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AMERICAN WOOD-PRESERVERS' ASSOCIATION
STANDARD

(This Standard is under the jurisdiction of AWPA Committee P-3)

P9-91

STANDARDS FOR SOLVENTS AND FORMULATIONS FOR ORGANIC PRESERVATIVE SYSTEMS

Note: Standard P9-87 consists of three pages dated as follows: Pgs. 1-3, 1987.

Note: The ASTM Standards referred to herein may be obtained from the American Society for Testing Materials, 1916 Race Street, Philadelphia, Pa. 19103.

1. Hydrocarbon Solvent, Type A for preparing solutions of oil-borne preservatives such as pentachlorophenol and copper naphthenate shall be composed of petroleum distillates, or a blend of petroleum distillates and co-solvents provided that the blended solvent meets the following requirements:

1.1 Distillation, ASTM Standard D-86, total volume of fractions:

1.1.1 50% volume distilling point—490° F. minimum.

1.1.2 90% volume distilling point—585° F. minimum.

1.2 Viscosity of the oil fraction undistilled above 500° F. from a 100 ml ASTM Standard D-86 distillation—Kinematic viscosity, cSt @ 100° F., ASTM Standard D-445—3.46 min. (equivalent SSU viscosity @ 100° F.—37.5 min., ASTM Standard D-88).

1.3 Flash Point, PMCC, ASTM Standard D-93 —150° F. minimum.

1.4 Solvency, grams of pentachlorophenol soluble at 75 degrees F. (see Standard A5, Sect. 4)

1.4.1 In 90 grams of whole oil—10 grams minimum.

1.4.2 In the oil fraction undistilled above 500°F from a 100 ml ASTM Standard D-86 distillation—6 grams minimum.

1.5 Water and Sediment, percent, B.S.&W., ASTM Standard D-96—0.5 maximum.

Note 1: If any co-solvents used are chlorinated solvents, they should not be distilled in a copper distillation apparatus, and the Lime Ignition method should not be used for boring assay.

Note 2: Any co-solvents used shall meet the following requirements on water solubility:

A. The co-solvent shall not be completely water soluble.

B. The co-solvent shall be permitted to have solubility in water to the extent that upon saturation, the solubility of pentachlorophenol in the total preservative blend shall not be affected and that emulsions do not result that would preclude its use.

C. The co-solvent shall not induce leaching of pentachlorophenol from the total preservative blend as determined by the method in Standard A5, Paragraph 8. The amount of pentachlorophenol found in the test sample shall not be less than that found in the control.

Note 3: When hydrocarbon solvent Type A is used to treat species that require steam conditioning (such as southern pine), it is recommended that the solvent have a maximum specific gravity of 0.910 at 60 degrees F. (minimum API gravity 24), ASTM Standard D-287. This will help avoid the formation of oil-water emulsions.

Note 4: When copper naphthenate is used, the penta solvency requirement in Section 1.4 may be deleted.

2. Hydrocarbon Solvent, Type B (Volatile Petroleum Solvent—LPG) for preparing solutions of pentachlorophenol, copper naphthenate and Copper-8-Quinolinolate, shall conform to the following requirements:

2.1 Vapor pressure @ 100 degrees F., ASTM Standard D-1287—200 psig maximum.

2.2 Distillation, ASTM Standard D-1837.

2.2.1 95 percent volume distilling point—36° F. maximum.

2.3 Auxiliary Solvent.

2.3.1 The auxiliary solvent not to exceed five percent of the total volume of the combined solvent and which will not increase the 95 percent boiling point of the liquefied petroleum gas above 36 degrees F., may be used providing its dry point shall be not more than 160 degrees F. by test method ASTM Standard D-1078.

Note: In using pentachlorophenol dissolved in the type of solvent described above, the usual requirement for solution concentration does not apply. The wood is treated using a full cell process and the retention is controlled by adjusting solution concentration. Results of treatment, with respect to retention, are determined either by assaying the treated wood or by inventorying the preservative in solution before and after a charge.

