American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee P-3

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	32
Number of Eligible Voters:	30
Number of Eligible Ballots Received:	22
Ballot Return Percentage:	73.3%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard P36-16

21F-P36-P3 Reaffirm & Revise P36

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 20 Yes, 0 No, and 2 Abstain.

One public objection unrelated to this proposal was received from an AWPA member who is not a member of the Technical Committee. The objection has been recorded but it is not subject to the negative comment resolution process which is limited to objections related to the proposal.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>899</td><td>AWPA P36 16 SECTION STANDARD FOR COPPER NAPHTHENATE (CUN) [Table Data]</td><td>
<table>
<tr><td>Preservative Code</td><td>CuN</td><td>Description of the Preservative</td><td>Application Method/Use Pattern</td><td>Acceptable Carriers/Diluents</td></tr>
<tr><td>Preservative Name</td><td>Copper Naphthenate</td><td>Oilborne preservative</td><td>Vacuum-pressure treatment/ Non-pressure treatment</td><td>Hydrocarbon Solvent</td></tr>
<tr><td colspan="5">Preservative Composition & Physical Chem. Requirements</td></tr>
<tr><td colspan="2">Composition on a 100% Active Basis</td><td colspan="3">Copper Naphthenate, as Cu metal: ~~6 to 8%.~~9 to 13%.</td></tr>
<tr><td colspan="2">Purity Criteria Actives</td><td colspan="3">(a) The acid used in the manufacture of copper naphthenate shall be at least 50% naphthenic acid of the group of carboxylic acids occurring in petroleum and not more than 50% carboxylic acids (C_9 or greater) having an acid number of not more than 355 mg KOH/g, and the blend shall have an acid number of not less than 180 mg KOH/g on an oil-free basis</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
</table>

		(b) All of the copper present in the concentrate shall be combined as copper naphthenate (c) Copper naphthenate concentrate shall not contain more than 0.5% water (d) The water-extractable copper shall not be more than 2% (relative) of the total copper in the concentrate.	
		Treating Solution	
		For treating solutions of Copper Naphthenate and requirements see AWPA Standards HSA and HSC	
		Analytical Methods [Only major analytical methods are listed. Refer to the AWPA BOS for additionally applicable standards]	
		Concentrate/Solutions: Cu: AWPA Standard A84, A88, & A89, A9-08, A21-08 Naphthenic Acid/Copper Naphthenate: AWPA Standard A13-03, A41-06	
		Wood: Cu: AWPA Standard A9-08, A21-08 Copper Naphthenate: AWPA Standard A41-06	
		Committee Recommendations	
		Minimum Retentions: Committee P-3 recommended the following minimum retentions: Lumber and Timbers Above Ground—0.040 pcf (0.64 kg/m^3), Ties—0.050 pcf (0.80 kg/m^3), Posts—0.050 pcf (0.80 kg/m^3), Lumber and Timbers Soil Contact—0.060 pcf (0.96 kg/m^3), Poles—0.075 pcf (1.2 kg/m^3), and Piles (Fresh Water and Foundation Piles)—0.075 pcf (1.2 kg/m^3). Note: Retentions are suitable in areas with Formosan termite activity. Committee P-3 also recommended that when a thermal process is used with copper naphthenate, the retention of copper, as metal, be not less than 0.1 pcf (1.6 kg/m^3) in the outer 0.5 inch. Committee P-3 also recommended that when retention of a gauge is specified, then the concentration of the copper shall be 0.5% minimum by weight. Committee P-3 also recommended for Southern Yellow Pine Poles, a retention of 0.06 pcf (0.96 kg/m^3) copper naphthenate as a copper in P9 Type A HydroCarbon Solvent. Poles that are made of other species, located in other decay hazard or contain other assay zones may require increased preservative retention of 0.075 and 0.100 pcf (1.2 and 1.6 kg/m^3).	
		Enforcement	
		Historical: Adopted in 2008 (formerly AWPA Standard P8, No. 2)	
		Reaffirmation: 1998, 2002, 2011, 2016	
		Amendments: 2002, 2011, 2016	
898	AWPA P36 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee P-4

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	37
Number of Eligible Voters:	34
Number of Eligible Ballots Received:	30
Ballot Return Percentage:	88.2%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard P55-16

21F-P55-P4 Reaffirm & Revise P55

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 27 Yes, 0 No, and 2 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>900</td><td>AWPA P55 16</td><td>Additional Comment: Reaffirm without Revisions</td><td>Approved as SUBMITTED</td></tr>
<tr><td>588</td><td>AWPA P55 16 SECTION STANDARD FOR ALKALINE COPPER BETAINE (KDS) [Table Data]</td><td>
<table>
<tr><th>Preservative Code</th><th>KDS</th><th>Description of the Preservative</th><th>Application Method/Use Pattern</th><th>Acceptable Carriers/Diluents</th></tr>
<tr><td>Preservative Name</td><td>Alkaline Copper Betaine</td><td>Waterborne preservative</td><td>Vacuum pressure treatment</td><td>Water</td></tr>
<tr><td colspan="5">Preservative Composition & Physical Chem. Requirements</td></tr>
<tr><td colspan="2">Composition on a 100% Active Basis</td><td colspan="3">Copper as CuO: 47.2%
DPAB as DPAB: 22.6%
Borate as boric acid: 30.2%</td></tr>
<tr><td colspan="2">Purity Criteria – Actives</td><td colspan="3">The treating solution shall contain bivalent copper, DPAB TGAI (Technical Grade Active Ingredient) and boric acid from materials in excess of 95% purity on an anhydrous basis. The commercial preservative shall be labeled as to its total content of active ingredient listed above.</td></tr>
<tr><td colspan="2">Essential Formulants</td><td colspan="3">The copper component shall be dissolved in ethanolamine and water, and the ratio of ethanolamine to copper shall be 3.65 ±0.35.</td></tr>
<tr><td colspan="5">Treating Solution</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
</table>

Tolerances	Work Solution Tolerances on 100% Oxide and Actives Basis Component Minimum Maximum Copper as CuO 43% 51% DPAB a.i. 18% 27% Borate as boric acid 26% 34%
Limitations	**pH:** 8–10
	Temperature: None, except as limited under UCS Standard T1
Analytical Methods [Only major analytical methods are listed. Refer to the AWPA BOS for additionally applicable standards]	
Concentrate/Solutions	CuO: AWPA ~~A2,~~ A9, A21 DPAB: AWPA ~~A18,~~ A37 Boric Acid: AWPA ~~A2,~~ A40
Wood	CuO: AWPA A9, A21~~A16, A18~~ DPAB: AWPA ~~A36,~~ A37 Boric Acid: AWPA ~~A2,~~ A40
Committee Recommendations	
Minimum Retentions	Committee P-4 recommended the following minimum retentions: UC1 to UC3B—0.19 pcf (3.0 kg/m^3), UC4A—0.43 pcf (6.8 kg/m^3), and UC4B to UC4C—0.75 pcf (12 kg/m^3). Note: Retentions are suitable in areas with Formosan termite activity.
Enforcement	
Historical	Adopted in 2010
Reaffirmation	2016
Amendments	None

AWPA Standard P56-19

21F-P56-P4 Reaffirm & Revise P56

Committee Meeting Action: Unanimously authorized letter ballot as MODIFIED.

Letter Ballot Results: Passed unanimously as modified with 28 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change					Committee Status
912	AWPA P56 19 SECTION STANDARD FOR ALKALINE COPPER BETAINE TYPE B (KDS B) [Table Data]	**Preservative Code**	**KDS-B**	**Description of the Preservative**	**Application Method/Use Pattern**	**Acceptable Carriers/Diluents**	Approved as MODIFIED
		Preservative Name	**Alkaline Copper Betaine Type B**	Waterborne preservative	Vacuum pressure treatment	Water	
		Preservative Composition & Physical Chem. Requirements					
		Composition on a 100% Active Basis	Copper as CuO: 67.7% DPAB as DPAB: 32.3%				
		Purity Criteria – Actives	The treating solution shall contain bivalent copper, DPAB TGAI (Technical Grade Active Ingredient) from materials in excess of 95% purity on an anhydrous basis. The commercial preservative shall be labeled as to its total content of active ingredient listed above.				
		Essential Formulants	The copper component shall be dissolved in ethanolamine and water, and the ratio of ethanolamine to copper shall be 3.65 ±0.35.				

		Treating Solution	
		Tolerances: Work Solution Tolerances on 100% Oxide and Actives Basis Component Minimum Maximum Copper as CuO 62% 73% DPAB a.i. 28% 37%	
		Limitations: **pH:** 8–10 **Temperature:** None, except as limited under UCS Standard T1	
		Analytical Methods [Only major analytical methods are listed. Refer to the AWPA BOS for additionally applicable standards]	
		Concentrate/Solutions: CuO: AWPA A9, A21 DPAB: AWPA ~~A18,~~ A37	
		Wood: CuO: AWPA A9, A21 DPAB: AWPA A36, A37	
		Committee Recommendations	
		Minimum Retentions: Committee P-4 recommended the following minimum retentions: UC1 to UC3B—0.14 pcf (2.2 kg/m^3), UC4A—0.29 pcf (4.7 kg/m^3), and UC4B to UC4C—0.53 pcf (8.4 kg/m^3). Note: Retentions are suitable in areas with Formosan termite activity.	
		Enforcement	
		Historical: Adopted in 2010	
		Reaffirmation: 2016	
		Amendments: 2019	
590	AWPA P56 19	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED

AWPA Standard P57-16

21F-P57-P4 Reaffirm & Revise P57

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 29 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
902	AWPA P57 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED
589	AWPA P57 16 SECTION STANDARD FOR ALKALINE COPPER BETAINE (KDS) (NONPRESSURE USE) [Table Data]	**Preservative Code**: **KDS** **Preservative Name**: **Alkaline Copper Betaine** **Description of the Preservative**: Waterborne preservative for wood composite protection **Application Method/Use Pattern**: To be applied to wood furnish during the manufacture of wood composites **Acceptable Carriers/Diluents**: Water **Preservative Composition & Physical Chem. Requirements** **Composition on a 100% Active Basis**: Copper as CuO: 47.2%; DPAB as DPAB: 22.6%; Borate as boric acid: 30.2% **Purity Criteria – Actives**: The treating solution shall contain bivalent copper, DPAB TGAI (Technical Grade Active Ingredient) and boric acid from materials in	Approved as SUBMITTED

	excess of 95% purity on an anhydrous basis. The commercial preservative shall be labeled as to its total content of active ingredient listed above.
Essential Formulants	The copper component shall be dissolved in ethanolamine and water, and the ratio of ethanolamine to copper shall be 3.65 ±0.35.
Treating Solution	
Tolerances	Work Solution Tolerances on a 100% Oxide and Actives Basis Component Minimum Maximum Copper as CuO 43% 51% DPAB a.i. 18% 27% Borate as boric acid 26% 34%
Limitations	**pH:** 8–10
	Temperature: None, except as limited under UCS Standard T1
Analytical Methods [Only major analytical methods are listed. Refer to the AWPA BOS for additionally applicable standards]	
Concentrate/Solutions	CuO: AWPA ~~A2,~~ A9, A21 DPAB: AWPA ~~A18,~~ A37 Boric Acid: AWPA ~~A2,~~ A40
Wood	CuO: AWPA A9, A21~~A16, A18~~ DPAB: AWPA ~~A36,~~ A37 Boric Acid: AWPA ~~A2,~~ A40
Miscellaneous	
Composites treated with KDS may not be suitable for all applications, depending on the type of composite. Compatibility of KDS with the adhesive must be tested before use.	
Enforcement	
Historical	Adopted in 2010
Reaffirmation	2016
Amendments	None

AWPA Standard P61-16

21F-P61-P4 Reaffirm without Revision P61

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 29 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
756	AWPA P61 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED

AWPA Standard P62-16

21F-P62-P4 Reaffirm without Revision P62

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 29 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposal	Committee Status
857	AWPA P62 16 SECTION STANDARD FOR MICRONIZED COPPER AZOLE TYPE C (MCA C)	**Additional Comment:** To reaffirm P62 with no revision and provide updated performance data, SDS, and label.	Approved as SUBMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee P-5

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	23
Number of Eligible Voters:	20
Number of Eligible Ballots Received:	18
Ballot Return Percentage:	90.0%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard A16-16

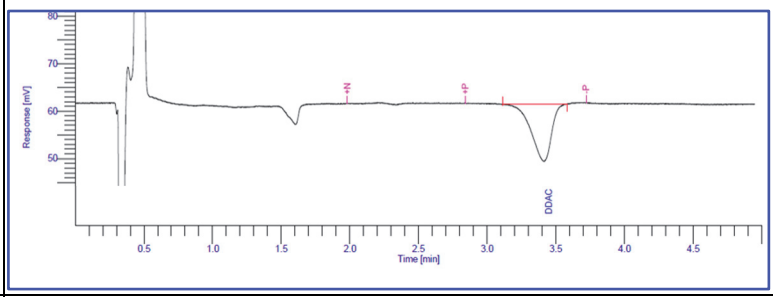
21F-A16-P5 Revise A16

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>750</td><td>AWPA A16 16 SECTION 8.3 [Table Data]</td><td>
<table>
<tr><th>Concentration in Wood</th><th colspan="2">Confidence Limit</th></tr>
<tr><th>% DDAC</th><th>Repeatability (r)</th><th>Reproducibility (R)</th></tr>
<tr><td>0.86</td><td>0.078</td><td>0.30</td></tr>
<tr><td>0.37</td><td>0.034</td><td>0.12</td></tr>
<tr><td>0.18</td><td>0.028</td><td>0.070</td></tr>
</table>
The above precision statement is based on round robin data from 5 laboratories, 3 materials and 3 replicates and thus does not meet the minimum requirements set forth in ASTM E691. Materials were tested covering a range of 0.18 to 0.86% DDAC.
</td><td>Approved as SUBMITTED</td></tr>
<tr><td>749</td><td>AWPA A16 16 SECTION 8.0 PARA 1</td><td>The following statements and tables should be used to judge the acceptability of an analysis using the described method and the conditions stated below. The precision data were generated following the guidelines of ASTM E691, but not all of the requirements were met for DDAC. ~~However, ASTM E691 recommends a minimum of 6 laboratories, 4 materials and 2 replicates. This study had 5 laboratories, 3 materials and 3 replicates and thus does not meet the minimum requirements set forth in ASTM E691.~~</td><td>Approved as SUBMITTED</td></tr>
<tr><td>748</td><td>AWPA A16 16 SECTION 7.4 PARA 1</td><td>$$\%\,\text{DDAC} = \frac{(\text{ppm DDAB in extract}) \times 0.02\,\text{L} \times 362.08}{(\text{sample mass g}) \times 10 \times 406.53}$$</td><td>Approved as SUBMITTED</td></tr>
</table>

		$$\text{Percent DDAC in Wood} = \frac{(\text{ppm DDAB in extract}) \times 0.02\text{L} \times 362.08\ \text{g/mol}}{(\text{sample mass, g}) \times 10 \times 406.53\ \text{g/mol}}$$ Molecular weight of DDAB:406.53 g/mol Molecular weight of DDAC: 362.08 g/mol	
747	AWPA A16 16 SECTION 7.4	**7.4.** Calculate the DDAC concentration (%) in wood by a molecular weight conversion from DDAB to DDAC using:	Approved as SUBMITTED
746	AWPA A16 16 SECTION 7.3	**7.3.** Calculate the equivalent DDABC concentration (ppm) in the extract from the peak area using the calibration regression equation.	Approved as SUBMITTED
745	AWPA A16 16 SECTION 7.2	**7.2.** Inject or use an autosampler to run the samples on the HPLC and measure the peak area of the samples.	Approved as SUBMITTED
744	AWPA A16 16 SECTION 7.1	**7.1.** Filter an aliquot of the sample extracts for injection into the HPLC system using a 0.45 µm PTFE HPLC through a syringe filter and syringe.	Approved as SUBMITTED
743	AWPA A16 16 SECTION 6.3	**6.3.** Measure the chromatographic peak (retention time: 3.5 min) area of the standards.	Approved as SUBMITTED
742	AWPA A16 16 SECTION 6.2	**6.2.** Prepare didecyldimethyl ammonium bromide (DDAB) standards of 50, 100, 500, 1000 ppm in extraction solution for calibration.	Approved as SUBMITTED
585	AWPA A16 16 SECTION 5.5	**5.5.** Retention time: ~3.5 min	Approved as SUBMITTED
583	AWPA A16 16 SECTION 5.5	5.6. Sample Chromatogram: 	Approved as SUBMITTED
582	AWPA A16 16 SECTION 5.1	**5.1.** Flow rate: 3 ml/minIsocratic flow of the prepared HPLC mobile phase at 3 ml/min	Approved as SUBMITTED
581	AWPA A16 16 SECTION 4.3	**4.3.** Immerse the vial half way in an ultrasonic bath solution and sonicate for 3 hours. After completing the extraction, remove the vial from ultrasonic bath and allow to cool and settle before analysis.	Approved as SUBMITTED
580	AWPA A16 16 SECTION 4.1	**4.1.** Weigh 500 mg (to nearest 0.1 mg) of oven-dried wood meal (o.d. basis) sample (30 mesh) into a screw cap PTFE lined screw toptest vial.	Approved as SUBMITTED
579	AWPA A16 16 SECTION 3.9 PARA 1	Add 0.75 g of benzyltrimethyl ammonium chlorideBTAC and 10.0 ml of acetic acid into a 1 L volumetric 1 liter flask then dilute to volume with theadd 1:5 water:/methanol solution to 1 liter volume. Stir toMix until fully dissolved. If solution is not clear, fFilter the solution through a 0.45 µm PTFE membrane filter under vacuum prior to use.	Approved as SUBMITTED

578	AWPA A16 16 SECTION 3.8	**3.8.** Extraction solution: Add 5.0 ml of formic acid into a 1 L volumetric flask and fill to volume with reagent alcohol.	Approved as SUBMITTED
577	AWPA A16 16 SECTION 3.5	**3.5.** Benzyltrimethylammonium chloride (BTAC), ACS reagent grade.	Approved as SUBMITTED
576	AWPA A16 16 SECTION 2.8	**2.98.** Class A volumetric pipet, 20 ml.	Approved as SUBMITTED
575	AWPA A16 16 SECTION 2.7	**2.87.** Analytical balance, 0.1 mg readability.	Approved as SUBMITTED
574	AWPA A16 16 SECTION 2.6	**2.76.** Ultrasonic bath.	Approved as SUBMITTED
573	AWPA A16 16 SECTION 1.0 PARA 1	This method is applicable to the determination of didecyldimethyl-ammonium chloride (DDAC) and DDAC equivalents in wood using high performance liquid chromatography (HPLC) with indirect UV detection following extraction. The chromatographic peaks appear as troughs or negative peaks. Monovalent cations produce an interference in the chromatogram.	Approved as SUBMITTED
572	AWPA A16 16 SECTION 2.6	**2.6.** 0.45 µm PTFE membrane filter and mobile phase degassing equipment	Approved as SUBMITTED
571	AWPA A16 16 SECTION 2.2	**2.2.** HPLC Column: Phenomenex Luna SCX cation exchange ~~column with particle size of~~ 5 µm, ~~column length of~~ 100 x~~mm and i.d. of~~ 4.6 mm or equivalent.	Approved as SUBMITTED

AWPA Standard A21-16

21F-A21-P5 Revise A21

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
909	AWPA A21 16 SECTION 8.2.1	**8.2.2** All samples should be filtered through a suitable filter before introduction to the ICP. **8.2.3** A quality assurance standard which can serve to verify the calibration and monitor the analysis sequence, is advisable. The quality assurance standard may be a reagent prepared standard and/or a solution preparation of known elemental content.	Approved as SUBMITTED
908	AWPA A21 16 SECTION 8.2.1	**8.2.1.1** An aliquot of each soluble treating solition should be acidified and diluted in a volumetric flask to contain 2% HNO_3 within the range of the calibration standards using water. **8.2.1.2** An aliquot of each particulate treating solution should be digested using concentrated HNO_3. Heat may be needed. Dilute the samples in a volumetric flask with water to the required range of the calibration standards.	Approved as SUBMITTED
804	AWPA A21 16 SECTION 13	**14. References:** 1. EPA Method 200.7 Revision 4.4, "Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry." https://www.epa.gov/sites/production/files/2015-08/documents/method_200-7_rev_4-4_1994.pdf	Approved as SUBMITTED

		2. EPA Method 6010B Revision 2, "Inductively Coupled Plasma-Atomic Emission Spectrometry." https://www.epa.gov/sites/production/files/documents/6010b.pdf 3. Inorganic Ventures Periodic Table. https://www.inorganicventures.com/periodic-table/	
803	AWPA A21 16 SECTION 12.2	**12.3 Oxide Calculations.** Concentration derived from certified standards is reported as ppm of the element in the samples; however, some actives are reported as oxides in AWPA calculations. The following factors can be used to obtain results in oxide form, if needed. Multiply: ppm Cu by 1.2518 to obtain ppm CuO ppm As by 1.5339 to obtain ppm As_2O_5 ppm Cr by 1.9231 to obtain ppm CrO_3 ppm Zn by 1.2447 to obtain ppm ZnO ppm B by 3.2201 to obtain ppm B_2O_3	Approved as SUBMITTED
802	AWPA A21 16 SECTION 8.1.2	**8.1.3** During validation of the method, a digestion blank should be prepared to ensure no interferences are present for the specific species that will be run. **8.1.4** All samples should be filtered through a suitable filter before introduction to the ICP.	Approved as SUBMITTED
801	AWPA A21 16 SECTION 9.8	**9.3 Blanks.** An acid blank for solutions and a digestion blank for wood samples should be prepared to a concentration of 2% HNO_3 in water.	Approved as SUBMITTED
799	AWPA A21 16 SECTION 13.1.2 PARA 2	The above precision statements are based on round robin data by six laboratories each running four replicate determinations on each of seven wood samples in the retention range from 0.2 to 1.5 ~~lbs/ft³~~pcf giving a total of 21 materials for evaluation of precision. These results are based on a future test result of two, since almost all ICP emission spectrometers have a built in average algorithm.	Approved as SUBMITTED
798	AWPA A21 16 SECTION 13.1.1	**13.1.1 Repeatability.** Duplicate single determinations on the same sample by the same operator using the same equipment should not be considered suspect~~ed~~ at the 95% confidence level if they do not differ from one another by equal to or less than the confidence limits shown in the following table.	Approved as SUBMITTED
797	AWPA A21 16 SECTION 13.1	**13.1** The following statements and tables should be used to judge the acceptability of analysis of~~r~~ duplicate samples using the ICP Method under conditions stated below.	Approved as SUBMITTED
795	AWPA A21 16 SECTION 12.2.1 PARA 2	$$pcf = \frac{ppm\ oxide\ x\ degree\ of\ dilution}{5000\ x\ wt.\ of\ sample\ g.}\ x\ wood\ density\ pcf$$ $$pcf = \frac{ppm \times degree\ of\ dilution}{1{,}000{,}000 \times wt.of\ sample\ (g)} \times species\ density\ (pcf)$$	Approved as SUBMITTED
794	AWPA A21 16 SECTION 12.2.1	**12.2.1** Calculate the pcf ~~oxide~~ in the sample as follows:	Approved as SUBMITTED
793	AWPA A21 16 SECTION 12.2.1 PARA 1	~~(sample was diluted into a 200 ml volumetric flask).~~	Approved as SUBMITTED
792	AWPA A21 16 SECTION 12.2	**12.2 Wood Ssamples.**	Approved as SUBMITTED
791	AWPA A21 16 SECTION 12.1.1 PARA 2	"Degree of dilution" is the product of all dilutions used in preparing samples. Example: Pipet 10 ml of CCA treating solution into a 200 ml volumetric flask and dilute to the mark. Analyze this solution for chromium, copper, and arsenic. Degree of dilution for Cr, Cu, and As will be: 200 mL/10 mL = 20.	Approved as SUBMITTED
790	AWPA A21 16 SECTION 12.1.1 PARA 1	$$\%\ oxide = ppm\ oxide\ x \frac{degree\ of\ dilution}{100000}\ x\ specific\ gravity\ of\ original\ solution$$ $$\% = ppm\ x \frac{degree\ of\ dilution}{10{,}000} \times specific\ gravity\ of\ solution$$	Approved as SUBMITTED
789	AWPA A21 16 SECTION 12.1.1	**12.1.1** Calculate the percent ~~oxide~~ in the sample from the following formula:	Approved as SUBMITTED
788	AWPA A21 16 SECTION 12.1	**12.1 Treating Ssolutions.**	Approved as SUBMITTED
787	AWPA A21 16 SECTION 11.5	11.4 Linearity, response, washout and carryover are all dependent on the specific design of the ICP, sample introduction system, and detection settings (axial, radial, read height). All analytes should be confirmed to be linear for the particular conditions used for the analysis. Some analytes such as boron have been noted to take longer to equilibrate and washout from the system.	Approved as SUBMITTED

786	AWPA A21 16 SECTION 11.4	**11.34** Calibration and quality assurance s~~S~~tandards should be frequently verified and re-made as required. Verification of standards can be determined by assaying freshly-made reagent standards or~~and by assaying~~ a freshly prepared wood standard.	Approved as SUBMITTED
785	AWPA A21 16 SECTION 11.3	**11.23** In most plasma emission spectrometers, the emission intensity is a ratio of the element intensity recorded by an~~by the~~ appropriate detector~~photomultiplier tube~~ and an electronically generated number. This mode of operation assumes a relatively high degree of stability of the plasma itself, the sample introduction system into the nebulizer chamber, and little, if any, matrix influence. Some spectroscopists have recommended the use of an internal standard, a frequent technique employed for flame emission spectrophotometry. For the ICP, analytical experience would warrant the use of the emission generated by an internal standard as a replacement for the electronically generated denominator. The best element(s) to serve as an internal standard would be one having similar chemical properties, having the same spectral order, with very small probability of existing at a measurable concentration in the unknowns, and having an emission line close to the emission-line wavelength of the unknown element being assayed.	Approved as SUBMITTED
784	AWPA A21 16 SECTION 11.2	~~11.2 Concentration may be determined as ppm of the element in the standard solutions. However, the elements are reported as oxides in AWPA calculations, and the following factors are used to obtain results in oxide form, a calculation that can be made by the spectrometer computer:~~ ~~Multiply:~~ ~~ppm Cu by 1.2518 to obtain ppm CuO~~ ~~ppm As by 1.5339 to obtain ppm As2O5~~ ~~ppm Cr by 1.9231 to obtain ppm CrO3~~ ~~ppm Zn by 1.2447 to obtain ppm ZnO~~ ~~ppm B by 3.2201 to obtain ppm B2O3~~	Approved as SUBMITTED
783	AWPA A21 16 SECTION 11.1	**11.1** Directly proportional behavior between emission and concentration is observed in plasma emission spectrometry. When the emissions of standard solutions containing known concentrations of analyte are measured and the emission intensity plotted against concentration, a calibration relationship is established. Over the region where the Beer's Law relationship is observed, the calibration yields a straight line. As the concentration and emission intensity increase, a point is reached where the relationship extends beyond the linear working range. However, a significant unique feature of plasma emission spectrometry is that this linear range normally extends over several decades of concentration, sufficient to accommodate the normal concentrations of analytes~~As, Cr, Cu, Zn, and B~~ found in treated wood and treating solutions. Therefore, the need to alter the calibration curve to compensate for non-linearity is not normally required. Linear working calibration ranges can vary, depending upon the operating conditions and instrument, but are typically greater than~~usually~~ 4 to 5 decades. Therefore, there is no need to dilute or concentrate digests in order to bring an elemental concentration of an unknown within the calibrated~~reading~~ range of the spectrometer. However, it is still good practice not to perform an unknown analysis should the concentration of the element be 10% greater than the concentration of the highest calibration standard unless linearity is confirmed. After the spectrometer is calibrated, the emission readings for solutions of unknown concentration may be measured and the concentration determined from the calibration curve. In the plasma emission spectrometer instrumentation, the calibration is made by the controlling computer which provides a direct readout of unknown concentration in the form desired.	Approved as SUBMITTED
782	AWPA A21 16 SECTION 10.1	**10.1** The plasma and spectrometer should be operated in accordance with manufacturer's recommendations. Instrument specific operating recommendations are typically found in the user manual. ~~Usually the plasma power conditions are given by the manufacturer and t~~The elemental wavelength should be~~is~~ selected on the basis of sensitivity and freedom from spectral interference. ~~Normally, the operating forward power for the plasma is 1 Kw.~~ Selected wavelengths should be checked against interferences that may be present in the matrix. The spectral lines most frequently selected are: ~~As - 193.6 nm, Cr - 267.7 nm, Cu - 324.7 nm, Zn - 213.8 nm, and B - 208.96 nm.~~ Element | Recommended Wavelength (nm)* | Known Interferences As | 193.696 | V, Al, Co, Fe, Ni [1] Cr | 267.716 | Fe, Mn, V [2] Cu | 324.754 | Mo, Ti, Fe, V [1,2] Zn | 213.856 | Ni, Cu, Fe [1] B | 249.677 | W, Co, Cr [3] P | 213.617 | Cu, Mo [3] *Other wavelengths may be substituted to avoid interferences or change intensity of the response. All selected wavelengths should be verified to be linear and without interferences in the calibrated ranges and matrices.	Approved as SUBMITTED
781	AWPA A21 16 SECTION 9.8	**9.28 Working S~~s~~tandards.** By appropriate dilution of the certified standard, prepare one standard containing an appropriate concentration (~~5 to 100 ppm,~~ see §8.1.25) of each element and a zero standard. Since usually a two-point calibration routine is required for the plasma spectrometer, only two calibration standards are necessary. However, it is advisable to prepare a quality assurance reference standard which can serve to verify the calibration, and to monitor the analysis sequence. The quality assurance standard may be a reagent prepared standard, and/or a wood digest of known elemental content.	Approved as SUBMITTED
780	AWPA A21 16 SECTION 9.7	~~9.7 Blanks. An acid blank for solutions and a digestion blank for wood samples should be prepared using 2N HNO3.~~	Approved as SUBMITTED

779	AWPA A21 16 SECTION 9.6	~~9.6 Standard boron solution. Dissolve 24.351 g of pure ammonium tetraborate in 100 ml water, warming if necessary. Transfer to a 1000 ml volumetric flask and dilute to the mark. This solution contains 1000 ppm B.~~	Approved as SUBMITTED
778	AWPA A21 16 SECTION 9.5	~~9.5 Standard zinc solution. Dissolve 0.5000 g pure zinc in 20 ml 2N HNO3, warming if necessary. Transfer to a 500 ml volumetric flask and dilute to the mark with 2N HNO3. This solution contains 1000 ppm Zn.~~	Approved as SUBMITTED
777	AWPA A21 16 SECTION 9.4	~~9.4 Standard arsenic solution. Dissolve 1.320 g As2O3 (dried at 105 - 110°C for 2 hours) by adding dropwise (while heating) 40 ml 50% H2O2. Evaporate to just less than 5 ml. Transfer to a 500 ml volumetric flask and dilute to the mark with 2N HNO3. This solution contains 2000 ppm As.~~	Approved as SUBMITTED
776	AWPA A21 16 SECTION 9.3	~~9.3 Standard chromium solution. Dissolve 0.9611 g Cro3 in 10 ml heated distilled water, transfer to a 500 ml volumetric flask, and dilute to the mark with 2N HNO3. This solution contains 1000 ppm Cr.~~	Approved as SUBMITTED
775	AWPA A21 16 SECTION 9.2	~~9.2 Standard copper solution. Dissolve 0.5000 g of pure copper foil or wire in 5 ml concentrated HNO3. Evaporate to dryness and dissolve in 10 ml concentrated HCl. Add 300 ml 2N HNO3. Transfer to a 500 ml volumetric flask and dilute to the mark with pure water. This solution contains 1000 ppm Cu.~~	Approved as SUBMITTED
774	AWPA A21 16 SECTION 9.1	**9.1** Certified standards containing known quantities (generally 1000-10,000 ppm) of each element are available for purchase. ~~and recommended to be used after appropriate dilution. However, standards may also be prepared using the following procedures.~~	Approved as SUBMITTED
773	AWPA A21 16 SECTION 8.2.1	**8.2.1 Dilution** ~~Prepare a dilution of the treating solutions with 2N HNO_3 within the range of the standard solutions.~~	Approved as SUBMITTED
772	AWPA A21 16 SECTION 8.1.2 PARA 2	Therefore, an appropriate set of standards should~~are to~~ be prepared to cover this expected range in concentration for each element to be determined. On sequential instruments, the gain should be set for optimum response.	Approved as SUBMITTED
771	AWPA A21 16 SECTION 8.1.2 [Table Data]	Cu Cr As Zn B P 5-100 5-100 10-1000 5-100~~25~~ 1-100~~50~~ 1-100	Approved as SUBMITTED
770	AWPA A21 16 SECTION 5.2.5	**5.2.5 Power S~~s~~upply.** A constant voltage, in accordance with manufacturer's instructions, must be supplied.	Approved as SUBMITTED
769	AWPA A21 16 SECTION 5.2.4	**5.2.4 Optical S~~s~~ystem.** There are two types of spectrometers commercially available - sequential (scanning monochromator) and the polychromator (simultaneous). The polychromator is faster as the elements assayed are done simultaneously. With the scanning monochromator, the elements are determined sequentially by either moving the grating or detector from one line position to another. In either case, spectrometers are completely computer-~~-~~controlled for all their essential operations. The spectrometer consists of an entrance slit, a grating, and a ~~photomultiplier~~ detector (for sequential spectrometers), or ~~an~~ array of ~~photomultiplier~~ detectors (for the polychromator) positioned at each selected spectral line location. Additional detectors may be specially positioned to measure background~~,~~ and/or to measure the emission from a selected internal standard(s). Detector~~New~~ technologies~~y~~ include photomultiplier tubes (PMT) and ~~uses a~~ charged coupled~~induced~~ devices (CCD) ~~detector which is like a miniature video camera with each pixel being an emission line. This detector has the possibility for over a thousand lines~~.	Approved as SUBMITTED
768	AWPA A21 16 SECTION 5.2.2	**5.2.2** The ICP is a more stable source for long-term operation~~,~~ and is the plasma in most common use.	Approved as SUBMITTED
767	AWPA A21 16 SECTION 3.4	**3.4** Background emission consists of Ar lines and some weak band emissions from OH, NO, and CN molecules present in the plasma. Most spectrometers compensate for the presence of background bands by placing detectors in critical areas of the spectrum~~,~~ and then measuring and deleting background emissions from the measured spectral emission. Background emission is primarily a problem associated with low concentration detection.	Approved as SUBMITTED
766	AWPA A21 16 SECTION 3.3	**3.3** Matrix interferences, also known as viscosity or bulk interferences, occur when the physical characteristics (viscosity, surface tension, etc.) of the sample and standard solutions differ considerably. Matrix effects can often be controlled by matching the concentration of major constituents in the sample and standard solutions. With most ICP spectrometers, the analyte is pumped into the nebulizer using a peristaltic pump, which minimizes viscosity characteristics of the analyte. Matrix interferences can also be controlled by using an internal standard.	Approved as SUBMITTED
765	AWPA A21 16 SECTION 2.1	**2.1** Plasma emission spectrometry is based on the principle of the process of energy release in the form of light at a specific wavelength when an atom elevated to an excited (ionic) state returns to its ground state. The amount of light energy released at this wavelength is directly proportional to the number of atoms of the selected element. The intensity of the emitted light released when aspirating known standards can be used to prepare a linear calibration of intensity versus concentration. Unknown concentrations can then be measured and compared to this calibration. Using a computer-~~-~~controlled spectrometer, the emission can be calibrated to display concentration directly. The basic instrumentation for a plasma emission spectrometer requires a plasma emission source, a nebulizer, a mono- or polychromator to isolate the specific wavelength of light to be measured, a detector to measure the light intensity, electronics to record the emitted electronic signal, and a computer system for calibrating the spectrometer and recording the results. The plasma is generated by passing argon (Ar) gas through an oscillating radio frequency magnetic field, which results in the collision of atoms and ions causing ohmic heating at temperatures ranging from 6,000 to 10,000°K. The plasma is an extremely stable energy source. The analyte is introduced as an aerosol into the plasma, which results in complete ionization of the atoms present. The characteristics of the generated atomic emission is one of high intensity with minimal self-absorption.	Approved as SUBMITTED
764	AWPA A21 16 SECTION 1.2	**1.2** The method is principally applicable to the determination of metallic elements. It is highly applicable to analyses for Cu, Cr, As, Zn, B and P~~B~~.	Approved as SUBMITTED

AWPA Standard A43-20

21F-A43-P5 Revise A43

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>847</td><td>AWPA A43 20 SECTION 11.4 [Table Data]</td><td>12. Precision Statement: The following statements and tables should be used to judge the acceptability of an analysis using the described method and conditions below. The precision data were developed following ASTM E691 using six laboratories, 3 samples and 3 replicates.

