sections 4.1 to 4.8 shall be reviewed and an analysis shall be prepared by an independent third party, either an accredited test laboratory or an independent wood scientist/engineer. The analysis shall provide conclusions that the product provides protection against decay and subterranean termites at the retentions and penetrations, AWPA use category and performance characteristics recommended for the product.

5.0 QUALITY CONTROL

5.1 The preservative-treated wood products shall be manufactured under an approved quality control program with inspections by an inspection agency that continually supervises the preservative process and tests and inspects the quality of the preservative-treated wood. Inspection agencies for preservative-treated wood shall be listed by an accreditation body that complies with the requirements of the American Lumber Standards Treated Wood Program, or that is otherwise acceptable to ICC-ES.

5.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted that lists purity specifications and physical properties of all chemicals used for production of the treated wood.

6.0 EVALUATION REPORT RECOGNITION

The following are conditions of use for the preservative-treated wood products covered by this acceptance criteria:

6.1 The evaluation report shall list the species of wood for both lumber and plywood, with minimum preservative retention levels, and whether the material is incised.

6.2 The evaluation report shall specify the types of metals that are permitted to be used for fasteners and connectors in contact with the treated wood product.

6.3 The evaluation report shall state that preservative-treated wood is not permitted to be used in areas subject to Formosan termite attack, unless data in accordance with Section 4.1.2 or 4.3, showing resistance to Formosan termites, is submitted.

6.4 The evaluation report shall specify limitations on the use of load duration factors in accordance with Section 2.3 of the NDS and, if applicable, any significant reduction in MOE or MOR.

6.5 The evaluation report shall list the approved treaters.

6.6 The evaluation report shall state that “Decking Use Only” is not permitted unless data showing comparable performance to that of existing approved preservatives, for species, dimensions and penetrations, is submitted.

6.7 When incising is required to meet the minimum penetration requirements for specific wood species and sizes of materials, it shall be limited to the depth, length and density specified in Section 4.3.8 of the NDS, or data shall be submitted establishing incising factors in accordance with Section 4.3.8 of the NDS. ■

TABLE 1—PENETRATION REQUIREMENTS

USE	SPECIES	REQUIRED PENETRATION
Above ground and ground contact	Ponderosa pine, radiata pine, patula pine, Caribbean pine, Scots pine—Germany, Scots pine—Sweden, red pine, southern pine and western red cedar	2.5" of wood or 85% of sapwood
	Douglas fir, hem-fir, redwood, and western hemlock	0.4" of wood and 90% of sapwood
Aboveground “Decking Use Only”	Douglas fir, hem-fir, and western hemlock	0.2" of wood and 90% of sapwood

Note: Where incising is used, measurements shall be made diagonally between the incisions.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

**APPENDIX A
COPPER-AZOLE WOOD PRESERVATIVE TREATMENT SYSTEMS
(Formerly AC143)**

A1.0 INTRODUCTION

A1.1 Purpose: The purpose shall be in accordance with Section 1.1 of this criteria.

A1.2 Scope: This appendix covers Copper-Azole wood-preservative systems for treatment of sawn lumber, timbers, round and square posts and plywood used in contact with the ground (AWPA UC4A and UC4B) or freshwater and out of contact with the ground (above ground) (AWPA UC3B). Materials complying with this criteria are suitable for locations requiring preservative-treated wood for fungal decay and/or termite resistance. The ICC-ES Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance Requirements (AC326) shall be used for evaluating waterborne Copper-Azole wood preservative systems, except when noted otherwise in this appendix.

A1.3 Codes and Referenced Standards: Where standards are referenced in this appendix, these standards shall be applied consistently with the code upon which compliance is based. Codes and standards are listed in Section 1.3 of AC326. Standards not listed in AC326 that are required for evaluation of waterborne Copper-Azole wood preservative systems are listed below:

A1.3.1 American Wood-Preservers' Association (AWPA):

A1.3.1.1 AWPA A2-05[®], Standard Methods for Analysis of Waterborne Preservative and Fire-retardant Formulations.

A1.3.1.2 AWPA A3-05[®], Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

A1.3.1.3 AWPA A9-01[®], Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy.

A1.3.1.4 AWPA A11-93[®], Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy.

A1.3.1.5 AWPA A21-00[®], Standard Method for the Analysis of Wood and Wood Treating Solutions by Inductively Coupled Plasma Emission Spectrometry.

A1.3.1.6 AWPA A28-05[®], Standard Method for Determination of Propiconazole and Tebuconazole in Wood, in Waterborne Formulations and in Treating Solutions by HPLC.

A1.3.1.7 AWPA A31-05[®], Standard Methods for the Analysis of Solutions and Wood for Azoles by Gas Chromatography (GC).

A1.3.1.8 AWPA C1-03[®], All Timber Products—Preservative Treatment by Pressure Processes.

A1.3.1.9 AWPA C2-02[®], Lumber, Timber, Bridge Ties and Mine Ties – Preservative Treatment by Pressure Processes.

A1.3.1.10 AWPA C5-03[®], Fence Posts—Preservative Treatment by Pressure Processes.

A1.3.1.11 AWPA C9-03[®], Plywood—Preservative Treatment by Pressure Processes.

A1.3.1.12 AWPA C15-03[®], Wood for commercial—Residential Construction Preservative Treatment by Pressure Processes.

A1.3.1.13 AWPA C16-03[®], Wood Used On Farms—Preservative Treatment by Pressure Processes.

A1.3.1.14 AWPA P5-05[®], Standard for Waterborne Preservatives.

