GDL-15

AMERICAN WOOD PROTECTION ASSOCIATION

GUIDANCE DOCUMENT L: DATA REQUIREMENT GUIDELINES FOR LISTING CHEMICALLY MODIFIED WOOD WITH ENHANCED DURABILITY IN THE AWPA STANDARDS

Jurisdiction: Technical Committee P-9

Adoption: Previously Appendix L to the AWPA Technical Committee Regulations, this document was converted to a Guidance Document by the AWPA Executive Committee in January 2013.

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This Guidance Document is not an AWPA Standard. These are nonmandatory guidelines presented to aid the user in understanding the basic testing requirements for wood protection systems and to assist the AWPA Technical Committees in the development of AWPA Standards. The testing of products in accordance with this Guidance Document does not constitute conformance to any AWPA Standard. No product can be considered to conform to an AWPA Standard until it has been subjected to complete technical review and voting by AWPA's Technical Committees, and procedural review and final action by the AWPA Executive Committee pursuant to the AWPA Technical Committee Regulations.

1. GENERAL INFORMATION AND PURPOSE

Chemically modified wood, for the purpose of AWPA standardization, is defined as any non-biocidal chemical treatment that changes the physical or chemical properties of wood to enhance its resistance to biodeterioration. Chemically modified woods with enhanced durability are listed in the AWPA Standards by means of a proposal and supporting data package submitted to the appropriate AWPA Technical Committee, followed by a discussion and voting process. The complete listing procedure is outlined in the AWPA Technical Committee Regulations. A similar procedure is followed to expand the applications for a listed treatment or modify the composition of a treatment system already listed in the AWPA Standards. The purpose of this Guidance Document is to guide proponents in the type of data to be included in a supporting data package to propose listing a new chemically modified wood with enhanced durability or modify the listing of an existing one. A proponent should be familiar with the AWPA Use Category System (UCS). Refer to the AWPA Book of Standards for information on the UCS. For more specific guidance on preservative standardization, proposal sponsors are encouraged to interact with the appropriate Technical Committees early in the preservative evaluation process. This can be initiated by asking Association Staff (see www.awpa.com for contact information) for the appropriate Technical Committee Chair to contact.

This document suggests certain data requirements for consideration of chemically modified woods with enhanced durability or modifications to the listing of such systems. While the proponent of a system is expected to provide all data suggested by this document, it is understood that it may not be possible to develop one or more types of data in some cases. In the event listed data is not submitted, the proponent shall provide justification for not doing so. Notwithstanding the statements in this document, the appropriate Technical Committee shall be the final arbiter of the type, quantity, and validity of the data needed for the listing of a system. For chemically modified woods, it is important to recognize that historical acceptance criteria (e.g., weight loss of <5%) may not be valid. In other cases, rating systems may have to be adapted to the specific modifications. Thus, the burden of consideration for the Technical Committee may be quite large and difficult.

The format of the AWPA Standard may also need to be altered from the usual one to allow for the particular modification system. A proponent is cautioned to maintain as much similarity as possible in proposing a standard for a modification system.

It may not be appropriate to express retention for chemically modified woods using traditional units such as pounds per cubic foot. As well, it may not be possible to use traditional chemical analysis methods such as XRF for determining retention for chemically modified woods. Therefore, the proponent is cautioned to provide a fully developed analytical procedure for use on the modified wood and to provide details for stating the retention in whatever terminology is appropriate. The various tests submitted for consideration should show an efficacy dependence on retention similar to that of typical chemical active ingredients.

After standardization of a new modification system, the proponents shall provide yearly data updates to the appropriate Technical Committee on critical field tests for a period of five years. Standards are then reaffirmed at 5 year intervals (see AWPA Guidance Document I).

2. TYPES OF PROPOSALS

These guidelines cover three types of wood modification system proposals:

Type 1 – Listing of a new chemically modified wood in the AWPA Standards or making a major change to a previously standardized modified wood. Examples of major changes are radically altering the modification chemistry such that the product has significantly different performance attributes.

Type 2 – Listing an AWPA standardized chemically modified wood in a new use category or categories.