12.1 Repeatability: Duplicate determination on the same sample by the same operator using the same equipment should not be suspect at the 95% confidence level, if they do not differ from one another by equal to or less than the limiting weight percent shown in the following tables.

12.2 Reproducibility: Duplicate determination on the same sample by different operators in different laboratories should not be suspect at the 95% confidence level, if they do not differ from one another by equal to or less than the limiting weight percent levels shown in the following tables.

Precision Table for Imidacloprid

<table>
<tr><th>Sample Type</th><th>Concentration, wt %</th><th>Repeatability (r)</th><th>Reproducibility (R)</th></tr>
<tr><td rowspan="3">Treating Solution</td><td>0.0018</td><td>0.0002</td><td>0.0003</td></tr>
<tr><td>0.0027</td><td>0.0003</td><td>0.0004</td></tr>
<tr><td>0.0036</td><td>0.0003</td><td>0.0005</td></tr>
<tr><td rowspan="3">Treated Wood</td><td>0.0019</td><td>0.0007</td><td>0.0008</td></tr>
<tr><td>0.0032</td><td>0.0006</td><td>0.0008</td></tr>
<tr><td>0.0046</td><td>0.0007</td><td>0.0009</td></tr>
</table></td><td>Approved as SUBMITTED</td></tr>
</table>

AWPA Standard A48-15r21

21F-A48-P5 Revise A48

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>890</td><td>AWPA A48 15R21 SECTION 10.3 [Table Data]</td><td>V = Volume of ~~methanol~~ solvent (mL)
W_{sol} = Weight of ~~methanol~~ solvent (g)
W_s = Weight of wood sample (g)</td><td>Approved as SUBMITTED</td></tr>
<tr><td>889</td><td>AWPA A48 15R21 SECTION 10.3 [Table Data]</td><td>$V = \frac{(W_{Sol})}{0.79}$ $V = \frac{(W_{Sol})}{0.80}$ (Equation 3)</td><td>Approved as SUBMITTED</td></tr>
<tr><td>855</td><td>AWPA A48 15R21 SECTION 10.3</td><td>10.3 The concentration of Teb, Prop, and Imid in wood samples is calculated using Equations 3-5. The weight of ~~methanol solvent~~ the extraction solvent (90:10 (v/v) acetonitrile:water) is first converted to volume by dividing the weight by the</td><td>Approved as SUBMITTED</td></tr>
</table>

<table>
<tr><td></td><td></td><td>density of the solvent. The concentration of active is then multiplied by the dilution factor to determine the amount in the original wood sample.</td><td></td></tr>
<tr><td>854</td><td>AWPA A48 15R21 SECTION 9.8</td><td>9.8 Run Time: 25~~17~~ minutes</td><td>Approved as SUBMITTED</td></tr>
<tr><td>853</td><td>AWPA A48 15R21 SECTION 9.7</td><td>9.7 Retention times: Imidacloprid 7.56~~7.09~~ min; Tebuconazole 18.94~~10.58~~ min; Propiconazole 21.54~~12.24~~ min</td><td>Approved as SUBMITTED</td></tr>
<tr><td>852</td><td>AWPA A48 15R21 SECTION 9.6 [Table Data]</td><td>
<table>
<tr><th>~~Time (min)~~</th><th>~~% A~~</th><th>~~% B~~</th><th>~~Curve (Waters-Empower software)~~</th></tr>
<tr><td>~~0.0~~</td><td>~~5~~</td><td>~~95~~</td><td>~~-~~</td></tr>
<tr><td>~~0.45~~</td><td>~~5~~</td><td>~~95~~</td><td>~~9~~</td></tr>
<tr><td>~~1.00~~</td><td>~~5~~</td><td>~~95~~</td><td>~~9~~</td></tr>
<tr><td>~~5.70~~</td><td>~~50~~</td><td>~~50~~</td><td>~~6~~</td></tr>
<tr><td>~~9.75~~</td><td>~~50~~</td><td>~~50~~</td><td>~~6~~</td></tr>
<tr><td>~~10.50~~</td><td>~~97~~</td><td>~~3~~</td><td>~~8~~</td></tr>
<tr><td>~~12.30~~</td><td>~~97~~</td><td>~~3~~</td><td>~~1~~</td></tr>
<tr><td>~~15.00~~</td><td>~~5~~</td><td>~~95~~</td><td>~~6~~</td></tr>
</table>
<table>
<tr><th>Time (min)</th><th>%A</th><th>%B</th><th>Curve (Waters-Empower Software)</th></tr>
<tr><td>0.0</td><td>20</td><td>80</td><td>-</td></tr>
<tr><td>4.0</td><td>30</td><td>70</td><td>6</td></tr>
<tr><td>21.0</td><td>55</td><td>45</td><td>6</td></tr>
<tr><td>22.0</td><td>95</td><td>5</td><td>1</td></tr>
<tr><td>22.1</td><td>20</td><td>80</td><td>1</td></tr>
<tr><td>25</td><td>20</td><td>80</td><td>1</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
<tr><td>851</td><td>AWPA A48 15R21 SECTION 9.4</td><td>9.4 Wavelengths: 225~~220~~ nm for Propiconazole and Tebuconazole. 270~~265~~ nm for Imidacloprid</td><td>Approved as SUBMITTED</td></tr>
<tr><td>850</td><td>AWPA A48 15R21 SECTION 9.1</td><td>9.1 Column temperature: 35~~30~~°C ±~~+/-~~ 5°C</td><td>Approved as SUBMITTED</td></tr>
<tr><td>849</td><td>AWPA A48 15R21 SECTION 8.1.3</td><td>8.1.3 Weigh 0.25 g of sample to the nearest 0.1 mg into the tube. Add 5 mL of 90:10 (v/v) acetonitrile:water~~methanol~~. Record the weight of the extraction solvent~~methanol~~.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>848</td><td>AWPA A48 15R21 SECTION 2 PARA 1</td><td>The treating solutions are diluted with methanol, and the resulting solutions are filtered with syringe filters. The treated wood is ground to a fine mesh size and the actives are extracted with 90:10 (v/v) acetonitrile:water ~~methanol~~ and the aid of a heated ultrasonic bath. The amount of Teb, Prop, and Imid is then determined using HPLC with ultraviolet (UV) detection.</td><td>Approved as SUBMITTED</td></tr>
</table>

AWPA Standard A68-16

21F-A68-P5 Revise A68

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
896	AWPA A68 16 SECTION 6.4	6.5. Interferences. The following interferences should be noted prior to the use of boron penetration indicator: The use of pine heartwood indicator or Methyl orange (Standard A49) interferes with boron indicator color development. The boron indicator should be used first. Where there is a question about the presence of heartwood, the core(s) should be split and the heartwood indicator applied on the split face of the core. Also, minimize the amount of indicator applied to the retention assay zone when analyzing boron by titration (Standard A40) to reduce any potential impacts on retention results.	Approved as SUBMITTED
895	AWPA A68 16 SECTION 6.1	**6.1. When cores are collected for the analysis of borate penetration, they should be kept separate, out of contact with other cores. Samples for boron penetration assay should be placed on a non-absorbent surface that does not allow for the pooling of indicator. Samples shall be dried prior to the application of indicator. Applying test**	**Withdrawn by proponent in**

		reagents to wet wood will result in a gradually moving penetration zone which must be marked with an indelible marker to preserve original reading. A smooth surface shows the results of the spot test better than a rough surface. The surface must be dry; otherwise, the test will not be satisfactory and semi-permanent. ~~The sample for penetration assay shall be dried prior to making the final cut to expose the surface for spraying. A smooth surface shows the results of the spot test better than a rough surface. The surface must be dry; otherwise the test will not be satisfactory.~~	**committee meeting before motion.**
894	AWPA A68 16 SECTION 5.2	5.3 For maximum shelf life, both Solution 1 and Solution 2 should be stored in a cool, dark location. Under such conditions, the storage life should exceed one month. Indicators can generally be considered effective as long as solutions remain similar in appearance to freshly made indicators (e.g., color of the solution has not changed, no precipitates are present).	Approved as SUBMITTED
892	AWPA A68 16 SECTION 3.1	**3.1.** The collection, storage, handling, and disposal of materials should be done in accordance with standard laboratory safety procedures, especially with acidic solutions such as employed in this method. Not all general safety concerns associated with this standard are addressed here. It is therefore the responsibility of the user to establish and follow appropriate good laboratory practices and general safety precautions where applicable.	Approved as SUBMITTED

AWPA Standard A7-19

21F-A7-P5 Revise A7

Committee Meeting Action: Unanimously authorized letter ballot as MODIFIED.

Letter Ballot Results: Passed unanimously as modified with 17 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
819	AWPA A7 19 SECTION 7.2	**7.2 Analytical procedure.** Accurately weigh~~t~~ 0.5 grams of wood sample into a microwave digestion tube. Add 14 ml nitric acid. Prepare a digestion blank along with the samples. Place the digestion tubes into the digestion vessels and screw on the caps to a firm fit. Place the digestion vessel into the carousel in the microwave oven, close the door, and begin the pre-programmed digestion sequence. This sequence is dependent on the output of the magnetron in the microwave oven and should be initially determined for each microwave based on not exceeding the pressure limitations of the vessels.	Approved as SUBMITTED
818	AWPA A7 19 SECTION 6.2	**6.2 Analytical procedure.** Accurately weigh~~t~~ 0.5 grams of wood sample into a microwave digestion tube. Add 8 ml nitric acid and 3 ml hydrogen peroxide. Prepare a digestion blank along with the samples. Place the digestion tubes into the digestion vessels and screw on the caps to a firm fit. Place the digestion vessel into the carousel in the microwave oven, close the door, and begin the pre-programmed digestion sequence. This sequence is dependent on the output of the magnetron in the microwave oven and should be initially determined for each microwave based on not exceeding the pressure limitations of the vessels.	Approved as SUBMITTED
817	AWPA A7 19 SECTION 5.3	**5.3** Quantitatively transfer the digest to a 100 or 200 ml volumetric flask dependent on the sample weight and expected concentration and dilute the sample to volume with deionized water.	Approved as SUBMITTED
816	AWPA A7 19 SECTION 5.2	**5.2 Analytical procedure.** Accurately ~~measure or~~ weigh wood sample into a 125 or 250 ~~or 500~~ ml Erlenmeyer flask for hotplate digestion or appropriate vessel for hot block use~~with about three glass beads~~. For most samples, a ratio of~~each gram of wood (5 maximum) add~~ 15 ml of nitric acid per 0.5 g wood meal is recommended. Record the wood mass (0.1mg readability). Rinse down the sides of the digestion vessel with appropriate volume of nitric acid. Add 2-3 glass beads to ease initial boiling action. A~~Prepare a~~ digestion blank should be prepared along with the samples. Add the samples to the hotplate or hot block and increase heat slowly with periodic swirling until all wood material is digested (typically less than 30 minutes). The solution should be clear or slightly cloudy with no visible particulate.~~Warm slowly on a hot plate. Increase heat after initial reaction of brown fumes subside and then heat until the solution clears.~~ Reduce heat, add dropwise 5 ml of hydrogen peroxide. If the solution is not clear after this treatment, increase heat and add dropwise another 5 ml hydrogen peroxide. After hydrogen peroxide additions, a slight haze is permissible, if present.	Approved as MODIFIED
815	AWPA A7 19 SECTION 3.1	**3.1** The~~is~~ use of acids generates toxic fumes which must be properly vented in a fume hood. Acids can also cause serious burns if allowed to come into contact with the skin or eyes. Proper safety equipment including eye protection should be worn at all times.	Approved as SUBMITTED
814	AWPA A7 19 SECTION 2.1	**2.1** Determine the density of the wood sample in pounds per cubic foot. A representative sample is then taken and ground to sawdust in a Wiley mill, or cut into small pieces. Increment borings may be used for determination of retentions, in which case the entire assay zone~~sample~~ is used. ~~and the volume is determined for calculations rather than using a weight basis.~~	Approved as SUBMITTED
813	AWPA A7 19 SECTION 1.1	**1.1** This method describes five procedures for the digestion of wood as an initial step for analysis for the constituents arsenic, chromium, copper, phosphate, boron and zinc, all of which may then be analyzed according to the procedures given in the appropriate AWPA Analytical Standards.	Approved as SUBMITTED

AWPA Standard A71-18

21F-A71-P5 Revise A71

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 18 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
839	AWPA A71 18 SECTION 6.3	**6.3.** The portions of wood containing petroleum solvent in which the oil-soluble organic biocide is carried will turn pink to bright red within 5 minutes. Untreated portions of wood sample retain their normal color.	Approved as SUBMITTED
838	AWPA A71 18 SECTION 6.2	**6.2.** Apply a very light ~~(invisible)~~ coating of the mixed powder to wood samples with a small brush. The mixed powder can also be successfully applied by dusting from a small hand spray gun.	Approved as SUBMITTED
837	AWPA A71 18 SECTION 6.1	**6.1. When penetration is not visually obvious, the** ~~The~~ mixed powder must be applied to freshly taken cores or wood borings. If in accordance with M2 Section 3, the borings are smudged or the penetration is difficult to discern, then the wood borings or cores should be ~~made and split wood borings or~~ split and the mixed powder applied to the freshly cut wood cross sections.	Approved as SUBMITTED
835	AWPA A71 18 SECTION 1.2	**1.2.** The penetration of oil-soluble organic biocides dissolved in ~~dark colored~~ Hydrocarbon Solvent Type A should first be judged by visual examination without staining.	Approved as SUBMITTED
834	AWPA A71 18 SECTION 8.2	**8.2.** A permanent record of treated borings or cross sections can be made by taking a picture or photocopying the borings or cross sections on a color photocopier/printer or by using a color scanner. A permanent record of the depth of penetration can be made by placing a ruler on the side of the borings or on the cross sections. If a color photocopier is used, the glass screen must be cleaned of any residual dye or oil.	Approved as SUBMITTED
832	AWPA A71 18 SECTION 2.1	**2.1.** The dry powdered oil red dyestuff dissolves in petroleum solvent, producing a pink to bright red color.	Approved as SUBMITTED
827	AWPA A71 18 SECTION 1.1	**1.1.** This method is designed exclusively for determining the penetration of oil-soluble organic biocides in wood where the wood has been treated with the oil-soluble organic biocide dissolved in ~~light colored~~ Hydrocarbon Solvent Type A (AWPA Standard HSA) and penetration is not obvious.	Approved as SUBMITTED

AWPA Standard A78-16

21F--A78-P5 Revise A78

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 18 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
888	AWPA A78 16 SECTION 6.4	**6.46.** Note: this method eliminates the biological variability of the amount of curcumin found in spice grade turmeric (Standard A68).	Approved as SUBMITTED
887	AWPA A78 16 SECTION 6.3	6.5. Interferences. The following interferences should be noted prior to the use of boron penetration indicator: The use of pine heartwood indicator or Methyl orange (Standard A49) interferes with boron indicator color development. The boron indicator should be used first. Where there is a question about the presence of heartwood, the core(s) should be split and the heartwood indicator applied on the split face of the core. Also, minimize the amount of indicator applied to the retention assay zone when analyzing boron by titration (Standard A40) to reduce any potential impacts on retention results.	Approved as SUBMITTED
885	AWPA A78 16 SECTION 4.1	4.2. Oven	Approved as SUBMITTED
882	AWPA A78 16 SECTION 6.3	**6.3.** Solution 2 is then applied in a similar manner to the areas that have been colored yellow by the application of Solution 1. The color changes should be observed carefully and will show up a few minutes after application of the second solution, but should not be recorded until at least 20 minutes have passed. In the presence of boron at a retention of 0.80 kg/m^3 or greater, the yellow color of the curcumin reagent solution is turned red to magenta. The intensity of the red color increases with increasing loading of Boron in the sample.	Approved as SUBMITTED

		6.4. After reagent application, placing wood in a warm oven accelerates and intensifies the color reaction to better differentiate between treated and untreated wood.	
881	AWPA A78 16 SECTION 5.2	5.3. For maximum shelf life, both Solution 1 and Solution 2 should be stored in a cool, dark location. Under such conditions, the storage life should exceed one month. Indicators can generally be considered effective as long as solutions remain similar in appearance to freshly made indicators (e.g., color of the solution has not changed, no precipitates are present).	Approved as SUBMITTED
880	AWPA A78 16 SECTION 6.1	**6.1. When cores are collected for the analysis of borate penetration, they should be kept separate, out of contact with other cores. Samples for boron penetration assay should be placed on a non-absorbent surface that does not allow for the pooling of indicator.** ~~The s~~Samples ~~for penetration assay~~ shall be dried prior ~~to making the final cut to expose the surface for spraying~~to the application of indicator. Applying test reagents to wet wood will result in a gradually moving penetration zone which must be marked with an indelible marker to preserve original reading. A smooth surface shows the results of the spot test better than a rough surface. The surface must be dry; otherwise, the test will not be satisfactory and semi-permanent.	**Withdrawn by proponent in committee meeting before motion.**

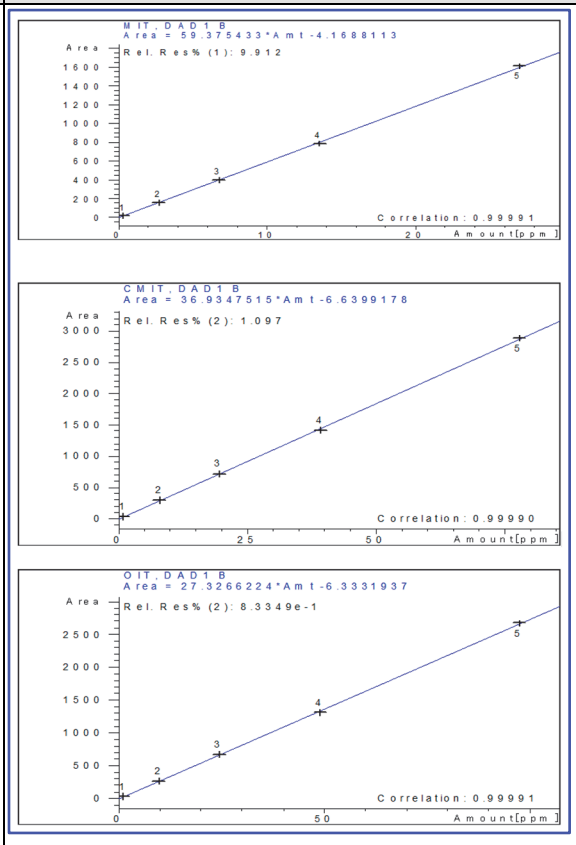
AWPA Standard A95-20

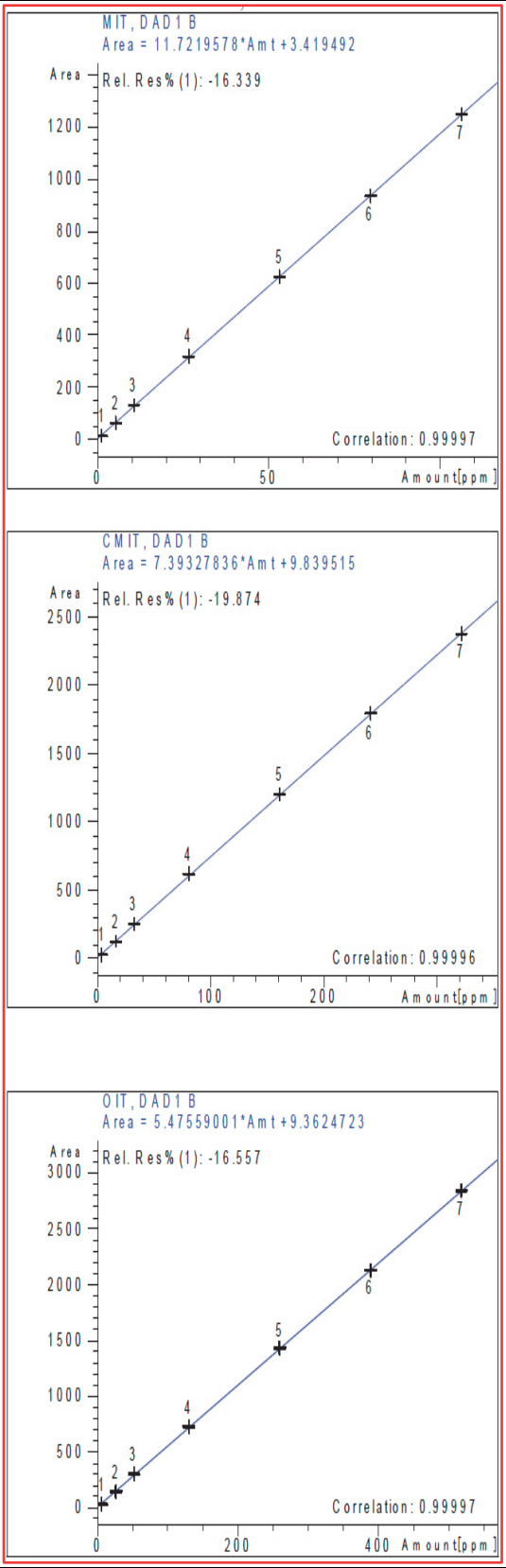
21F-A95-P5 Revise A95

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 18 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
812	AWPA A95 20 SECTION 12.1.2 FIGURE 3 PARA 1		Approved as SUBMITTED


MIT, DAD1 B
Area = 11.7219578*Amt+3.419492
Rel. Res% (1): -16.339
Area
Correlation: 0.99997
Amount[ppm]
CMIT, DAD1 B
Area = 7.39327836*Amt+9.839515
Rel. Res% (1): -19.874
Area
Correlation: 0.99996
Amount[ppm]
OIT, DAD1 B
Area = 5.47559001*Amt+9.3624723
Rel. Res% (1): -16.557
Area
Correlation: 0.99997
Amount[ppm]

<table>
<tr><td>811</td><td>AWPA A95 20 SECTION 12.1.2 [Table Data]</td><td>Precision Table<table><tr><td></td><td></td><td></td><td colspan="2">95% Confidence Limits</td></tr><tr><td>#</td><td>Mold Inhibitors in Treating Solution</td><td>ppm</td><td>Within Lab: Repeatability</td><td>Between Labs: Reproducibility</td></tr><tr><td rowspan="3">~~Sample~~Level 1</td><td>MIT</td><td>~~5~~6</td><td>0.10</td><td>0.31</td></tr><tr><td>CMIT</td><td>~~15~~17</td><td>0.47</td><td>1.27</td></tr><tr><td>OIT</td><td>75</td><td>1.81</td><td>5.23</td></tr><tr><td rowspan="3">~~Sample~~Level 2</td><td>MIT</td><td>~~10~~11</td><td>0.14</td><td>0.36</td></tr><tr><td>CMIT</td><td>~~30~~31</td><td>0.72</td><td>1.84</td></tr><tr><td>OIT</td><td>~~100~~98</td><td>2.76</td><td>8.97</td></tr><tr><td rowspan="3">~~Sample~~Level 3</td><td>MIT</td><td>~~20~~24</td><td>0.26</td><td>0.73</td></tr><tr><td>CMIT</td><td>~~60~~68</td><td>0.98</td><td>3.65</td></tr><tr><td>OIT</td><td>~~150~~147</td><td>2.93</td><td>12.12</td></tr></table></td><td>Approved as SUBMITTED</td></tr>
<tr><td>810</td><td>AWPA A95 20 SECTION 12.1.2 PARA 2</td><td>The above precision statements ~~will base~~ are based on an interlaboratory study ~~with~~using 6 laboratories, 3 level materials, and 3 test results over three different days. ~~analyzing three (3) samples in triplicate on each of two days.~~</td><td>Approved as SUBMITTED</td></tr>
<tr><td>809</td><td>AWPA A95 20 SECTION 12.1.2</td><td>12.1.2 Reproducibility: ~~Triplicate~~Duplicate determination on the same sample by analysts in different laboratories should not be suspect at the 95% confidence level if they do not differ from one another by equal to or less than the limits shown in the following table:</td><td>Approved as SUBMITTED</td></tr>
<tr><td>808</td><td>AWPA A95 20 SECTION 12.1.1</td><td>12.1.1 Repeatability: ~~Triplicate~~ Duplicate determinations by the same analyst using the same equipment should not be suspect at the 95% confidence level if the averages of the duplicates do not differ from another by equal to or less than the limits shown in the following table.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>807</td><td>AWPA A95 20 SECTION 12.1</td><td>12.1 The following statement and tables should be used to evaluate the acceptability of an analysis using this method. The precision data were developed following the guidelines in ASTM E691-18.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>806</td><td>AWPA A95 20 SECTION 10.1</td><td>10.1 Inject a solvent blank (i.e., methanol) followed by the ~~1, 5, 10, 25, 50, and 125~~ 1, 10, 25, 50 and 100ppm (nominal) MIT, CMIT and OIT calibration standards prepared in §7.2. Examine the resulting chromatograms to ensure that peak responses are being integrated properly by the data acquisition system.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>805</td><td>AWPA A95 20 SECTION 5.2</td><td>5.2 High Performance Liquid Chromatograph (HPLC) with a UV detector capable of measuring wavelength of ~~230 nm and~~ 270 nm, column heater, binary gradient elution capability and data acquisition system, Agilent, Shimadzu or equivalent.</td><td>Approved as SUBMITTED</td></tr>
</table>

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee P-6

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	30
Number of Eligible Voters:	28
Number of Eligible Ballots Received:	23
Ballot Return Percentage:	82.1%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard E10-16

21F-E10-P6 Revise E10

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 21 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
913	AWPA E10 16 SECTION 21 PARA 16	17. Burdsall, H. and E. Dorworth. 1994. Preserving Culturesof Wood-Decaying Basidiomycotina Using Sterile Distilled Water in Cryovials. *Mycologia*, 86(2), 275-280. 18. Richter, D.L., Kangas, L.C., Smith, J.K., Laks, P.E., 2010. Comparison of effectiveness of wood decay fungi maintained by annual subculture on agar and stored in sterile water for 18 years. Canadian Journal of Microbiology. 56(3), 268-271	Approved as SUBMITTED
844	AWPA E10 16 SECTION 12.2.1	~~12.2.1 Loss of Preservative. Remove any film, especially in the case of copper-bearing preservatives, adhering to the glass walls of the bottles with hydrochloric acid and add to the leach water for analysis. Check 10 ml aliquots of the 6-hour leach water qualitatively for each of the components in the original salt formulation. When the presence of leached components has been established qualitatively, determine their amount by appropriate chemical analysis. Calculate the loss from the original retention, as determined by the weight increase of the blocks (T2 - T1).~~	Approved as SUBMITTED
843	AWPA E10 16 SECTION 12.2	**12.2 Leaching Procedure for Water-Borne Preservatives.** Treated blocks can be exposed to a standard leaching protocol described in AWPA E11 to evaluate the leachability of waterborne wood preservatives. ~~Expose the blocks to leaching by reagent water in a constant temperature room maintained at 27°C ±1°C. For each retention group, place four treated blocks in a 225 ml (8-oz.), wide-mouth, screw-capped bottle and weight them down with inert material and cover the blocks with 50 ml of reagent water for each block. Place the bottles containing the blocks covered with water into a vacuum desiccator and evacuate to a pressure of 100 mm of mercury or less for one-half hour or until air bubbles cease to escape from the submerged blocks. Then break the vacuum to allow the impregnation of blocks by the water, and remove the weights from the blocks. After 6, 24, and 48 hours, and thereafter at every 24-hour interval for a period of two weeks, remove the leach water from the bottle, measure, and save for analysis if desired. Replace the amount of leach water removed by a fresh change of reagent water.[3] Some wood-plastic composites are resistant to water uptake and this can be partially overcome by using warm water (<70°C or 158°F) for the exposure.~~	Approved as SUBMITTED
754	AWPA E10 16	22~~21~~. Ibach, R.E., Gnatowski, M., Sun, G. (2013): Field and Laboratory Decay Evaluations of Wood-Plastic Composites. *Forest Prod. J.* 63(3/4), 76-87.	Approved as SUBMITTED