A1.4 Definitions:

A1.4.1 Preservative: Copper-Azole preservatives are waterborne, copper-tebuconazole preservative systems used for treating wood. There are three formulations of Copper-Azole preservatives: Type A (CBA-A), Type B (CA-B) and Type C (CA-C).

A1.4.1.1 Copper-Azole Type A preservative (CBA-A) is copper, boric acid and tebuconazole in a 25:25:1 ratio.

A1.4.1.2 Copper-Azole Type B preservative (CA-B) is copper and tebuconazole in a 25:1 ratio.

A1.4.1.3 Copper-Azole Type C preservative shall have composition and tolerances as specified in the proprietary quality control documentation.

These active ingredients may be dissolved in a solution of ethanolamine and/or ammonia in water.

A1.4.2 Active Component (Nominal):

A1.4.2.1 The CBA-A preservative shall have the following composition:

Copper as Cu metal 49%

Boron as Boric Acid (H3BO3) 49%

Azole as Tebuconazole 2%

Subject to the tolerances listed in Table A1.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

A1.4.2.2 The CA-B preservative shall have the following composition:

- Copper as Cu metal 96.1%
 - Azole as Tebuconazole 3.9%
- Subject to the tolerances listed in Table A1.

A1.4.3 Active Component (Minimum, Maximum): The active components present in the treating solution of CBA-A and CA-B shall be within the ranges shown in Table 1. Active components present in CA-C treating solutions shall be as specified in the quality control documentation.

A1.4.4 Preservative-treated Wood: Refer to Section 1.4 of this criteria.

A2.0 BASIC INFORMATION

Basic information required for waterborne Copper-Azole wood preservative systems shall be provided in accordance with Section 2.0 of this criteria.

A3.0 PRESERVATIVE TREATMENT PROCESS

A3.1 General: General requirements for preservative treatment process shall be in accordance with Section 3.1 of this criteria.

A3.2 Treatment Standards:

A3.2.1 Wood Preservative: The preservative shall conform to the composition described in Section A1.4 of this appendix, and to applicable AWWA Analytical Standards as indicated in Section A3.7 of this appendix.

A3.2.2 Material: Copper-azole wood preservatives are used to treat the following materials and wood species:

A3.2.2.1 Dimensional lumber and timbers of the following sapwood species: southern pine, ponderosa pine, red pine, Patula pine, Scots pine—Germany, Scots Pine—Sweden, radiata pine and caribbean pine.

A3.2.2.2 Dimensional lumber and timbers of the following heartwood species: Douglas fir, western hemlock, hem-fir.

A3.2.2.3 Lumber to be labeled “Decking Use Only” shall not exceed a nominal thickness of 2 inches (51 mm) and a nominal width of 8 inches (204 mm) for decking and specialty use of the species listed in Sections A3.2.2.1 and A3.2.2.2.

A3.2.2.4 Round and sawn posts and building poles of southern pine, ponderosa pine, radiata pine, red pine, Douglas fir and western hemlock.

A3.2.2.5 Plywood shall be Exterior or Exposure 1 of the following species and grade classifications: southern yellow pine face veneers, Group 1 or 2, no hardwood core veneers, and Douglas fir face veneers, Group 1 or 2, no hardwood core veneers.

A3.2.3 Physical Quality: Physical quality of treated lumber and plywood shall be in accordance with Section 3.2.3 of this criteria.

A3.2.4 Incising: Incising of lumber shall be in accordance with Section 3.2.4 of this criteria.

A3.3 Treatment Process: Treatment process shall be in accordance with Section 3.3 of this criteria.

A3.4 Results of Treatment: Results of treatment shall be in accordance with Section 3.4 of this criteria.

A3.4.1 Sampling Method: Sampling shall be in accordance with Section 3.4.1 of this criteria.

A3.4.2 Retention by Assay: Retention of CA-C shall be in accordance with Section 3.4.2 of this criteria. Retention of CBA-A and CA-B shall be in accordance with Sections A3.4.2.1, A 3.4.2.2 and A3.4.2.3 of this appendix.

A3.4.2.1 Above Ground: Assay zones shall be the same as shown in AWWA standards. Minimum total retention and minimum retentions (above ground) of each component based on the assay for copper shall not be less than those shown in the following table:

COMPONENT	CBA-A	CA-B
Copper, as Cu metal	0.08 pcf (1.3 kg/m ³)	0.08 pcf (1.3 kg/m ³)
Boron, as boric acid	0.08 pcf (1.3 kg/m ³)	None
Tebuconazole	0.0033 pcf (0.053 kg/m ³)	0.0033 pcf (0.053 kg/m ³)
Total	0.20 pcf (3.3 kg/m³)	0.10 pcf (1.7 kg/m³)

The retention by assay shall be determined using the analytical standards specified in Section A3.7 of this appendix.

A3.4.2.2 Above Ground—Decking Use Only: Minimum retentions for heartwood species shall be the same as in Section A3.4.2.1 for aboveground use. Minimum total retention and minimum retentions (aboveground, decking use only) of each component for sapwood species based on the assay for copper shall not be less than those shown in the following table:

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

COMPONENT	CBA-A	CA-B
Copper, as Cu metal	0.064 pcf (1.02 kg/m ³)	0.064 pcf (1.02 kg/m ³)
Boron, as boric acid	0.064 pcf (1.02 kg/m ³)	None
Tebuconazole	0.0026 pcf (0.04 kg/m ³)	0.0026 pcf (0.04 kg/m ³)
Total	0.16 pcf (2.56 kg/m³)	0.08 pcf (1.28 kg/m³)

The retention by assay shall be determined using the analytical standards specified in Section A3.7 of this appendix.

