ROHM AND HAAS COMPANY
INDEPENDENCE MALL WEST
PHILADELPHIA, PENNSYLVANIA 19105

STAIN RESISTANT PRIMERS FOR WOOD BASED ON RHOPLEX AC-388 ACRYLIC EMULSION

FORMULATIONS PR-88-4, PR-88-4A, PR-88-5 PR-88-5A, PR-88-6, PR-88-6A

INTRODUCTION

Stain resistant wood primer formulations containing basic lead silicate or dibasic lead phosphite are now available based on Rhoplex AC-388. The method used to control the leaching of water-soluble stains from wood was developed originally with Rhoplex AC-34 acrylic emulsion and basic lead silicate in the primer pigmentation.

In such systems, the lead-containing pigment apparently reacts with organic colorants leached from the wood to form insoluble substances. In laboratory tests, dibasic lead phosphite appears to be more efficient than basic lead silicate in holding out stains. Primers containing diabasic lead phosphite are whiter than basic lead silicate-containing primers, which discolor. The discoloration is not generally transmitted to the emulsion topcoat paint applied over it. In some cases, however, basic lead silicate may require the use of two coats, whereas this has not been necessary in tests with dibasic lead phosphite primers.

These stain resistant primer formulations can be used on practically any type of bare wood with good results, including cedar, redwood, cypress, yellow pine, white pine, fir and plywood.

NOTES ON FORMULATIONS

There are two grades of basic lead silicate commonly used in stain resistant primers of this type: EP-202 made by the Eagle-Picher Industries, Inc. and Oncor 45X (Green Seal) made by the National Lead Company. It should be noted that the bulking values of these two grades are quite different. Therefore, it is necessary to use different levels of calcium carbonate to maintain a 30 percent PVC paint.

Dyphos PG made by the National Lead Company is the grade of dibasic lead phosphite used in formulations PR-88-4 and PR-88-4A. It is used at a level of 75 pounds. At this time, we have no stability or exterior durability data on these two recently developed formulations.

Alkyd modified formulations are presented for each type of lead pigment. The long oil alkyd replaces 12 percent of Rhoplex AC-388 on a volume solids basis. We have found no significant differences in properties between modified and unmodified primers, if alkyd modification is kept at, or below, 12 percent.

TABLE 1 – STAIN RESISTANT PRIMERS FOR WOOD MADE WITH RHOPLEX AC-388 AND DYPHOS PG

Materials	Formulation PR-88-4		Formulation PR-88-4A	
	Pounds	Gallons	Pounds	Gallons
Water	60.3	7.24	60.3	7.24
Ethylene glycol	30.0	3.22	30.0	3.22
Hydroxyethyl cellulose (2.5% solution)	80.0	9.75	80.0	9.75
Tamol 850 (30%)	8.5	0.85	8.5	0.85
Preservative (57% mercury)	1.8	0.11	1.8	0.11
Antifoamer	1.0	0.13	1.0	0.13
Dibasic lead phosphite: Dyphos PG	75.0	1.50	75.0	1.50
Non-chalking rutile titanium dioxide	150.0	4.56	150.0	4.56
Calcium carbonate	125.1	5.68	125.1	5.68
Grind the above materials in a high-speed mill (Cowles, 3800 to 4500 feet per minute for 10 to 15 minutes) and let down, at a slower speed, as follows:				
Rhoplex AC-388 (50%)	498.9	56.68	439.0	49.87
Long oil alkyd*	–	–	26.7	3.20
Antifoamer	1.0	0.13	1.0	0.13
Pine oil	10.0	1.08	5.0	0.55
Propylene glycol	30.0	3.23	30.0	3.23
Water and/or hydroxyethyl cellulose (2.5%)	48.1	5.84	83.1	9.98
	1119.7	100.00	1116.5	100.00
*Drier treated with 0.5% by weight of 6% cobalt, 0.5% of 6% manganese, and 1.4% of 24% lead, prior to incorporation of alkyd.				
Physical Constants				
Pigment volume content	30.5%		30.5%	
Solids: Volume	38.4%		38.4%	
Weight	53.5%		53.5%	
Approximate pH	9.4 to 9.7		9.4 to 9.7	
Approximate viscosity: (Krebs Units)				
Initial	70 to 76		70 to 76	
Equilibrated	80 to 84		80 to 84	
Approximate raw material cost	$2.03/gallon		$2.02/gallon	