<table>
<tr><td></td><td>SECTION 21 PARA 21</td><td></td><td></td></tr>
<tr><td>753</td><td>AWPA E10 16 SECTION 21 PARA 20</td><td>2120. Defoirdt, N., Gardin, S., Van den Bulcke, J., Van Acker, J. (2010): Moisture dynamics of WPC and the impact on fungal testing. Int. Biodeterior. Biodegrad. 64, 65–72.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>752</td><td>AWPA E10 16 SECTION 21 PARA 19</td><td>2019. Ibach, R.E. Gnatowski, M. Hui, G. "Laboratory and Field Evaluations of the Decay Resistance of WPC" Proceedings of 11th International Conference on Wood & Biofiber Plastic Composites, Madison WN, May 16-18, 2011.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>751</td><td>AWPA E10 16 SECTION 21 PARA 17</td><td>197. Curling, S., Winandy, J.E. 2008. Comparison of the effects of gamma irradiation and steam sterilization on Southern pine sapwood. Forest Products Journal 58(1/2):87-90</td><td>Approved as SUBMITTED</td></tr>
<tr><td>712</td><td>AWPA E10 16 SECTION 21 PARA 16</td><td>18. Richter, D.L., Kangas, L.C., Smith, J.K., Laks, P.E., 2010. Comparison of effectiveness of wood decay fungi maintained by annual subculture on agar and stored in sterile water for 18 years. Canadian Journal of Microbiology. 56(3), 268-271</td><td>Approved as SUBMITTED</td></tr>
<tr><td>709</td><td>AWPA E10 16 SECTION 21 PARA 16</td><td>17. Burdsall, H. and E. Dorworth. 1994. Preserving Culturesof Wood-Decaying Basidiomycotina Using Sterile Distilled Water in Cryovials. Mycologia, 86(2), 275-280.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>708</td><td>AWPA E10 16 SECTION 21 PARA 18</td><td>18. Clemons, C.M. and Ibach, R.E. 2004. The Effects of Processing Method and Moisture History on the Laboratory Fungal Resistance of Wood-HDPE Composites. April 2004 Forest Products Journal. 54(4) pp. 1-8.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>707</td><td>AWPA E10 16 TABLE 1 [Table Data]</td><td>
<table>
<tr><td></td><td>G. trabeum PR. placenta</td><td>N. lepideus</td><td>I. lacteus</td><td>T. versicolor</td></tr>
<tr><td>Ponderosa Pine</td><td>54 (40)</td><td>58 (45)</td><td>----------</td><td>39 (30)</td><td>27 (20)</td></tr>
<tr><td>Douglas-fir</td><td>30 (25)</td><td>40 (30)</td><td>----------</td><td>----------</td><td>----------</td></tr>
<tr><td>Southern Pine</td><td>48 (40)</td><td>51 (40)</td><td>36 (25)</td><td>----------</td><td>----------</td></tr>
<tr><td>Sweetgum</td><td>----------</td><td>----------</td><td>----------</td><td>39 (25)</td><td>56 (40)</td></tr>
<tr><td>Birch</td><td>----------</td><td>62 (50)</td><td>48 (35)</td><td>70 (50)</td><td>64 (50)</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
<tr><td>705</td><td>AWPA E10 16 SECTION 18.3</td><td>18.3 Use of Weight-Loss Percentages. The calculated weight-loss percentages (see Section 16.1) may contain certain operational complications. These may be the result of loss of preservative during the test period or failure of the blocks to come to exactly the same moisture equilibrium as before the test period. Such losses, which are not due to decay, may show a progressive increase from lower to higher retentions (Fig. 3), particularly in the case of a volatile or leachable preservative. When the weight losses in blocks show an increase, and the increase is progressive as the retention decreases, decay loss, in addition to any operational loss, is indicated. The threshold value is then considered to be the average retention at which this transition in weight loss is indicated. Slight surface decay that is not progressive may be shown by blocks having retentions that are somewhat above the threshold. In such instances, decay losses leading to determination of thresholds are not considered to occur until there is a definite increase in weight losses over and above those relatively low ones that result from surface decay. Weight losses in solvent-treated blocks (or blocks treated with a formulation with 0% active ingredient) should be compared with those in untreated blocks to determine any effects of solvents (formulation components) on decay. Acceptable weight losses in untreated controls, indicating that the decay capacity of the isolate used has not been decreased during successive subculturing, will differ between test fungi and/or between isolates of a given fungus for a given wood substrate and incubation time. For instance, the Madison 617 (ATCC 11539) isolate of G. trabeum (brown-rot) should cause weight losses of 40% or greater in southern pine sapwood blocks in 12 weeks. The FP 101664 (ATCC 42462) isolate of T. versicolor (white-rot) also should cause weight losses in excess of 40% in sweetgum sapwood blocks exposed for 12 weeks but usually causes weight losses of 20% to 30% in southern pine sapwood blocks after 16 weeks of exposure. Laboratories conducting AWPA E10 tests should verify the decay capacities of the isolates of their test fungi/wood substrate/exposure times to establish a weight loss baseline below which test results would be considered to be suspect or invalid (historic data of weight losses of untreated controls could be used to establish a baseline at a given laboratory). Tests with weight losses in untreated controls below their established baselines should be repeated. In instances where the baseline for a given fungus/wood substrate/incubation time established by a given laboratory is significantly lower than that established by other laboratories, the culture in question should be discarded and a new one obtained from a reliable source. The tTable 1 below gives baselines established from historic data on untreated controls for different isolates/wood substrate/incubation times by 6 laboratories.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>704</td><td>AWPA E10 16 SECTION 14.3</td><td>14.3 An alternative method of preparing and inoculating jars using white-rot fungi is to partially bury the sterilized test block in the soil within the culture bottle such that the top surface of the block is level with the soil surface, then placing the inoculum and feeder strip on top of the block.[8] When using this method, adjust the incubation as required to account for the time needed to fully cover the feeder strip.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>703</td><td>AWPA E10 16 SECTION 14.2</td><td>14.2. An alternative method for inoculation and insertion of the test block is to do both simultaneously. Proceed as described in Section 14.1, but place the test block on top of the feeder strip immediately after placement of the inoculum. When using this method, adjust the incubation as required to account for the time needed to fully cover the feeder strip.</td><td>Approved as SUBMITTED</td></tr>
</table>

702	AWPA E10 16 SECTION 14.1	**14.1** After the sterilized soil culture bottles and blocks are thoroughly cooled ~~(if necessary)~~, cut a piece of fungus inoculum ~~equivalent to~~ approximately 5-10 mm square from near the leading edge of mycelium in Petri dish cultures. Old cultures whose mycelium has completely covered Petri dish surfaces should not be used. Place sections of inoculum in contact with an edge of the feeder strip on the soil. Close the culture bottles with lids released one-fourth turn from a tightened position (unlined lids) or tighten lids (filter lids) and incubate at the desired temperature until the feeder strips are covered by mycelium (approximately three weeks). Alternatively, several sterile feeder strips can be exposed to a test fungus simultaneously by placing them in Petri dishes inoculated with the fungus and incubated until covered with mycelium. After the feeder strips in the bottles are covered with inoculum, or after inoculated feeder strips are aseptically transferred from Petri dishes to the bottles, aseptically place the test blocks into the jar on top of the feeder strip, with a cross-section face centered in contact with the feeder strip. Close the culture bottles with lids as described above.	Approved as SUBMITTED
701	AWPA E10 16 SECTION 13.3.4	**13.3.24 Sterilization by Steam.** (alternate method to Section 13.1) This method shall only be used for preparations known to be heat stable and not volatile in steam. The day before introducing them into the culture vessels, place the specimens in Petri dishes putting specimens for a single concentration series together in one dish; arrange these specimens so that they do not touch, using glass or stainless steel rods between each of them. Cover the Petri dishes and place them in a steamer. The steam shall circulate round the dishes for 20 minutes. After this, leave the Petri dishes to cool for 24 hours in a room at ambient temperature, and then repeat the steaming procedure for 10 minutes. Do not open the Petri dishes until the precise moment when the specimens are to be placed in the culture vessels.	Approved as SUBMITTED
700	AWPA E10 16 SECTION 13.3.3	~~13.3.3 Sterilization by Propylene Oxide. This method is not recommended for organic preservatives and is unsuitable for products containing boron or those containing chlorinated or phenolic substances e.g., pentachlorophenol and tar oils. Safety Note. The chemical nature of this product requires special safety measures. Reference should be made to any national regulations governing its use.~~	Approved as SUBMITTED
699	AWPA E10 16 SECTION 13.3.2	~~13.3.2 Sterilization by Ethylene Oxide-Based Sterilant. This method is not recommended for organic preservatives and is unsuitable for products containing boron or those containing chlorinated or phenolic substances, e.g., pentachlorophenol and tar oils. Safety Note. The toxic and explosive nature of this product requires special safety measures. Reference should be made to any national regulations governing its use. The samples shall be arranged in low density polyethylene envelopes of sufficient permeability (30 µm to 50 µm thick). One study procedure is as follows. Place the samples for 60 minutes in an appropriate apparatus where the ethylene oxide is at a concentration of 1,200 mg/liter (12%) at a pressure of 560 kPa the temperature being 55°C and the relative humidity being 70% to 80%. Ventilate the envelopes for at least 48 hours by exposing them to a current of sterile air. When ready to insert specimens into culture vessels, open the envelopes under aseptic conditions.~~	Approved as SUBMITTED
697	AWPA E10 16 SECTION 13.3.1	**13.3.1 Sterilization by Ionizing Radiation[11,12,13].** This method is suitable for all preservatives and is preferred by some for organic preservatives and preservatives of unknown composition provided no adverse interactions have been demonstrated. The specimens shall be arranged parallel to each other, "flat" within a sealed polyethylene envelope ~~sealed by~~ (hot iron welding, zip closure, etc.). The polyethylene sheet shall be at least 90 µm thick. Polyethylene sheeting may be used, folding the sheet over the specimen bed and welding along 3 sides. ~~It is more practical to use polyethylene sheeting sold in rolls. The specimens are introduced into this sheeting and welded on both sides.~~ To minimize possible influence from ozone, it is advisable to reduce the oxygen content in the envelope before sealing, by introducing nitrogen into the envelope. Send the envelopes thus prepared to an irradiation center. Advice with regard to the packing of the envelopes shall be obtained from the irradiation center. The envelopes have to be subjected to radiation to a minimum level of 2.0 Mrad (1 Mrad = 10^4 J/kg = 10^4 Gy). The maximum dose must not exceed 2.5 Mrad when using radioisotopes (e.g., Co-60 sources) or 5 Mrad when using electron accelerators. There appears to be a difference in post-exposure strength properties between sterilization obtained using high-intensity radiation over a shorter time with low intensity applied for a longer period. Higher radiation rates over shorter durations have been found to cause less strength loss and thus are preferable[17]. After irradiation the envelopes may be stored at the laboratory without detrimental effect for several weeks. When ready to insert specimens into culture vessels, open the envelopes under aseptic conditions.	Approved as SUBMITTED
696	AWPA E10 16 SECTION 13.2	**13.2** Alternatively, test blocks may be sterilized by microwave, gamma irradiation, gases, autoclaving for 20 min at 121°C, or immersion in boiling water for one minute.[10] Blocks treated with formulations whose efficacies are suspected of being affected by heat should be sterilized by both a heat-producing (autoclave sterilization) and non-heating procedure (e.g., 30 second dip in boiling water) to check for such effects. This will double the number of blocks required for a given test.	Approved as SUBMITTED
694	AWPA E10 16 SECTION 13.1	**13.1 Steam Sterilization.** Before putting the test blocks in the culture bottles, place them by retention groups into closed containers containing a filter paper soaked with 5 ml of water or wrap them in aluminum foil and steam at 100°C ±2°C (212° ±4°F) for 20 minutes.	Approved as SUBMITTED
692	AWPA E10 16 SECTION 12.1.2	**12.1.2 Volatility Test.** Prior to placing the beakers containing the blocks in the weathering apparatus, (see Section 3.9.1), a check shall be made to ensure~~assure~~ that the blocks are still spaced equally on the hardware cloth without touching the side of the beaker or one another. Weather the blocks for 334 hours (13.9 days) at a suitable temperature to maintain the blocks at 46-52°C (114-126°F).	Approved as SUBMITTED
691	AWPA E10 16 SECTION 10.2	**10.2** Test blocks for wood- based composite treated during the manufacturing process, either by the addition of a preservative to the furnish or to the glue, should be cut from the final product in a manner that produces test material that is representative of the natural variability of the material. Composites made in a batch process should be sampled randomly, taking into consideration the size of the individual samples made and the volume of the run. If a wood composite is made in a continuous process, test blocks should be collected from samples obtained at the beginning and end of the run, as well as taken periodically from the line during production. Test blocks should be cut from material representing all ranges of densities observed in the composite made. In composites consisting of a multilayer structure (for example core and faces), test blocks should be cut and tested separately for each region if possible as mentioned in Section 5.1.2. Also, composites with significant thickness (>37.5 mm (1.5 in))should have a series of test blocks cut at different distances from the surface. Additionally, the representative specimens should also be assayed for active ingredients using the appropriate analytical methods to identify the potential depletion and fixation of preservative during the composite manufacturing process. Care has to be taken that the assay results are accurate due to the	Approved as SUBMITTED

		potential fixation of certain types of active ingredients in the composite glue line. This will allow the correlation to be observed between the progress of decay in the wood-based portion of the tested blocks and the actual concentration of the active ingredient in the composite. It is known that the decay resistance of wood composites treated on line during the manufacturing process may be sensitive, not only to the quantities of preservative used, but also to the manufacturing process conditions.	
690	AWPA E10 16 SECTION 10	**10. Preparation of Wood-b ~~B~~ased Composite Test Blocks:**	Approved as SUBMITTED
688	AWPA E10 16 SECTION 9.4	**9.4 Treatment Procedure.** It is desirable to choose blocks for treatment that have the narrowest practicable spread in density; for example, weight differences not exceeding 0.5 g among 19 mm blocks in a given test are desirable and should be obtainable. If that is not possible, then a randomized complete block (RCB) design should be followed. RCB is a statistical concept that helps remove a controllable outside factor, in this case density, from obscuring treatment effects. For example, support sorting has produced 3 density groups (low, medium and high) with 25 wood blocks in each group. Suppose also that there are 5 treatments or concentrations (including controls) planned with 15 wood blocks per treatment. In a RCB design, each treatment would be randomly assigned to 5 low density wood blocks, 5 medium density wood blocks, and 5 high density wood blocks. The basic concept of blocking is to ensure that the variation in density is as equal as possible across the five treatment groups. Place the blocks to be treated with a given concentration of preservative in a suitable beaker with spacers between and weigh them down to prevent eventual floating on the treating solution. Place the beaker in the desiccator or bell jar of the impregnation apparatus (Fig. 1) directly below the outlet from the separatory funnel or treating solution flask. Suitable equipment for vacuum/pressure impregnation of the blocks may also be used. Typically, the blocks are submerged in the treating solution then exposed to 30 minutes vacuum (approx. 100 mm Hg) followed by 60 minutes pressure 700 kPa (100 psi) and a 30 minute period at atmospheric pressure to allow any kick-back to occur. If the apparatus illustrated in Fig. 1 is used, a tube should extend from the funnel stem to the bottom of the beaker. Attach the apparatus to the vacuum or suction pump and reduce the pressure in the treating chamber to 100 mm of mercury or less and hold this pressure for 10 to 20 minutes. Pour the prepared solution of the preservative into the separatory funnel or solution flask, using sufficient solution so that the blocks will remain covered after the treatment is completed. Admit the solution into the beaker by slowly opening the stopcock G in Figure 1. This addition may require five minutes or more. After sufficient solution has been added, slowly admit air into the desiccator to break the vacuum. Add the air at an even rate over 10-15 minutes to avoid cavitation. Remove the beaker from the treating chamber and cover with a watch glass or plastic film to minimize loss of treating solvent by evaporation. Leave the blocks submerged in the treating solution for at least 30 minutes. A longer time is necessary for some treating solutions to obtain maximum and uniform absorptions in the blocks (Note 8). Remove the blocks from the solution individually, wipe lightly to remove surface preservative solution, and immediately weigh to the nearest 0.01 g (T_2). Record the gain in weight (T_2 - T_1) as the grams of treating solution absorbed (Note 7). **Note 8.** Calculated retentions are based on uniform distribution of the preservative in the wood. Such distribution is obtained only if the absorptions represent the total amount of liquid a block will hold. Most of the air has been evacuated from the wood before the preservative solution is introduced, leaving the cell cavities free to be filled with the solution. The amount of air space available to hold liquids has been determined for woods of different density and moisture content.[9] The approximate maximum absorption to be expected can therefore be computed from the percentage of air space and the specific gravity of the treating solution. The greater the volume of air space (the lower the density), the greater the absorption that should be obtained if all air cavities are filled. With water-soluble preservatives, absorptions are higher than for oil-type preservatives because water not only fills the airspaces, but is also absorbed into the cell walls. When initially testing new formulations, it is desirable to treat additional blocks to each target retention, and following treatment, section them to determine uniformity of penetration. Use the 19 mm blocks and cut them into two or three zones and analyze each zone for the preservative using a standard method of analysis. When cutting the block into three zones cut off the outer 3 mm and then the next 3 mm. This will require 12 cuts. Combine the six segments from each zone and analyze. When cutting the block into two zones, cut off the outer 4.5 mm from the two radial (end grain) faces only. This will require only two cuts. Combine the two outer segments and analyze. Analyze the cores separately.	Approved as SUBMITTED
687	AWPA E10 16 SECTION 9.1.2	**9.1.2** If oil-borne or volatile formulations are to be tested, condition the blocks before and after treatment in a room controlled as specified in Section 9.1.1. If water-borne formulations are to be tested, blocks can be conditioned before and after treatment as outlined above or by being placed in a forced-draft oven ~~controlled~~ at 40°C until two consecutive ~~re~~weighings are within 0.1% of each other~~equal~~ (approximately 8 to 12 hours). **Note 7.** Coding the different weights as T_1, T_2, etc., avoids confusion and simplifies recording data. The suggested system of T designations is as follows, with all weights to be recorded in grams:	Approved as SUBMITTED
686	AWPA E10 16 SECTION 8 PARA 1	**8.2 Water storage.** Inoculate fresh Petri dishes and incubate. Cut small sections or use a cork borer to cut agar section from the leading edge of the mycelium growing on the Petri dishes. Prepare 2 mL sterilized culture tubes with 1 mL of sterile water and place the agar pieces into the culture tube under sterile conditions. The agar pieces should be fully submerged. Secure the cap and store the tube in a refridgerator maintained between 2°C and 5°C (35°F and 40°F). Cultures stored in water have been shown to be stable for years with little maintenance. [17,18]	Approved as SUBMITTED
685	AWPA E10 16 SECTION 8 PARA 1	**8.1 Storage on Slants.** When not in active use, store the test cultures in at least two test tube malt-agar slants per fungus that contain small pieces of sterile sapwood of either a non-durable softwood (brown-rot fungi) or a medium density hardwood (white-rot fungi) to stimulate the production of cellulolytic enzymes during storage in a refrigerator maintained between 2°C and 5°C (35°F and 40°F). When the slants are used to inoculate Petri dishes, inoculate and incubate replacement slants until the surface of the slant is covered by mycelium prior to refrigeration. The test tube that works well is 150 by 16 mm, equipped with a plastic screw cap. It is recommended that the liner in the cap be removed before using. Depending on the type of refrigerator used, check agar slants every one to two months for loss of moisture. When the culture appears excessively dry, inoculate fresh Petri dishes and incubate. Use the leading edge of the mycelium growing on the Petri dishes to inoculate new slants. Only sections of the mycelium that are characteristic of the appearance of the growth of the test fungus should be used to inoculate either test tubes or additional Petri dishes. For example, *G. trabeum* cultures growing on Petri dishes may form "sectors" of appressed	Approved as SUBMITTED

		rather than fluffy mycelium that lose one or bothcontain only one of the nuclei present in the cells of the parent dikaryon. Such "sectors" should be avoided when transferring cultures.	
683	AWPA E10 16 SECTION 8	**8. Storage of Test Cultures:** The following methods may be used to store fungal cultures.	Approved as SUBMITTED
682	AWPA E10 16 SECTION 7.2.3	**7.2.4**3 The procedures discussed in Sections 7.2, 7.2.1 and 7.2.2 may be used with both brown-rot and white-rot test fungi. Studies have shown, however, that decay by white-rot fungi is increased by substituting Whatman No. 1 filter paper for the wooden feeder strips and using water containing 0.23% malt extract to bring the soil to its water-holding capacity[7].	Approved as SUBMITTED
681	AWPA E10 16 SECTION 7.2.2	**7.2.3** Alternatively, the soil can be wetted before addition to the culture bottles when it is found that preparing the soil as the method describes produces soil too wet for ideal fungal growth. A commercial horticulture loam with a water holding capacity of approximately 80% is often used. The soil moisture content is adjusted to the point where the soil just clumps when squeezed manually and no excess free water drips from the soil when squeezed. The soil is sieved as previously described (7.2) and then water is added to the proper consistency. The soil is then added to loosely fill each jar to about 65% capacity. A flat tamping tool is used to gently tamp and level the surface of the soil. Soil should half-fill each jar after tamping. The soil should not be compacted down as aerated soil allows for proper fungal growth. The feeder strips are then added, and the jars are sterilized as described in 7.2.2.	Approved as SUBMITTED
679	AWPA E10 16 SECTION 7.2.2	**7.2.2** Add the required amount of reagent water to five to ten culture bottles and add the corresponding volume of soil to each. By adding the water to the bottles before the soil, the surfaces of the culture bottles above the soil level remain clean and the water diffuses through the soil during sterilization without puddling. A funnel with a stem of large diameter that reaches nearly to the bottom of the culture bottles can be made and used to admit soil with minimum dust settlement on the glass. Level the soil surface and place directly on the soil one sapwood feeder strip for each test block to be used. Weigh each complete bottle (W_5) and autoclave the prepared bottles, with caps loosened, at 103.4 kPa (15 psig) for 30 minutes (225 ml jar size) or 45 minutes (450 ml jar size). Reweigh each bottle after the final sterilization (W_6) and determine the weight loss in grams during sterilization. This weight loss in grams equals the ml of water lost during sterilization. Add this amount of water (W_5 - W_6) to the figure obtained above to determine the amount of water to add to each test bottle prior to sterilization. **Note 6.** Depending on the soil and test fungus, this procedure may not always give the correct amount of water to add to the soil for optimal fungal growth. Experience will determine the amount of additional water required to maintain fungal activity during the duration of the test.	Approved as SUBMITTED
678	AWPA E10 16 SECTION 7.2	**7.2 Soil Substrate.** A soil substrate with a water-holding capacity between 20% and 40% (Note 5) and a pH between 5.0 and 8.0 shall be used. After breaking up all clumps, the soil is mixed to pass through a screen of approximately 6 to 8 mesh and stored in large covered containers. The soil should not be so wet when it is sifted that the particles again stick together. The oven-dried weight of 118 ml of sifted soil should not be less than 90 g. Studies indicate that soil should be obtained from forested rather than agricultural sites.[6] If the pH of the soil is below 5.0, the soil should be amended with hydrated lime to adjust the pH to between 5.0 and 8.0. **Note 5.** The water-holding capacity of a soil should be considered as that percentage of water, based on the oven-dry weight of the soil, that is retained after subjecting the soil to the following procedure based on a method of G.J.A. Bouyoucos, "A Comparison Between the Suction Method and the Centrifuge Method for Determining the Moisture Equivalent of Soils." *Soils Science*, 40, 165-170 (1935). To determine soil water-holding capacity, pass a sample of air-dry soil through a screen of approximately 6 to 8 mesh. Use this sieved soil to fill a small Buchner funnel approximately 50 mm in diameter and 25 mm in depth, and fitted with rapid-filtering paper, to somewhat more than capacity. Compact the soil by tappingdropping the funnel three times fromthrough a height of 10 mm (0.4 in.) on a wooden table top. Level the soil surface by cutting off excess soil with a spatula at the top of the funnel without further compaction. Then place the filled funnel in a 400 ml beaker and retain in an upright position by wedges at the sides of the funnel. Add water to the beaker to a depth slightly above the level of the filter paper. Allow the soil to wet by capillarity so as to reduce the danger of entrapping air within the column. When the upper soil surface shows signs of wetting, add more water until the water level in the beaker is approximately at the upper surface of the funnel. Place a cover over the beaker, and allow the soil to soak for 12-24 hours or overnight. Then pPlace the funnel in a suction flask which is connected to a water aspirator or vacuum pump, place an inverted beaker on top of the soil and cover and apply full suction for 15 minutes. During suctioning, cover the funnel with a moist cloth on which an inverted cup is placed to prevent evaporation of water from the exposed soil surface. Apply full suction for 15 minutes thenAfter 15 minutes remove the funnel from the suction flask, scrape the soil into a weighed receptacle, and weigh to obtain the wet weight, W_1. Oven-dry to a constant weight at 105°C ±2°C (220°F ±4°F) and reweigh soil, W_2. Determine soil moisture content (water-holding capacity) based on the oven-dry weight of soil.	Approved as SUBMITTED
677	AWPA E10 16 SECTION 7.1	**7.1 Malt Agar Substrate.** For both stock test-tube and petri dish cultures of the test fungi, use a nutrient medium consisting of two weight percent malt extract and 1.5 weight percent agar. The addition of 0.005 weight percent of yeast extract to the medium will accelerate the growth of many species of decay fungi. Steam sterilize the medium in an autoclave at 121°C and 103 kPa (15 psig) of steam for 20 minutes, then and allow to cool to 50ºC before pouring plates before inoculations.	Approved as SUBMITTED
675	AWPA E10 16 SECTION 6.2.1.2	**6.2.1.2** *Rhodonia placenta* (Fr) Niemelá, Larss. & Schigel = *Postia placenta* (Fries) M. Larsen et Lombard = *Poria placenta* (Fr.) Cooke = *Poria monticola* Murr. (Madison 698, ATCC 11538) —A fungus particularly tolerant to copper and zinc compounds.	Approved as SUBMITTED
674	AWPA E10 16 SECTION 6.1	**6.1 General Considerations.** The brown-rot fungus *Gloeophyllum trabeum* (ATCC isolate 11539; Madison 617) and the white-rot fungus *Trametes versicolor* (ATCC isolate 42462) should be used in screening tests with new formulations. In addition, when screening copper-containing systems a second copper-tolerant brown-rot fungus, *Rhodonia*~~*Postia*~~ *placenta* (ATCC 11538), should be employed. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations or wood based composite. Fungi used in these tests should include the brown-rot *Gloeophyllum trabeum* (ATCC 11539; Madison 617) and the white-rot *Trametes versicolor* (ATCC 42462 or Madison 697...ATCC 12679). When copper-containing preservatives are being tested, a copper-tolerant fungus such as *Postia placenta* should be used. Additional species that may be used include those listed in Sections 6.2 and 6.3 or others whose efficacies are documented in	Approved as SUBMITTED

		archival literature citations.[15, 16] In some instances, more than one isolate of a test fungus or more than two fungi per brown-rot and/or white-rot may be desirable. **Note 3.** The numbers following the fungus names refer to standard strains of test fungi maintained in the American Type Culture Collection (ATCC), 10801 University Boulevard~~P.O. Box 1549~~, Manassas, VA 201100~~8~~ (www.atcc.org) or other repositories of fungal isolates. The Madison isolates are maintained at the USDA Forest Service, Forest Products Laboratory in Madison, WI. Information about these fungi may be found in: Duncan, C.G. and F.F. Lombard. 1965. *Fungi Associated with Principal Decays in Wood Products in the United States*. USDA Forest Service, Research Paper W0-4. 31 pp. A discussion of tolerance of fungi to preservatives, and a list of fungi tolerant to various preservatives, may be found in: Levy, M. P. 1973. *Control Methods*. pp. 183-216. *In:* Nicholas, D. D. (Ed.) Wood Deterioration and its Prevention by Preservative Treatments. Vol. 1. *Degradation and Protection of Wood*. Syracuse University Press, Syracuse, New York. 380 pp. **Note 4.** To verify that the copper-tolerant fungus employed is effective at degrading copper-treated wood, it may be desirable to concurrently run a set of wood blocks treated to 2.2 kg/m^3 (0.14 pcf) with copper(II). Active copper-tolerant fungi should give weight losses of 30% or more, with equal or greater weight losses often observed with the copper-treated blocks compared to the control/untreated wood blocks (Green and Clausen, International Biodet. Biodeg. 51, 145-149, 2003; Clausen et al., International Biodet. Biodeg. 46, 69-76, 2000; Shupe et al. International Research Group/Wood Pres. IRG/WP 10-30541, 2010).	
673	AWPA E10 16 SECTION 5.2	**5.2.1 Check Blocks** Test blocks included to account for any operational complications that may be the result of the loss of preservative during the test period or failure of the blocks to come to the same moisture equilibrium as prior to test initiation. Two blocks per concentration, substrate and test fungi should be place in non-inoculated bottles for the duration of each test incubation time. Therefore, if both brown rot and white rot fungi are being tested two blocks per incubation period as included.	Approved as SUBMITTED
669	AWPA E10 16 SECTION 5.2	**5.2 Test Blocks.** Test blocks should be cubes milled as accurately as possible to 14 mm (0.55 in.) or 19 mm (0.75 in.) which yields a nominal volume of 2.7 cm^3 or 6.9 cm^3, respectively, as determined by measuring a random sample of the blocks to be used in a test. Softwood (conifer) blocks usually are exposed to brown-rot fungi and hardwood (angiosperm) blocks to white-rot fungi, but both white and brown rot fungi are often used to provide a range of decay capabilities. See Section 14.1 for duration of tests using the two block sizes. If treated softwood sapwood blocks are exposed with white-rot fungi, untreated controls of both the softwood used and a medium-density hardwood (e.g., sweetgum, aspen, etc.) should be used to verify the decay capacity of the fungus isolate used; white-rot fungi tend to cause very low weight losses in untreated softwood blocks. When using composites with profiles that do not allow for creation of standard blocks, the pieces shall be fabricated so that they contain a similar volume of 6.9 cm^3 as outlined above for 19 mm (0.75 in.) block.	Approved as SUBMITTED
667	AWPA E10 16 SECTION 5.1	**5.1 General Properties of Sawn Lumber or Wood-b~~B~~ased Composite Test Blocks.** Sapwood of a non-durable conifer such as southern pine (*Pinus spp.*) should be used for softwood test blocks, and sapwood from a nondurable, medium-density angiosperm such as sweetgum (*Liquidambar styraciflua* L.), aspen (*Populus spp.*) or yellow-poplar (*Liriodendron tulipifera* L.) should be used for hardwood test blocks. Selection of either a softwood or hardwood is dependent on the products that are to be treated with the preservative in question. In the case of wood based composite, mixtures of hardwood and softwood are permitted. The wood or wood composite should be free of knots and visible concentration of resins, and showing no visible evidence of infection by mold, stain, or wood-destroying fungi. Wood specimens should have~~, with~~ 2 to 4 rings per 10 mm (six to ten rings per in.) ~~should be used~~. Whenever practicable, selection of the wood for the test blocks should begin at the sawmill. Newly cut boards, nominally 25 mm (1 in.) thick, that are immediately kiln dried without anti-stain treatment are required to provide chemical-free wood that has had minimum opportunity for fungus infection or deterioration before use in the soil-block culture test. Where known, temperatures at which the wood was kiln-dried should be recorded.	Approved as SUBMITTED
665	AWPA E10 16 SECTION 5	**5. Wood and Wood-b~~B~~ased Composites:**	Approved as SUBMITTED
664	AWPA E10 16 SECTION 3.10	**3.10** Culture Bottles (Note 1), fitted with screw caps without liners (Fig. 2). Clear or amber bottles may be used (see Section 3.2). **Note 1.** For use with one block only, use 225 ml (8 oz) nominal capacity French square or cylindrical bottles. For use with two blocks only, use 450 ml (16 oz) nominal capacity cylindrical bottles. Alternatively, foil-covered autoclavable plastic containers with vented lids~~tops~~ that maintain sterility (e.g., holes filled with cotton, micro-filters, etc.) may be used. An alternative lid using a 25 mm diameter metrical autoclavable filter with a pore size of 0.2 microns (Gelman Filtration Products, 600 South Wagner Rd., Ann Arbor, Michigan 48106) can be used for the prevention of mite infestation during the duration of the soil block test.[4] Appropriate polypropylene lids (43 mm unlined~~linerless~~ caps) can be obtained from M. Jacob and Sons, P. O. Box 9069, Farmington Hills, MI 48333. The lids are first prepared by punching or drilling a centered hole 6.4 mm (0.25 in) in diameter, then lightly sanding the interior of the lid with medium grit paper to ensure proper adhesion. The filter is glued on the inside of the lid using a small amount of high temperature silicone or slow curing epoxy. (The center hole provides for aeration of the jar, so be certain that the glue does not cover this area.) Allow the adhesive to cure overnight. In most cases, the lids can be reused if they are autoclaved on the liquid cycle or manually vented slowly so as not to damage the filter over the hole. An alternative method for covering the lid hole is to use a piece of 12 mm (0.5 in) wide cloth adhesive first-aid tape (e.g. Top Care®, Topco Associates, Inc., Skokie, IL 60077 or equivalent). Cut a piece approximately 12 mm (0.5 in) long and fasten over the exterior surface hole prior to autoclaving jars. It has been found that the tape adheres well to the lid and excludes mites and other contamination while allowing gas exchange.	Approved as SUBMITTED
662	AWPA E10 16 SECTION 3.7	**3.7 Impregnation Apparatus.** A suitable desiccator or bell jar shielded to protect personnel in event of breakage, provided with suitable separatory funnel or auxiliary flask for holding the treating solution and vacuum gage or manometer (Fig. 1). Suitable equipment for vacuum/pressure impregnation of the blocks may also be used. Typically, the blocks are submerged in the treating solution then exposed to 30 minutes vacuum (approx. 100 mm Hg) followed by 60 minutes pressure 700 kPa (100 psi) and a 30 minute period at atmospheric pressure to allow any kick-back to occur. ASTM Standard 1413 – 76 (Rea~~p~~pproved 1994), Section 10.4 gives an alternative treatment procedure that may be considered	Approved as SUBMITTED
661	AWPA E10 16	**3.2 Incubation Room or Incubation Cabinet.** Maintained at a selected temperature between 22°C and 28°C (71°F and 83°F) and an average relative humidity between 80% and 90%. The selected temperature shall not vary more than	Approved as SUBMITTED