3. Hydrocarbon Solvent, Type C (Light Hydrocarbon Solvent with Auxiliary Solvent).

Petroleum solvent for preparing solutions of pentachlorophenol shall be composed of the following

solvents conforming to the respective indicated requirements:

3.1	Light Petroleum Solvent[1]	
3.11	Gravity, °API at 60° F (D-287)	40.9 min.
3.12	Gravity, Spec. at 60° F (by conversion)	0.820 max.
3.13	Color (D-1500)	1 max.
3.14	Flash TCC, °F (D-56)	80 min.
3.15	Distillation, °F (D-86)	
	IBP	360 max.
	EP	415 max.
3.16	Doctor Test (D-484)	Negative

3.2 Auxiliary Solvent

3.21 An auxiliary or co-solvent shall be used with the Light Petroleum Solvent and pentachlorophenol but shall not exceed 10% of the total volume of the combined solvents. The combination of the auxiliary solvent and Light Petroleum Solvent shall have the following properties:

(a) Viscosity: Kin. vis. cSt. at 100° F. (D 445)	5.8 max.
(Equiv. SUS vis. at 100° F. = 45 max. by ASTM D-88.)	
(b) Flash, TCC °F (D-56)	80 min.

3.22 Anti-Blooming. The auxiliary solvent shall have such properties and shall be used at such concentrations to prevent "blooming". Blooming is defined as formation of visible penta crystals on any surface of the treated wood within a period of two days after completion of treatment.

3.23 Water Solubility of Auxiliary Solvent. (Standard A5, Par. 9)—Interface not less than 49.5 ml; not more than 50.5 ml.

3.3 For Solubilized Copper-8-Quinolinolate and Copper Naphthenate solutions the auxiliary solvent need not be used.

4. Hydrocarbon Solvent, Type D (Chlorinated Hydrocarbon Solvent-Inhibited Grade of Methylene Chloride) for preparing solutions of pentachlorophenol, shall conform to the following requirements:

4.1	Distillation Range, °C @ 760 mm Hg	39 min.
	ASTM D 1078-49T	40 max.
4.2	Specific Gravity, 25/25°C	1.314 min.
	ASTM D 2111B-71	1.319 max.
4.3	Color, APHA	
	ASTM D 2108-64	15 max.
4.4	Water Content, ppm	
	ASTM D 1364-64	100 max.
4.5	Nonvolatile Matter, ppm	
	ASTM D 2109-71	10 max.
4.6	Acidity as HCl, percent	
	ASTM D 1613-66	0.001 max.
4.7	Acid Acceptance, percent	
	ASTM D 2107-68	0.03 min.

5. System Type E for Preparation of Solutions of Pentachlorophenol and Dispersions of these in Water.

5.1 Definitions

5.1.1 The "organic solvent" is defined as the solvent for the pentachlorophenol as defined in paragraph 5.3.

[1] For treatment of lumber, the distillation E.P. shall be 375° F. max.

5.1.2 "Penta concentrate" is defined as a solution of pentachlorophenol in the "organic solvent".

5.1.3 The "dispersing agent" is defined as the substance that, when mixed with the "penta concentrate" causes that "penta concentrate" to disperse easily when mixed into water.

5.1.4 The "dispersible concentrate" is the "penta concentrate" mixed with the "dispersing agent" in the proper proportions for use.

5.1.5 The "treating mixture" is the resulting liquid after the "dispersible concentrate" has been mixed with water and the system is ready for use.

5.2 Specifications of Pentachlorophenol

Pentachlorophenol used in the water dispersible system shall meet the requirements of AWPA Standard P8.

5.3 Specifications of the "Organic Solvent"

5.3.1 The solvent for preparing the solutions of pentachlorophenol shall be composed of petroleum distillates, or a blend of petroleum distillates and co-solvents provided that the blended solvent meets the following requirements:

5.3.1.1 Distillation, ASTM Standard D-86, total volume of fractions:

5.3.1.1.1 50% volume distilling point — 490°F minimum.

5.3.1.1.2 90% volume distilling point — 585°F minimum.

5.3.1.2 Viscosity of the solvent fraction undistilled above 500°F from a 100 ml ASTM Standard D-86 distillation—Kinematic viscosity, cSt @ 100°F, ASTM Standard D-445—3.46 min. (equivalent SSU viscosity @ 100°F—37.5 min., ASTM Standard D-88).

5.3.1.3 Flash Point, PMCC, ASTM Standard D-93—150°F minimum.

5.3.1.4 Solvency, grams of pentachlorophenol soluble at 75°F. (See Standard A5, Sect. 4) In the solvent fraction undistilled above 500°F from 100 ml ASTM Standard D-86 distillation—6 grams minimum.

5.3.1.5 Water and Sediment, percent, B.S. & W., ASTM Standard D-96—0.5 maximum.

Note 1: If any co-solvents used are chlorinated solvents, they should not be distilled in a copper distillation apparatus, and the Lime Ignition method should not be used for boring assay.