A3.4.2.3 Ground Contact: Assay zones shall be the same as those shown in AWPA standards. Minimum total retention and minimum retentions (ground contact) of each component, based on the assay for copper and balance in the treating solution shall not be less than those shown in the following table:

COMPONENT	CBA-A	CA-B
Copper, as Cu metal	0.16 pcf (2.6 kg/m ³)	0.16 pcf (2.6 kg/m ³)
Boron, as boric acid	0.16 pcf (2.6 kg/m ³)	None
Tebuconazole	0.0066 pcf (0.11 kg/m ³)	0.0066 pcf (0.11 kg/m ³)
Total	0.41 pcf (6.5 kg/m³)	0.21 pcf (1.7 kg/m³)

The retention by assay shall be determined using the analytical standards specified in Section A3.7 of this appendix.

A3.4.3 Standard Density for Assay Calculation (AWPA Standard A 12): Densities for assay calculation shall be in accordance with Section 3.4.2.3 of this criteria.

A3.4.4 Penetration: Penetration shall be in accordance with Section 3.4.3 of this criteria.

A3.5 Drying after Treatment: Drying after treatment shall be in accordance with Section 3.5 of this criteria.

A3.6 Marking: Marking shall be in accordance with Section 3.6 of AC326.

A3.7 Analysis Standards:

A3.7.1 For copper, use the following as applicable:

- AWPA Standard A9: X-ray Fluorescence Spectroscopy.
- AWPA Standard A11: Atomic Absorption Spectroscopy.
- AWPA Standard A21: Inductively Coupled Plasma. Spectroscopy.

A3.7.2 For boron, use the following as applicable:

- AWPA Standard A2, Section 16: Determination of Boron Using Carminic Acid.
- AWPA Standard A21: Inductively Coupled Plasma Spectroscopy.

A3.7.3 For propiconazole and tebuconazole, use the following as applicable:

- AWPA Standard 28: Determination of Propiconazole and Tebuconazole in Wood, in Waterborne Formulations and in Treating Solutions by HPLC.
- AWPA Standard 31: Analysis of Solutions and Wood for Azoles by Gas Chromatography (GC).

A3.7.4 For determining penetration of Copper Azole use the following:

- AWPA Standard A3, Section 14: Determining Penetration of Copper Containing Preservatives.

A4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the Copper-Azole wood preservative system treated wood shall be documented by testing. The testing and performance requirements listed in this appendix document treated wood used in contact with the ground (AWPA UC4A, AWPA UC4B) and in aboveground, weather-exposed (AWPA UC3B) conditions. Testing shall be in accordance with AWPA and ASTM standards and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section A2.4 of this appendix. The following documentation (Sections A4.1 to A4.8) is needed to substantiate the performance characteristics of the wood preservative products:

A4.1 Laboratory Tests: Testing shall be in accordance with Section 4.1 of this criteria.

A4.2 Simulated Field Tests: Testing shall be in accordance with Section 4.2 of this criteria.

A4.3 Field Tests: Ground-contact field stake testing and aboveground field testing in accordance with Sections A4.3.1 and A4.3.2.

Conditions of Acceptance: Testing shall demonstrate efficacy of the recommended levels of the wood preservative for the products and uses listed in this appendix.

A4.3.1 Ground-contact field stake tests, in accordance with AWPA E7 or ASTM D 1758, shall demonstrate performance for ground contact.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

A4.3.2 Aboveground field testing in accordance with AWPA E9 (L-joints), AWPA E16 (horizontal lap joints) or AWPA E18 (Ground Proximity) shall demonstrate performance for above ground use. Lap joint test results shall be accepted as valid provided that the nominal mean rating of the joint surfaces for the untreated controls is equal to or greater than 3.0 on a scale of 0 to 5 (0 = sound, and 5 = failure). The test shall be continued until all untreated control samples have failed, and an updated inspection report shall be provided upon the one-year and subsequent re-evaluations until a minimum of five years of exposure is achieved.

A4.4 Preservative Permanence: Testing indicated in Sections A4.4.1, A4.4.2 and A4.4.3 shall be performed.

Conditions of Acceptance: Testing shall demonstrate levels of the wood preservative for the products and uses indicated in this appendix.

A4.4.1 Refer to Section 4.4.1 of this criteria.

A4.4.2 Soil bed depletion testing in accordance with AWPA E14.

A4.4.3 Refer to Section 4.4.2 of this criteria.

A4.5 Effects on Wood Properties: Testing shall be in accordance with Section 4.5 of this criteria.

A4.6 Corrosion: Testing shall be in accordance with Section 4.6 of this criteria.

A4.7 Treatment Testing: Testing shall be in accordance with Section 4.7 of this criteria.

A4.8 Analysis of Test Documentation: Analysis of test data shall be in accordance with Section 4.8 of this criteria.

A5.0 QUALITY CONTROL

Quality control shall be in accordance with Section 5.0 of this criteria.

A6.0 EVALUATION REPORT RECOGNITION

Conditions of use shall be in accordance with Section 6.0 of this criteria.

TABLE A1—PRESENCE OF ACTIVE COMPONENTS IN THE TREATING SOLUTION

ACTIVE COMPONENTS	CBA-A		CA-B	
	Minimum Percent	Maximum Percent	Minimum Percent	Maximum Percent
Copper, as Cu metal	44.0	54.0	95.4	96.8
Boron, as Boric Acid	44.0	54.0	None	None
Azole as Tebuconazole	1.8	2.8	3.2	4.6

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

**APPENDIX B
COPPER-QUATERNARY AND COPPER-ZINC WOOD-PRESERVATIVE TREATMENT SYSTEMS
(Formerly AC78)**

B1.0 INTRODUCTION

B1.1 Purpose: The purpose shall be in accordance with Section 1.1 of this criteria.

