ACCEPTANCE CRITERIA FOR
COPPER-QUATERNARY AND COPPER-ZINC
WOOD PRESERVATIVE TREATMENT SYSTEMS

AC78

Approved October 2006
Effective January 1, 2007

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.
1.0 INTRODUCTION

1.1 Purpose: The purpose of this criteria is to establish minimum requirements for copper-quaternary and copper-zinc wood preservative systems treatment, 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 (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. For applicable code sections, refer to Section 1.1 of AC326.

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

1.2 Scope: This acceptance criteria 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 or freshwater and out of contact with the ground (above ground). 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 criteria.

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. Codes and standards are listed in Section 1.3 of AC326. Standards not listed in AC326 that are required for evaluation of copper-quaternary wood and copper-zinc preservative systems are listed below:

1.3.1 American Wood-Preservers’ Association (AWPA) Standards:

1.3.1.1 AWPA A2-06®, Standard Methods for Analysis of Waterborne Preservative and Fire-retardant Formulations.

1.3.1.2 AWPA A3-05®, Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

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

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

1.3.1.5 AWPA A16-93®, Standard for HPLC Method for Didecyldimethylammonium Chloride Determination in Treated Wood.

1.3.1.6 AWPA A17-03®, Standard for Determination of Didecyldimethylammonium Chloride in ACQ Solutions.

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

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

1.3.2 ICC-ES Acceptance Criteria:

1.3.2.1 Acceptance Criteria for Proprietary Wood Preservative Systems—Common Requirements for Treatment Process, Test Methods and Performance (AC326).

1.4 Definitions:

1.4.1 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 2:1, by weight. The copper-quaternary preservative is available as Types 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.

1.4.2 Active Component (Nominal): The copper-quaternary preservative shall have the following composition:

Copper, as CuO 66.7%
Quat (Section 1.4.3) 33.3%

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

1.4.3 Quat: The quat used in copper-quaternary Types B and D is didecyldimethyl ammonium chloride or didecyldimethyl ammonium carbonate. The Quat used in copper-quaternary Type C is alkyldimethylbenzyl ammonium chloride (ADBAC).
1.4.4 Active Component (Minimum, Maximum): The active component present in the copper-quaternary treating solution shall be within the following ranges:

<table>
<thead>
<tr>
<th>ACTIVE COMPONENT</th>
<th>MINIMUM PERCENT</th>
<th>MAXIMUM PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, as CuO</td>
<td>62.0</td>
<td>71.0</td>
</tr>
<tr>
<td>Quat (Section 1.4.3)</td>
<td>29.0</td>
<td>38.0</td>
</tr>
</tbody>
</table>

1.4.5 Preservative-treated Wood: Refer to AC326.

2.0 BASIC INFORMATION

Basic information required for copper-quaternary and copper-zinc wood preservative systems shall be provided in accordance with Section 2.0 of AC326.

3.0 PRESERVATIVE TREATMENT PROCESS

3.1 General: General requirements for preservative treatment process shall be in accordance with Section 3.1 of AC326.

3.2 Treatment Standards:

3.2.1 Wood Preservative: The preservative shall conform to the composition described in Section 1.4 of this criteria, and to the applicable AWPA Analytical Standards as indicated in Section 3.7 of this criteria.

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

3.2.3 Physical Quality: Physical quality of treated lumber and plywood shall be in accordance with Section 3.2.3 of AC326.

3.2.4 Incising: Incising of lumber shall be in accordance with Section 3.2.4 of AC326.

3.3 Treatment Process: Treatment process shall be in accordance with Section 3.3 of AC326.

3.4 Results of Treatment: Results of treatment shall be in accordance with Section 3.4 of AC326.

3.4.1 Sampling Method: Sampling shall be in accordance with Section 3.4.1 of AC326.

3.4.2 Retention by Assay:

3.4.2.1 Retention: Retention shall be in accordance with Section 3.4.2 of AC326.

The composition of the preservative in use may deviate from the limits specified in Section 1.4.4, 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 1.