	SECTION 3.2	±3°C (±4°F) and the selected humidity not more than ±10%. Lights should remain off during decay tests except when needed for periodic inspections. Uneven exposures of soil bottles to incandescent lighting may~~will~~ influence test results.[2] Amber bottles may be used to further mitigate this risk but are not required~~are preferred to clear glass bottles~~. Within each test, decay bottles for the various treatments should be randomly located on incubator shelves. When volatile preservative systems are tested, it is recommended that air exchange within the incubation cabinet, if passive, be supplemented with an active fan system. Reports on procedures must describe the lighting conditions during the course of the test. The area adjacent to the incubation cabinet should be cleaned periodically (e.g., weekly) with a miticide ~~(e.g., Kelthane)~~.	
658	AWPA E10 16 SECTION 2.1	**2.1** Blocks of solid wood, wood-based composites, or wood-plastic composites are used for testing. When preservatives are included in the evaluations, conditioned blocks of the appropriate substrate can be either impregnated with different concentrations of a preservative in water or suitable organic solvent to produce a series of preservative retentions in the blocks. Alternatively, composite materials can be fabricated by adding different concentrations of the actives to the furnish prior to manufacturing to produce the range of retentions. After periods of conditioning or weathering, the impregnated blocks are exposed to recognized destructive species of both brown-rot and white-rot wood-destroying fungi. At least one brown-rot and one white-rot fungus should be used in screening tests with new formulations. For screening copper-based formulations, the proponent may want to employ two brown-rot fungi, one of which is the copper-tolerant ~~*Postia*~~ *Rhodonia placenta*, and one copper-intolerant brown-rot and one white-rot fungus. In general, the accuracy of the preservative efficacy determination will increase as more fungi are used. The minimum amount of preservative that protects the impregnated blocks against decay by a given test fungus is defined as the threshold retention for that organism. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations. Failure to protect is evidenced by loss of mass from the treated wood or wood based composite blocks, as indicated by a loss of weight. Blocks treated with preservatives of known efficacies should be included in tests with new formulations. Comparisons with other preservative systems should be made with blocks used in the same test. Between-test comparisons are less accurate than within-test comparisons.	Approved as SUBMITTED
657	AWPA E10 16 SECTION 1.2 [Table Data]	Section Summary of Method 2 Apparatus 3 Reagents 4 Wood and Wood-b-~~B~~ased Composites 5 Test Fungi 6 Culture Media 7 Storage of Test Cultures 8 Preparation and Impregnation of Sawn Wood Test Blocks 9 Preparation of Wood-b-~~B~~ased Composite Test Blocks 10 Conditioning of Treated Blocks of Wood and Wood Composites 11 Preservative Permanence 12 Sterilization of Treated Test Blocks 13 Block Installation and Culture Bottle Inoculation 14 Incubation and Duration of Test 15 Handling Test Blocks After Exposure to Test Fungi 16 Calculation of Weight Losses 17 Evaluation of Test Results 18 Refining the Threshold 19 Report 20 References 21	Approved as SUBMITTED

AWPA Standard E11-16

21F-E11-P6 Reaffirm without Revisions E11

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 21 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
867	AWPA E11 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED

AWPA Standard E14-16

21F-E14-P6 Revise E14

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 21 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
897	AWPA E14 16 SECTION 10 PARA 11	**j)** Details of the assessment ratings for each sample at each inspection, including the statistical analysis described in Section 9.~~3~~4	Approved as SUBMITTED
762	AWPA E14 16 SECTION 8.3.2.2	**8.3.2.2 MOE_{dyn} determination after exposure.** After every three months exposure period, remove the test samples from the soil bed, and clean ~~of~~off adhering soil. Equilibrate the test stakes in a constant humidity/temperature cabinet to an EMC equivalent to that attained in Section 8.~~3~~4.~~2~~3.1. Weigh each sample to the nearest 0.1 g and proceed with Steps 2-5 in Section 8.~~3~~4.~~2~~3.1. Record the frequency values separately for two surfaces tested.	Approved as SUBMITEED
761	AWPA E14 16	**Additional Comment:** Reaffirm without Revisions	**Withdrawn by proponent prior to committee meeting**

AWPA Standard E16-16

21F-E16-P6 Revise E16

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 21 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
759	AWPA E16 16	**Additional Comment:** Reaffirm without Revisions	**Withdrawn by proponent prior to committee meeting**
758	AWPA E16 16 SECTION 4.1.2	**4.1.2 Wood quality:** Clear, defect free wood with no evidence of decay, insect attack, mold, or stain shall be used. Excessive cross grain, juvenile and reaction wood, knots, resin, wane, or other obvious defects are unacceptable. The density for a given test substrate shall be representative of the reported values for the wood species (or in the case of bio-based composites, the target density). All samples should fall within ±20% of the median density value of the substrate specimens used in the test, based on size and weight. If the range of calculated densities differ by more than ±10% of the median value, all samples must be allocated to treatment groups so that each treatment group has a similar density distribution prior to treatment. ~~and should have a distribution of ±15% of the median value of the substrate specimens used in the test.~~ All the wood used in the test shall have been handled and dried in the same way.	Approved as SUBMITTED
646	AWPA E16 16 SECTION 4.1.3	**4.1.3 Preparation of lap-joints:** Two types of lap-joints may be used: transverse, with the overlap joint across the test piece, and longitudinal, with the overlap joint down the length of the test piece. Both types are applicable to treated and untreated solid wood or wood-based composites. The lap-joints shall be prepared from 89 mm wide "parent" boards. The parent board length will depend on the type of lap-joint being prepared. The thickness may vary to accommodate the substrate being tested, but 38 mm should be used when possible. For example, a composite manufactured to a thickness of 19 mm will have a lap-joint specimen thickness also of 19 mm where the thickness of the arms of the joint will be approximately 9.5 mm. The parent boards are treated using the appropriate methodology and dried.	Approved as SUBMITEED

AWPA Standard E19-16

21F-E19-P6 Revise E19

Committee Meeting Action: Unanimously authorized letter ballot as MODIFIED.

Letter Ballot Results: Passed unanimously as modified with 19 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
893	AWPA E19 16 SECTION 4.1	**4.1 Wood.** Nine 1.22 m (4-ft) long sections are cut from each of three 3.66 m (12-ft) boards. Sections from the same parent shall be labeled A, B, and C. Similarly labeled smaller lengths may be used if they are end-sealed to prevent longitudinal penetration. There are thus a total of nine samples.	Approved as SUBMITTED
891	AWPA E19 16 SECTION 5.2.1	**5.2.1 Leachate.** After leaching, using clean tools/equipment, the boring shall be removed from the leachate solution. The leachate solution shall then be acidified to pH 1 with nitric acid. The acidified leachate shall be analyzed by either atomic adsorption or inductively coupled plasma spectroscopy techniques, such as AWPA Standard ~~A11-93 or~~ A21-~~00~~.	Approved as MODIFIED

AWPA Standard E22-16

21F-E22-P6 Revise E22

Committee Meeting Action: Unanimously authorized letter ballot as MODIFIED.

Letter Ballot Results: Passed unanimously as modified with 21 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
915	AWPA E22 16 SECTION 17 PARA 4	~~4~~10. Duncan, C.G. 1967. Effect of light on the rate of decay of three wood-destroying fungi. Phytopathology 57(10): 1121-1125.~~Duncan, C.G. and F.F. Lombard 1965. Fungi associated with principal decays in wood products in U.S. USDA Forest Service, Research Paper WO-4~~	Approved as SUBMITTED
914	AWPA E22 16 SECTION 6.1	**6.1 General considerations.** The brown-rot fungus *Gloeophyllum trabeum* (ATCC isolate 11539, Madison 617) and the white-rot fungus *Trametes versicolor* (ATCC isolate 42462) should be used in screening tests with new formulations. In addition, when screening copper-containing systems a second copper-tolerant brown-rot fungus, *Postia placenta* (ATCC 11538), should be employed. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations. Fungi used in these tests should include the brown-rots *Gloeophyllum trabeum* (ATCC 11539) and *Postia placenta* (ATCC 11538) and the white-rots *Trametes versicolor* (ATCC 42462) and *Irpex lacteus* (ATCC 11245). When copper-containing preservatives are being tested, a copper-tolerant fungus such as *Postia placenta* should be used. Additional species that may be used include those listed in Sections 6.2 and 6.3 or others whose efficacies are documented in archival literature citations. In some instances, more than one isolate of a test fungus may be desirable. The numbers following the fungus names refer to standard strains of test fungi maintained in the American Type Culture Collection (ATCC), PO Box 1549, Manassas, VA 20108 USA (www.atcc.org) or other repositories of fungal isolates. The Madison isolates are maintained as part of the culture collection at the USDA Forest Service, Forest Products Laboratory, Center for Forest Mycology Research in Madison, WI. Information about these fungi may be found in~~:~~ Duncan~~,~~ and Lombard~~.~~, 1965. A discussion of tolerance of fungi to preservatives~~,~~ and a list of fungi tolerant to various preservatives~~,~~ may be found in~~:~~ Levi, 1982~~73~~. To verify that the copper-tolerant fungus employed is effective at degrading copper-treated wood, it may be desirable to concurrently run a set of wood blocks treated to the UC4A retention for the copper(II) component of a preservative system. ~~2.2 kg/m^3 (0.14 pcf) with copper(II).~~ Active copper-tolerant fungi should give weight losses of 30% or more, with equal or greater weight losses often observed with the copper-treated blocks compared to the control/untreated wood blocks (Green and Clausen, ~~International Biodet. Biodeg. 51, 145-149,~~ 2003; Clausen et al., ~~International Biodet. Biodeg. 46, 69-76,~~ 2000; Shupe et al. ~~International Research Group/Wood Pres. IRG/WP 10-30541~~, 2010). In addition, after four weeks of exposure, copper-tolerant fungi will cause more than 60% compression strength loss of pine sapwood blocks treated with copper(II) or water (Tang et al., 2016).	Approved as SUBMITTED

736	AWPA E22 16 SECTION 17 PARA 12	~~12~~23. Toole, E.R. 1971. Reduction in crushing strength and weight associated with decay by rot fungi. Wood Science 3(3): 172-178.	Approved as SUBMITTED
735	AWPA E22 16 SECTION 17 PARA 12	21. Shupe, T.F., K. Ragon, Q. Wu, M.H. Freeman, and C.R. McIntyre. 2010. Copper preservative systems: a rapid investigation into effects of co-biocides and used treating solutions. International Research Group on Wood Protection. IRG/WP 10-30541. 22. Tang, J.D., T. Ciaramitaro, D.D. Nicholas, M. Tomaso-Peterson, and S.V. Diehl. 2016. Defeating copper tolerance: an example of how "omics" research can accelerate discovery of new wood protection compounds. Proceedings of the American Wood Protection Association 112: 106-113.	Approved as SUBMITTED
734	AWPA E22 16 SECTION 17 PARA 11	~~11~~20. Richter, D.L., P.E. Laks, K.M. Larsen, and A.L. Stephens. 2005. Comparison of isolates and strains within the brown-rot fungus genus Gloeophyllum using the soil block decay method. Forest Products Journal. 55 (1): 72-75.	Approved as SUBMITTED
733	AWPA E22 16 SECTION 17 PARA 11	19. Orsler, R.J. and G.E. Holland. 1982. Degradation of tributyltin oxide by fungal culture filtrates. International Biodeterioration Bulletin 18(4): 95-98.	Approved as SUBMITTED
732	AWPA E22 16 SECTION 17 PARA 10	~~10~~18. Nicholas, D.D. and Z. Jin. 1996. Use of compression strength loss for measuring decay in the soil block test. International Research Group on Wood Protection~~eservation~~. IRG/WP96-20083.	Approved as SUBMITTED
731	AWPA E22 16 SECTION 17 PARA 9	~~9~~17. MacLean, J.D. 1958. "~~E~~Effect of ~~M~~moisture ~~C~~changes on the ~~S~~shrinkage, ~~S~~swelling, ~~S~~specific ~~G~~gravity, a~~A~~ir or v~~V~~oid s~~S~~pace, w~~W~~eight, and s~~S~~imilar p~~P~~roperties of w~~W~~ood." USDA Forest Service, ~~Products Laboratory~~ Report No. 1448. 47 pp.~~U. S. Forest Service (1958)~~.	Approved as SUBMITTED
730	AWPA E22 16 SECTION 17 PARA 9	16. Liese, W. and O. Schmidt. 1976. Inhibitor tolerance and growth behavior of some wood-destroying Basidiomycetes around the ring-shell test. Material und Organismen 11: 97-108.	Approved as SUBMITTED
729	AWPA E22 16 SECTION 17 PARA 8	~~8~~15. Leithoff, H., R.-D. Peek, V. Borck, R. Gottschke, H. Kirk, and M. Grinda. 1999. Toxic values derived from EN 113 tests — are they determined by the virulence of a test fungus? International Research Group on Wood Protection~~eservation~~. IRG/99-20176.	Approved as SUBMITTED
728	AWPA E22 16 SECTION 6.1	**6.1 General considerations.** The brown-rot fungus *Gloeophyllum trabeum* (ATCC isolate 11539, Madison 617) and the white-rot fungus *Trametes versicolor* (ATCC isolate 42462) should be used in screening tests with new formulations. In addition, when screening copper-containing systems a second copper-tolerant brown-rot fungus, *Postia placenta* (ATCC 11538), should be employed. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations. Fungi used in these tests should include the brown-rots *Gloeophyllum trabeum* (ATCC 11539) and *Postia placenta* (ATCC 11538) and the white-rots *Trametes versicolor* (ATCC 42462) and *Irpex lacteus* (ATCC 11245). When copper-containing preservatives are being tested, a copper-tolerant fungus such as *Postia placenta* should be used. Additional species that may be used include those listed in Sections 6.2 and 6.3 or others whose efficacies are documented in archival literature citations. In some instances, more than one isolate of a test fungus may be desirable. The numbers following the fungus names refer to standard strains of test fungi maintained in the American Type Culture Collection (ATCC), PO Box 1549, Manassas, VA 20108 USA (www.atcc.org) or other repositories of fungal isolates. The Madison isolates are maintained at the USDA Forest Service, Forest Products Laboratory in Madison, WI. Information about these fungi may be found in: Duncan, and Lombard.1965. A discussion of tolerance of fungi to preservatives, and a list of fungi tolerant to various preservatives, may be found in: Levi, 1982~~73~~. To verify that the copper-tolerant fungus employed is effective at degrading copper-treated wood, it may be desirable to concurrently run a set of wood blocks treated to 2.2 kg/m^3 (0.14 pcf) with copper(II). Active copper-tolerant fungi should give weight losses of 30% or more, with equal or greater weight losses often observed with the copper-treated blocks compared to the control/untreated wood blocks (Green and Clausen, International Biodet. Biodeg. 51, 145-149, 2003; Clausen et al., International Biodet. Biodeg. 46, 69-76, 2000; Shupe et al. International Research Group/Wood Pres. IRG/WP 10-30541, 2010).	Approved as SUBMITTED
727	AWPA E22 16 SECTION 17 PARA 7	~~7~~14. Levi, M.P. 1982~~73~~. Control Methods. ~~Pp 183-216.~~ In: ~~Nicholas, D.D. (ed.)~~ W~~w~~ood D~~d~~eterioration and I~~i~~ts P~~p~~revention by P~~p~~reservative T~~t~~reatments. Vol. 1. Degradation and Protection of Wood, D.D. Nicholas (ed). Syracuse University Press. Syracuse N.Y. p. 183-216~~380 pp~~.	Approved as SUBMITTED
726	AWPA E22 16 SECTION 17 PARA 6	~~6~~13. Janzen, S. and D.D. Nicholas 2002. Use of transverse compression properties as measurement of wood biodegradation. Part I. Effect of white rot on yellow poplar. International Research Group on Wood Protection~~eservation~~. IRG/WP02-40239.	Approved as SUBMITTED
725	AWPA E22 16 SECTION 17 PARA 5	~~5~~12. Highley, T.L. and T.C. Scheffer. 1970. A need for modifying the soil-block method for testing natural resistance to white rot? Material und Organismen 5(4): 281-292.	Approved as SUBMITTED

724	AWPA E22 16 SECTION 17 PARA 5	11. Green, F. and C.A. Clausen. 2003. Copper tolerance of brown-rot fungi: time course of oxalic acid production. International Biodeterioration and Biodegradation 51(2): 145-149.	Approved as SUBMITTED
723	AWPA E22 16 SECTION 17 PARA 4	410. Duncan, C.G. and F.F. Lombard 1965. Fungi associated with principal decays in wood products in U.S. USDA Forest Service, Research Paper WO-4	Approved as SUBMITTED
722	AWPA E22 16 SECTION 17 PARA 4	49. Duncan, C.G. 1967. Effect of light on the rate of decay of three wood-destroying fungi. Phytopathology 57(10): 1121-1125.~~Duncan, C.G. and F.F. Lombard 1965. Fungi associated with principal decays in wood products in U.S. USDA Forest Service, Research Paper WO-4~~	Approved as SUBMITTED
721	AWPA E22 16 SECTION 17 PARA 3	-3. AWPA 2021b. E10 Laboratory method for evaluating the decay resistance of wood-based materials against pure basidiomycete cultures: soil/block test. In: AWPA Book of Standards, AWPA, Birmingham, AL. p. 417-428. 4. Clausen, C.A., F. Green, B.M. Woodward, J.W. Evans, and R.C. DeGroot. 2000. Correlation between oxalic acid production and copper tolerance in Wolfiporia cocos. International Biodeterioration and Biodegradation 46(1): 69-76. 5. Clausen, C.A. and K.M. Jenkins. 2011. Chronicles of Fibroporia radiculosa (=Antrodia radiculosa) TFFH 294. USDA General Technical Report FPL-GTR-204. 5 pp. 6. Coggins, C.R. and D.H. Jennings. 1975. A cabinet designed for fungal growth studies and an example of its use in investigating the sensitivity of Serpula lacrymans to zinc oxychloride. International Biodeterioration Bulletin 11(2): 64-66. 7. Da Costa, E.W.B. 1979. Comparative decay resistance of Australian timbers in accelerated laboratory tests. Australian Forest Research 9: 119-135. 8. Duncan, C. G. 1958. Studies of the methodology of soil-block testing. USDA Forest Service, Report No. 2114. 126 pp.	Approved as SUBMITTED
720	AWPA E22 16 SECTION 17 PARA 2	2. ~~American Wood Preservers' Association Standards 2004.~~AWPA 2021a. A49 Standard for determination of heartwood in pines and Douglas fir. In: AWPA Book of Standards, AWPA, Birmingham, AL. p. 254-255	Approved as SUBMITTED
719	AWPA E22 16 SECTION 14.3 PARA 1	$\frac{\text{Avg. Str. of Unexposed} - \text{Avg. Str. of Exposed}}{\text{Avg. Str. of Unexposed}} \times 100$ $\text{Percent compression strength loss} = \frac{\text{Avg. Str. of Unexposed} - \text{Avg. Str. of Exposed}}{\text{Avg. Str. of Unexposed}} \times 100$	Approved as SUBMITTED
718	AWPA E22 16 SECTION 14.3	**14.3 Determination of the toxic threshold value.** In order to further define the toxic threshold value, the average compression strength values, expressed as g/mm^2, for each group of wafers is calculated. The average values for each group of wafers exposed to the fungus are then used to calculate the percent compression strength loss for each treatment level using the following formula:	Approved as SUBMITTED
717	AWPA E22 16 SECTION 14.2	**14.2 Estimation of the initial significant dose response.** A measure of the lowest level of biocide, expressed as kg/m^3 or ~~pounds/cubic foot (~~pcf~~)~~ of wood that significantly affects the fungus can be determined by comparing the compression strength of the group of unexposed wafers to that of the compression strength of each group of treated wafers exposed to the fungus. By using a one-way~~n~~ analysis of variance to compare significant differences in the strength values of all of the treatment groups, the preservative retention range at which significant decay is apparent can be established. When the difference in strength values between the unexposed group and a group at some retention level is found to be significant, then the initial significant dose response retention range lies between this retention level and the adjacent higher retention level.	Approved as SUBMITTED
716	AWPA E22 16 SECTION 11.2	**11.2** Alternatively, test wafers may be sterilized by microwave, gamma irradiation, gases, autoclaving, or immersion in boiling water for one minute (See AWPA Standard E10 for details).	Approved as SUBMITTED
715	AWPA E22 16 SECTION 11.1	**11.1** Before putting the test wafers in the culture containers, place them by retention groups into closed containers containing a filter paper soaked with 5 ml of water or wrap them in an inert material and steam at 120°C ±2°C (248°F ±3.6°F) for 20 minutes. After cooling, aseptically place the test wafers in the previously prepared culture containers~~,~~ with the cross-section face centered on and in contact with the mycelium-covered feeder strip~~, in the previously prepared culture containers~~ (see Figure 2 and Section 8.1).	Approved as SUBMITTED
714	AWPA E22 16 SECTION 10.1	**10.1** After the wafers have been impregnated and weighed to obtain absorption, space them on trays or racks and expose them under open laboratory room conditions or in a running fume hood until the solvent evaporates and the moisture content of the wafers is relatively stable.	Approved as SUBMITTED
713	AWPA E22 16 SECTION 9.8	**9.8 Fungal ~~virulence~~decay capacity.** Although the extent of decay in the untreated wafers provides some indication of the activity of the fungus, more information can be obtained by including additional groups of wafers that are exposed to the fungus for various periods of time. Consequently, it is recommended that periodically an additional set of untreated wafers—five groups of eight wafers each—be included. Individual groups are removed after 0, 3, 6, 9 and 12 days exposure to the fungus in order to determine the rate of decay. Knowing the rate of decay is useful since the decay capacity of a fungus can change with time (Richter et al., 2005), which in turn could cause changes in toxic threshold	Approved as MODIFIED

		values ~~Since the toxic threshold values are related to fungal virulence~~ (Leit~~er~~hoff et al., 1999). ~~and that it is known that the activity of the fungus can change with time (Richter et al., 2005), this information is useful in evaluating the results of a given test.~~ In general, lower ~~virulence~~ decay capacity will result in higher toxic threshold values (Leithoff et al., 1999).	
711	AWPA E22 16 SECTION 9.7	**9.7 Control wafers.** For each fungus used in a preservative test, treat eight wafers with solvent only. Put these solvent-treated control wafers through all steps of the decay test. The uniformity of strength loss caused in them by the test fungus serves as an indication of the fungitoxicity of the solvents (formulation components) or the effects of the solvents (formulation components) on the decay susceptibility of the wood being used. For common solvents used to dilute formulations, e.g., toluene, water, etc., it is not necessary to re-test them once it has been established that they do not appreciably influence the amount of decay by a given fungus. Untreated control wafers should be put through all stages of the decay test to determine the activity of the fungus cultures used.	Approved as SUBMITTED
710	AWPA E22 16 SECTION 9.5	**9.5 Treatment procedure.** Place the wafers to be treated with a given concentration of preservative in a suitable beaker and weigh them down to prevent eventual floating on the treating solution. Place the beaker in the impregnation apparatus (Fig~~.~~ure 1) directly below the outlet on top and attach a solvent resistant tube to the glass tube long enough to reach the bottom of the beaker containing the wafers when the lid is in position. Connect another solvent resistant tube to the inlet that is long enough to extend into the beaker containing the treating solution. Attach the apparatus to the vacuum or suction pump and reduce the pressure in the treating chamber to 100 mm of ~~mercury~~ Hg or less and hold this pressure for 10 to 20 minutes. Pour the prepared solution of the preservative into the external solution beaker, using sufficient solution so that the blocks will remain covered after the treatment is completed. Admit the solution into the beaker by slowly opening the stopcock V_2 in Figure 1. This addition may require five minutes or more. After sufficient solution has been added, slowly admit air into the chamber to break the vacuum. Add the air at an even rate over 5-10 minutes to avoid cavitation. Remove the beaker from the treating chamber and cover with a watch glass or plastic film to minimize loss of treating solvent by evaporation. Leave the wafers submerged in the treating solution for at least 15 minutes. A longer time may be necessary for some treating solutions to obtain maximum and uniform absorptions in the blocks. Remove the wafers from the solution individually, wipe lightly to remove surface preservative solution, and immediately weigh to the nearest 0.01 g (T_2). Record the gain in weight (T_2 - T_1) as the grams of treating solution absorbed. Calculated retentions are based on uniform distribution of the preservative in the wood. Such distribution is obtained only if the absorptions represent the total amount of liquid a block will hold. Most of the air has been evacuated from the wood before the preservative solution is introduced, leaving the cell cavities free to be filled with the solution. The amount of air space available to hold liquids has been determined for woods of different density and moisture content. The approximate maximum absorption to be expected can therefore be computed from the percentage of air space and the density of the treating solution. The greater the volume of air space (the lower the specific gravity), the greater the absorption that should be obtained if all air cavities are filled. With water-soluble preservatives, absorptions are higher than for oil-type preservatives because water not only fills the airspaces, but is also absorbed into the cell walls. When initially testing new formulations, it is desirable to treat solvent treated wafers to determine the solution retention for this particular group of wafers.	Approved as SUBMITTED
706	AWPA E22 16 SECTION 9.3	**9.3 Preparation of preservative treating solutions.** The treating solutions of the preservatives shall be prepared in appropriate concentrations so as to leave in the wafers, after removal of the solvent, a range of retentions (at least five when refining thresholds) running from below to above the anticipated threshold. The lowest retention (exclusive of blocks treated with solvent only), and preferably at least two retentions, should be low enough to permit fungus attack and consequent decay and definite strength loss. When the preservative is soluble or miscible in water the required concentrations should be made with deionized water. Preservatives that are insoluble in water, such as creosote, creosote-coal tar solutions, and solutions of pentachlorophenol or copper naphthenate in an oil carrier, shall be diluted with toluene or similar solvent. If ready-to-use formulations are being tested, the diluent should be the ready-to-use product with 0% active ingredient; some blocks should be treated with this diluent alone (diluent controls). The dilutions are necessary to provide a uniform distribution of preservative at retentions low enough to permit fungus attack and to determine threshold values for the various test fungi employed. Immediately before treating, ~~All~~ preservatives should be either completely dissolved and in solution or well suspended in an emulsion to promote ~~in such a state of solution before use that the active ingredients will be well~~ uniform distribut~~ed~~ion of the active ingredient(s) throughout the treated wood. The number of concentrations to be prepared for any given preservative depends on whether it is possible to anticipate a threshold and how close it is necessary to determine it. The preferred procedure is to run a preliminary test to locate an approximate threshold, and then to run a critical series of tests, narrowing the interval between concentrations around the level of the approximate threshold. Untreated controls and wafers treated with at least three retentions of a formulation of known efficacy should be included in all tests with new formulations. With new preservative systems, it may be desirable to test both leached and unleached wafers at each retention. See AWPA E10 (AWPA, 2021b) for the leaching procedure.	Approved as SUBMITTED
698	AWPA E22 16 SECTION 9.1 FIGURE 3 PARA 2	[2] Treating solution concentration (% a~~-~~ctive i~~-~~ngredient).	Approved as SUBMITTED
695	AWPA E22 16 SECTION 9.1 PARA 1	A group of at least eight wafers will be selected for each treatment retention along with two groups of solvent treated wafers. The solvent treated wafers serve as controls with one group being exposed to the fungus and the other group being processed without exposure to the fungus. The solvent treated group of wafers that are exposed to the fungus provides information on the activity of the fungus and an average strength loss of at least 50% must be achieved before the test can be considered to be valid. In order to make sure that the preservative treatment does not affect the compression strength, two groups of wafers can be prepared for the highest retention level, with one group being exposed to the fungus and the other processed without exposure. In each set of wafers, the assignment of individual wafers to each group will be done in accordance with the scheme outlined in Figure 3. This set consists of 72 wafers, which were numbered sequentially from 1 to 72, when they were cut from a single stick. The wafers were initially assigned sequentially to each block (1-9 for Block 1, 2-18 for Block 2, etc.) and then the numbers were randomized within each block. In this particular set of wafers, Group 1 and possibly Group 9 wafers will provide the average	Approved as SUBMITTED