B1.2 Scope: This appendix covers copper-quaternary and copper-zinc wood preservative systems. The copper-quaternary and copper-zinc wood preservatives are used to treat sawn lumber, timbers, plywood, poles and posts. The treated wood products are used in contact with ground (AWPA UC4A and UC4B) or freshwater and out of contact with the ground (above ground) (AWPA UC3B). Materials complying with this criteria are suitable for locations requiring preservative-treated wood for fungal decay and/or termite resistance. The ICC-ES Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance Requirements (AC326) shall be used for evaluating copper-quaternary and copper-zinc wood preservative systems, except when noted otherwise in this appendix.

B1.3 Codes and Referenced Standards: Where standards are referenced in this appendix, these standards shall be applied consistently with the code upon which compliance is based. Codes and standards are listed in Section 1.3 of AC326. Standards not listed in AC326 that are required for evaluation of copper-quaternary and copper-zinc wood preservative systems are listed below:

B1.3.1 American Wood-Preservers' Association (AWPA):

B1.3.1.1 AWPA A2-05[®], Standard Methods for Analysis of Waterborne Preservative and Fire-retardant Formulations.

B1.3.1.2 AWPA A3-05[®], Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

B1.3.1.3 AWPA A9-01[®], Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy.

B1.3.1.4 AWPA A11-93[®], Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy.

B1.3.1.5 AWPA A16-93[®], Standard for HPLC Method for Didecyldimethylammonium Chloride Determination in Treated Wood.

B1.3.1.6 AWPA A17-03[®], Standard for Determination of Didecyldimethylammonium Chloride in ACQ Solutions.

B1.3.1.7 AWPA A18-05[®], Standard for Determination of Quaternary Ammonium Compounds in Wood by 2-Phase Titration.

B1.3.1.8 AWPA A21-00[®], Standard Method for the Analysis of Wood and Wood Treating Solutions by Inductively Coupled Plasma Emission Spectrometry.

B1.4 Definitions:

B1.4.1 Copper-quaternary and Copper-zinc Wood Preservative Systems: Copper-quaternary preservatives are compositions containing copper (II) ions, carbonate and quaternary ammonium compound (quat). The ratio of copper, expressed as CuO, to quat is 1:1 by weight for Type A or 2:1, by weight for Types B, C and D. The copper-quaternary preservative is available as Types A, B, C and D. Copper-zinc preservatives are compositions containing copper and zinc in a fixed ratio by weight.

The preservative shall have a pH from 8 to 11. When ethanolamine is used, the weight of ethanolamine in treating solutions shall be 2.75 times the weight of copper oxide; and when ammonia is used, the weight of the ammonia in treating solutions shall be at least 1.0 times the weight of copper oxide. To aid in solution, it is necessary for the treating solution to contain carbonate anions. The amount of carbonate, expressed as CO₂ shall be at least 0.25 times the amount of copper oxide.

The preservatives shall contain bivalent copper, zinc and quaternary ammonium compounds as appropriate, derived from compounds having a purity in excess of 95 percent on an anhydrous basis. The commercial preservative shall be labeled as to its total content of active ingredients.

B1.4.2 Active Component (Nominal): The Type A copper-quaternary preservative shall have the following composition:

Copper, as CuO 50.0%

Quat (Section B1.4.3) 50.0%

The Type B, C and D copper-quaternary preservative shall have the following composition:

Copper, as CuO 66.7%

Quat (Section B1.4.3) 33.3%

For the copper-zinc formulation, the ratio shall be as specified in the approved quality documentation submitted to ICC-ES by the applicant for the evaluation report.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

B1.4.3 Quat: The quat used in copper-quaternary Types A, B and D is didecyldimethyl ammonium chloride or didecyldimethyl ammonium carbonate. The Quat used in copper-quaternary Type C is alkyldimethylbenzyl ammonium chloride (ADBAC).

B1.4.4 Active Component (Minimum, Maximum): The active component present in the copper-quaternary treating solution shall be within the following ranges:

ACTIVE COMPONENT	MINIMUM PERCENT	MAXIMUM PERCENT
Type A		
Copper, as CuO	45.5	54.5
Quat (Section B1.4.3)	45.5	54.5
Types B, C and D		
Copper, as CuO	62.0	71.0
Quat (Section B1.4.3)	29.0	38.0

B1.4.5 Preservative-treated Wood: Refer to Section 1.4 of this criteria.

B2.0 BASIC INFORMATION

Basic information required for copper-quaternary and copper-zinc wood preservative systems shall be provided in accordance with Section 2.0 of this criteria.

B3.0 PRESERVATIVE TREATMENT PROCESS

B3.1 General: General requirements for preservative treatment process shall be in accordance with Section 3.1 of this criteria.

B3.2 Treatment Standards:

B3.2.1 Wood Preservative: The preservative shall conform to the composition described in Section B1.4 of this appendix, and to applicable AWPA Analytical Standards as indicated in Section B3.7 of this appendix.

B3.2.2 Material: Wood species and material to be treated with the wood preservative shall be noted in the evaluation report.

B3.2.3 Physical Quality: Physical quality of treated lumber and plywood shall be in accordance with Section 3.2.3 of this criteria.

B3.2.4 Incising: Incising of lumber shall be in accordance with Section 3.2.4 of this criteria.

B3.3 Treatment Process: Treatment process shall be in accordance with Section 3.3 of this criteria.

B3.4 Results of Treatment: Results of treatment shall be in accordance with Section 3.4 of this criteria.