Type 3 – Minor alteration(s) to an AWPA standardized chemically modified wood. An example of a minor alteration would be changes in ratios of modifying agents in multi-component systems.

The distinction between major and minor alterations (*Type 1* and *Type 3* proposals) may be unclear at times. A proponent is encouraged to interact with the appropriate AWPA Technical Committee for guidance on how to classify a proposal (see Section 1, above).

Additives are not normally considered during the modification review process. It is the responsibility of the proponent to fully document the modification process and identify any additives, if present.

3. HOW TO USE THESE GUIDELINES

To use these guidelines, the proponent should:

1. Determine what type of proposal is being considered (see Section 2).

2. Decide in what Use Categories the modified wood product will be used (see Section 2 of Standard U1for descriptions of the different Use Categories).

3. Determine what other information should be included in the proposal and data package by referring to Section 4.

4. Depending on the proposal type and Use Categories of interest, determine the recommended performance data necessary by referring to Table 1. This Table is used in conjunction with Section 5, Methodology for Generating Performance Data, which describes the individual data guidelines in more detail.

4. GUIDELINES FOR ALL SUBMISSIONS

4.1 Information Suggested for All *Type 1* Submissions – All *Type 1* proposals should include the following information:

4.1.1 Proposed wording for the modification listing in the appropriate Standard. The proponent should model the proposed wording on what is currently used in the relevant Standard.

4.1.2 Listing of the proposed Use Categories and corresponding level of modification necessary for the use category.

4.1.3 Chemical and physical properties of the chemically modified wood. Pertinent information on the chemical and physical properties shall be provided. Particular emphasis should be placed on chemical and thermal stability since these factors may have an effect on the long term performance. It may be helpful to discuss by-products or residuals as well. Examples of relevant chemical and physical properties are: density and hydrolytic stability.

4.1.4 EPA registration status. The proponent must advise the AWPA of the regulatory nature of the product. If EPA registration is required, a proposal to list a modification system can be made while that preservative is still in the EPA registration process or in negotiation with the EPA as to its classification, but standardization cannot occur until registration or classification is complete (see Section 7.5.7 of the AWPA Technical Committee Regulations).

4.1.5 MSDS(s) for the modified wood.

4.1.6 Methods for determination of:

A. Level of modification of wood as quantitative measurement

B. Penetration gradient of the modification throughout the wood

4.1.7 Treatability. At a minimum, information on the penetration and resulting gradient resulting from laboratory, pilot production, or manufacturing facility treatment with the proposed wood modification system or process and species shall be provided.

4.1.8 Performance data as specified in Table 1 and Section 5.

4.2 Information Suggested for All *Type 2* Submissions – All *Type 2* proposals should include information as listed in Section 4.1.1, 4.1.2, and 4.1.8 above.

4.3 Information Suggested for All *Type 3* Submissions – All *Type 3* proposals should include information as listed in Section 4.1.3, 4.1.4, 4.1.5, 4.1.6, and 4.1.8 above.

4.4 Use of Control Treatments. All evaluations of chemically modified wood performance should include comparative information from untreated wood controls and at least one AWPA-listed preservative system with a commercial history of use in the same Use Category or Categories as the proposed system. Comparison to two listed wood preservatives is recommended.

4.5 Wood Species. If the modification system or process is intended for use with softwoods, radiata pine or southern pine sapwood is preferred for performance evaluations. If the modification system or process is to be used with hardwoods, representative species for the proposed commercial application(s) should be used for evaluating the performance of the product.

4.6 Test Retentions. Choosing levels of modification to be evaluated in performance tests is a critical part of the experimental design. It is desirable to include modification levels at or close to the projected commercial use levels of the product. For tests that evaluate the fungal and insect resistance of the preservative, it is highly desirable to include levels that bracket the performance threshold. See AWPA Standard E7, Section 6.4, for additional general guidance.