Note 2: Any co-solvents used shall meet the following requirements on water solubility:

A. The co-solvent shall not be completely water soluble.

B. The co-solvent shall not include leaching of pentachlorophenol from the total preservative blend as determined by the method in Standard A5, Paragraph 8. The amount of pentachlorophenol found in the test sample shall not be less than that found in the control.

5.4 Specifications of the "Dispersing Agent"

The "dispersing agent" shall be composed on alkyl aryl sulfonates containing C-8 to C-16 alkyl chains with at least 90% in the C-10 to C-14 range. Co-surfactants shall not exceed 30% by weight of the total active sulfonates.

5.5 Requirements of the "Dispersible Concentrate"

5.5.1 The "dispersible concentrate" shall show no signs of penta crystallization while standing at 40°F (test method shown in Appendix A).

5.5.2 The "dispersible concentrate" shall blend easily with water. (Mixing test method shown in Appendix B).

5.6 Requirements of the "Treating Mixture"

5.6.1 The "treating mixture" shall show no signs of penta crystallization at 40°F (test method shown in Appendix A).

5.6.2 The "treating mixture" shall be stable when tested by the method in Appendix C (Mixing test in Appendix B can be used to form mixture for stability test).

5.6.3 The pH of the treating mixture shall not exceed 7.5.

5.6.4 The treating mixture shall not produce blooming on treated wood.

6. Hydrocarbon Solvent Type F for non-pressure treatment. Petroleum solvent for preparing solutions of preservatives shall be composed of the following solvents conforming to the respective indicated requirements.

6.1 Light Petroleum Solvent

6.11	Gravity, API @ 60 F (D-287)	57 min.
6.12	Gravity Spec. @ 60 F (D-891)	0.7275 min.
6.13	Color (D-158)	30 min.
6.14	Flash point (F), T.C.C. (D-56)	<20 min.
6.15	Distillation (F) (D-86)	
	IBP	360 max.
	EP	415 max.
6.16	Sulfur H_2S/Doctor (D-484)	Negative

APPENDIX A
TEST METHOD FOR CRYSTALLIZATION

A 100 ml sample to be tested is poured into a stopper-type 100 ml graduated cylinder. A seed crystal of pentachlorophenol is added to the sample. The stopper is then placed on the graduate and the graduate is placed in a conventional refrigerator compartment (normally maintained at 40°F). The sample is allowed to rest undisturbed for four hours. After the four hour chilling cycle is complete, the test sample is removed from the refrigerator and allowed to warm up to room temperature (75°F to 78°F) for at least two hours. After the sample has set undisturbed for this warmup period, it is visually examined to see if any additional crystals are present. If any additional penta crystals are present, the sample fails. If not, the chill warm cycles are repeated four more times. No signs of additional penta crystals after five complete cycles indicates satisfactory results.

APPENDIX B
MIXING TEST

1. Put 85 ml of water to be used in preparing the treating mixture into a stopper-type 100 ml graduated cylinder.

2. Adjust the temperature of the water in the graduate and the sample of dispersible concentrate to be tested to between 65°F and 95°F.

3. Slowly pour 15 ml of dispersible concentrate into the water without allowing the dispersible concentrate to contact the sides of the graduate. Dispersion formation should occur immediately as the dispersible concentrate contacts the water.

4. Place the stopper on the graduate and invert the cylinder 3 times shaking slightly with each inversion.

5. The treating mixture in the cylinder should now be homogeneous in appearance and ready for use.

Note: This procedure can be used to form the treating mixture for the stability test.

APPENDIX C
STABILITY TEST FOR TREATING MIXTURES

1. To test a treating mixture freshly prepared from the dispersible concentrate, prepare a treating mixture as in the Mixing Test (Appendix B). Allow the sample to sit undisturbed for 12 hrs. Maintain the temperature between 65 and 95°F.

2. For used treating mixtures, obtain a 100 ml sample in a stoppered 100 ml graduate cylinder. Shake the cylinder 10 times to obtain a homogeneous liquid. Allow the sample to sit undisturbed for twice the length of time required for the pressure period of the treating cycle.

3. After the settling period, obtain a sample from the top 5 ml of the undisturbed dispersion.

4. Shake the cylinder vigorously for 60 sec., and immediately obtain a sample of the shaken dispersion.

5. Analyze both samples for pentachlorophenol. The penta concentration of the settled sample should be within 10 percent of the penta concentration of the shaken sample.

NOTE:

After 1991, Solvent Types B and D, as used with pentachlorophenol will be removed, without prejudice, for lack of use.