B3.4.1 Sampling Method: Sampling shall be in accordance with Section 3.4.1 of this criteria.

B3.4.2 Retention by Assay:

B3.4.2.1 Retention shall be in accordance with Section 3.4.2 of this criteria.

The composition of the Type B, C and D preservative in use may deviate from the limits specified in Section B1.4.4, provided that the preservative retention in treated material is determined by assay, and the retention so determined conforms to the minimum percentage requirements in Table B1. The composition of the Type A preservative in use shall conform to the minimum percentage requirements specified in the quality documentation.

B3.4.2.2 Assay Zones: Assay zones shall be the same as shown in AWPA standards for similar wood species and products. Material that is clearly marked “Decking Use Only” shall have an assay zone of 0.0 to 0.2 inch (0 to 5 mm).

B3.4.3 Standard Density for Assay Calculation (AWPA Standard A 12): Densities for assay calculation shall be in accordance with Section 3.4.2.3 of this criteria.

B3.4.4 Penetration: Penetration shall be in accordance with Section 3.4.3 of this criteria.

B3.5 Drying after Treatment: Drying after treatment shall be in accordance with Section 3.5 of this criteria.

B3.6 Marking: Marking shall be in accordance with Section 3.6 of AC326.

B3.7 Analysis Standards:

B3.7.1 For copper and/or zinc, use the following as applicable:

- AWPA A2 (Paragraph 6)
- AWPA A9: X-ray Fluorescence Spectroscopy.
- AWPA A11: Atomic Absorption Spectroscopy.
- AWPA A21: Inductively Coupled Plasma. Spectroscopy.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

B3.7.2 For quat, use the following as applicable:

- AWPA A17 Determination of Didecyldimethylammonium chloride in ACQ solutions.
- AWPA A18 Determination of Quaternary Ammonium compounds in ACQ solutions.

B3.7.3 For ammonia, use the following:

- AWPA A2 (Paragraph 1)

B3.7.4 For determining penetration, use the following:

- AWPA A3, Section 14: Determining Penetration of Copper Containing Preservatives.

B4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the wood preservative system shall be documented by testing. The testing and performance requirements listed in this appendix document treated wood used in contact with ground (AWPA UC4A, AWPA UC4B) and in aboveground, weather-exposed (AWPA UC3B) conditions. Testing shall be in accordance with AWPA and ASTM standards and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section 2.0 of this criteria. The following documentation (that noted in Sections B4.1 to B4.8) is needed to substantiate the performance characteristics of the wood-preservative products:

B4.1 Laboratory Tests: Testing shall be in accordance with Section 4.1 of this criteria.

B4.2 Simulated Field Tests: Testing shall be in accordance with Section 4.2 of this criteria.

B4.3 Field Tests: Testing shall be in accordance with Section 4.3.4 of this criteria.

B4.4 Preservative Permanence: Testing indicated in Sections B4.4.1, B4.4.2 and B4.4.3 shall be performed.

Conditions of Acceptance: Testing shall demonstrate levels of the wood preservative for the products and uses indicated in this appendix.

B4.4.1 Refer to Section 4.4.1 of this criteria.

B4.4.1 Soil bed depletion testing in accordance with AWPA E 14, if submitted in accordance with Section B4.2 of this criteria.

B4.4.3 Refer to Section 4.4.2 of this criteria.

B4.5 Effects on Wood Properties: Testing shall be in accordance with Section 4.5 of this criteria.

B4.6 Corrosion: Testing shall be in accordance with Section 4.6 of this criteria.

B4.7 Treatment Testing: Testing shall be in accordance with Section 4.7 of this criteria.

B4.8 Analysis of Test Documentation: Analysis of test data shall be in accordance with Section 4.8 of this criteria.

B5.0 QUALITY CONTROL

Quality control shall be in accordance with Section 5.0 of this criteria.

B6.0 EVALUATION REPORT RECOGNITION

Conditions of use shall be in accordance with Section 6.0 of this criteria.

TABLE B1—COPPER-QUATERNARY RETENTION LEVELS

WOOD PRESERVATIVE TREATMENT SYSTEM	RETENTION AS SPECIFIED, pcf (kg/m ³)	MINIMUM COPPER AS CuO, pcf (kg/m ³)	MINIMUM QUAT ACTIVE, pcf (kg/m ³)	MINIMUM SUM, pcf (kg/m ³)
Copper-quaternary	0.15 (2.4)	0.08 (1.3)	0.04 (0.65)	0.15 (2.4)
	0.25 (4.0)	0.13 (2.1)	0.07 (1.1)	0.25 (4.0)
	0.40 (6.4)	0.21 (3.4)	0.11 (1.8)	0.40 (6.4)
	0.60 (9.6)	0.32 (5.1)	0.16 (2.6)	0.60 (9.6)
	0.80 (12.8)	0.42 (6.7)	0.22 (3.5)	0.80 (12.8)
	1.00 (16.0)	0.53 (8.5)	0.27 (4.3)	1.00 (16.0)

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

**APPENDIX C
DCOIT WOOD PRESERVATIVE TREATMENT SYSTEMS
(Formerly AC314)**

C1.0 INTRODUCTION

C1.1 Purpose: The purpose shall be in accordance with Section 1.1 of this criteria.

C1.2 Scope: This appendix covers DCOIT and DCOIT plus copper wood preservative systems for sawn lumber, timbers, and plywood used in contact with the ground (AWPA UC4A and UC4B) and out of contact with the ground (aboveground) (AWPA UC3B). Materials complying with this appendix are suitable for locations requiring preservative-treated wood for fungal decay and/or termite resistance. The ICC-ES Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance Requirements (AC326) shall be used for DCOIT and DCOIT plus copper wood preservative systems, except when noted otherwise in this appendix.