5. METHODOLOGY FOR GENERATING PERFORMANCE DATA

This section describes the performance testing requirements listed in Table 1 in more detail and gives some example methods to obtain the performance data. Standard test methods are not available for evaluating all the performance criteria. Whenever standard methods are not available, nonstandard methods are suggested. Use of methods other than those suggested (or modified suggested methods) may also be acceptable provided they are based on sound experimental principles. A decision on the acceptability of data generated by new or modified test methods will be made by the particular AWPA Technical Committee that has jurisdiction over listing the proposed modification system, product, or process. The name of the institution or company which performed the test should be stated. The use of third-party testing labs and agencies for critical tests is recommended.

The final decision on whether the data package supports the proposed modification system, product, or process lies with the appropriate Technical Committee. Data substitutions, for example long term field studies may preclude the necessity for certain accelerated laboratory testing, may be allowed by the Technical Committee. Allowing such data substitutions is the prerogative of the Technical Committee. Guidance on such issues can be obtained from the appropriate Technical Committee Chair. Contact information can be obtained from Association Staff (found at www.awpa.com).

5.1 Chemically Modified Wood Product Efficacy

This section refers to specialized considerations when evaluating the anti-fungal and/or anti-insect performance properties of chemically modified wood products.

5.1.1 Chemically modified wood products may include sapwood and heartwood. Test samples should be large enough to ensure adequate representation of both or samples primarily composed of either sapwood or heartwood should both be evaluated.

5.1.2 Proponents must provide data on the "modification efficacy" in both sapwood and heartwood materials, just as in the protocols for "biocidal wood preservatives". The Treatments Committees will also require data to ensure that the penetration requirements they establish are adequate to prevent the inclusion of vulnerable unmodified or inadequately modified material in the treated commodity. If the modification system does not fully penetrate wood, then Proponents of any such chemical modification system need to present data on exactly how cut surfaces should be sealed after cutting or machining and recommendations for coatings that will withstand any expansion of the material under the conditions of use.

5.1.3 Some chemically modified wood products incorporate binding agents with unreacted compounds or components (such as formaldehyde or sodium hydroxide) that may contribute to decay, mold, or termite resistance. If such components are anticipated to be lost in service, the test samples should be subjected to leaching or accelerated aging steps to remove these fugitive components prior to biological testing. Alternatively, the test method may be designed to promote loss of these fugitive components allowing sufficient time for biodeterioration then to occur.

5.1.4 Some chemically modified wood products incorporate processing parameters (such as high temperatures), binding agents (such as thermoplastics), or additives that prevent the wood component reaching a suitable moisture content early enough in defined-duration laboratory tests for biodeterioration to be detectable before the recommended test period is over. If such components are anticipated to be lost in service or if the wood component is anticipated to ultimately reach a suitable moisture content in service for biodeterioration to occur, the samples should be subjected to accelerated aging or pre-wetting procedure or the test method should be extended sufficiently for biodeterioration to occur. To separate the effect of chemical modification from the effects of processing parameters, binding agents, or additives, controls should include both untreated composite and solid wood of the same species used to manufacture the composite.

5.1.5 Some chemically modified wood products are subjected to mechanical compression during processing may irreversibly swell more than non-compressed wood products when exposed to conditions conducive to biodeterioration. Allowance should be made in the test design to ensure that such swelling would not interfere with the ability to remove the sample from the test assembly without physical damage.

5.1.6 Where efficacy tests rely on change in mechanical properties as a method of assessing the decay or termite resistance, a set of reference samples should, where possible, be exposed to the same environmental conditions but in the absence of the test organisms to assess the effects of the environmental conditions on mechanical properties.

5.2 Effect of Chemical Modification Processes on Wood Physical Properties

Preferred Methods: The preferred method depends on the type of material being considered. For general details on which evaluation or test methods to use, see Table 1 which refers the user to specific methods required by Guidance Document A. Because many chemically modified wood products have historically been tested using comparable international test standards, a non-exclusive list of a few comparable test methods are listed in Table 2.