		baseline compression strength for non-decayed wood that is needed to determine the amount of decay in Groups 2-7 after exposure to the fungus.	
693	AWPA E22 16 SECTION 8.1	**8.1** After the sterilized soil culture containers are thoroughly cooled, cut fungus inoculum sections from near the leading edge of mycelium (e.g. 10 mm squares) in petri dish cultures. Old cultures whose mycelium has completely covered the petri dish surface should not be used. Place several sections of inoculum in contact with an edge of the feeder strip on the soil. Close the containers with lids and incubate at the desired temperature until the feeder strips are covered by mycelium (approximately two weeks). An alternative inoculation method is to inoculate the soil culture containers as above and then incubate for a few days, until visible mycelium is observed contacting the soil, then place the test wafers on top of the feeder strips. This alternative method should not be used with preservatives that are highly leachable, such as disodium octaborate tetrahydrate (SBX). The incubation period with this alternative inoculation method should be increased by about two weeks to allow the time necessary for the fungal mycelium to spread across the feeder strips. The culture containers are now ready to receive the test wafers. When not in active use, store the test cultures in at least two test tube malt-agar (or malt-yeast extract-agar) slants per fungus in a refrigerator maintained between 2°C and 5°C (35°F and 40°F). Sterile sawdust or small pieces of sterile sapwood of either a non-durable softwood (brown-rot fungi) or a medium density hardwood (white-rot fungi) can be added to stimulate the production of cellulolytic enzymes during storage. When the slants are used to inoculate petri dishes, inoculate and incubate replacement slants until the surface of the slant is covered by mycelium prior to refrigeration. The test tube that works well is 150 by 16 mm, equipped with a plastic screw cap. It is recommended that the liner in the cap be removed before using. Depending on the type of refrigerator used, check agar slants every one to two months for loss of moisture. When the culture appears excessively dry, inoculate fresh petri dishes and incubate. Use the leading edge of the mycelium growing on the petri dishes to inoculate new slants. Only sections of the mycelium that have a typical appearance of the test fungus should be used.	Approved as SUBMITTED
689	AWPA E22 16 SECTION 7.2.1	**7.2.1 Preparation of soil culture containers.** ~~Add~~ Determine the weight of three quarters of a cup of soil, W_3. This is the amount of soil to be used in ~~to~~ each of the containers. Then add sufficient water to bring the moisture content of the soil to 130% of its water holding capacity. To provide this quantity of water, two calculations are required: (1) water to bring the moisture content of the unsterilized soil to 130% WHC, and (2) water to replace that lost during sterilization of the culture containers. To determine the amount of water needed for calculation (1), weigh the three quarters of a cup of soil, W_3. Dry this soil at 105°C ± 2°C (220°F ± 4°F) to a constant weight and reweigh, W_4. The amount of water to be added to each culture container with the specified amount of soil can be calculated as follows: $$\text{Water, g or mL} = (0.013 \times \text{Percent WHC} \times W_4) + (W_4 - W_3)$$ ~~I~~ W_3 = Weight of the stock soil W_4 = Weight of the oven-dried soil To determine the amount of water needed for calculation (2), add the required amount of water from calculation (1) to five culture containers, then add the corresponding weight of soil, W_3. Level the soil surface and place ~~directly on the soil~~ two sapwood feeder strips directly on the soil. Loosely cover the container with ~~and attach~~ a lid ~~to each container prior to~~ and cover with a piece of aluminum foil that extends over the sides of the container. Do not push the lid fully onto the container at this point. Weigh each complete container, W_5. ~~s~~Steam sterilize~~ation~~ in an autoclave for 45~~20~~ minutes at ~~a temperature between~~ 121~~–124~~°C and 103 kPa (15 psig). Allow containers to cool to room temperature, then reweigh, W_6. The amount of water in grams lost during sterilization is ($W_5 - W_6$). The average amount of water lost from the five containers needs to be added to calculation (1) above. The sum of calculations (1) and (2) is the amount of water added to each test container before sterilization. It should be noted that ~~D~~depending on the soil and test fungus, this procedure may not always give the correct amount of water to add to the soil for optimal fungal growth. Experience will determine the amount of additional water required to maintain fungal activity during the duration of the test. The procedures in Sections 7.2 and 7.2.1 may be used with both brown-rot and white-rot test fungi. Studies have shown, however, that decay by white-rot fungi is increased by either (a) substituting Whatman No. 1 filter paper for the wooden feeder strips and using water containing 0.23% malt extract to bring the soil to its water-holding capacity or (b) pushing the sterilized test blocks completely into the soil of sterile soil-block containers~~bottles~~ and placing an inoculated feeder strip on top of each one (Highley and Scheffer, 1970).	Approved as SUBMITTED
684	AWPA E22 16 SECTION 7.2 PARA 1	Water-holding capacity (WHC): $\text{Percent} = \frac{W1 - W2}{W2} \times 100$ $\text{Percent WHC} = \frac{W_1 - W_2}{W_2} \times 100$	Approved as SUBMITTED
680	AWPA E22 16 SECTION 7.2	**7.2 Soil Substrate.** A soil substrate with a water-holding capacity in the range of 20% and ~~5~~40% and a pH between 5.0 and 8.0 shall be used. After breaking up all clumps, the soil is mixed and screened through a sieve of approximately 6 to 8 mesh and stored in large covered containers. The soil should not be so wet when it is sifted that the particles again stick together. Studies indicate that soil should be obtained from forested rather than agricultural sites (Amburgey, 1978). If the pH of the soil is below 5.0, the soil should be amended with hydrated lime to ~~adjust~~ bring the pH ~~to~~ between 5.0 and 8.0. To determine soil water-holding capacity, pass a sample of air-dry soil through a sieve of	Approved as SUBMITTED

		approximately 6 to 8 mesh. Use this sieved soil to fill a small Buchner funnel ~~approximately~~ (about 50 mm in diameter~~, and~~ 25 mm in depth, and fitted with rapid-filtering paper)~~.~~ to somewhat more than capacity. Compact the soil by dropping the funnel three times through a height of 10 mm (0.4 in.) on a wooden table top. Level the soil surface by cutting off excess soil with a spatula at the top of the funnel without further compaction. Then place the filled funnel in a 400 ml beaker and retain in an upright position by wedges at the sides of the funnel. Add water to the beaker to a depth slightly above the level of the filter paper. Allow the soil to wet by capillarity so as to reduce the danger of entrapping air within the column. When the upper soil surface shows signs of wetting, add more water until the water level in the beaker is approximately at the upper surface of the funnel. Place a cover over the beaker, and allow the soil to soak for 12 hours or overnight. Then place the funnel in a suction flask which is connected to a water aspirator or vacuum pump, and apply full suction for 15 minutes. During suctioning, cover the funnel with a moist cloth on which an inverted cup is placed to prevent evaporation of water from the exposed soil surface. After 15 minutes remove the funnel from the suction flask, scrape the soil into a weighed receptacle, and weigh to obtain the wet weight, W_1. Oven-dry to a constant weight at 105°C ± 2°C (220°F ± 4°F) and reweigh soil, W_2. Water-holding capacity or WHC (g) = W_1 - W_2. Percent WHC is the water-holding capacity expressed as a percent of the ~~Determine soil moisture content (water-holding capacity) based on the~~ oven-dry weight of soil.	
676	AWPA E22 16 SECTION 7.1	**7.1 Malt agar substrate.** For both stock test tube and petri dish cultures of the test fungi, use a nutrient medium consisting of ~~two weight percent~~ 2% malt extract and 1.5% ~~weight percent~~ agar. The addition of 0.~~00~~5% ~~weight percent of~~ yeast extract to the medium will accelerate the growth of many species of decay fungi. Steam sterilize the medium in an autoclave at ~~a temperature between~~ 121~~-124~~°C and 103 kPa (15 psig) for 20 minutes ~~and~~ then allow to cool to 50°C before ~~inoculations~~pouring plates.	Approved as SUBMITTED
672	AWPA E22 16 SECTION 6.3.2.1	**6.3.2.1** *Pleurotus ostreatus* (Jacq. ex Fr.) Kummer (ATCC 32237) ~~Degradation of wood. (Applied Microbiological Biotechnology 20: 150-154. 1984.)~~	Approved as SUBMITTED
671	AWPA E22 16 SECTION 6.3.1.1	**6.3.1.1** *Trametes versicolor* (L. ex Fr.) Pilat = *Coriolus versicolor* (L.) Quel. = *Polyporus versicolor* (L. ex Fr.) (FP-101664-Sp, ATCC 42462, Madison 697). Wood decay resistance testing. Degradation of TBTO~~.~~ (Orsler and Holland, ~~International Biodeterioration Bulletin 18: 95-98.~~ 1982~~.~~).	Approved as SUBMITTED
670	AWPA E22 16 SECTION 6.2.2.9	**6.2.2.9** *Wolfiporia cocos* (F.A. Wolf) Ryv. & Gilb. (MD106R). A copper-tolerant fungus~~.~~ (Clausen et al., 2000)~~and Green, International Biodet. Biodeg. 51, 139-144, 2003~~.	Approved as SUBMITTED
668	AWPA E22 16 SECTION 6.2.2.8	**6.2.2.8** *Fibroporia radiculosa* (= *Antrodia radiculosa*) (Peck) Gilb. & Ryvarden (TFFH 294). A wide-spread copper-tolerant fungus~~.~~ (Clausen and Jenkins, ~~Chronicles of *Fibroporia radiculosa* (= *Antrodia radiculosa*) TFFH 294; USDA General Technical Report FPL-GTR-204,~~ 2011; Tang et al., 2016)~~, 5 p~~.	Approved as SUBMITTED
666	AWPA E22 16 SECTION 6.2.2.7	**6.2.2.7** *Trametes lilacino-gilva* (Berk.) Lloyd (ATCC 46156) Wood decay resistance tests~~.~~ (Da Costa, ~~Australian Forest Research 9: 119-135.~~ 1979~~.~~).	Approved as SUBMITTED
663	AWPA E22 16 SECTION 6.2.2.6	**6.2.2.6** *Antrodia xantha* (Fr.)Ryv. = *Poria xantha* (Fr.) Cooke (ATCC 11086) Tolerant to copper~~.~~ (Duncan, ~~C. G.~~ 1958). ~~Studies of the methodology of soil-block testing. USDA Forest Service, Report No. 2114. 126 pp.)~~	Approved as SUBMITTED
660	AWPA E22 16 SECTION 6.2.2.5	**6.2.2.5** *Meruliporia incrassata* (Berk. et Curt.) Murr. = *Poria incrassata* (Berk. et Curt.) Burt (Madison 563, ATCC 11236). Tolerant to copper (Green and Clausen, 2003).	Approved as SUBMITTED
659	AWPA E22 16 SECTION 6.2.2.3	**6.2.2.3** *Serpula lacr~~i~~ymans* (Wulf. et Jacq.:Fr.) Schroet. = *Merulius lacrymans* (Wulf ex Fr.) (ATCC 36335) Sensitivity to zinc oxychloride (Coggins and Jennings, ~~International Biodeterioration Bulletin 11: 64-66.~~ 1975.) Test strain for inhibitor tolerance (Liese and Schmidt, ~~. (Material und Organismen 11: 97-108.~~ 1976.)	Approved as SUBMITTED
656	AWPA E22 16 SECTION 6.1	**6.1 General considerations.** The brown-rot fungus *Gloeophyllum trabeum* (ATCC isolate 11539, Madison 617) and the white-rot fungus *Trametes versicolor* (ATCC isolate 42462) should be used in screening tests with new formulations. In addition, when screening copper-containing systems a second copper-tolerant brown-rot fungus, *Postia placenta* (ATCC 11538), should be employed. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations. Fungi used in these tests should include the brown-rots *Gloeophyllum trabeum* (ATCC 11539) and *Postia placenta* (ATCC 11538) and the white-rots *Trametes versicolor* (ATCC 42462) and *Irpex lacteus* (ATCC 11245). When copper-containing preservatives are being tested, a copper-tolerant fungus such as *Postia placenta* should be used. Additional species that may be used include those listed in Sections 6.2 and 6.3 or others whose efficacies are documented in archival literature citations. In some instances, more than one isolate of a test fungus may be desirable. The numbers following the fungus names refer to standard strains of test fungi maintained in the American Type Culture Collection (ATCC), PO Box 1549, Manassas, VA 20108 USA (www.atcc.org) or other repositories of fungal isolates. The Madison isolates are maintained as part of the culture collection at the USDA Forest Service, Forest Products Laboratory, Center for Forest Mycology Research in Madison, WI. Information about these fungi may be found in~~:~~ Duncan~~,~~ and Lombard~~.~~, 1965. A discussion of tolerance of fungi to preservatives~~,~~ and a list of fungi tolerant to various preservatives~~,~~ may be found in~~:~~ Levi, 1973. To verify that the copper-tolerant fungus employed is effective at degrading copper-treated wood, it may be desirable to concurrently run a set of wood blocks treated to the UC4A retention for the copper(II) component of a preservative system. ~~2.2 kg/m^3 (0.14 pcf) with copper(II).~~ Active copper-tolerant fungi should give weight losses of 30% or more, with equal or greater weight losses often observed with the copper-treated blocks compared to the control/untreated wood blocks (Green and Clausen, ~~International Biodet. Biodeg. 51, 145-149,~~ 2003; Clausen et al., ~~International Biodet.~~	Approved as SUBMITTED

		~~Biodeg. 46, 69-76,~~ 2000; Shupe et al. ~~International Research Group/Wood Pres. IRG/WP 10-30541~~, 2010). In addition, after four weeks of exposure, copper-tolerant fungi will cause more than 60% compression strength loss of pine sapwood blocks treated with copper(II) or water (Tang et al., 2016).	
655	AWPA E22 16 FIGURE 2	**Figure 2.** (A) Autoclavable ~~plastic~~ polypropylene culture container with feeder strips and four wafers. (B) Arrangement of the wafers on the feeder strips.	Approved as SUBMITTED
654	AWPA E22 16 SECTION 5.3.1	**5.3.1 General considerations.** Two feeder strips are needed for the four wafers in each culture container (Figure 2). The sapwood selected for feeder strips should be capable of providing a satisfactory growth of the test fungus. Coniferous sapwood, such as pine, is used with coniferous test blocks exposed to brown-rot fungi, such as *Gloeophyllum trabeum*, whereas the sapwood of a non-durable angiosperm (e.g., sweetgum) often is used with hardwood ~~test~~ wafers ~~and~~ tested against white-rot fungi such as *Trametes versicolor*. Other non-durable wood species are permissible.	Approved as SUBMITTED
653	AWPA E22 16 SECTION 5.2	**5.2 Test wafers.** Test wafers should be manufactured from sticks milled as accurately as possible to 1000 mm x 18 mm x 18 mm (longitudinal x radial x tangential). To minimize among-sample strength variation for the eight replicate wafers within one treatment set, the length of the stick used to cut wafers should be no more than 1,067 mm (42 inches). This length limit is not necessary if only the weight loss of the decayed wood samples is determined. Wafers measuring 5 mm in the longitudinal direction are then cut and numbered sequentially from the stick. Softwood (gymnosperm or conifer) wafers usually are exposed to brown-rot fungi and hardwood (angiosperm) wafers to white-rot fungi, but exceptions are permitted. If treated softwood sapwood blocks are exposed to white-rot fungi, untreated controls of both the softwood used and a medium-density hardwood (e.g., sweetgum, aspen, etc.) should be ~~used~~ tested to verify the decay capacity of the fungus isolate used; white-rot fungi tend to cause relatively low strength losses in untreated softwood wafers.	Approved as SUBMITTED
652	AWPA E22 16 SECTION 5.1.1	**5.1.1 Sapwood identification.** When the boundary between heartwood and sapwood is difficult to recognize, a color test such as AWPA A49 (AWPA, 2021a) should be used to distinguish between the two. ~~(AWPA, 2004).~~ Uneven absorptions may be caused by the presence of heartwood.	Approved as SUBMITTED
651	AWPA E22 16 SECTION 5.1	**5.1 General properties.** Sapwood of a non-durable conifer such as southern pine (*Pinus* spp.) should be used for softwood test wafers, and sapwood from a nondurable, medium-density angiosperm such as aspen (*Populus tremuloides*), ~~or~~ cottonwood (*Populus deltoides*), or sweetgum (*Liquidamber styraciflua*) should be used for hardwood test blocks. The wood should be dry, free of knots and visible concentration of resins, and showing no visible evidence of infection by mold, stain, or wood-destroying fungi, with 2 to 8 rings/18 mm.	Approved as SUBMITTED
650	AWPA E22 16 SECTION 3.8	**3.8 Culture containers.** Sixteen ounce round Microlite (or equivalent) autoclavable ~~plastic~~ polypropylene food containers (80 mm deep by 110 mm in diameter at the top and 90 mm in diameter at the bottom) with lids that have a 10 mm hole plugged with cotton, or other suitable material to prevent contamination and provide aeration.	Approved as SUBMITTED
649	AWPA E22 16 SECTION 3.6	**3.6 Impregnation apparatus.** A suitable desiccator or bell jar provided with suitable separatory funnel or auxiliary flask for holding the treating solution and Vacuum gage or manometer (Figure 1). Suitable equipment for vacuum/ pressure impregnation of the blocks may also be used. For pressure treatment the wafers are submerged in the treating solution then exposed to 20 minutes vacuum (approx. 100 mm Hg) followed by 30 minutes pressure at approximately 700 kPa.	Approved as SUBMITTED
648	AWPA E22 16 SECTION 3.5	**3.5 Vacuum pump or water suction pump.** This apparatus must reduce pressure to 100 mm of ~~mercury~~ Hg or less.	Approved as SUBMITTED
647	AWPA E22 16 SECTION 2.1	**2.1** Conditioned wafers of wood are impregnated with solutions, emulsions, or dispersions of a preservative in water or suitable organic solvent to form one or more series of retentions of the preservative in the wafers. After conditioning and sterilization, the impregnated wafers are exposed to recognized destructive species of both brown-rot and white-rot wood-destroying fungi. At least one brown-rot and one white-rot fungus are generally used in screening tests with new formulations. For screening copper-based formulations, the proponent may want to employ two brown-rot fungi, one of which is the copper-tolerant *Postia placenta*, and one copper-~~intolerant~~ susceptible brown-rot and one white-rot fungus. In general, the accuracy of the preservative efficacy determination will increase as more fungi are used. The minimum amount of preservative that significantly reduces the amount of decay by a given test fungus is defined as the toxic response retention. The minimum amount of preservative that provides complete protection of the impregnated wafers against decay by a given test fungus is defined as the threshold retention for that organism. It is recommended that a minimum of two species of both brown-rot and white-rot fungi should be used when refining the thresholds of new preservative formulations. When copper-containing preservatives are being tested, a copper-tolerant fungus such as *Postia placenta* should be used. Failure to protect is evidenced by loss of radial compression strength of treated wood wafers (Janzen and Nicholas, 2002; Nicholas and Jin, 1996; Toole, 1971). For comparison purposes, wafers treated with preservatives of known efficacies can be included in tests with new formulations.	Approved as SUBMITTED

AWPA Standard E23-16

21F-E23-P6 Reaffirm without Revision E23

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 22 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
760	AWPA E23 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED

AWPA Standard E28-16

21F-E28-P6 Revise E28

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 22 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
607	AWPA E28 16 SECTION 10 PARA 1	National Lumber Grades Authority. 1996. Standard grading rules for Canadian lumber. NLGA. Burnaby, BC pp. 207-208. Scheffer, T.C. A Climate Index for Estimating Potential of Decay in Wood Structures Above Ground. For. Prod. J. 1971. 21(10):25-31.	Approved as SUBMITTED
606	AWPA E28 16 SECTION 9.8	**9.8 Evaluation results.** Mean and standard deviation for surface appearance, checking and cupping shall be reported on a treatment group bases. Along with raw data tables providing information on each sample evaluated. Statistical analysis (examples: ANOVA, Tukey's HSD) is encouraged whenever appropriate and those results should be included in the final report.	Approved as SUBMITTED
605	AWPA E28 16 SECTION 9.3	**9.3 Climatological information.** Weather data if available should include monthly average rainfall and average temperature, average monthly minimum and maximum temperatures and average monthly solar radiation received at the site, for the duration of the test. If desired, a Scheffer climate index can be calculated and included with reporting to provide a quantitative index of above ground biodeterioration potential of the test site (Scheffer 1971). Note the time and intensity of the most recent rain event prior to evaluation.	Approved as SUBMITTED
604	AWPA E28 16 SECTION 8.1 PARA 1	• Color Change: Subjective visual assessment similar to ASTM D3274-88. Spectrophotometric methods may also be used to measure color.	Approved as SUBMITTED
603	AWPA E28 16 SECTION 8 PARA 1	Annually, or after~~After two five, and ten, years of exposure or~~ other appropriate intervals determined by the operator, ~~depending on local climate,~~ each of the twenty boards per deck will be assessed for surface appearance, checking and cupping.	Approved as SUBMITTED
602	AWPA E28 16 SECTION 7.1	**7.1 Deck construction.** The decks are to be constructed using stainless steel screws (other types of screws may be used to study corrosivity of preservative-treated or naturally durable wood). Use two fasteners at each end per Figure 1. If it is desired to evaluate twist, bow and crook on longer boards, a loose rope attachment may be substituted for the stainless steel screws. The experimental boards shall be mounted, uniformly spaced a minimum of 5 mm apart, in two rows of ten replicates, onto a sub-frame. This sub-frame shall be constructed of nominal 2 x 6 inch boards using a naturally durable species or treated wood anticipated to outlast the experimental boards and set on edge (Figure 1). Since decay may be anticipated to start in the junction between deck board and frame and preservative mobility from the frame may be an issue, the treatment should ideally be a higher loading of that used in the experimental boards. ~~Labelling of the test boards should be on the underside to protect from weathering.~~ When the wood species is predominantly heartwood, the cut ends of boards on at least one side of each treated deck shall be brush-coated with two applications of field-cut preservative compatible with pressure treatment.	Approved as SUBMITTED

601	AWPA E28 16 SECTION 6.3	**6.3 Post-treatment process.** Unless specific post-treatment conditioning is recommended by the preservative manufacturer, treated samples shall be air-dried in a well-ventilated, protected area to below the fiber saturation point of 28-30% MC (for additional discussion, see Section 7: Drying after treatment in the T1 Processing and Treatment standard). If samples are stacked for drying, supporting rods should be made of an inert material. When air-dry, sample boards are to be cut to 0.6 m in length, removing the end-seal if present. Each replicate shall be cut from a separate board and a 5 cm analytical sub-sample for determination of preservative retention and penetration shall be cut immediately adjacent to the sample. Analyze using AWPA standard methods, where appropriate, or using an analytical method supplied by the preservative manufacturer.	Approved as SUBMITTED
600	AWPA E28 16 SECTION 6.2	**6.2 Treatment process.** Preservative treatment of test material with the experimental preservative shall be carried out using a process specified by the manufacturer or a suitable process for the intended end use. This will generally be a full cell or modified full cell pressure process, simulating commercial practice (see Section 2: Treatments in T1 Processing and Treatment standard for further details). For products under development, it is desirable to test more than one loading. Ideally, a minimum of three levels bracketing the anticipated effective loading should be included. The weight uptake (gauge retention) of the treated boards shall be determined by weighing each board to the nearest 10 g before and after treatment. Preservative retentions should be expressed as kilograms active ingredient per cubic meter of wood.	Approved as SUBMITTED
599	AWPA E28 16 SECTION 6.1	**6.1 Preservative.** The preservative and/or additives under evaluation shall be accompanied by an analytical certificate and a ~~material~~ safety data sheet (~~M~~SDS), and shall be stored and handled in accordance with recommendations of the manufacturer.	Approved as SUBMITTED
598	AWPA E28 16 SECTION 5.4	**5.4 Labeling of samples.** Unique identification numbers, written in permanent ink, shall be assigned to the lumber and cut samples, and be retained throughout all steps of preparation. Once the final test samples are selected, permanent identification labels shall be affixed to each board in the decking module. Labelling of the test boards should be on the underside to protect from weathering. If using preservative systems with suspected corrosion issues, stainless steel or at least galvanized steel tags and fasteners are recommended in direct wood contact.	Approved as SUBMITTED
597	AWPA E28 16 SECTION 5.2	**5.2 Selection of wood.** The wood used should be free of mold, stain, decay or insect attack. Lumber graded at least #2 and better should be used and it should be without bark inclusions, large knots, excessive cross grain, resin pockets or other obvious defects. It is also advisable that flat sawn boards should be used when evaluating the performance of a chemical treatment imparted on the wood. The test material shall be nominal 2 x 6 inch or 5/4 x 6 inch in cross-section and be dried to a moisture content typically used commercially for treated wood. Parent boards should also be of adequate length to allow end matching of samples across treatment groups. Note, 25 mm thick (5/4 inch nominal) boards may dry faster after wetting events and may therefore give different results in terms of checking and cupping.	Approved as SUBMITTED
596	AWPA E28 16 SECTION 4.3	**4.3** Materials to construct two reference decks. ~~one made of~~ CCA treated southern pine and ~~the other of~~ vertical grain heartwood redwood are recommended references.	Approved as SUBMITTED
595	AWPA E28 16 SECTION 4.1	**4.1** Appropriate field-cut preservative compatible with pressure treatment (if applicable) ~~(for western/heartwood species only)~~	Approved as SUBMITTED
594	AWPA E28 16 SECTION 3.2	**3.2** Facilities for preservative treatment of wood boards by pressure processes (if applicable).	Approved as SUBMITTED
593	AWPA E28 16 SECTION 2 PARA 1	The test consists of decking modules placed outdoors, above ground~~out of contact with the ground~~, and designed to simulate exterior residential decking exposed to poorly ventilated environmental conditions. To properly assess a treatment, modules treated with the preservatives without additives and decks constructed using reference materials must be included. Non-destructive inspections of the boards are performed periodically. The boards on the test decks should be at least~~are~~ 60 cm long. If it is desired to evaluate twist, bow and crook, a larger deck module and longer boards may be used.	Approved as SUBMITTED
592	AWPA E28 16 SECTION 1.2	**1.2** The test method is suitable for evaluating the effects of, surface profiling, different wood protection systems~~preservatives~~, and additives such as dimensional stabilizers~~ation~~ and UV protectant treatments on commercially treated species. In addition, the test method may also be used to compare different grain orientations and newly introduced wood species.	Approved as SUBMITTED
591	AWPA E28 16 SECTION 1.1	**1.1** This standard specifies a method for testing the serviceability of decking boards exposed outdoors, above ground~~out of contact with the ground~~, in a decking module closely resembling poorly ventilated decking in residential use. Since the experimental design is virtually identical, it may conveniently be run at the same time as AWPA E25-~~08~~ Standard Field Test for Evaluation of Wood Preservatives to be Used Above-Ground (UC3B) Decking Test ~~Method~~. This test method is intended to be a commodity test.	Approved as SUBMITTED

AWPA Standard E30-16

21F-E30-P6 Revise E30

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 23 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
645	AWPA E30 16 SECTION 20 PARA 1	This test method uses biological organisms and is, therefore, dependent on the physiological actions of these organisms. Care should be taken to avoid inferring that results are quantitatively ~~repeatable or~~ reproducible.	Approved as SUBMITTED
644	AWPA E30 16 SECTION 19.4.2	**19.4.2** Mean mass loss~~rating~~, standard deviations or standard errors of each test~~treatment~~ group ~~at each sampling interval~~	Approved as SUBMITTED
643	AWPA E30 16 SECTION 19.4.1	**19.4.1** Date of installation and duration of test~~, inspection intervals and date of inspections~~	Approved as SUBMITTED
642	AWPA E30 16 SECTION 19.3.1	**19.3.1** Conditions (temperature/RH) and duration of test	Approved as SUBMITTED
641	AWPA E30 16 SECTION 19.2.3	**19.2.3** Preparation and dimensions of test specimens including conditioning/oven drying conditions and method of sterilization	Approved as SUBMITTED
640	AWPA E30 16 SECTION 19.2.1	**19.2.1** Species and details of origin. For products: note the essential composition of the product as well as the geographic distribution of the samples and the number of trees/boards sampled per locality (specify geographic source of timber). For trees: note the diameters, growth rates, tree ages and specific gravity	Approved as SUBMITTED
639	AWPA E30 16 SECTION 18.1 PARA 1	As an alternative to using percent weight loss as a performance indicator of test materials, a ratio of performance relative to the non-durable reference material (see Section 9.1 for descriptions of reference material) may be used to characterize durability. This is similar to methods described in the European standard EN350-1~~, section~~ and is calculated as such: Average weight (mass) loss of naturally durable test materials/Average weight (mass) loss of reference material (non-durable controls) = relative durability ratio. Using this method serves to normalize durability data providing more flexibility in the test methodology for inter-laboratory comparisons.	Approved as SUBMITTED
638	AWPA E30 16 SECTION 18 PARA 1	Percent weight loss provides a measure of the relative decay susceptibility or, inversely, decay resistance of the wood material. Weight losses for the materials may range from 0 to 70%. If the wood is highly decay resistant, slight gains in weight may occur as the wood absorbs water soluble matter from the soil ~~salts translocated from the soil by the fungus~~. There may also be slight losses in weight (<3%) with no apparent visible evidence of decay. Such results are normal and do not affect the validity of the results. Decay resistance can be evaluated on the basis of either percent weight loss or residual weight. Decay resistance can also be categorized in more general terms for comparative purposes based upon the degree of weight loss experienced. These categories can be described as follows:	Approved as SUBMITTED
637	AWPA E30 16 SECTION 16 PARA 1	At the end of the test, the blocks should be carefully scraped clean of any soil or adhering mycelium before being placed on the screen trays to air dry for several days before being reconditioned at the temperature and RH conditions originally employed for this purpose. Weighing the wet blocks can be useful for determining final moisture content to confirm that the wood was wet enough for decay to occur. The blocks must first dry under relative humidity conditions at least 20% below the relative humidity of the conditioning room (see E10 Section 16.1). ~~B~~Blocks that are badly decayed should be placed in small containers and labeled so that small bits of wood are not lost through handling. Once the blocks have reached constant weight, each block should be weighed (nearest 0.01 g).	Approved as SUBMITTED
636	AWPA E30 16 SECTION 15 PARA 1	The non-decay resistant reference blocks should be exposed in the same manner and a sufficient number should be started to allow for removals over the course of the test. After 8 weeks of exposure, 2 blocks should be removed, scraped clean of adhering mycelium, conditioned at 60~~oven dried (103~~°C~~)~~ and weighed to determine mass loss on the basis of differences between initial and final oven dry weight. Additional blocks should be removed at weekly intervals until weight loss reaches 50% or the 16-week time period is reached. A minimum of 6 blocks should be removed, conditioned and weighed at the end of the test to confirm that conditions were suitable for aggressive fungal decay. If weight losses on the reference blocks fail to reach 50%, then the severity of test or the selection of reference wood must be considered to be inadequate.	Approved as SUBMITTED
635	AWPA E30 16 SECTION 13.2	**13.2 Sterilization of test blocks:** Sterilization by irradiation (2.5 M~~m~~rad of ionizing radiation if radioisotopes are used or 2.5 to 5.0 M~~m~~rad if electron accelerators are employed) is the preferred method for sterilization since it minimizes the risk of altering durability through exposure to elevated temperature through destruction or redistribution of extractives. Blocks can be sealed in polyethylene envelopes or other impermeable packages so that blocks can be safely stored between irradiation and introduction to the decay chambers. Other s~~S~~terilization methods such as steaming, microwaves, autoclaving for 20 minutes at 121ºC or fumigation are acceptable but	Approved as SUBMITTED

		volatiles in the blocks may be altered. Steaming is typically performed by sealing the blocks in plastic containers and heating for 20 minutes at 100°C to~~; sealing the blocks in plastic containers can~~ help reduce volatile losses.	
634	AWPA E30 16 SECTION 13.1	**13.1 Inoculation of test bottles:** Approximately 10 mm squares or discs of a given test fungus are placed on the edge of the feeder strip in each decay chamber. The bottles are loosely capped and incubated at 28°C and 70% RH~~relative humidity~~ for 3 weeks or until the fungal mycelium has covered the feeder strip. The bottles are then ready to receive the test blocks.	Approved as SUBMITTED
633	AWPA E30 16 SECTION 13 PARA 1	Stock cultures of the test fungi are typically grown on the appropriate agar-based media prior to use and similarly sized discs or squares are cut from the actively growing edge of each test fungus.	Approved as SUBMITTED
632	AWPA E30 16 SECTION 12.2	**12.2 Sterilization:** The bottles are loosely capped and~~ steam~~ sterilized in an autoclave for 45~~30~~ minutes at 121°C. The bottles are allowed to slowly cool before fungal inoculation.	Approved as SUBMITTED
631	AWPA E30 16 SECTION 12.1	**12.1 Bottle preparation:** A sufficient amount of water is added to the bottles to produce a final soil moisture content of 130% of the water holding capacity as determined using procedures described in AWPA Standard E10. The soil is then slowly added to approximately one third of the bottle height and the feeder strip(s) is added. Adding the water first reduces splashing of soil on the sides of the glass chamber. Alternatively, the soil can be wetted before addition to the culture bottles when it is found that preparing the soil as the method describes produces soil too wet for ideal fungal growth. A commercial horticulture loam with a water holding capacity of approximately 80% is used. The soil moisture content is adjusted to the point where the soil just clumps when squeezed manually. The soil is sieved as previously described (see E10 Section 7.2) and then water is added to the proper consistency. The soil is then added to loosely fill each jar to about 65% capacity. A flat tamping tool is used to gently tamp down to level the surface of the soil. After tamping the soil should half-fill each jar. The soil should not be compacted down as aerated soil allows for proper fungal growth.	Approved as SUBMITTED
630	AWPA E30 16 SECTION 11 PARA 1	Place test blocks on screened trays and bring them to equilibrium weight at 60 ±1ºC in the conditioning chamber~~room~~ before weighing (nearest 0.01 g). If weighing is performed outside the chamber, place samples in a closed container to limit the potential for moisture absorption. This weight (W_1) is the basis for determining weight loss caused by fungal exposure. If an alternative conditioning temperature is selected, the same temperature must be used before and after fungal exposure.	Approved as SUBMITTED
629	AWPA E30 16 SECTION 10 PARA 1	Wood or paper f~~F~~eeder strips are used to help establish the test fungi prior to introduction of the test blocks.	Approved as SUBMITTED
628	AWPA E30 16 SECTION 9.1	**9.1 Reference blocks:** Pine sapwood (*Pinus spp.*) blocks (16 per fungus: 32 total) or some other softwood of comparably low decay resistance should be prepared if a softwood species or product is being tested. Potential alternative softwood species~~Other materials~~ include sapwoods of true firs~~,~~ (*Abies spp.*), spruce (*Picea spp.*) or hemlock (*Tsuga spp.*). If broad leaf species (hardwoods) are evaluated, 48 sapwood blocks (16 per test fungus) of sweetgum (*Liquidambar spp.*), aspen (*Populus spp.*) or other low durability species shall be prepared. Potential alternative hardwood species include beech (*Fagus spp.*), birch (*Betula spp.*), or maple (*Acer spp.*). All blocks shall have the same dimensions as the test blocks and shall be conditioned at the same temperature as the test blocks ~~oven dried~~ and weighed prior to exposure to the test fungi in the same manner and timing as used for the test blocks. The progress of decay on these reference blocks shall be used as the guide for terminating the experiment for the test blocks. W~~The w~~eight losses of reference ~~these~~ blocks at the end of the test shall serve to~~as points of reference,~~ establish~~ing~~ that conditions were suitable for aggressive fungal attack.	Approved as SUBMITTED
627	AWPA E30 16 SECTION 8.1	**8.1 Cutting:** Samples shall be sawn into blocks (25 by 25 by 9 mm with the 9 mm in the grain direction). Blocks shall have a normal growth rate and a density consistent with previous reports for the species. Samples should~~,~~ be free of knots~~,~~; abnormal resins~~;~~ or gums, and have no evidence of fungal attack. Blocks should be labeled with their source as soon after cutting as possible using a steel die, pencil or an indelible marker.	Approved as SUBMITTED
626	AWPA E30 16 SECTION 7.3 PARA 1	Sample boards should be randomly selected from different units to improve the likelihood that each board originated from a different tree. Sampling should ensure that materials are collected such that the principal areas where the species grows are represented or the final report should delineate the approximate geographic area represented. The minimum number of boards of any species should be 40.	Approved as SUBMITTED
625	AWPA E30 16 SECTION 7.2.1	**7.2.1 Heartwood durability** can vary from the butt upwards and from the pith to the sapwood~~by position in the trunk~~. It is important that the approximate sampling position ~~of sampling~~ be uniform. The outer heartwood of the lower trunk is typically most decay resistant. Where there is no visible difference between sapwood and heartwood, the sampling should extend across the entire radius. The presence of sapwood may be apparent in the results and these samples can be segregated accordingly. It is sometimes possible to distinguish sapwood by applying water to the cross section and observing where it is most rapidly absorbed; this is more likely to be sapwood. For some species with documented colorimetric reactions, heartwood indicator solutions may be used.	Approved as SUBMITTED
624	AWPA E30 16 SECTION 7.2	**7.2 Samples from trees:** Only heartwood shall be used since no sapwood is durable where conditions are favorable for decay. For general appraisal of a timber species, select~~ed samples of wood form~~ the lowermost 4.5 m of the trunk and, in so far as possible, from the outer third of the heartwood core. Sample~~s~~ should also be obtained from both sides of the trunk. The wood should be representative of the quality of the species in respect to defects, rate of growth and density. Enough trees and areas should be sampled to reveal any significant within species variations in decay resistance. The sample should be representative of the growing range. The minimum number for a standard evaluation should be 20. Tree diameters, specific gravity and age of the sample trees, if determinable, should be reported.	Approved as SUBMITTED
623	AWPA E30 16 SECTION 7.1	**7.1 Wood species** shall be identified using available literature or sourced to the original tree containing foliage. This is especially important where several species are sold under a common name.	Approved as SUBMITTED
622	AWPA E30 16 SECTION 6.2.3	**6.2.2~~3~~** An oven dry weight of 75~~90~~ g or greater for 10~~2~~0 cm^3 of soil.	Approved as SUBMITTED