C1.3 Codes and Referenced Standards: Where standards are referenced in this appendix, these standards shall be applied consistently with the code upon which compliance is based. Codes and standards are listed in Section 1.3 of AC326. Standards not listed in AC326 that are required for evaluation of DCOIT and DCOIT plus copper wood preservative systems are listed below:

C1.3.1 American Wood-Preservers' Association (AWPA):

C1.3.1.1 AWPA A2-06[®], Standard Methods for Analysis of Waterborne Preservative and Fire-retardant Formulations.

C1.3.1.2 AWPA A3-05[®], Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

C1.3.1.3 AWPA A4-03[®], Standard Methods for Sampling Wood Preservatives.

C1.3.1.4 AWPA A9-01[®], Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy.

C1.3.1.5 AWPA A11-93[®], Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy.

C1.3.1.6 AWPA A30-00[®], Standard Method for the Determination of 4,5-Dichloro-2-N-Octyl-4-Isothiazolin-3-One (RH-287) in Wood by High Performance Liquid Chromatography (HPLC).

C1.4 Definitions:

C1.4.1 DCOIT Wood Preservative System: DCOIT wood preservative system is defined as a wood-preservative treatment with a formulation containing 4,5-Dichloro-2-n-octyl-4-isothiazolin-3-one.

C1.4.2 DCOIT Plus Copper Wood Preservative System: DCOIT plus copper wood preservative system is defined as a wood-preservative treatment with a formulation containing 4,5-Dichloro-2-n-octyl-4-isothiazolin-3-one and a soluble alkaline copper complex.

C1.4.3 Preservative-treated Wood: Refer to Section 1.4 of this criteria.

C2.0 BASIC INFORMATION

Basic information required for DCOIT and DCOIT plus copper wood preservative systems shall be provided in accordance with Section 2.0 of this criteria.

C3.0 PRESERVATIVE TREATMENT PROCESS

C3.1 General: General requirements for preservative treatment process shall be in accordance with Section 3.1 of this criteria.

C3.2 Treatment Standards:

C3.2.1 Wood Preservative: DCOIT and DCOIT plus copper treated wood shall conform to the composition described in Section 1.4 of this criteria, and to applicable analytical standards as indicated in Section 3.7 of this criteria.

C3.2.2 Material: Wood species for lumber shall be Douglas fir, hem-fir, ponderosa pine, Radiata pine, red pine, redwood, Scots pine—Germany, southern pine, western hemlock, and western red cedar. Lumber to be labeled “Decking Use Only” shall be Douglas fir, western hemlock or hem-fir, and shall not exceed a nominal thickness of 2 inches (51 mm) and a nominal width of 6 inches (152 mm). Plywood shall be Exterior or Exposure 1. Only the following types and grade classifications may be used:

- Southern pine plywood (face veneers Group 1 or 2); no hardwood core veneers.
- Western plywood (face veneers Group 1 or 2); no hardwood core veneers.

C3.2.3 Physical Quality: Physical quality of treated lumber and plywood shall be in accordance with Section 3.2.3 of this criteria.

C3.2.4 Incising: Incising of lumber shall be in accordance with Section 3.2.4 of this criteria.

C3.3 Treatment Process: Treatment process shall be in accordance with Section 3.3 of this criteria.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

C3.4 Results of Treatment: Results of treatment shall be in accordance with Section 3.4 of this criteria.

C3.4.1 Sampling Method: Sampling shall be in accordance with Section 3.4.1 of this criteria.

C3.4.2 Retention by Assay: Retention shall be in accordance with Section 3.4.2 of this criteria.

C3.4.3 Standard Density for Assay Calculation (AWPA Standard A 12): Densities for assay calculation shall be in accordance with Section 3.4.2.3 of this criteria.

C3.4.4 Penetration: Penetration shall be in accordance with Section 3.4.3 of this criteria.

C3.5 Drying after Treatment: Drying after treatment shall be in accordance with Section 3.5 of this criteria.

C3.6 Marking: Marking shall be in accordance with Section 3.6 of AC326.

C3.7 Analysis Standards:

C3.7.1 DCOIT: For DCOIT preservative-treated wood, use the following as applicable:

- analytical protocol described in AWPA A30.
- A modified version of the analytical protocol described in AWPA Standard A9 may be used as an alternative procedure to AWPA A30.

C3.7.2 DCOIT Plus Copper: For DCOIT plus copper use the following as applicable:

- AWPA Standard A2
- AWPA Standard A3
- AWPA Standard A9
- AWPA Standard A11
- AWPA Standard A21
- AWPA Standard A30

C4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the wood preservative system shall be documented by testing. The testing and performance requirements listed in this appendix document treated wood used in contact with ground (AWPA UC4A, AWPA UC4B) and in aboveground, weather-exposed (AWPA UC3B) conditions. Testing shall be in accordance with AWPA and ASTM standards and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section 2.0 of this criteria. The following documentation (that noted in Sections C4.1 to C4.8) is needed to substantiate the performance characteristics of the wood-preservative products:

C4.1 Laboratory Tests: Testing shall be in accordance with Section 4.1 of this criteria.

C4.2 Simulated Field Tests: Testing shall be in accordance with Section 4.2 of this criteria.

C4.3 Field Tests: Testing shall be in accordance with Section 4.3 .4 of this criteria.

C4.4 Preservative Permanence: Testing indicated in Section C4.4.1 for AWPA UC4A, UC4B and UC3B shall be performed. Testing indicated in Section C4.4.2 for AWPA UC4A and UC4B shall be performed for ground-contact use. Testing indicated in Sections C4.4.3 and C4.4.4 shall be performed for AWPA UC3B aboveground unprotected use.