TABLE 2 – STAIN RESISTANT PRIMERS FOR WOOD MADE WITH RHOPLEX AC-388 AND ONCOR 45X

Materials	Formulation PR-88-5		Formulation PR-88-5A	
	Pounds	Gallons	Pounds	Gallons
Water	40.0	4.80	40.0	4.80
Tamol 850 (30%)	6.5	0.65	6.5	0.65
Potassium tripolyphosphate	1.5	0.07	1.5	0.07
Antifoamer	1.0	0.13	1.0	0.13
Ethylene glycol	35.0	3.76	35.0	3.76
Preservative (57% mercury)	1.8	0.11	1.8	0.11
Hydroxyethyl cellulose (2.5% solution)	80.0	9.75	80.0	9.75
Basic lead silicate National Lead, Oncor 45X	125.0	3.75	125.0	3.75
Non-chalking rutile titanium dioxide	150.0	4.56	150.0	4.56
Silica	69.4	3.15	69.4	3.15
Grind the above materials in a high-speed mill (Cowles, 3800 to 4500 feet per minute for 10 to 15 minutes) and let down, at a slower speed, as follows:				
Rhoplex AC-388 (50%)	498.9	56.68	438.6	49.80
Long oil alkyd*	–	–	26.7	3.20
Antifoamer	1.0	0.13	1.0	0.13
Tributyl phosphate	12.4	1.53	10.9	1.34
Water and/or hydroxyethyl cellulose (2.5%)	80.4	10.93	112.3	14.80
	1102.9	100.00	1099.7	100.00
*Drier treated with 0.5% by weight of 6% cobalt, 0.5% of 6% manganese, and 1.4% of 24% lead, prior to incorporation of alkyd.				
Physical Constants				
Pigment volume content	30.0%		30.0%	
Solids: Volume	38.1%		38.1%	
Weight	53.3%		53.2%	
Approximate pH	9.4 to 9.7		9.4 to 9.7	
Approximate viscosity: (Krebs Units)				
Initial	74 to 78		74 to 78	
Equilibrated	80 to 84		80 to 84	
Approximate raw material cost	$1.78/gallon		$1.77/gallon	

TABLE 3 – STAIN RESISTANT PRIMERS FOR WOOD MADE WITH RHOPLEX AC-388 AND EAGLE-PICHER 202

Materials	Formulation PR-88-6		Formulation PR-88-6A	
	Pounds	Gallons	Pounds	Gallons
Water	40.0	4.80	40.0	4.80
Tamol 850 (30%)	5.0	0.50	5.0	0.50
Antifoamer	1.0	0.13	1.0	0.13
Ethylene glycol	35.0	3.76	35.0	3.76
Preservative (57% mercury)	1.8	0.11	1.8	0.11
Hydroxyethyl cellulose (2.5% solution)	80.0	9.75	80.0	9.75
Basic lead silicate:				
Eagle-Picher, EP-202	125.0	2.32	125.0	2.32
Non-chalking rutile titanium dioxide	150.0	4.56	150.0	4.56
Silica	100.9	4.58	100.9	4.58
Grind the above materials in a high-speed mill (Cowles, 3800 to 4500 feet per minute for 10 to 15 minutes) and let down, at a slower speed, as follows:				
Rhoplex AC-388 (50%)	498.9	56.68	438.6	49.80
Long oil alkyd*	–	–	26.7	3.20
Antifoamer	1.0	0.13	1.0	0.13
Tributyl phosphate	12.4	1.53	10.9	1.34
Water and/or hydroxyethyl cellulose (2.5%)	88.8	10.75	120.7	14.62
	1143.8	100.00	1140.6	100.00
*Drier treated with 0.5% by weight of 6% cobalt, 0.5% of 6% manganese, and 1.4% of 24% lead, prior to incorporation of alkyd.				
Physical Constants				
Pigment volume content	30.0%		30.0%	
Solids: Volume	38.1%		38.1%	
Weight	54.6%		54.4%	
Approximate pH	9.4 to 9.7		9.4 to 9.7	
Approximate viscosity: (Krebs Units)				
Initial	74 to 78		74 to 78	
Equilibrated	80 to 84		80 to 84	
Approximate raw material cost	$1.85/gallon		$1.84/gallon	

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