621	AWPA E30 16 SECTION 6.2.2	**6.2.**1~~2~~ pH between 5.0 and 8.0	Approved as SUBMITTED
620	AWPA E30 16 SECTION 6.2.1	~~**6.2.1** Water holding capacity of 20 to 40%~~	Approved as SUBMITTED
619	AWPA E30 16 SECTION 6.1	**6.1 Malt extract agar:** The nutrient medium which shall be used for stock test tube or petri dish cultures of the test fungi shall contain~~be~~ 1.5% malt extract and 1.5% agar by weight. Alternative media may be used provided they do not negatively affect the decay capacity of the fungus. Media shall be sterilized by autoclaving~~steaming~~ at 103 kPa for 20 minutes. Volumes greater than 1L may require additional sterilization time.	Approved as SUBMITTED
618	AWPA E30 16 SECTION 5.2	**5.2 For testing Hardwoods:** *Gloeophyllum trabeum* (Per ex Fr.)(Isolate ATCC 11539) or *Rhodonia*~~*Postia placenta*~~ (Fr) Niemelá, Larss. & Schigel~~M. Lars et Lombard~~ (Isolate ATCC 11538) and *Trametes versicolor* (L ex Fr.) Pilát (Isolate 42462)	Approved as SUBMITTED
617	AWPA E30 16 SECTION 5.1	**5.1 For testing Softwoods:** *Gloeophyllum trabeum* (Per ex Fr.)(Isolate ATCC 11539) and *Rhodonia*~~*Postia placenta*~~ (Fr) Niemelá, Larss, & Schigel~~M. Lars et Lombard~~ (Isolate ATCC 11538)	Approved as SUBMITTED
616	AWPA E30 16 SECTION 4.7	**4.7 Other equipment:** Conventional equipment and glassware for culturing and aseptic handling of fungi and test material such as laminar flow hoods, drying ovens, autoclaves, refrigerators, nutrient media, transfer needles, forceps, petri dishes and test tubes.	Approved as SUBMITTED
615	AWPA E30 16 SECTION 4.6	**4.6 Sterilizer:** Either a system capable of delivering 2.5 M~~m~~rad of ionizing radiation (preferred) or an autoclave capable of heating the wood to a minimum of 121~~00~~°C for 20 minutes as per Section 13.2.	Approved as SUBMITTED
614	AWPA E30 16 SECTION 4.5	**4.5 Culture bottles:** Screw cap cylindrical or square 225 or 450 ml bottles with a minimum mouth diameter of 32 mm. The caps should be free of liners that might support microbial growth. Alternatively, lids equipped with a 25 mm diameter autoclavable filter membrane with a maximum pore size of 0.2 µm can help reduce the risk of mite infestation. A 1 mm diameter hole is drilled in the lid center, the inner surface around this hole is sanded and the filter is glued inside using either high temperature silicon or a slow curing epoxy.	Approved as SUBMITTED
613	AWPA E30 16 SECTION 4.4	**4.4 Conditioning trays:** Trays for conditioning samples prior to and after exposure~~condition~~ should be made from screening that permits free air flow around all sides of each block ~~during initial drying and final conditioning of the test blocks~~.	Approved as SUBMITTED
612	AWPA E30 16 SECTION 4.2	**4.2 Incubation chamber:** Materials shall be incubated at a temperature between 25° and 30°C and a relative humidity (RH) between 80 and 90%. Temperature and RH should not vary by more than +/- 3°C and 10%, respectively. Altered conditions may be more suitable if different fungi are evaluated.	Approved as SUBMITTED
611	AWPA E30 16 SECTION 4.1	**4.1 Conditioning chamber:** Materials shall be conditioned to equilibrium at 60 ± 1ºC. Lower temperatures may be used for materials containing volatile extractives. ~~at a selected temperature between 20° and 30°C and a relative humidity between 25 and 75%. The selected temperature shall not vary more than /- 1°C nor the relative humidity vary by more than /- 2% over the exposure period. It may be useful to employ the same conditions for both the conditioning and incubation chambers.~~	Approved as SUBMITTED
610	AWPA E30 16 SECTION 3 PARA 1	The test method is useful for determining the decay resistance of wood of various species. It is an initial means for estimating the ability of a wood species to resist severe fungal~~microbial~~ attack and thereby qualify the performance level of a wood species. The test method is not intended to provide quantifiably reproducible values. It is a qualitative test method designed to provide reproducible means for establishing relative decay resistance between various wood species.	Approved as SUBMITTED
609	AWPA E30 16 SECTION 2 PARA 1	Sterilized s~~S~~mall wood blocks of the timber species of interest are exposed to pure cultures of selected decay fungi in decay chambers. ~~Decay fungi are grown on wood feeder strips of decay susceptible wood or on filter paper placed on the substrate in the chamber. Test blocks are weighed before and after exposure and any loss in weight is the measure of decay susceptibility or resistance of the wood.~~ The test is terminated when non-durable wood reference blocks experience a weight loss of 50% or greater.	Approved as SUBMITTED
608	AWPA E30 16 SECTION 1 PARA 1	This method covers the evaluation of natural decay resistance of wood~~, but may also be used to evaluate the resistance of other wood-based materials to degradation by wood-destroying fungi~~. AWPA-E10 shall be used for wood products treated with a wood preservative or modified through other means. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.	Approved as SUBMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-1

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	17
Number of Eligible Voters:	17
Number of Eligible Ballots Received:	14
Ballot Return Percentage:	82.4%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard U1 Section 3-21

21F-U13-T1 Revise U1s3

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 14 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status

828 — AWPA U1 SECTION 3 21 SECTION TABLE 3 1 GUIDE TO COMMODITY SPECIFICATIONS FOR TREATED WOOD END USES ARRANGED BY USE [Table Data]3 — Approved as SUBMITTED

Commodity	Use	Exposure	Use Category	Commodity Specification: Section	Commodity Specification: Special Reqs.
Lumber/Timbers, cont.	Permanent Wood Foundation	Ground Contact and Above Ground	4B	A	4.2
	Highway Construction, Building Structural Support	Ground Contact or Fresh Water		A	4.3
	Crib Walls, Retaining Walls, Important Structural, Greenhouse	Ground Contact or Fresh Water		A	
	Marine Out of Water and Above Ground	Salt Water Splash		A	G-2.9
	Marine Out of Water and Ground Contact	Salt Water Splash	4C	A	G-2.9
	Aquaculture	Fresh Water		A	

	Marine, Aqua/Mariculture, Highway, Boats	Brackish or Salt Water	5A-5B-5C	G	6.1-6.4
	Fire Retardant, Fire Protection	Interior	FA	H	
	Fire Retardant, Fire Protection	Exterior	FB	H	
Millwork, Trim	Above Ground, Interior	Insect Only	1	A	4.1
	Above Ground, Interior	Above Ground, Damp	2	A	4.1
	Painted/Coated	Above Ground, Exterior	3A	A	4.1
	Unpainted	Above Ground, Exterior	3B	A	
Oriented Strand Board (OSB)	Sheathing, Above Ground, Interior	Insect Only	1	J	
	Sheathing, Above Ground, Interior	Damp	2	J	
	Sheathing, Above Ground, Protected Exterior	Protected	3A	J	
Parallel Strand Lumber (PSL)	See Composite Lumber				
Pergola	Pergola	Ground Contact or Fresh Water	4A	A	
Piles, Foundation	Building Construction, Completely Embedded in Soil	Ground Contact	4C	E	
Piles, Round	Highway Construction	Ground Contact or Fresh Water	4C	E	
	Marine/Highway Construction	Brackish or Salt Water	5A-5B-5C	G	6.1-6.4
Piles, Sawn	Residential/Business Structural Support	Ground Contact or Fresh Water	4B	A	
	Residential/Business Structural Support, Critical	Ground Contact or Fresh Water	4C	A	
Plywood	Above Ground, Interior, Subfloor	Above Ground, Damp	2	F	
	General, Including Agriculture/Farms	Above Ground, Exterior	3B	F	
	Food Harvest-Storage-Contact	Above Ground, Exterior		F	
	Roof Decking, Flooring/Subflooring	Above Ground, Exterior		F	2.6
	General: Including Edging, Agriculture, Mariculture, Boats,		4A	F	
	Furniture, Gazebos,	Ground Contact or Fresh Water			
	Compost/Plant/Mushroom Boxes, Flumes				

				Brine Storage, Highway Construction Materials	Ground Contact or Fresh Water		F	B-4.1
				Wet Industrial Processing Areas	Ground Contact or Fresh Water		F	
				Fire Escapes, Exterior Exposed	Above Ground and Ground Contact		F	
				Marine	Salt Water Splash	4B	F	
				Permanent Wood Foundation	Ground Contact and Above Ground		~~A~~F	~~4.2~~4.1
				Marine/Highway Construction, Boat Building	Brackish or Salt Water	5A-5B-5C	G	
				Fire Retardant, Fire Protection	Interior	FA	H	
				Fire Retardant, Fire Protection	Exterior	FB	H	

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-2

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	56
Number of Eligible Voters:	46
Number of Eligible Ballots Received:	34
Ballot Return Percentage:	73.9%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard U1 COMM SPEC A-21

21F-U1A-T2 Revise U1csA

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 34 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>826</td><td>AWPA U1 COMM SPEC A 21 SECTION 4.2.5</td><td>4.2.5 Marking. Each piece of lumber ~~and plywood~~ treated as Permanent Wood Foundation material under AWPA Standards shall be marked by a qualified inspection agency to identify the preservative, retention, Use Category (UC) level, year of treatment, and the producer. The material also shall be marked as Permanent Wood Foundation and have the notation ADAT or KDAT to show the lumber ~~or plywood~~ has been dried after treatment.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>825</td><td>AWPA U1 COMM SPEC A 21 PARA 32</td><td>4.2.4 Grade. Lumber used as Permanent Wood Foundation material shall be manufactured and graded in accordance with industry published grading rules for each specific species except that after treatment, raised grain, checking, size variations and incising marks are permitted. ~~Plywood shall conform to U.S. Product Standard PS 1 or PS 2 with exterior glue and softwood plies only. Plywood shall bear the mark of or have a certificate of inspection issued by a qualified plywood inspection agency.~~</td><td>Approved as SUBMITTED</td></tr>
<tr><td>824</td><td>AWPA U1 COMM SPEC A 21 SECTION 4.2.3</td><td>4.2.3 Drying After Treatment. Drying of Permanent Wood Foundation lumber after treatment is required to assure dimensional stability and structural strength. Moisture content shall not exceed 19% in each piece of lumber. ~~The moisture content in each piece of permanent wood foundation plywood shall not exceed 18%.~~ The moisture content limit for PWF lumber ~~and plywood~~ may not be waived.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>823</td><td>AWPA U1 COMM SPEC A 21 SECTION 4.2.1 [Table Data]</td><td>
<table>
<tr><th>Species</th><th>Preservatives</th></tr>
<tr><td>Southern Pine</td><td>ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA, MCA, MCA-C</td></tr>
<tr><td>Red Pine</td><td>ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA, MCA</td></tr>
<tr><td>Ponderosa Pine</td><td>ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA, MCA</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
</table>

			Scots Pine-Ger, Scots Pine-Swe, Patula Pine: ACQ-D, CA-B, CA-C, MCA Coastal Douglas-fir: ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C Western Hemlock, Hem Fir: ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA, MCA, MCA-C Alpine Fir: CCA ~~Plywood~~: ~~ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA, MCA, MCA-C~~	
822	AWPA U1 COMM SPEC A 21 SECTION 4.2	**4.2 Lumber ~~and Plywood~~ for Permanent Wood Foundation (PWF) UC4B Retentions.** Permanent wood foundations are constructed under the jurisdiction of building codes and may require code approved quality marks. Use of stainless steel fasteners is recommended for PWF.		Approved as SUBMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-4

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	39
Number of Eligible Voters:	39
Number of Eligible Ballots Received:	31
Ballot Return Percentage:	79.5%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard T1 Section D-21

21f-T1D-T4 Revise T1sD

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 30 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
842	AWPA T1 SECTION D 21 SECTION 8 PARA 5	**Deep Incised, Radial Drilled, or Through-Bored Poles:** Penetration in deep incised, radial drilled, or through-bored Douglas-fir poles and other ground line enhanced species shall be determined by removing at least one additional increment core from an area at least 300 mm (1 ft) inward from the edge of the affected zone. Increment cores shall be taken from locations that are in the approximate center of the boring pattern. Penetration of through-bored poles shall be measured to the pith center for poles less than 560 mm (22 in) in diameter at the sampling point, or a maximum of 280 mm (11 in) on poles greater than 560 mm (22 in) in diameter.	Approved as SUBMITTED
841	AWPA T1 SECTION D 21 SECTION 8 PARA 4	**Group B Poles:** A borer core shall be taken at a point in a plane approximately 300 mm to 600 mm (1 to 2 ft.) below the brand (300 mm (1 ft.) below the ground line in Western Red Cedar) from each pole less than 15 m (50 ft.) in length and two borer cores approximately 90 degrees apart shall be taken from each pole 15 m (50 ft.) and longer (except Western Red Cedar). Only those poles meeting the penetration requirements will be accepted. Wherever depth "or" percent of sapwood is specified, it shall be interpreted to mean whichever is less. Wherever depth "and" percent of sapwood penetration is specified, it shall be interpreted to mean whichever is greater. Penetration into heartwood is not required for charges of material which require either a minimum sapwood penetration and/or percent of the sapwood penetration.	Approved as SUBMITTED

AWPA Standard U1 COMM SPEC B-21

21F-U1B-T4 Revise U1csB

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 29 Yes, 0 No, and 2 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status

917 — AWPA U1 COMM SPEC B 21 SECTION 3.1.2 [Table Data]

Preservative	Pines						Douglas-Fir	Western Hemlock	Western Larch
	Southern	Ponderosa	Jack	Lodgepole	Red	Radiata			
Use Category 4A – pcf									
CR (a)	8.0	8.0	8.0	6.0	8.0	#	8.0	8.0	8.0
CR-S (a)	8.0	8.0	8.0	6.0	8.0	#	#	#	#
CR-PS (a)	8.0	8.0	8.0	7.0	8.0	#	8.0	8.0	8.0
CuN	0.055	0.055	#	0.055	#0.055	#	0.055	#	#
DCOI-A (c)	0.13	#0.13	#	#	0.13	#	0.13	#	#
PCP-A & PCP-C (b)	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40
ACQ-B	0.40	0.40	#	#	#	#	0.40	0.40	0.40
ACQ-C	0.40	#	#	0.40	0.40	0.40	#	#	#
ACQ-D	0.40	#	#	#	#	#	#	#	#
ACZA	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40
CA-B	0.21	#	#	0.21	0.21	#	#	#	#
CA-C	0.15	#	#	0.15	0.15	#	#	#	#
CCA	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
CuN-W	0.11	#	#	#	#	#	#	#	#
KDS	0.47	#	#	#	#	0.47	0.47	0.47	#
KDS-B	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	#
MCA	0.15	#	#	#	#	#	#	#	#
MCA-C	0.15	#	#	#	#	0.15	#	#	#
Use Category 4B -- pcf									
CR (a)	10.0	10.0	10.0	10.0	100.	#	10.0	10.0	10.0
CR-S (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0
CR-PS (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0
CuN	0.069	0.069	#	0.069	#0.069	#	0.069	#	#
DCOI-A (c)	0.17	#0.17	#	#	0.17	#	0.17	#	#
PCP-A & PCP-C (b)	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50
ACQ-B	0.50	0.50	#	#	#	#	0.50	0.50	0.50
ACQ-C	0.50	#	#	0.50	0.50	0.50	#	#	#
ACQ-D	0.50	#	#	#	#	#	#	#	#
ACZA	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50
CA-B	0.25	#	#	0.25	0.25	#	#	#	#
CA-C	0.25	#	#	0.25	0.25	#	#	#	#
CCA	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MCA	0.25	#	#	#	#	#	#	#	#

Committee Status: Approved as SUBMITTED

916 AWPA U1 COMM SPEC B 21 SECTION 3.1.1 [Table Data]

Preservative	Pines						Douglas-Fir	Western Hemlock	Western Larch
	Southern	Ponderosa	Jack	Lodgepole	Red	Radiata			
Use Category 4A –kg/m³									
CR (a)	128	128	128	96	128	#	128	128	128
CR-S (a)	128	128	128	96	128	#	#	#	#
CR-PS (a)	128	128	128	112	128	#	128	128	128
CuN	0.88	0.88	#	0.88	#0.88	#	0.88	#	#
DCOI-A (c)	2.1	#2.1	#	#	2.1	#	2.1	#	#
PCP-A & PCP-C (b)	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4
ACQ-B	6.4	6.4	#	#	#	#	6.4	6.4	6.4
ACQ-C	6.4	#	#	6.4	6.4	6.4	#	#	#
ACQ-D	6.4	#	#	#	#	#	#	#	#
ACZA	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4
CA-B	3.3	#	#	3.3	3.3	#	#	#	#
CA-C	2.4	#	#	2.4	2.4	#	#	#	#
CCA	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
CuN-W	1.76	#	#	#	#	#	#	#	#
KDS	#	7.5	7.5	7.5	7.5	#	#	#	#
KDS-B	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	#
MCA	2.4	#	#	#	#	#	#	#	#
MCA-C	2.4	#	#	#	#	2.4	#	#	#
Use Category 4B – kg/m³									
CR (a)	160	160	160	160	160	#	160	160	160
CR-S (a)	160	160	160	160	160	#	160	160	160
CR-PS (a)	160	160	160	160	160	#	160	160	160
CuN	1.1	1.1	#	1.1	#1.1	#	1.1	#	#
DCOI-A (c)	2.7	#2.7	#	#	2.7	#	2.7	#	#
PCP-A & PCP-C (b)	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
ACQ-B	8.0	8.0	#	#	#	#	8.0	8.0	8.0
ACQ-C	8.0	#	#	8.0	8.0	8.0	#	#	#
ACQ-D	8.0	#	#	#	#	#	#	#	#
ACZA	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
CA-B	4.0	#	#	4.0	4.0	#	#	#	#
CA-C	4.0	#	#	4.0	4.0	#	#	#	#
CCA	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
MCA	4.0	#	#	#	#	#	#	#	#

Approved as SUBMITTED

906 AWPA U1 COMM SPEC B 21 SECTION 3.1.2 [Table Data]

Preservative	Pines						Douglas-Fir	Western Hemlock	Western Larch
	Southern	Ponderosa	Jack	Lodgepole	Red	Radiata			
Use Category 4A – pcf									
CR (a)	8.0	8.0	8.0	6.0	8.0	#	8.0	8.0	8.0
CR-S (a)	8.0	8.0	8.0	6.0	8.0	#	#	#	#
CR-PS (a)	8.0	8.0	8.0	7.0	8.0	#	8.0	8.0	8.0
CuN	0.055	0.055	#	0.055	#0.055	#	0.055	#	#
DCOI-A (c)	0.13	#	#	#	0.13	#	0.13	#	#
PCP-A & PCP-C (b)	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40
ACQ-B	0.40	0.40	#	#	#	#	0.40	0.40	0.40

Approved as SUBMITTED

			ACQ-C	0.40	#	#	0.40	0.40	0.40	#	#	#			
			ACQ-D	0.40	#	#	#	#	#	#	#	#			
			ACZA	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40			
			CA-B	0.21	#	#	0.21	0.21	#	#	#	#			
			CA-C	0.15	#	#	0.15	0.15	#	#	#	#			
			CCA	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40			
			CuN-W	0.11	#	#	#	#	#	#	#	#			
			KDS	0.47	#	#	#	#	0.47	0.47	0.47	#			
			KDS-B	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	#			
			MCA	0.15	#	#	#	#	#	#	#	#			
			MCA-C	0.15	#	#	#	#	0.15	#	#	#			
			Use Category 4B -- pcf												
			CR (a)	10.0	10.0	10.0	10.0	100.	#	10.0	10.0	10.0			
			CR-S (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0			
			CR-PS (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0			
			CuN	0.069	0.069	#	0.069	#0.069	#	0.069	#	#			
			DCOI-A (c)	0.17	#	#	#	0.17	#	0.17	#	#			
			PCP-A & PCP-C (b)	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50			
			ACQ-B	0.50	0.50	#	#	#	#	0.50	0.50	0.50			
			ACQ-C	0.50	#	#	0.50	0.50	0.50	#	#	#			
			ACQ-D	0.50	#	#	#	#	#	#	#	#			
			ACZA	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50			
			CA-B	0.25	#	#	0.25	0.25	#	#	#	#			
			CA-C	0.25	#	#	0.25	0.25	#	#	#	#			
			CCA	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			
			MCA	0.25	#	#	#	#	#	#	#	#			
905	AWPA U1 COMM SPEC B 21 SECTION 3.1.1 [Table Data]		**Preservative**	**Pines**						**Douglas-Fir**	**Western Hemlock**	**Western Larch**			Approved as SUBMITTED
				Southern	**Ponderosa**	**Jack**	**Lodgepole**	**Red**	**Radiata**						
			Use Category 4A –kg/m^3												
			CR (a)	128	128	128	96	128	#	128	128	128			
			CR-S (a)	128	128	128	96	128	#	#	#	#			
			CR-PS (a)	128	128	128	112	128	#	128	128	128			
			CuN	0.88	0.88	#	0.88	#0.88	#	0.88	#	#			
			DCOI-A (c)	2.1	#	#	#	2.1	#	2.1	#	#			
			PCP-A & PCP-C (b)	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4			
			ACQ-B	6.4	6.4	#	#	#	#	6.4	6.4	6.4			
			ACQ-C	6.4	#	#	6.4	6.4	6.4	#	#	#			
			ACQ-D	6.4	#	#	#	#	#	#	#	#			
			ACZA	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4			
			CA-B	3.3	#	#	3.3	3.3	#	#	#	#			
			CA-C	2.4	#	#	2.4	2.4	#	#	#	#			
			CCA	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4			
			CuN-W	1.76	#	#	#	#	#	#	#	#			
			KDS	#	7.5	7.5	7.5	7.5	#	#	#	#			
			KDS-B	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	#			
			MCA	2.4	#	#	#	#	#	#	#	#			
			MCA-C	2.4	#	#	#	#	2.4	#	#	#			

Use Category 4B – kg/m³									
CR (a)	160	160	160	160	160	#	160	160	160
CR-S (a)	160	160	160	160	160	#	160	160	160
CR-PS (a)	160	160	160	160	160	#	160	160	160
CuN	1.1	1.1	#	1.1	#1.1	#	1.1	#	#
DCOI-A (c)	2.7	#	#	#	2.7	#	2.7	#	#
PCP-A & PCP-C (b)	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
ACQ-B	8.0	8.0	#	#	#	#	8.0	8.0	8.0
ACQ-C	8.0	#	#	8.0	8.0	8.0	#	#	#
ACQ-D	8.0	#	#	#	#	#	#	#	#
ACZA	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
CA-B	4.0	#	#	4.0	4.0	#	#	#	#
CA-C	4.0	#	#	4.0	4.0	#	#	#	#
CCA	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
MCA	4.0	#	#	#	#	#	#	#	#

877	AWPA U1 COMM SPEC B 21 TABLE 4.4.1 [Table Data]		Approved as SUBMITTED

Preservative	SI -- kg/m³					US Customary -- pcf				
	Southern Pine	**Ponderosa Pine**	**Red Pine**	**Radiata Pine**	**Coastal Douglas-fir**	**Southern Pine**	**Ponderosa Pine**	**Red Pine**	**Radiata Pine**	**Coastal Douglas-fir**
CR (a)	144	144	216	#	192.0	9.0	9.0	13.5	#	12
DCOI-A (c)	2.4	#2.4	3.2	#	3.2	0.15	#0.15	0.20	#	0.20
PCP-A & PCP-C (b)	7.2	7.2	9.6	#	9.6	0.45	0.45	0.60	#	0.60
ACZA	9.6	9.6	9.6	#	9.6	0.60	0.60	0.60	#	0.60
CA-B	5.0	#	5.0	#	#	0.31	#	0.31	#	#
CA-C	5.0	#	5.0	#	#	0.31	#	0.31	#	#
CCA	9.6	9.6	9.6	9.6	9.6	0.60	0.60	0.60	0.60	0.60
MCA	5.0	#	#	#	#	0.31	#	#	#	#

876	AWPA U1 COMM SPEC B 21 TABLE 4.2.1 [Table Data]		Approved as SUBMITTED

Preservative	Pines						Douglas-Fir		Western Redcedar	Western Larch
	Southern	Ponderosa	Jack	Lodgepole	Red	Radiata	Coastal	Interior		
Modified Exposure (Farm Use) -- kg/m³										
CR (a)	120	120	192	192	168	#	144	256	256	256
CR-S (a)	120	120	192	192	168	#	144	256	256	256
DCOI-A (c)	2.1	#2.1	#	#	2.8	#	2.4	#	2.7	#
PCP-A & PCP-C (b)	6.1	6.1	9.6	9.6	8.5	#	7.2	8.0	8.0	8.0
ACQ-B	9.6	9.6	9.6	9.6	9.6	#	9.6	9.6	9.6	9.6
ACQ-C	9.6	#	#	#	9.6	9.6	#	#	#	#
ACQ-D	9.6	#	#	9.6	9.6	9.6	9.6	#	9.6	#
ACZA	9.6	9.6	9.6	9.6	9.6	#	9.6	9.6	9.6	9.6
CA-B	5.0	#	#	5.0	5.0	#	#	#	5.0	#
CA-C	5.0	#	#	5.0	5.0	#	#	#	5.0	#
CCA	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
MCA	5.0	#	#	#	#	#	#	#	#	#
Modified Exposure (Farm Use) -- pcf										
CR (a)	7.5	7.5	12	12	10.5	#	9.0	16	16	16
CR-S (a)	7.5	7.5	12	12	10.5	#	9.0	16	16	16
DCOI-A (c)	0.13	#0.13	#	#	0.18	#	0.15	#	0.17	#

			PCP-A & PCP-C (b)	0.38	0.60	0.60	0.60	0.53	#	0.45	0.50	0.50	0.50	
			ACQ-B	0.60	0.60	0.60	0.60	0.60	#	0.60	0.60	0.60	0.60	
			ACQ-C	0.60	#	#	#	0.60	0.60	#	#	#	#	
			ACQ-D	0.60	#	#	0.60	0.60	0.60	0.60	#	0.60	#	
			ACZA	0.60	0.60	0.60	0.60	0.60	#	0.60	0.60	0.60	0.60	
			CA-B	0.31	#	#	0.31	0.31	#	#	#	0.31	#	
			CA-C	0.31	#	#	0.31	0.31	#	#	#	0.31	#	
			CCA	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	
			MCA	0.31	#	#	#	#	#	#	#	#	#	
875	AWPA U1 COMM SPEC B 21 SECTION 3.1.2 [Table Data]		**Preservative**	**Pines**						**Douglas-Fir**	**Western Hemlock**	**Western Larch**	Approved as SUBMITTED	
				Southern	**Ponderosa**	**Jack**	**Lodgepole**	**Red**	**Radiata**					
			Use Category 4A – pcf											
			CR (a)	8.0	8.0	8.0	6.0	8.0	#	8.0	8.0	8.0		
			CR-S (a)	8.0	8.0	8.0	6.0	8.0	#	#	#	#		
			CR-PS (a)	8.0	8.0	8.0	7.0	8.0	#	8.0	8.0	8.0		
			CuN	0.055	0.055	#	0.055	#	#	0.055	#	#		
			DCOI-A (c)	0.13	#0.13	#	#	0.13	#	0.13	#	#		
			PCP-A & PCP-C (b)	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40		
			ACQ-B	0.40	0.40	#	#	#	#	0.40	0.40	0.40		
			ACQ-C	0.40	#	#	0.40	0.40	0.40	#	#	#		
			ACQ-D	0.40	#	#	#	#	#	#	#	#		
			ACZA	0.40	0.40	0.40	0.40	0.40	#	0.40	0.40	0.40		
			CA-B	0.21	#	#	0.21	0.21	#	#	#	#		
			CA-C	0.15	#	#	0.15	0.15	#	#	#	#		
			CCA	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
			CuN-W	0.11	#	#	#	#	#	#	#	#		
			KDS	0.47	#	#	#	#	0.47	0.47	0.47	#		
			KDS-B	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	#		
			MCA	0.15	#	#	#	#	#	#	#	#		
			MCA-C	0.15	#	#	#	#	0.15	#	#	#		
			Use Category 4B -- pcf											
			CR (a)	10.0	10.0	10.0	10.0	100.	#	10.0	10.0	10.0		
			CR-S (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0		
			CR-PS (a)	10.0	10.0	10.0	10.0	10.0	#	10.0	10.0	10.0		
			CuN	0.069	0.069	#	0.069	#	#	0.069	#	#		
			DCOI-A (c)	0.17	#0.17	#	#	0.17	#	0.17	#	#		
			PCP-A & PCP-C (b)	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50		
			ACQ-B	0.50	0.50	#	#	#	#	0.50	0.50	0.50		
			ACQ-C	0.50	#	#	0.50	0.50	0.50	#	#	#		
			ACQ-D	0.50	#	#	#	#	#	#	#	#		
			ACZA	0.50	0.50	0.50	0.50	0.50	#	0.50	0.50	0.50		
			CA-B	0.25	#	#	0.25	0.25	#	#	#	#		
			CA-C	0.25	#	#	0.25	0.25	#	#	#	#		
			CCA	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50		
			MCA	0.25	#	#	#	#	#	#	#	#		
874	AWPA U1		**Preservative**	**Pines**									Approved as SUBMITTED	

COMM SPEC B 21 SECTION 3.1.1 [Table Data]

	Southern	Ponderosa	Jack	Lodgepole	Red	Radiata	Douglas-Fir	Western Hemlock	Western Larch
Use Category 4A –kg/m³									
CR (a)	128	128	128	96	128	#	128	128	128
CR-S (a)	128	128	128	96	128	#	#	#	#
CR-PS (a)	128	128	128	112	128	#	128	128	128
CuN	0.88	0.88	#	0.88	#	#	0.88	#	#
DCOI-A (c)	2.1	#2.1	#	#	2.1	#	2.1	#	#
PCP-A & PCP-C (b)	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4
ACQ-B	6.4	6.4	#	#	#	#	6.4	6.4	6.4
ACQ-C	6.4	#	#	6.4	6.4	6.4	#	#	#
ACQ-D	6.4	#	#	#	#	#	#	#	#
ACZA	6.4	6.4	6.4	6.4	6.4	#	6.4	6.4	6.4
CA-B	3.3	#	#	3.3	3.3	#	#	#	#
CA-C	2.4	#	#	2.4	2.4	#	#	#	#
CCA	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
CuN-W	1.76	#	#	#	#	#	#	#	#
KDS	#	7.5	7.5	7.5	7.5	#	#	#	#
KDS-B	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	#
MCA	2.4	#	#	#	#	#	#	#	#
MCA-C	2.4	#	#	#	#	2.4	#	#	#
Use Category 4B – kg/m³									
CR (a)	160	160	160	160	160	#	160	160	160
CR-S (a)	160	160	160	160	160	#	160	160	160
CR-PS (a)	160	160	160	160	160	#	160	160	160
CuN	1.1	1.1	#	1.1	#	#	1.1	#	#
DCOI-A (c)	2.7	#2.7	#	#	2.7	#	2.7	#	#
PCP-A & PCP-C (b)	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
ACQ-B	8.0	8.0	#	#	#	#	8.0	8.0	8.0
ACQ-C	8.0	#	#	8.0	8.0	8.0	#	#	#
ACQ-D	8.0	#	#	#	#	#	#	#	#
ACZA	8.0	8.0	8.0	8.0	8.0	#	8.0	8.0	8.0
CA-B	4.0	#	#	4.0	4.0	#	#	#	#
CA-C	4.0	#	#	4.0	4.0	#	#	#	#
CCA	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
MCA	4.0	#	#	#	#	#	#	#	#

AWPA Standard U1 COMM SPEC D-21

21F-U1D-T4 Revise U1csD

Committee Meeting Action: Unanimously authorized letter ballot as MODIFIED.