Conditions of Acceptance: Refer to Section 4.4 of this criteria.

C4.4.1 Laboratory leaching testing refer to Section 4.4.1 of this criteria.

C4.4.2 Depletion from ground-contact stake testing refer to Section 4.4.2 of this criteria.

C4.4.3 Depletion from specimens testing. Refer to Section 4.4.3 of this criteria.

C4.4.4 Testing in accordance with the leaching procedure of Annex A of AC62 may be used when evaluating product for installation in aboveground, unprotected applications. After such testing, the material shall demonstrate resistance to brown rot fungi in accordance with AWPA E10.

C4.5 Effects on Wood Properties: Testing shall be in accordance with Section 4.5 of this criteria.

C4.6 Corrosion: Testing shall be in accordance with Section 4.6 of this criteria.

C4.7 Treatment Testing: Testing shall be in accordance with Section 4.7 of this criteria.

C4.8 Analysis of Test Documentation: Analysis of test data shall be in accordance with Section 4.8 of this criteria.

C5.0 QUALITY CONTROL

Quality control shall be in accordance with Section 5.0 of this criteria.

C6.0 EVALUATION REPORT RECOGNITION

Conditions of use shall be in accordance with Section 6.0 of this criteria.

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

**APPENDIX D
COPPER-POLYMERIC BETAININE WOOD-PRESERVATIVE TREATMENT SYSTEMS**

D1.0 INTRODUCTION

D1.1 Purpose: The purpose shall be in accordance with Section 1.1 of this criteria.

D1.2 Scope: This appendix covers copper-polymeric betaine wood-preservative systems. The copper-polymeric betaine wood preservatives are used to treat sawn lumber, timbers, plywood, poles and posts. The treated wood products are used in contact with ground (AWPA UC4A and UC4B) or freshwater and out of contact with the ground (above ground) (AWPA UC3B). Materials complying with this criteria are suitable for locations requiring preservative-treated wood for fungal decay and/or termite resistance. The ICC-ES Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance Requirements (AC326), shall be used for evaluating copper-polymeric betaine wood preservative systems, except when noted otherwise in this appendix.

D1.3 Codes and Referenced Standards: Where standards are referenced in this appendix, the standards shall be applied consistently with the code upon which compliance is based. Codes and standards are listed in Section 1.3 of AC326. Standards not listed in AC326 that are required for evaluation of copper-polymeric betaine wood preservative systems are listed below:

D1.3.1 American Wood-Preservers' Association (AWPA):

D1.3.1.1 AWPA A2-05[®], Standard Methods for Analysis of Waterborne Preservative and Fire-retardant Formulations.

D1.3.1.2 AWPA A3-05[®], Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

D1.3.1.3 AWPA A9-01[®], Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy.

D1.3.1.4 AWPA A11-93[®], Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy.

D1.3.1.5 AWPA A16-93[®], Standard for HPLC Method for Didecyldimethylammonium Chloride Determination in Treated Wood.

D1.3.1.6 AWPA A17-03[®], Standard for Determination of Didecyldimethylammonium Chloride in ACQ Solutions.

D1.3.1.7 AWPA A18-05[®], Standard for Determination of Quaternary Ammonium Compounds in Wood by 2-Phase Titration.

D1.3.1.7 AWPA A21-00[®], Standard Method for the Analysis of Wood and Wood Treating Solutions by Inductively Coupled Plasma Emission Spectrometry.

D1.3.1.8 AWPA A36-04[®], Standard for Determination of Quaternary Ammonium Compounds in Wood by Potentiometric Back-Titration Using Sodium Lauryl Sulfate and Hyamine 1622.

D1.3.1.10 AWPA A37-05[®], Standard for Determination of Quaternary Ammonium Compounds in Wood and Wood Treating Solutions by Potentiometric Back-Titration Using Sodium Tetrphenylborate.

D1.3.1.11 AWPA A40-06[®], Standard Method for Determination of Boron Trioxide in Treating Solutions and Treated Wood by Potentiometric Titration with Sodium Hydroxide.

D1.4 Definitions:

D1.4.1 Copper-polymeric Betaine Wood Preservative Systems: Copper-polymeric betaine preservative systems are waterborne systems containing three active ingredients: polymeric betaine, copper carbonate and boric acid in monoethanolamine and water. Polymeric betaine itself is a reaction product solution formed from didecylamine (DDA), ethylene oxide, propylene glycol and boric acid in water. The result is a complex borate ester that exists in the reaction product solution in equilibrium with free boric acid and the quaternary ammonium ion formed from the reaction of DDA and ethylene oxide. There are two formulations, KDS and KDS Type B (KDS-B).

D1.4.1.1 KDS contains copper, polymeric betaine, and boric acid in a ratio of 1.25:1:0.8 where copper is expressed as CuO, polymeric betaine is expressed as Technical Grade Active Ingredient (TGAI), and boric acid is expressed as equivalent (BAE).

D1.4.1.2 KDS Type B (KDS-B) contains copper and polymeric betaine in a ratio of 1.25:1 where copper is expressed as CuO and polymeric betaine is expressed as Technical Grade Active Ingredient (TGAI).

The active ingredients may be dissolved in ethanolamine and water.

D1.4.2 Active Component (Nominal):

D1.4.2.1 The KDS preservative shall have the following composition subject to the tolerances listed in the quality documentation:

Copper, as CuO	41%
Polymeric betaine	33%
Boric acid	26%

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

D1.4.2.2 The KDS-B preservative shall have the following composition subject to the tolerances listed in the quality documentation:

Copper, as CuO	56%
Polymeric betaine	44%

D1.4.3 Active Component (Minimum, Maximum): The active ingredients present in the treating solution shall fall in the ranges listed in the quality documentation.