3.4.2.2 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).

3.4.2.3 Standard Density for Assay Calculation (AWPA Standard A 12): Densities for assay calculation shall be in accordance with Section 3.4.2.3 of AC326.

3.4.3 Penetration: Penetration shall be in accordance with Section 3.4.3 of AC326.

3.5 Drying after Treatment: Drying after treatment shall be in accordance with Section 3.5 of AC326.

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

3.7 Analysis Standards:

3.7.1 For copper and/or zinc, use the following as applicable:

- AWPA A2 (Paragraph 6)
- AWPA A9: X-ray Fluorescence Spectroscopy.

3.7.2 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.

3.7.3 For ammonia, use the following:

- AWPA A2 (Paragraph 1)

3.7.4 For determining penetration, use the following:

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

4.0 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 criteria 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 4.1 to 4.7) is needed to substantiate the performance characteristics of the wood-preservative products:

4.1 Laboratory Tests: Testing shall be in accordance with Section 4.1 of AC326.

4.2 Simulated Field Tests: Testing if submitted shall be in accordance with Section 4.2 of AC326.

4.3 Field Tests: Testing shall be in accordance with Section 4.3.4 of AC326.

4.4 Preservative Permanence: Testing indicated in Sections 4.4.1, 4.4.2 and 4.4.3 shall be performed.

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

4.4.1 Refer to Section 4.4.1 of AC326.

4.4.2 Soil bed depletion testing in accordance with AWPA E 14, if submitted in accordance with Section 4.2 of this criteria.
4.4.3 Refer to Section 4.4.2 of AC326.

4.5 Effects on Wood Properties: Testing shall be in accordance with Section 4.5 of AC326.

4.6 Corrosion: Testing shall be in accordance with Section 4.6 of AC326.

4.7 Treatment Testing: Testing shall be in accordance with Section 4.7 of AC326.

5.0 QUALITY CONTROL

Quality control shall be in accordance with Section 5.0 of AC326.

6.0 EVALUATION REPORT RECOGNITION

Conditions of use shall be in accordance with Section 6.0 of AC326.

### TABLE 1—COPPER-QUATERNARY RETENTION LEVELS

<table>
<thead>
<tr>
<th>WOOD PRESERVATIVE TREATMENT SYSTEM</th>
<th>RETENTION AS SPECIFIED, pcf (kg/m³)</th>
<th>MINIMUM COPPER AS CuO, pcf (kg/m³)</th>
<th>MINIMUM QUAT ACTIVE, pcf (kg/m³)</th>
<th>MINIMUM SUM, pcf (kg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper-quaternary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.15 (2.4)</td>
<td>0.08 (1.3)</td>
<td>0.04 (0.65)</td>
<td>0.15 (2.4)</td>
<td></td>
</tr>
<tr>
<td>0.25 (4.0)</td>
<td>0.13 (2.1)</td>
<td>0.07 (1.1)</td>
<td>0.25 (4.0)</td>
<td></td>
</tr>
<tr>
<td>0.40 (6.4)</td>
<td>0.21 (3.4)</td>
<td>0.11 (1.8)</td>
<td>0.40 (6.4)</td>
<td></td>
</tr>
<tr>
<td>0.60 (9.6)</td>
<td>0.32 (5.1)</td>
<td>0.16 (2.6)</td>
<td>0.60 (9.6)</td>
<td></td>
</tr>
<tr>
<td>0.80 (12.8)</td>
<td>0.42 (6.7)</td>
<td>0.22 (3.5)</td>
<td>0.80 (12.8)</td>
<td></td>
</tr>
<tr>
<td>1.00 (16.0)</td>
<td>0.53 (8.5)</td>
<td>0.27 (4.3)</td>
<td>1.00 (16.0)</td>
<td></td>
</tr>
</tbody>
</table>