Letter Ballot Results: Passed unanimously as modified with 30 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

920 — AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data] — Approved as SUBMITTED

Species	Preservative Retention (kg/m³)				Preservative Retention (pcf)			
	CR as solution	PCP-A, PCP-C as a.i.	DCOI-A as a.i.	CuN Cu as metal	CR as solution	PCP-A, PCP-C as a.i.	DCOI-A as a.i.	CuN Cu as metal
Use Category 4A and 4B								
Southern Pine								
Outer zone	144	~~6.08~~7.2	#2.4	~~1.52~~1.5	9.0	0.45	#0.15	0.095
Inner zone (a)	72	~~3.68~~3.7	#1.23	~~0.768~~0.77	4.5	0.23	#0.08	0.048
Coastal Douglas fir –								
Outer zone	144	~~6.08~~7.2	~~2.03~~2.4	~~1.52~~1.5	9.0	0.45	0.15	0.095
Inner zone (a)	72	~~3.68~~3.7	~~1.23~~1.2	~~0.768~~0.77	4.5	0.23	0.08	0.048
Use Category 4C								
Southern Pine								
Outer zone	192	9.6	#3.2	2.4	~~12.0~~12	0.60	#0.20	0.15
Inner zone (a)	96	4.8	#1.6	1.2	6.0	0.30	#.010	0.075
Coastal Douglas fir –								
Outer zone	192	9.6	3.2	2.4	~~12.0~~12	0.60	0.20	0.15
Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075

919 — AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data] — Approved as SUBMITTED

Species	Oil-Type Preservative Retentions (kg/m³)				Waterborne Preservative Retentions (kg/m³)					
	CR, CR-S solution	PCP-A, PCP-C ai	DCOI-A ai	CuN Cu as metal	ACZA	CCA(b)	ACQ-B	CA-B	CA-C	MCA
Use Category 4A – kg/m³										
Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir –										
Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#
Inner zone (a)	72	~~3.68~~3.7	#	~~0.608~~0.61	4.8	4.8	4.8			
Jack Pine	192	9.6	#	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#
Lodgepole Pine	192	9.6	3.2	~~1.52~~1.5	9.6	9.6	9.6	#	#	#

Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	5.3	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#
Alaska Yellow Cedar	320	16	~~#~~5.3	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Western Larch	256	~~12.8~~13	~~4.27~~4.3	~~#~~1.92	9.6	9.6	9.6	#	#	#
Ponderosa Pine	96	4.8	~~#~~1.6	0.96	9.6	9.6	9.6	#	#	#
Use Category 4B – kg/m^3										
Southern Pine	120	~~6.08~~6.1	2.1	~~1.28~~1.3	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir – Outer zone	144	7.2	2.4	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Coastal Douglas fir – Inner zone (a)	72	~~3.68~~3.7	#	0.77	4.8	4.8	4.8			
Jack Pine	192	9.6	#	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Red Pine	160	8.0	2.7	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Lodgepole Pine	192	9.6	3.2	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	5.3	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#
Alaska Yellow Cedar	320	16	~~#~~5.3	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Western Larch	~~288~~256	~~12.8~~13	~~4.27~~4.3	~~#~~1.92	9.6	9.6	9.6	#	#	#
Ponderosa Pine	120	~~6.08~~6.1	~~#~~2.0	~~1.28~~1.3	9.6	9.6	9.6	#	#	#
Use Category 4C – kg/m^3										
Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
Coastal Douglas fir – Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8			
Jack Pine	256	~~12.8~~13	#	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
Lodgepole Pine	256	~~12.8~~13	~~4.27~~4.3	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	~~#~~5.3	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#
Alaska Yellow Cedar	320	16	~~#~~5.3	~~1.92~~1.9	9.6	9.6	9.6	#	#	#

		Western Larch	256	~~12.8~~13	~~4.27~~4.3	#2.4	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	144	7.2	#2.4	2.1	9.6	9.6	9.6	#	#	#	
918	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (pcf)**				**Waterborne Preservative Retentions (pcf a.i.)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – pcf											
		Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#	
		Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30				
		Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#	
		Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	0.33	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#0.33	~~0.120~~0.12	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#0.120	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	6.0	0.30	#0.10	0.060	0.60	0.60	0.60	#	#	#	
		Use Category 4B –pcf											
		Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#	
		Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30				
		Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#	
		Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	0.33	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#0.33	~~0.120~~0.12	0.60	0.60	0.60	#	#	#	

		Western Larch	~~18.0~~16.0	0.80	0.27	#0.120	0.60	0.60	0.60	#	#	#
		Ponderosa Pine	7.5	0.38	#0.13	0.080	0.60	0.60	0.60	#	#	#
		Use Category 4C –pcf										
		Southern Pine	9.0	0.45	0.15	~~0.130~~0.13	0.60	0.60	0.60	0.31	0.31	0.31
		Coastal Douglas fir – Outer zone Inner zone (a)	 12.0 6.0	 0.60 0.30	 0.20 #	 ~~0.150~~0.15 0.075	 0.60 0.30	 0.60 0.30	 0.60 0.30	 # 	 # 	 #
		Jack Pine	16.0	0.80	#	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
		Red Pine	12.0	0.60	0.20	~~0.150~~0.15	0.60	0.60	0.60	#	#	#
		Lodgepole Pine	16.0	0.80	0.27	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
		Western Red Cedar	20.0	1.0	#0.33	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#
		Alaska Yellow Cedar	20.0	1.0	#0.33	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
		Western Larch	16.0	0.80	0.27	#0.150	0.60	0.60	0.60	#	#	#
		Ponderosa Pine	9.0	0.45	#0.15	~~0.130~~0.13	0.60	0.60	0.60	#	#	#
904	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (kg/m³)**				**Waterborne Preservative Retentions (kg/m³)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – kg/m³											
		Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone Inner zone (a)	 144 72	 7.2 3.68	 2.4 #	 1.2 0.608	 9.6 4.8	 9.6 4.8	 9.6 4.8	 # 	 # 	 # 	
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#1.92	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	96	4.8	#	0.96	9.6	9.6	9.6	#	#	#	

		Use Category 4B – kg/m³										
		Southern Pine	120	6.08	2.1	1.28	9.6	9.6	9.6	5.0	5.0	5.0
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.52	9.6	9.6	9.6	#	#	#
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.77	4.8	4.8	4.8			
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#
		Red Pine	160	8.0	2.7	1.52	9.6	9.6	9.6	#	#	#
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#
		Western Larch	288	12.8	4.27	#1.92	9.6	9.6	9.6	#	#	#
		Ponderosa Pine	120	6.08	#	1.28	9.6	9.6	9.6	#	#	#
		Use Category 4C – kg/m³										
		Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
		Coastal Douglas fir – Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8			
		Jack Pine	256	12.8	#	1.92	9.6	9.6	9.6	#	#	#
		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
		Lodgepole Pine	256	12.8	4.27	1.92	9.6	9.6	9.6	#	#	#
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
		Western Red Cedar	320	16	#	1.92	9.6	9.6	9.6	5.0	5.0	#
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#
		Western Larch	256	12.8	4.27	#2.4	9.6	9.6	9.6	#	#	#
		Ponderosa Pine	144	7.2	#	2.1	9.6	9.6	9.6	#	#	#
903	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (pcf)**				**Waterborne Preservative Retentions (pcf a.i.)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – pcf											
		Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir –											

Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	16.0	0.80	0.27	#0.120	0.60	0.60	0.60	#	#	#
Ponderosa Pine	6.0	0.30	#	0.060	0.60	0.60	0.60	#	#	#
Use Category 4B –pcf										
Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	18.0	0.80	0.27	#0.120	0.60	0.60	0.60	#	#	#
Ponderosa Pine	7.5	0.38	#	0.080	0.60	0.60	0.60	#	#	#
Use Category 4C –pcf										
Southern Pine	9.0	0.45	0.15	0.130	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#
Inner zone (a)	6.0	0.30	#	0.075	0.30	0.30	0.30			
Jack Pine	16.0	0.80	#	0.120	0.60	0.60	0.60	#	#	#
Red Pine	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#
Lodgepole Pine	16.0	0.80	0.27	0.120	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#

		Western Red Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#0.150	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	9.0	0.45	#	0.130	0.60	0.60	0.60	#	#	#	

879 AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data] — Approved as SUBMITTED

Species	Preservative Retention (kg/m³)				Preservative Retention (pcf)			
	CR as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	**CR** as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal
Use Category 4A and 4B								
Southern Pine								
Outer zone	144	6.08	#2.4	1.52	9.0	0.45	#0.15	0.095
Inner zone (a)	72	3.68	#1.23	0.768	4.5	0.23	#0.08	0.048
Coastal Douglas fir –								
Outer zone	144	6.08	2.03	1.52	9.0	0.45	0.15	0.095
Inner zone (a)	72	3.68	1.23	0.768	4.5	0.23	0.08	0.048
Use Category 4C								
Southern Pine								
Outer zone	192	9.6	#3.2	2.4	12.0	0.60	#0.20	0.15
Inner zone (a)	96	4.8	#1.6	1.2	6.0	0.30	#.010	0.075
Coastal Douglas fir –								
Outer zone	192	9.6	3.2	2.4	12.0	0.60	0.20	0.15
Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075

873 AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data] — Approved as SUBMITTED

Species	Oil-Type Preservative Retentions (kg/m³)				Waterborne Preservative Retentions (kg/m³)					
	CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**
Use Category 4A – kg/m³										
Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir –										
Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#
Inner zone (a)	72	3.68	#	0.608	4.8	4.8	4.8			
Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#
Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#
Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#

		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	96	4.8	#	0.96	9.6	9.6	9.6	#	#	#	
		Use Category 4B – kg/m³											
		Southern Pine	120	6.08	2.1	1.28	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.52	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.77	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.52	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	288	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	120	6.08	#	1.28	9.6	9.6	9.6	#	#	#	
		Use Category 4C – kg/m³											
		Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8				
		Jack Pine	256	12.8	#	1.92	9.6	9.6	9.6	#	#	#	
		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	256	12.8	4.27	1.92	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	#5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	144	7.2	#	2.1	9.6	9.6	9.6	#	#	#	
872	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES												Approved as SUBMITTED

Species	Oil-Type Preservative Retentions (pcf)	Waterborne Preservative Retentions (pcf a.i.)

TREATED USING THE PRESSURE PROCESS [Table Data]

	CR, CR-S solution	PCP-A, PCP-C ai	DCOI-A ai	CuN Cu as metal	ACZA	CCA(b)	ACQ-B	CA-B	CA-C	MCA
Use Category 4A – pcf										
Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	6.0	0.30	#	0.060	0.60	0.60	0.60	#	#	#
Use Category 4B –pcf										
Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	18.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	7.5	0.38	#	0.080	0.60	0.60	0.60	#	#	#
Use Category 4C –pcf										
Southern Pine	9.0	0.45	0.15	0.130	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#

		Inner zone (a)	6.0	0.30	#	0.075	0.30	0.30	0.30				
		Jack Pine	16.0	0.80	#	0.120	0.60	0.60	0.60	#	#	#	
		Red Pine	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	16.0	0.80	0.27	0.120	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	#0.33	0.120	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	9.0	0.45	#	0.130	0.60	0.60	0.60	#	#	#	
871	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (kg/m³)**				**Waterborne Preservative Retentions (kg/m³)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – kg/m³											
		Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.608	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	96	4.8	#1.6	0.96	9.6	9.6	9.6	#	#	#	
		Use Category 4B – kg/m³											
		Southern Pine	120	6.08	2.1	1.28	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.52	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.77	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.52	9.6	9.6	9.6	#	#	#	

		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	288	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	120	6.08	#2.0	1.28	9.6	9.6	9.6	#	#	#	
		Use Category 4C – kg/m³											
		Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8				
		Jack Pine	256	12.8	#	1.92	9.6	9.6	9.6	#	#	#	
		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	256	12.8	4.27	1.92	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	#	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	144	7.2	#2.4	2.1	9.6	9.6	9.6	#	#	#	
870	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (kg/m³)**				**Waterborne Preservative Retentions (kg/m³)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – kg/m³											
		Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#	
		Inner zone (a)	72	3.68	#	0.608	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	

		Alaska Yellow Cedar	320	16	#5.3	1.92	9.6	9.6	9.6	#	#	#
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#
		Ponderosa Pine	96	4.8	#	0.96	9.6	9.6	9.6	#	#	#
		Use Category 4B – kg/m³										
		Southern Pine	120	6.08	2.1	1.28	9.6	9.6	9.6	5.0	5.0	5.0
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.52	9.6	9.6	9.6	#	#	#
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.77	4.8	4.8	4.8			
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#
		Red Pine	160	8.0	2.7	1.52	9.6	9.6	9.6	#	#	#
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#
		Alaska Yellow Cedar	320	16	#5.3	1.92	9.6	9.6	9.6	#	#	#
		Western Larch	288	12.8	4.27	#	9.6	9.6	9.6	#	#	#
		Ponderosa Pine	120	6.08	#	1.28	9.6	9.6	9.6	#	#	#
		Use Category 4C – kg/m³										
		Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
		Coastal Douglas fir – Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8			
		Jack Pine	256	12.8	#	1.92	9.6	9.6	9.6	#	#	#
		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
		Lodgepole Pine	256	12.8	4.27	1.92	9.6	9.6	9.6	#	#	#
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
		Western Red Cedar	320	16	#	1.92	9.6	9.6	9.6	5.0	5.0	#
		Alaska Yellow Cedar	320	16	#5.3	1.92	9.6	9.6	9.6	#	#	#
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#
		Ponderosa Pine	144	7.2	#	2.1	9.6	9.6	9.6	#	#	#
869	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES											Approved as SUBMITTED

Species	Oil-Type Preservative Retentions (pcf)	Waterborne Preservative Retentions (pcf a.i.)

TREATED USING THE PRESSURE PROCESS [Table Data]

	CR, CR-S solution	PCP-A, PCP-C ai	DCOI-A ai	CuN Cu as metal	ACZA	CCA(b)	ACQ-B	CA-B	CA-C	MCA
Use Category 4A – pcf										
Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	6.0	0.30	#0.10	0.060	0.60	0.60	0.60	#	#	#
Use Category 4B –pcf										
Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	18.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	7.5	0.38	#0.13	0.080	0.60	0.60	0.60	#	#	#
Use Category 4C –pcf										
Southern Pine	9.0	0.45	0.15	0.130	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#

		Inner zone (a)	6.0	0.30	#	0.075	0.30	0.30	0.30				
		Jack Pine	16.0	0.80	#	0.120	0.60	0.60	0.60	#	#	#	
		Red Pine	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	16.0	0.80	0.27	0.120	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	9.0	0.45	#0.15	0.130	0.60	0.60	0.60	#	#	#	

868	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (pcf)**				**Waterborne Preservative Retentions (pcf a.i.)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – pcf											
		Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#	
		Coastal Douglas fir – Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30				
		Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#	
		Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#0.33	0.120	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	6.0	0.30	#	0.060	0.60	0.60	0.60	#	#	#	
		Use Category 4B –pcf											
		Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#	
		Coastal Douglas fir – Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30				
		Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#	
		Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#	

Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#	
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#	
Alaska Yellow Cedar	20.0	1.0	~~#~~0.33	0.120	0.60	0.60	0.60	#	#	#	
Western Larch	18.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
Ponderosa Pine	7.5	0.38	#	0.080	0.60	0.60	0.60	#	#	#	
Use Category 4C –pcf											
Southern Pine	9.0	0.45	0.15	0.130	0.60	0.60	0.60	0.31	0.31	0.31	
Coastal Douglas fir – Outer zone	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#	
Inner zone (a)	6.0	0.30	#	0.075	0.30	0.30	0.30				
Jack Pine	16.0	0.80	#	0.120	0.60	0.60	0.60	#	#	#	
Red Pine	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#	
Lodgepole Pine	16.0	0.80	0.27	0.120	0.60	0.60	0.60	#	#	#	
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
Western Red Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	0.31	0.31	#	
Alaska Yellow Cedar	20.0	1.0	~~#~~0.33	0.120	0.60	0.60	0.60	#	#	#	
Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
Ponderosa Pine	9.0	0.45	#	0.130	0.60	0.60	0.60	#	#	#	

866 AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data]

Species	Preservative Retention (kg/m^3)				Preservative Retention (pcf)			
	CR as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	**CR** as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal
Use Category 4A and 4B								
Southern Pine								
~~Outer zone~~	~~144~~120	6.08	#	~~1.52~~1.3	~~9.0~~7.5	~~0.45~~0.38	#	~~0.095~~0.08
~~Inner zone (a)~~	~~72~~	~~3.68~~	~~#~~	~~0.768~~	~~4.5~~	~~0.23~~	~~#~~	~~0.048~~
Coastal Douglas fir – Outer zone	144	~~6.08~~7.2	2.03	1.52	9.0	0.45	0.15	0.095
Inner zone (a)	72	3.68	1.23	0.768	4.5	0.23	0.08	0.048
Use Category 4C								
Southern Pine								
~~Outer zone~~	~~192~~144	~~9.6~~7.2	#	~~2.4~~2.1	~~12.0~~9.0	~~0.60~~0.45	#	~~0.15~~0.13

WITHDRAWN Proponent has requested to withdraw this proposal after discussion with staff.

		~~Inner zone (a)~~	~~96~~	~~4.8~~	~~#~~	~~1.2~~	~~6.0~~	~~0.30~~	~~#~~	~~0.075~~	
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	12.0	0.60	0.20	0.15	
		Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075	
865	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data]	**Species**	**Preservative Retention (kg/m³)**				**Preservative Retention (pcf)**				Approved as SUBMITTED
			CR as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	**CR** as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	
		Use Category 4A and 4B									
		Southern Pine Outer zone	144	6.08	#	~~1.52~~1.5	9.0	0.45	#	0.095	
		Inner zone (a)	72	~~3.68~~3.7	#	~~0.768~~0.77	4.5	0.23	#	0.048	
		Coastal Douglas fir – Outer zone	144	6.08	2.03	~~1.52~~1.5	9.0	0.45	0.15	0.095	
		Inner zone (a)	72	~~3.68~~3.7	~~1.23~~1.2	~~0.768~~0.77	4.5	0.23	0.08	0.048	
		Use Category 4C									
		Southern Pine Outer zone	192	9.6	#	2.4	~~12.0~~12	0.60	#	0.15	
		Inner zone (a)	96	4.8	#	1.2	6.0	0.30	#	0.075	
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	~~12.0~~12	0.60	0.20	0.15	
		Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075	
864	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 5.22 [Table Data]	**Treated Zone & Species**	**Testing Point (a)**	**Preservative Retention (kg/m³)**			**Preservative Retention (pcf)**				Approved as SUBMITTED
				CR (as solution)	**PCP-A (as a.i.)**	**CuN (Cu as metal)**	**CR (as solution)**	**PCP-A (as a.i.)**	**CuN (Cu as metal)**		
		Use Category 4A and 4B									
		Full Length Treated Western Red Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15		
			MP	96	4.8	0.80	6.0	0.30	0.050		
		Full Length Treated Alaska Yellow Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15		
			MP	96	4.8	0.80	6.0	0.30	0.050		
		Butt-Treated Western Red Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15		
		Butt-Treated Alaska Yellow Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15		
		Butt-Treated Northern White Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15		

		Full Length Treated Western Larch	GL	320	~~12.8~~13	#	20	0.80	#	
		Use Category 4C								
		Full Length Treated Western Red Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15	
			MP	96	4.8	0.80	6.0	0.30	0.050	
		Full Length Treated Alaska Yellow Cedar	GL	320	~~16.0~~16	2.4	20	1.0	0.15	
			MP	96	4.8	0.80	6.0	0.30	0.050	
		Butt-Treated Western Red Cedar	GL	#	#	#	#	#	#	
		Butt-Treated Alaska Yellow Cedar	GL	#	#	#	#	#	#	
		Butt-Treated Northern White Cedar	GL	320	#	#	20	#	#	
		Full Length Treated Western Larch	GL	256	~~12.8~~13	#	16	0.80	#	

863	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data]	**Species**	**Preservative Retention (kg/m³)**				**Preservative Retention (pcf)**				Approved as SUBMITTED
			CR as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	**CR** as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	
		Use Category 4A and 4B									
		Southern Pine									
		Outer zone	144	6.08	#	1.52	9.0	0.45	#	0.095	
		Inner zone (a)	72	3.68	#	0.768	4.5	0.23	#	0.048	
		Coastal Douglas fir –									
		Outer zone	144	6.08	~~2.03~~2.4	1.52	9.0	0.45	0.15	0.095	
		Inner zone (a)	72	3.68	1.23	0.768	4.5	0.23	0.08	0.048	
		Use Category 4C									
		Southern Pine									
		Outer zone	192	9.6	#	2.4	12.0	0.60	#	0.15	
		Inner zone (a)	96	4.8	#	1.2	6.0	0.30	#	0.075	
		Coastal Douglas fir –									
		Outer zone	192	9.6	3.2	2.4	12.0	0.60	0.20	0.15	
		Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075	

861	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (kg/m³)**				**Waterborne Preservative Retentions (kg/m³)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – kg/m³											
		Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0	

Coastal Douglas fir – Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#
Coastal Douglas fir – Inner zone (a)	72	~~3.68~~3.7	#	~~0.608~~0.61	4.8	4.8	4.8			
Jack Pine	192	9.6	#	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#
Lodgepole Pine	192	9.6	3.2	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	5.3	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#
Alaska Yellow Cedar	320	16	#	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Western Larch	256	~~12.8~~13	~~4.27~~4.3	#	9.6	9.6	9.6	#	#	#
Ponderosa Pine	96	4.8	#	0.96	9.6	9.6	9.6	#	#	#
Use Category 4B – kg/m^3										
Southern Pine	120	~~6.08~~6.1	2.1	~~1.28~~1.3	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir – Outer zone	144	7.2	2.4	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Coastal Douglas fir – Inner zone (a)	72	~~3.68~~3.7	#	0.77	4.8	4.8	4.8			
Jack Pine	192	9.6	#	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Red Pine	160	8.0	2.7	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Lodgepole Pine	192	9.6	3.2	~~1.52~~1.5	9.6	9.6	9.6	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#
Western Red Cedar	320	16	5.3	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#
Alaska Yellow Cedar	320	16	#	~~1.92~~1.9	9.6	9.6	9.6	#	#	#
Western Larch	288	~~12.8~~13	~~4.27~~4.3	#	9.6	9.6	9.6	#	#	#
Ponderosa Pine	120	~~6.08~~6.1	#	~~1.28~~1.3	9.6	9.6	9.6	#	#	#
Use Category 4C – kg/m^3										
Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0
Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#
Coastal Douglas fir – Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8			
Jack Pine	256	~~12.8~~13	#	~~1.92~~1.9	9.6	9.6	9.6	#	#	#

		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	256	~~12.8~~13	~~4.27~~4.3	~~1.92~~1.9	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	#	~~1.92~~1.9	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	~~1.92~~1.9	9.6	9.6	9.6	#	#	#	
		Western Larch	256	~~12.8~~13	~~4.27~~4.3	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	144	7.2	#	2.1	9.6	9.6	9.6	#	#	#	

860 AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 6.52 [Table Data]

Species	Preservative Retention (kg/m^3)				Preservative Retention (pcf)				Approved as SUBMITTED
	CR as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	**CR** as solution	**PCP-A, PCP-C** as a.i.	**DCOI-A** as a.i.	**CuN** Cu as metal	
Use Category 4A and 4B									
Southern Pine									
Outer zone	144	~~6.08~~7.2	#	1.52	9.0	0.45	#	0.095	
Inner zone (a)	72	3.68	#	0.768	4.5	0.23	#	0.048	
Coastal Douglas fir –									
Outer zone	144	~~6.08~~7.2	2.03	1.52	9.0	0.45	0.15	0.095	
Inner zone (a)	72	3.68	1.23	0.768	4.5	0.23	0.08	0.048	
Use Category 4C									
Southern Pine									
Outer zone	192	9.6	#	2.4	12.0	0.60	#	0.15	
Inner zone (a)	96	4.8	#	1.2	6.0	0.30	#	0.075	
Coastal Douglas fir –									
Outer zone	192	9.6	3.2	2.4	12.0	0.60	0.20	0.15	
Inner zone (a)	96	4.8	1.6	1.2	6.0	0.30	0.10	0.075	

859 AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]

Species	Oil-Type Preservative Retentions (pcf)				Waterborne Preservative Retentions (pcf a.i.)						Approved as SUBMITTED
	CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
Use Category 4A – pcf											
Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31	
Coastal Douglas fir –											
Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#	
Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30				

Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	6.0	0.30	#	0.060	0.60	0.60	0.60	#	#	#
Use Category 4B –pcf										
Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir –										
Outer zone	9.0	0.45	0.15	0.095	0.60	0.60	0.60	#	#	#
Inner zone (a)	4.5	0.23	#	0.048	0.30	0.30	0.30			
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
Western Larch	18.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	7.5	0.38	#	0.080	0.60	0.60	0.60	#	#	#
Use Category 4C –pcf										
Southern Pine	9.0	0.45	0.15	~~0.130~~0.13	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir –										
Outer zone	12.0	0.60	0.20	~~0.150~~0.15	0.60	0.60	0.60	#	#	#
Inner zone (a)	6.0	0.30	#	0.075	0.30	0.30	0.30			
Jack Pine	16.0	0.80	#	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
Red Pine	12.0	0.60	0.20	~~0.150~~0.15	0.60	0.60	0.60	#	#	#
Lodgepole Pine	16.0	0.80	0.27	~~0.120~~0.12	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	#	~~0.120~~0.12	0.60	0.60	0.60	0.31	0.31	#

		Alaska Yellow Cedar	20.0	1.0	#	~~0.120~~0.12	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	9.0	0.45	#	~~0.130~~0.13	0.60	0.60	0.60	#	#	#	
846	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4B RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (kg/m³)**				**Waterborne Preservative Retentions (kg/m³)**						Approved as SUBMITTED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – kg/m³											
		Southern Pine	96	4.8	1.6	0.96	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.2	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.608	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.2	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	96	4.8	#	0.96	9.6	9.6	9.6	#	#	#	
		Use Category 4B – kg/m³											
		Southern Pine	120	6.08	2.1	1.28	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	144	7.2	2.4	1.52	9.6	9.6	9.6	#	#	#	
		Coastal Douglas fir – Inner zone (a)	72	3.68	#	0.77	4.8	4.8	4.8				
		Jack Pine	192	9.6	#	1.52	9.6	9.6	9.6	#	#	#	
		Red Pine	160	8.0	2.7	1.52	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	192	9.6	3.2	1.52	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	5.3	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	~~288~~256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	

		Ponderosa Pine	120	6.08	#	1.28	9.6	9.6	9.6	#	#	#	
		Use Category 4C – kg/m^3											
		Southern Pine	144	7.2	2.4	2.1	9.6	9.6	9.6	5.0	5.0	5.0	
		Coastal Douglas fir – Outer zone	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Inner zone (a)	96	4.8	#	1.2	4.8	4.8	4.8				
		Jack Pine	256	12.8	#	1.92	9.6	9.6	9.6	#	#	#	
		Red Pine	192	9.6	3.2	2.4	9.6	9.6	9.6	#	#	#	
		Lodgepole Pine	256	12.8	4.27	1.92	9.6	9.6	9.6	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	9.6	#	#	#	#	
		Western Red Cedar	320	16	#	1.92	9.6	9.6	9.6	5.0	5.0	#	
		Alaska Yellow Cedar	320	16	#	1.92	9.6	9.6	9.6	#	#	#	
		Western Larch	256	12.8	4.27	#	9.6	9.6	9.6	#	#	#	
		Ponderosa Pine	144	7.2	#	2.1	9.6	9.6	9.6	#	#	#	
845	AWPA U1 COMM SPEC D 21 (SUPPLEMENT) SECTION 4.4A RESULTS OF TREATMENT (RETENTION) FOR POLES TREATED USING THE PRESSURE PROCESS [Table Data]	**Species**	**Oil-Type Preservative Retentions (pcf)**				**Waterborne Preservative Retentions (pcf a.i.)**						Approved as MODIFIED
			CR, CR-S solution	**PCP-A, PCP-C** ai	**DCOI-A ai**	**CuN** Cu as metal	**ACZA**	**CCA**(b)	**ACQ-B**	**CA-B**	**CA-C**	**MCA**	
		Use Category 4A – pcf											
		Southern Pine	6.0	0.30	0.10	0.060	0.60	0.60	0.60	0.31	0.31	0.31	
		Coastal Douglas fir – Outer zone	9.0	0.45	0.15	0.075	0.60	0.60	0.60	#	#	#	
		Inner zone (a)	4.5	0.23	#	0.038	0.30	0.30	0.30				
		Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#	
		Red Pine	10.0	0.50	0.17	0.075	0.60	0.60	0.60	#	#	#	
		Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#	
		Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#	
		Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#	
		Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#	
		Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#	
		Ponderosa Pine	6.0	0.30	#	0.060	0.60	0.60	0.60	#	#	#	
		Use Category 4B –pcf											
		Southern Pine	7.5	0.38	0.13	0.080	0.60	0.60	0.60	0.31	0.31	0.31	