D1.4.4 Preservative-treated Wood: Refer to Section 1.4 of this criteria.

D2.0 BASIC INFORMATION

Basic information required for copper-polymeric betaine wood preservative systems shall be provided in accordance with Section 2.0 of this criteria.

D3.0 PRESERVATIVE TREATMENT PROCESS

D3.1 General: General requirements for preservative treatment process shall be in accordance with Section 3.1 of this criteria.

D3.2 Treatment Standards:

D3.2.1 Wood Preservative: The preservative shall conform to the composition described in Section D1.4, and to applicable AWPA analytical standards as indicated in Section D3.7.

D3.2.2 Wood species and material to be treated with the wood preservative shall be noted in the evaluation report.

D3.2.3 Physical Quality: Physical quality of treated lumber and plywood shall be in accordance with Section 3.2.3 of this criteria.

D3.2.4 Incising: Incising of lumber shall be in accordance with Section 3.2.4 of this criteria.

D3.3 Treatment Process: The treatment process shall be in accordance with Section 3.3 of this criteria.

D3.4 Results of Treatment: Results of treatment shall be in accordance with Section 3.4 of this criteria.

D3.4.1 Sampling shall be in accordance with Section 3.4.1 of this criteria.

D3.4.2 Retention by Assay:

D3.4.2.1 Retention shall be in accordance with Section 3.4.2 of this criteria. The composition of the preservative in use may deviate from the limits specified in Section D1.4.4, provided that the preservative retention in treated material is determined by assay, and the retention so determined conforms to the minimum percentage requirements listed in the quality documentation.

D3.4.2.2 Assay Zones: Assay zones shall be the same as shown in AWPA standards for similar wood species and products. Material that is clearly marked "Decking Use Only" shall have an assay zone of 0.0 to 0.2 inch (0 to 5 mm).

D3.4.3 Standard Density for Assay Calculation (AWPA Standard A 12): Densities for assay calculation shall be in accordance with Section 3.4.2.3 of this criteria.

D3.4.4 Penetration shall be in accordance with Section 3.4.3 of this criteria.

D3.5 Drying after Treatment: Drying after treatment shall be in accordance with Section 3.5 of this criteria.

D3.6 Marking: Marking shall be in accordance with Section 3.6 of AC326.

D3.7 Analysis Standards:

D3.7.1 For copper, use the following as applicable:

- AWPA A2 (paragraph 6)
- AWPA A9
- AWPA A11
- AWPA A21

D3.7.2 For polymeric betaine, use the following as applicable:

- AWPA A17
- AWPA A18
- AWPA A36
- AWPA A37

D3.7.3 For boric acid, use the following:

ACCEPTANCE CRITERIA FOR PROPRIETARY WOOD PRESERVATIVE SYSTEMS—COMMON REQUIREMENTS FOR TREATMENT PROCESS, TEST METHODS AND PERFORMANCE

- AWPA A2
- AWPA A21
- AWPA A40

D3.7.4 For copper penetration determination, use the following:

- AWPA A3 Section 14

D4.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

The performance characteristics of the wood preservative system shall be documented by testing. The testing and performance requirements listed in this appendix document treated wood used in contact with ground (AWPA UC4A, AWPA UC4B) and in aboveground, weather-exposed (AWPA UC3B) conditions. Testing shall be in accordance with AWPA and ASTM standards and shall demonstrate resistance to fungal decay and to subterranean termites. Product sampling shall be in accordance with Section 2.0 of this criteria. The following documentation (that noted in Sections D4.1 to D4.8) is needed to substantiate the performance characteristics of the wood-preservative products:

D4.1 Laboratory Tests: Testing shall be in accordance with Section 4.1 of this criteria.

D4.2 Simulated Field Tests: Testing shall be in accordance with Section 4.2 of this criteria.

D4.3 Field Tests: Testing shall be in accordance with Section 4.3.4 of this criteria.

D4.4 Preservative Permanence: Testing indicated in Sections D4.4.1, D4.4.2 and D4.4.3 shall be performed.

Conditions of Acceptance: Testing shall demonstrate levels of the wood preservative for the products and uses indicated in this appendix.

D4.4.1 Refer to Section 4.4.1 of this criteria.

D4.4.2 Soil bed depletion testing in accordance with AWPA E 14, if submitted in accordance with Section D4.2 of this criteria.

D4.4.3 Refer to Section 4.4.2 of this criteria.

D4.5 Effects on Wood Properties: Testing shall be in accordance with Section 4.5 of this criteria.

D4.6 Corrosion: Testing shall be in accordance with Section 4.6 of this criteria.

D4.7 Treatment Testing: Testing shall be in accordance with Section 4.7 of this criteria.

D4.8 Analysis of Test Documentation: Analysis of test data shall be in accordance with Section 4.8 of this criteria.

D5.0 QUALITY CONTROL

Quality control shall be in accordance with Section 5.0 of this criteria.

D6.0 EVALUATION REPORT RECOGNITION

Conditions of use shall be in accordance with Section 6.0 of this criteria.

TABLE D1—PRESENCE OF ACTIVE COMPONENTS IN TREATING SOLUTIONS

ACTIVE COMPONENTS	KDS		KDS-B	
	Minimum Percent	Maximum Percent	Minimum Percent	Maximum Percent
Copper, as Cu metal	37	45	50	60
Polymeric betaine TGAI	30	36	40	50
Boric acid	23	29	None	None