5.3 Effect of Chemical Modification Processes on Fire Performance

Preferred Method: ASTM E1354-97, Standard Test Method for Heat and Visible Smoke Release Rates for Products Using an Oxygen Consumption Calorimeter. The preferred method should use a sample dimension of 100 x 100 mm, and a heat flux rate of 50 kW/m^2. If smoke toxicity is a potential concern for the chemically modified wood under consideration, ASTM E662, Smoke Generated by Solid Materials, should be performed in conjunction with BSS 7239, Smoke Toxicity, measuring the specific gases CO, HF, NO_2, HCl, HCN, and SO_2. Alternatively, ASTM E1678-09, Standard Test Method for Measuring Smoke Toxicity for Use in Fire Hazard Analysis, may also be used. A third smoke toxicity protocol is known as the UPITT Method and several laboratories offer this test.

6. JURISDICTION

6.1 Technical Committee P-9 collaborates with other Technical Committees to determine which properties or parameters need to be evaluated for chemically modified wood for various use categories.

6.2 Chemically Modified Wood processes and products recognized by Technical Committee P-9 are then individually addressed in AWPA Standards U1 and T1 for specific commodity products by various T-Committees.

Table 1. Summary of data suggested in a data package used to support a proposal to list a new wood modification system or process in the AWPA Standards, make major or minor modifications to an AWPA-listed system, or expand the applications for a listed system into new use categories. See Section 5.0 of these Guidelines for further information on test methods.

(M = Mandatory, R = Recommended)

TESTING REQUIREMENTS	Guidance Document A Section	UC1	UC2	UC3A	UC3B	UC4A-C	UC5A-C
Wood Modification Efficacy							
Laboratory Efficacy Testing							
Soil Block	5.2.1.1		M	M	M	M	M
Soft-Rot	5.2.1.2					M	M
Termite	5.2.1.3	M	M	M	M	M	M
Soil Bed	5.2.1.4			R	R	R	R
Field Efficacy Testing							
Field Stakes	5.2.3.1			R	R	M	M
Post	5.2.3.2					R	R
Above-Ground	5.2.3.3		M	M	M		
Termite	5.2.3.4	M	M	M	M	M	M
Marine Panels	5.2.3.5						M
Wood Modification Depletion							
Laboratory Depletion Testing							
Water Leach	5.3.1.1		R	M	M	M	M
Soil Leach	5.3.1.2					M	M
Evaporative Aging [a]	5.3.1.3	M	M	M	M	M	M
Field Depletion Testing							
Field Stake	5.3.2.1					M	M
Above-Ground	5.3.2.2		R	M	M		
Marine Panels	5.3.2.3						M
Physical Properties of Modified Wood							
Strength	Table 2 [b]	M	M	M	M	M	M
Electrical Conductivity [c]	5.4.2				M	M	M
Hygroscopicity	5.4.3	M	M	M	M	M	M
Modification Corrosivity							
Treating Solution [d]	5.5						
Modified Wood	5.4.4	M	M	M	M	M	M

[a] Evaporative aging is applicable to wood modification systems or processes where one or more of the active ingredients are organic compounds with a significant vapor pressure.

[b] Different performance test methods apply to different product types and uses (See Table 2 of this document for specific details).

[c] This highly recommended test applies only to components of utility line structures and railway ties.

[d] The treating solution is often known to be corrosive and data are required only for listing processes, not the product.

Table 2. Listing of recognized standard test methods for various biological efficacy or physical properties testing.

TEST METHOD	US (AWPA or ASTM)
Biological Efficacy	
Laboratory Efficacy Testing	
Soil Block	E10
Soft-Rot	E23
Termite	E1
Soil Bed	E14
Field Efficacy Testing	
Field Stakes	E7
Post	E8
Above-Ground	E9, E16, E18, PEM-13
Termite	E21, E26
Marine	E5
Physical Properties	
Strength	
Solid wood	ASTM D5664 [b]
Composites	ASTM D5516 [b]
Electrical Conductivity [a]	
Hygroscopicity	ASTM D3201
Corrosivity	
Treating Solution	E17
Modified Wood	E12

[a] See Katz and Miller 1963, AWPA Proc. Vol59:204-217

[b] Sections of D5516 and/or D5664 requiring extended elevated temperature exposures do not need to be followed for chemically modified wood that is not intended for permanent use in roof systems or other high-temperature service environments (>38 °C (100 °F))