Coastal Douglas fir – Outer zone Inner zone (a)	9.0 4.5	0.45 0.23	0.15 #	0.095 0.048	0.60 0.30	0.60 0.30	0.60 0.30	#	#	#
Jack Pine	12.0	0.60	#	0.095	0.60	0.60	0.60	#	#	#
Red Pine	10.0	0.50	0.17	0.095	0.60	0.60	0.60	#	#	#
Lodgepole Pine	12.0	0.60	0.20	0.095	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	0.33	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	~~18.0~~16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	7.5	0.38	#	0.080	0.60	0.60	0.60	#	#	#
Use Category 4C –pcf										
Southern Pine	9.0	0.45	0.15	0.130	0.60	0.60	0.60	0.31	0.31	0.31
Coastal Douglas fir – Outer zone Inner zone (a)	12.0 6.0	0.60 0.30	0.20 #	0.150 0.075	0.60 0.30	0.60 0.30	0.60 0.30	#	#	#
Jack Pine	16.0	0.80	#	0.120	0.60	0.60	0.60	#	#	#
Red Pine	12.0	0.60	0.20	0.150	0.60	0.60	0.60	#	#	#
Lodgepole Pine	16.0	0.80	0.27	0.120	0.60	0.60	0.60	#	#	#
Radiata Pine (Chilean)	#	#	#	#	#	0.60	#	#	#	#
Western Red Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	0.31	0.31	#
Alaska Yellow Cedar	20.0	1.0	#	0.120	0.60	0.60	0.60	#	#	#
Western Larch	16.0	0.80	0.27	#	0.60	0.60	0.60	#	#	#
Ponderosa Pine	9.0	0.45	#	0.130	0.60	0.60	0.60	#	#	#

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-7

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	40
Number of Eligible Voters:	34
Number of Eligible Ballots Received:	24
Ballot Return Percentage:	70.6%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard M22-21

21F-M22-T7 Revise M22

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 23 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
570	AWPA M22 21 SECTION 1.6	**1.6 Retention—Lower Confidence Limit (LCL).** A confidence interval of the median of the retentions for each charge shall be used to calculate a LCL for each production category retention sample set. A one-tailed 95% critical value shall be used when calculating the confidence interval. The resulting LCL shall be compared to the required retention using a minimum of two significant figures. The term "required retention" as used throughout this section shall be consistent with M25 Section 6.5.10~~6~~.	Approved as SUBMITTED

AWPA Standard M23-21

21F-M23-T7 Revise M23

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 24 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
569	AWPA M23 21 SECTION 3.2.2	**3.2.2 Analysis of Treated Products.** For plants that have implemented M25§6.5.~~9~~5, verify that the required percentage of samples have been submitted to the agency or chemical supplier for analysis of all active components. Verify that the documented methodology has been correctly applied to estimate the preservative retention.	Approved as SUBMITTED

AWPA Standard M25-21

21F-M25-T7 Revise M25

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 24 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
923	AWPA M25 21 SECTION 6.5.4	**6.5.4 Glued Laminated Timber.** Retention samples for Glued Laminated Timber (treated after gluing) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. For Glued Laminated Timber (laminations treated before gluing) follow guidelines in Section 4.3.1. **6.5.5 Cross Laminated Timber.** Retention samples for Cross Laminated Timber (laminations treated before gluing) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1. **6.5.6 Mechanically Fastened Timber (lamination treated before assembly).** Retention samples for Mechanically Fastened Timber (laminations treated before assembly) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly. **6.5.7 Structural Composite Lumber (LVL, PSL).** Retention samples for Structural Composite Lumber shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.5.1.	Approved as SUBMITTED
922	AWPA M25 21 SECTION 6.4.2.3	**6.4.2.4 Glued Laminated Timber.** Determination of Glued Laminated Timber (treated after gluing) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. Determination of Glued Laminated Timber (laminations treated before gluing) penetration shall be section 4.3.1. **6.4.2.5 Cross Laminated Timber.** Determination of Cross Laminated Timber (laminations treated before gluing) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1. **6.4.2.6 Mechanically Fastened Timber (lamination treated before assembly).** Determination of Mechanically Fastened Timber (lamination treated before assembly) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly. **6.4.2.7 Structural Composite Lumber (LVL, PSL).** Determination of Structural Composite Lumber penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites section 4.5.1.	Approved as SUBMITTED

921	AWPA M25 21 SECTION 6.3.3	**6.3.4 Glued Laminated Timber.** Glued Laminated Timber (treated after gluing) shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. For Glued Laminated Timber (laminations treated before gluing) follow guidelines in Section 4.3.1. **6.3.5 Cross Laminated Timber.** Cross Laminated Timber (laminations treated before gluing) shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1. **6.3.6 Mechanically Fastened Timber (lamination treated before assembly).** Mechanically Fastened Timber shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly. **6.3.7 Structural Composite Lumber (LVL, PSL).** Structural Composite Lumber shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.5.1.	Approved as SUBMITTED
567	AWPA M25 21 SECTION 12.2	**12.2 Agency inspection report.** Following each inspection visit the plant shall receive from the agency a report providing results of the products tested, the plant's status in accordance with Standard M22 and an assessment of the plant's internal quality control program in accordance with Standard M23. Details regarding any non-conformance of products, non-compliance of methods and retreatment shall be included.	Approved as SUBMITTED
566	AWPA M25 21 SECTION 12.1.1 PARA 12	**l.** Number of borings taken and any deviations to core sampling pattern	Approved as SUBMITTED
565	AWPA M25 21 SECTION 12.1.1 PARA 6	**f.** Material type, dimensions and species~~Species and type of material~~	Approved as SUBMITTED
564	AWPA M25 21 SECTION 11.1	**11.1 General.** Treated products should be stacked during storage on treated or non-decaying wood or other treated or non-decaying permanent skids of such dimensions and so arranged as to support the material without producing noticeable distortion and to permit an air space beneath the material. To ensure proper product performance, some commodities, preservative systems, or material intended for interior use may require additional storage and handling (e.g., UC 2 borate-treated wood must be protected from liquid water). Storage areas should be free of debris, decayed wood and vegetation and should have sufficient drainage to prevent treated wood products from contact with standing water.	Approved as SUBMITTED
563	AWPA M25 21 SECTION 10.2	**10.2 Kiln drying after treatment.** Treated products dried after treatment shall be tested in accordance with Section 3.4. To be labeled as "KDAT' or sold as kiln dried, the moisture content of treated lumber shall be 19% or less and of treated plywood shall be 18% or less. The sample used to determine the moisture content of the treated wood products shall not be used to determine the retention of the charge.	Approved as SUBMITTED
562	AWPA M25 21 SECTION 9 PARA 1	**9.2. Minimum Retreat Process Parameters.** Note that process limitations may vary between commodities and species and the Commodity Sections of Standard T1 should be consulted to ensure limits are not exceeded. ~~All retreatment shall be in accordance with T1 Section 6. These~~ The minimum retreat requirements are only applicable to charges where re-treatment with other process parameters cannot meet the minimum penetration and retention requirements of the applicable standards. The following process requirements for retreatment may be cumulative across multiple treatments. ~~Retreated charges shall be labeled in accordance with Standard M23 Section 3.2.4.~~	Approved as SUBMITTED
561	AWPA M25 21 SECTION 9 PARA 1	**9.1. General.** All retreatment shall be in accordance with T1 Section 6. Retreated charges shall be labeled in accordance with Standard M23 Section 3.2.4.	Approved as SUBMITTED
560	AWPA M25 21 SECTION 8 PARA 1	Charges found non-conforming for either penetration or retention shall be clearly identified as non-conforming and isolated for re-treatment in a manner that will prevent confusion with conforming charges. All non-conforming charges shall be documented as such in the plant records. All non-conforming charges shall be retreated at least one time. When non-conforming charges are retreated, they shall be documented so that they can be traced to the original charge. All retreated charges that are still non-conforming after retreatment using the ~~minimum parameters~~ Minimum Retreat Process Parameters described in ~~Paragraph~~Section 9 or any charges that have not been documented as meeting an applicable standard shall not be labeled with any reference to a retention, standard, or Use Category.	Approved as SUBMITTED
559	AWPA M25 21 SECTION 6.5.6	**6.5.610 Retention conformance.** For a charge or lot to be conforming in retention it must (1) conform to the minimum total retention required for the Use Category for which it was treated as listed in Standard U1 and in Standard T1, Section 3, Table 3.2 and (2) conform to the minimum retentions of individual components listed in Standard T1, Section 3, Table 3.2. This may be accomplished either by analysis of all components or by analysis and estimation of unanalyzed components as permitted in section 6.5.59. When multiple sets of cores are used for penetration, each set of cores shall be analyzed separately and the results averaged to obtain the final retention.	Approved as SUBMITTED
558	AWPA M25 21 SECTION 6.5.5	**6.5.59 Treating plant estimation of total retention.** For sawn materials, pressure treated wood composites ~~(plywood)~~ and other consumer products treated with waterborne preservatives containing multiple ~~active~~ biocide actives~~components~~, where at least one component is readily analyzed in each charge at the plant site, the retention of the unanalyzed component(s) and the total retention in each charge may be calculated based upon the analyzed component(s) using a documented methodology. Use of this method shall only be permitted when the plant is monitored by a third party inspection agency and the method is reviewed by the agency for its accuracy in providing production that meets all component and total retention requirements. Supporting documentation may include the use of analyzed components levels in the concentrate, treating solutions, and wood as well as charge data that can be used to estimate the retention of any unanalyzed component(s).	Approved as SUBMITTED
557	AWPA M25 21 SECTION 6.5.4	**6.5.7 Structural Composite Lumber (LVL, PSL).** Retention samples for Structural Composite Lumber shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.5.1.	Approved as SUBMITTED

556	AWPA M25 21 SECTION 6.5.4	**6.5.6 Mechanically Fastened Timber (lamination treated before assembly).** Retention samples for Mechanically Fastened Timber (laminations treated before assembly) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly.	Approved as SUBMITTED
555	AWPA M25 21 SECTION 6.5.4	**6.5.5 Cross Laminated Timber.** Retention samples for Cross Laminated Timber (laminations treated before gluing) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1.	Approved as SUBMITTED
554	AWPA M25 21 SECTION 6.5.4	**6.5.4 Glued Laminated Timber.** Retention samples for Glued Laminated Timber (treated after gluing) shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. For Glued Laminated Timber (laminations treated before gluing) follow guidelines in Section 4.3.1.	Approved as SUBMITTED
553	AWPA M25 21 SECTION 6.5.4	**6.5.84 Analysis.** Analyze the treated wood retention sample(s) from each charge using the method in an applicable AWPA analytical "A" standard referenced in the applicable AWPA preservative "P" standard for the preservative being evaluated. The preservative active(s) defined in the applicable "P" standard (except as permitted by Section 6.5.59) and the total retention shall be reported as pounds per cubic foot of wood (or kilograms per cubic meter). Standard wood densities from AWPA Standard A12 shall be used for lumber, plywood and composite wood products. If an applicable density is not listed, the density may be measured and calculated for each charge or lot. When multiple sets of cores are used for penetration, each set of 20 shall be assayed separately and averaged for the final retention.	Approved as SUBMITTED
552	AWPA M25 21 SECTION 6.5.2	**6.5.2 Plywood.** Retention samples for plywood shall be taken in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.1.3. For sapwood species, heartwood plies shall not be included in the assay.	Approved as SUBMITTED
551	AWPA M25 21 SECTION 6.5	**6.5 Retention requirements.** All charges or lots with conforming penetration shall be tested for retention in accordance with an applicable AWPA "A" standard. The required assay zone shall be cut from each set (generally 20) of cores taken for penetration and combined for analysis. When multiple sets of cores are used for penetration, each set of cores shall be analyzed separately, and the results averaged to obtain the final retention. Cores shall be included in the sample for analysis even if penetration is non-conforming or incomplete in the assay zone.	Approved as SUBMITTED
550	AWPA M25 21 SECTION 6.4.2.3	**6.4.2.7 Structural Composite Lumber (LVL, PSL).** Determination of Structural Composite Lumber penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites section 4.5.1.	Approved as SUBMITTED
549	AWPA M25 21 SECTION 6.4.2.3	**6.4.2.6 Mechanically Fastened Timber (lamination treated before assembly).** Determination of Mechanically Fastened Timber (lamination treated before assembly) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly.	Approved as SUBMITTED
548	AWPA M25 21 SECTION 6.4.2.3	**6.4.2.5 Cross Laminated Timber.** Determination of Cross Laminated Timber (laminations treated before gluing) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1.	Approved as SUBMITTED
547	AWPA M25 21 SECTION 6.4.2.3	**6.4.2.4 Glued Laminated Timber.** Determination of Glued Laminated Timber (treated after gluing) penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. Determination of Glued Laminated Timber (laminations treated before gluing) penetration shall be section 4.3.1.	Approved as SUBMITTED
546	AWPA M25 21 SECTION 6.4.2.2	**6.4.2.2 Plywood.** Determination of plywood penetration shall be in accordance with Standard T1, Commodity Section F: Pressure-Treated Wood Composites, section 4.1.2. For sapwood species, heartwood plies are not required to be penetrated.	Approved as SUBMITTED
545	AWPA M25 21 SECTION 6.4.2.1.3	**6.4.2.1.3 Heartwood species.** A minimum depth of penetration is required without regard to heartwood. Without clear evidence of preservative penetration to this depth, the core fails. In addition, the standard requires sapwood penetration beyond the minimum depth of penetration. All sapwood areas, regardless of location within the specified core length, must be assessed for clear evidence of preservative penetration. A core must meet or exceed both the required percent of treated sapwood by area requirement and the minimum depth of penetration to pass~~; otherwise it fails~~.	Approved as SUBMITTED
544	AWPA M25 21 SECTION 6.3.3	**6.3.7 Structural Composite Lumber (LVL, PSL).** Structural Composite Lumber shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.5.1.	Approved as SUBMITTED
543	AWPA M25 21 SECTION 6.3.3	**6.3.6 Mechanically Fastened Timber (lamination treated before assembly).** Mechanically Fastened Timber shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.4.1.1 for timbers not surfaced after assembly or 4.4.2.1 for timbers surfaced after assembly.	Approved as SUBMITTED
542	AWPA M25 21 SECTION 6.3.3	**6.3.5 Cross Laminated Timber.** Cross Laminated Timber (laminations treated before gluing) shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.3.1.	Approved as SUBMITTED
541	AWPA M25 21 SECTION 6.3.3	**6.3.4 Glued Laminated Timber.** Glued Laminated Timber (treated after gluing) shall be sampled in accordance with Standard T1 Commodity Section F: Pressure-Treated Wood Composites, section 4.2.1. For Glued Laminated Timber (laminations treated before gluing) follow guidelines in Section 4.3.1.	Approved as SUBMITTED
540	AWPA M25 21 SECTION 5.1	**5.1 Treating charge numbers.** ~~Each pack of lumber~~The treated material within a charge ~~-~~shall be identified with its specific charge number using durable tags, indelible marker or other means. The marking shall be clearly visible and legible after treatment to enable easy identification ~~of packs~~ for sampling and tracing. When multiple packs of material are present within a single charge, each pack shall carry the charge identifier. When packs of treated products are repackaged (such as after kiln drying, resorting, or other post-treatment processing) a unique identifier shall be applied that is traceable in the plants records to the treatment charge(s).	Approved as SUBMITTED
539	AWPA M25 21 SECTION 4.1	**4.1 Sampling.** Preservative samples should be taken from the work tank immediately after the solution is returned at the end of the pressure period. Work tanks with continuous mechanical agitation may be sampled immediately prior	Approved as SUBMITTED

		to filling ~~of~~ the cylinder. When taking the sample, adequate preservative shall be allowed to flow through the sample valve to ensure the sample is representative of the tank solution.	
538	AWPA M25 21 SECTION 3.4.2	**3.4.3 Microwave drying method.** This method may be used for determination of moisture content and should follow the oven drying method provided care is taken not to overheat or char the samples. Individual labs should conduct a drying study to develop a schedule based on type of microwave used.	Approved as SUBMITTED
537	AWPA M25 21 SECTION 3.4.2	**3.4.2 Moisture meter method.** Electrical resistance moisture meters may be used for verification of wood moisture content prior to treatment using insulated needles of proper length for the material being tested. Readings shall be corrected for wood species (and temperature if hot from a kiln or cold from outdoor storage) in accordance with the manufacturer's instructions. Information on meter types, standardization and calibration may be found in ASTM D4444. For composite wood products, additional information may be required from product manufacturers on calibration charts due to densification, glue lines, etc., which may impact the accuracy of moisture meters. For verification of moisture content of treated lumber or members that are kiln dried after treatment (KDAT/DAT) or air dried after treatment (ADAT/DAT) insulated pins should be driven to 1/5 of the thickness in enough pieces to provide adequate indication of moisture content. Moisture meter readings over 25 percent may be less accurate. If 15% or more of the pieces have moisture readings over 25%, the oven-drying method should be used to determine moisture content.	Approved as SUBMITTED
536	AWPA M25 21 SECTION 3.4.1 [Table Data]	M = percent moisture content W = original weight of the wood and w = weight of the wood after oven-drying at 10~~1~~3±2°C (21~~5~~7±4°F) to a constant weight.	Approved as SUBMITTED
535	AWPA M25 21 SECTION 3.4	**3.4 Moisture content sampling.** Plant quality control personnel shall sample the moisture content of representative materials to be treated. Moisture content may be determined with a moisture meter, ~~or by~~ the oven-drying method, or the microwave drying method. Material with moisture content elevated to the degree that it will prevent achieving the required penetration during treatment should be rejected and isolated for further drying. Wood rejected for high moisture content may be air or kiln dried and accepted for treatment when reinspection shows it is acceptable. The plant may choose to treat any material, regardless of moisture content but must still meet all preservative penetration and retention requirements.	Approved as SUBMITTED
534	AWPA M25 21 SECTION 2.2	**2.2 Tanks.** There shall be available calibration tables for all tanks in which preservative is measured which indicate the source of the table. Tanks that have been damaged or altered shall be re-calibrated and recertified. Tank levels may be measured by any type of suitable mechanical or electronic device. Calibration of electronic devices shall be verified not less than annually, but more frequently if required. Weight (pressure) sensors shall be recalibrated when the type of preservative or solution concentration in the tank is substantially changed. To verify a tank measuring device, physically measure the height of solution at three levels, over a range of at least one-half the volume of the tank and determine the volume of solution at each level from the tank calibration table. The readings for electronic level devices shall not vary by more than 2% from the calibration table volumes.	Approved as SUBMITTED
533	AWPA M25 21 SECTION 2.1	**2.1 Recording equipment and gauges.** Pressure retorts shall be equipped with devices to record the time, pressure, vacuum and temperature (when treated at elevated temperatures) during each treating cycle. Retorts shall have separate and visible pressure, vacuum and temperature gauges separate from the recording instruments to ~~verifying~~verify accuracy of the recording equipment. Work tanks shall also have a temperature indicator when preservatives are stored at elevated temperatures. Records shall be kept in the following SI or US Customary units.	Approved as SUBMITTED
532	AWPA M25 21 SECTION 2 PARA 1	Treating plants shall have, and maintain in good working order and calibration, the plant equipment and instrumentation necessary to produce treated wood products in accordance with the requirements of applicable AWPA standards. A laboratory shall be equipped and maintained in good working order and calibrated properly ~~calibration~~ to test ~~the~~ preservative solutions and treated wood products~~as required~~.	Approved as SUBMITTED
531	AWPA M25 21 SECTION 1.3	**1.3 Inspection agency.** An independent agency accredited by ALSC in its treated wood program shall be contracted to maintain an ongoing quality auditing program at the treating plant. Treated wood products shall be sampled, tested and evaluated in accordance with this standard and applicable sections of other AWPA Use Category and Quality Control Standards. Plant inspection data for penetration and retention results shall be evaluated in accordance with AWPA Standard M22. Plant facilities, methods, marking and other aspects of production shall be assessed in accordance with AWPA Standard M23. The agency is not responsible for the quality of treated products; it is responsible for carrying out the monitoring program in accordance with applicable standards and its program requirements.	Approved as SUBMITTED
530	AWPA M25 21 SECTION SCOPE: PARA 1	This standard provides procedures for quality control and inspection at wood preserving plants of residential and commercial products, including but not limited to lumber, timbers, and ~~plywood~~certain pressure treated wood composites such as plywood, glue laminated timber, cross laminated timber, mechanically fastened timber, and structural composite lumber. These products are generally treated without a written specification from the end user and are generally supplied through retail lumber dealers and home centers to consumers and contractors for use in residential and commercial construction. This standard contains minimum requirements for the treating plant quality control and inspection agencies to monitor the treating plant and process, sample treated products and determine conformance to the applicable portions of Standards U1 and T1.	Approved as SUBMITTED

AWPA Standard M3-16

21F-M3-T7 Reaffirm without Revision

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 22 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
528	AWPA M3 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-8

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	31
Number of Eligible Voters:	24
Number of Eligible Ballots Received:	21
Ballot Return Percentage:	87.5%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard T1 Section J-21

21F-T1J-T8 Revise T1sJ

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 20 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>821</td><td>AWPA T1 SECTION J 21 SECTION TABLE J3 [Table Data]</td><td>
<table>
<tr><td rowspan="2">Parameters</td><td colspan="3">WOOD COMPOSITE TYPE</td></tr>
<tr><td colspan="2">Laminated Strand Lumber (LSL)</td><td>Oriented Strand Board (OSB)</td><td>Engineered Wood Siding</td></tr>
<tr><td>Preservative</td><td colspan="2">Zinc Borate, powder and aqueous dispersion</td><td>Zinc Borate Powder</td><td>Zinc Borate Powder</td></tr>
<tr><td rowspan="3">Minimum Retention</td><td>Decay</td><td>Termites</td><td>Decay and Termites</td><td>Decay and Termites</td></tr>
<tr><td>0.75% by weight of Zinc Borate (P51) ~~based on average of 3 cross section cores~~</td><td>0.90% by weight of Zinc Borate (P51) ~~based on average of 3 cross section cores~~</td><td rowspan="2">0.88% by weight of Zinc Borate (P51)

Retention based on an average of 3 samples obtained at approximately 4 hour intervals during a 12-hour shift</td><td rowspan="2">1.0% by weight of Zinc Borate (P51)

Retention based on an average of 3 samples obtained at approximately 4 hour intervals during a 12-hour shift</td></tr>
<tr><td colspan="2">Retention based on rolling average of 3 samples obtained at approximiately 4-hour production intervals. Each sample shall</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
</table>

	comprise of 3 full-thickness core specimens		
Assay Zone	Full cross-section		
Minimum Penetration	Full cross-section		
Manufacturing Process	Steam Injection Press	Oil-heated, multi-opening press	Oil-heated, multi-opening press
Process Limitations	See Note (1)	See Note (1)	See Note (1)
Treatment Method	In-process blending		
Adhesive Type	100% pMDI	Liquid or powdered PF, or pMDI	pMDI
Wood Species	50 to 100% aspen (*Populus spp.*), or yellow-poplar (*Liriodendron tulipifera*) or cucumbertree (*Magnolia acuminata.*) or red maple (*Acer rubrum*) with up to 50% sycamore (*Platanus occidentalis*) and up to 25% birch (*Betula spp.*) and up to 13% beech (*Fagus grandifolia*)	100% southern pine (*Pinus* spp.) Or 80 to 100% trembling aspen (*P. tremuloides*) with up to 20% ash (*Fraxinus* spp.), maple (*Acer* spp.), birch (*B. papyrifera*), basswood (*T. americana*), or balsam poplar (*P. balsamifera*) and/or up to 10% spruce (*Picea* spp.), pine (*Pinus* spp.) or balsam fir (*A. balsamea*) Or 50 to 100% Lodgepole Pine (*Pinus contorta*) with up to 45% of trembling aspen (*Populus tremuloides*) and/or up to 10% of Western White birch (*Betula papyrifera*), Engelmann Spruce (*Picea engelmannii*), White Spruce (*Picea glauca*), Jack Pine (*Pinus banksiana*), Balsam fir (*A. balsamea*), subalpine fir (*Abies lasiocarpa*), Douglas fir (*Pseudotsuga menziesii*), Black Cottonwood (*Populus trichocarpa*), Ponderosa pine (*Pinus ponderosa*), Mountain Hemlock (*Tsuga mertensiana*) and/or Balsam Poplar (*Populus balsamifera*).	75 to 100% trembling aspen (*Populus tremuloides*) with up to 25% paper birch (*B. papyrifera*), basswood (*T. americana*), balsam poplar (*P. balsamifera*), and/or balsam fir (*A. balsamea*)
Wood Element Geometry	Approximately 200 mm long, 12-19 mm wide, and 0.88-1.27 mm thick	Approximately 75-150 mm long, 3-40 mm wide, and 0.25-0.75 mm thick	Approximately 75-100 mm long, 3-40 mm wide, and 0.25-0.75 mm thick
Service Conditions	Weather Protection (e.g. coating, laminate, cladding) Required for UC3A		
Use Category Limit	UC1, UC2, UC3A	UC1, UC2, UC3A	UC1, UC2, UC3A

AWPA Standard U1 COMM SPEC F-21

21F-U1F-T8 Revise U1csF

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 20 Yes, 0 No, and 1 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

<table>
<tr><th>▼ID</th><th>Item</th><th>Proposed Change</th><th>Committee Status</th></tr>
<tr><td>911</td><td>AWPA U1 COMM SPEC F 21 SECTION 3.0</td><td>4.0 Special Requirements:
Some applications of treated wood have unique requirements for preservatives, species and process limitations of specific commodities. These include the following:

4.1 Plywood for Permanent Wood Foundation (PWF) UC4B Retentions. Permanent wood foundations are constructed under the jurisdiction of building codes and may require code approved quality marks. Use of stainless steel fasteners is recommended for PWF.

4.1.1 Allowable Species and Preservatives

Species — Preservatives
Plywood, softwood — ACQ-B, ACQ-C, ACQ-D, ACZA, CA-B, CA-C, CCA-C, MCA, MCA-C

4.1.2 Drying After Treatment. Drying of Permanent Wood Foundation plywood after treatment is required to assure dimensional stability and structural strength. The moisture content in each piece of permanent wood foundation plywood shall not exceed 18%. The moisture content limit for PWF plywood may not be waived.

4.1.3 Grade. Permanent Wood Foundation plywood shall conform to U.S. Product Standard PS 1 or PS 2 with exterior glue and softwood plies only. Plywood shall bear the mark of or have a certificate of inspection issued by a qualified plywood inspection agency.

4.1.4 Marking. Each piece of plywood treated as Permanent Wood Foundation material under AWPA Standards shall be marked by a qualified inspection agency to identify the preservative, retention, Use Category (UC) level, year of treatment, and the producer. The material also shall be marked as Permanent Wood Foundation and have the notation ADAT or KDAT to show the plywood has been dried after treatment.</td><td>Approved as SUBMITTED</td></tr>
<tr><td>886</td><td>AWPA U1 COMM SPEC F 21 SECTION 3.2B PRESERVATIVE RETENTIONS (PCF) --- STRUCTURAL GLUED LAMINATED TIMBER (TREATED AFTER GLUING) [Table Data]</td><td>
<table>
<tr><th></th><th colspan="9">Preservative Systems</th></tr>
<tr><th>USE CATEGORY Species</th><th>CR[a] (Creosote)</th><th>CR-S[a]</th><th>CR-PS[a]</th><th>DCOI-A</th><th>PCP-A[a] PCP-C[a]</th><th>Cu8[a]</th><th>CuN[a]</th><th>IPBC/PER[c]</th><th>ACZA</th></tr>
<tr><td colspan="10">UC1, UC2, UC3A, UC3B</td></tr>
<tr><td>Southern Pine</td><td>8.0</td><td>8.0</td><td>8.0</td><td>#0.10</td><td>0.30</td><td>0.020</td><td>0.040</td><td>0.055</td><td>#</td></tr>
<tr><td>Coastal Douglas-fir</td><td>8.0</td><td>8.0</td><td>8.0</td><td>0.10</td><td>0.30</td><td>#</td><td>0.040</td><td>0.055</td><td>0.30</td></tr>
<tr><td>Western Hemlock, Hem-Fir</td><td>8.0</td><td>8.0</td><td>8.0</td><td>#</td><td>0.30</td><td>0.020</td><td>0.040</td><td>0.055</td><td>#</td></tr>
<tr><td>Red Oak</td><td>7.0</td><td>7.0</td><td>7.0</td><td>#</td><td>#</td><td>#</td><td>#</td><td>#</td><td>#</td></tr>
<tr><td>Red Maple, Yellow Poplar</td><td>8.0</td><td>8.0</td><td>8.0</td><td>#</td><td>#</td><td>#</td><td>#</td><td>#</td><td>#</td></tr>
<tr><td colspan="10">UC4A</td></tr>
<tr><td>Coastal Douglas-fir</td><td>10.0</td><td>10.0</td><td>10.0</td><td>0.20</td><td>0.60</td><td>#</td><td>0.060</td><td>#</td><td>0.60</td></tr>
<tr><td>Southern Pine</td><td>10.0</td><td>10.0</td><td>10.0</td><td>#0.20</td><td>0.60</td><td>#</td><td>0.060</td><td>#</td><td>#</td></tr>
<tr><td>Western Hemlock, Hem-Fir</td><td>10.0</td><td>10.0</td><td>10.0</td><td>#</td><td>0.60</td><td>#</td><td>0.060</td><td>#</td><td>#</td></tr>
</table>
</td><td>Approved as SUBMITTED</td></tr>
</table>

			Red Oak	8.5	8.5	8.5	#	#	#	#	#	#		
			Red Maple, Yellow Poplar	10.0	10.0	10.0	#	#	#	#	#	#		
			UC4B, UC4C[(b)]											
			Southern Pine	12.0	12.0	#	#0.20	0.60	#	0.075	#	#		
			Coastal Douglas-fir	12.0	12.0	12.0	0.20	0.60	#	0.075	#	0.60		
884	AWPA U1 COMM SPEC F 21 SECTION 3.2A PRESERVATIVE RETENTIONS (KG/M3) --- STRUCTURAL GLUED LAMINATED TIMBER (TREATED AFTER GLUING) [Table Data]			**Preservative Systems**										Approved as SUBMITTED
			USE CATEGORY Species	**CR[(a)] (Creosote)**	**CR-S[(a)]**	**CR-PS[(a)]**	**DCOI-A**	**PCP-A[(a)] PCP-C[(a)]**	**Cu8[(a)]**	**CuN[(a)]**	**IPBC/PER[(c)]**	**ACZA**		
			UC1, UC2, UC3A, UC3B											
			Southern Pine	128	128	128	#1.6	4.8	0.32	0.64	0.88	#		
			Coastal Douglas-fir	128	128	128	1.6	4.8	#	0.64	0.88	4.8		
			Western Hemlock, Hem-Fir	128	128	128	#	4.8	0.32	0.64	0.88	#		
			Red Oak	112	112	112	#	#	#	#	#	#		
			Red Maple, Yellow Poplar	128	128	128	#	#	#	#	#	#		
			UC4A											
			Coastal Douglas-fir	160	160	160	3.2	9.6	#	0.96	#	9.6		
			Southern Pine	160	160	160	#3.2	9.6	#	0.96	#	#		
			Western Hemlock, Hem-Fir	160	160	160	#	9.6	#	0.96	#	#		
			Red Oak	136	136	136	#	#	#	#	#	#		
			Red Maple, Yellow Poplar	160	160	160	#	#	#	#	#	#		
			UC4B, UC4C[(b)]											
			Southern Pine	192	192	#	#3.2	9.6	#	1.2	#	#		
			Coastal Douglas-fir	192	192	192	3.2	9.6	#	1.2	#	9.6		
829	AWPA U1 COMM SPEC F 21 SECTION 2.8 PARA 1		**NOTE:** Plywood treated for **Marine application (salt water)** is shown in Commodity Specification G. ~~Plywood treated for **Permanent Wood Foundation (PWF)** is shown in Commodity Specification A, Special Requirements 4.2.~~											Approved as SUBMITTED

American Wood Protection Association
Protecting Wood Since 1904

BALLOT RESULTS
AWPA Technical Committee T-11

Ballot Opening/Closing Dates:	10/19/2021 to 11/18/2021
Items Subject to Recirculation:	N/A
Recirculation Ballot Opening/Closing:	N/A
Total Number Committee Members:	26
Number of Eligible Voters:	22
Number of Eligible Ballots Received:	15
Ballot Return Percentage:	68.2%
Deadline for Appeals:	N/A – No Unresolved Objections

AWPA Standard M21-16

21F-M21-T11 Reaffirm without Revision M21

Committee Meeting Action: Unanimously authorized letter ballot as submitted.

Letter Ballot Results: Passed unanimously as submitted with 15 Yes, 0 No, and 0 Abstain.

Executive Committee Final Action: Ratified and made effective upon publication of the 2022 Book of Standards.

▼ID	Item	Proposed Change	Committee Status
587	AWPA M21 16	**Additional Comment:** Reaffirm without Revisions	Approved as SUBMITTED