

STATE OF CALIFORNIA

Department of Transportation Specification

White Tintable Finish Paint Waterborne Acrylic Latex Vehicle (Formula PWB-174A)

SCOPE

This specification covers a pre-mixed waterborne paint formulated for use as a finish coat on properly prepared metal surfaces. This coating is intended for spray application. Limited application can be made by brushing and rolling.

REQUIREMENTS

General:

This specification is intended to specify paint that will meet service requirements for bridge construction and maintenance. Application and use of this coating shall be in conformance with the provisions in Section 59-2, "Painting Structural Steel", or Section 59-3, "Painting Galvanized Surfaces", whichever is applicable, and Section 91, "Paint", of the *State of California Department of Transportation Standard Specifications*. All properties listed shall be maintained for a minimum of one year after acceptance. If the vendor is making this paint for the first time, the Transportation Laboratory in Sacramento must be consulted.

Materials:

The raw materials for use in the paint formula shall conform to the specifications designated or paint material code number hereinafter specified.

QUALITY ASSURANCE

All paint intended for use by the California Department of Transportation (Department) must be sampled, tested and approved by the Transportation Laboratory **before** shipment. The manufacturer shall take a representative one-quart sample of each batch of paint and ship the samples to the Transportation Laboratory for approval, unless other arrangements have been made. Raw materials and copies of batch records used in the manufacture of the paint shall be submitted if requested.

Transportation Laboratory, Chemical Testing Branch, 5900 Folsom Blvd., Sacramento, CA 95819, attn.: Lisa Dobeck, Fax (916) 227-7168.

A batch shall be that amount of paint that was manufactured and packaged in a single operation. The paint container shall be labeled with, but not limited to, the State Specification number, date of manufacture and batch number. The Department also reserves the right to retest any batch after delivery. Results from such retesting shall prevail over all other tests and will be the basis of rejection. Material not meeting the

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specification shall be removed and replaced by the supplier at their expense, including all costs for handling, retesting and shipping.

All tests shall be conducted in accordance with the appropriate ASTM test methods referenced under the “Characteristics of Paint” section of this document and methods used by the Transportation Laboratory.

Patents:

The contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnify and save harmless the State of California, and its duly authorized representatives from all suits at law or action of every nature for, or on account of, the use of any patented materials, equipment, devices, or processes.

Description:

This specification covers a pre-mixed waterborne paint formulated for use as a finish coat on properly prepared metal surfaces. This coating is intended for spray application. Limited application can be made by brushing or rolling. This paint is an industrial maintenance coating to be colored by the manufacturer as specified and is not for residential use.

Predispersed colorants:

Degussa Aqua-Chem® 895 colorants were used in the development of this formulation. Adjustments of the amounts used may be necessary to match the colors specified. Predispersed colorants from other manufacturers may not be compatible with this formulation. Colorants selected shall be compatible, light fast, and chemically resistant. They shall not contain lead, chrome or zinc, or volatile organic compounds (VOC) as defined by the U.S. EPA in 40 CFR Part 51 Section 51.100.

Composition:

When colored paints are specified, dry pigments or predispersed colorants may be substituted for titanium dioxide to achieve the specified color. However, the finished paint shall not contain less than 100 lb/100 gal of titanium dioxide. Additionally, the maximum amount of predispersed colorant added shall not exceed 12 fluid oz/gal or 9.4% by volume. The physical characteristics of the coating shall remain within specified limits after any pigment substitution.

Paint shall be mixed in the following proportions and sequence:

Hold back part of the water initially to get a good grind viscosity. Do not exceed 100 °F during this operation. Add remainder of water after the grind is achieved.

<u>Grind Ingredients:</u>		<u>Weight percent</u>	<u>Lbs./ 100gal</u>
Water	(1)	4.95	50.0
Dispersant	(2)	0.15	1.5

Grind Aid	(3)	0.59	6.0
Surfactant	(4)	0.20	2.0
Ammonium Hydroxide (28%)	(5)	0.25	2.5
Titanium Dioxide	(6)	14.84	150.0
Calcium Carbonate	(7)	4.95	50.0
Defoamer	(8)	0.40	4.0

Note-1: High concentrations of grind ingredients in the latex can cause irreversible agglomeration of latex-pigment composite particles. This will occur if the latex is let down into the grind. Consequently, it is important to slowly add the grind to the latex in the let down phase instead of adding the latex to the grind. This should be done with moderate agitation.

Note-2: **Premix* the coalescent and plasticizer prior to addition in let down phase.

<u>Let Down Ingredients:</u>		<u>Weight percent</u>	<u>Lbs./ 100gal</u>
Styrenated Acrylic Latex	(9)	67.8	680
(Coalescent) DPM*	(10)	2.89	29
(Coalescent) Texanol*	(11)	1.33	13.3
TEG-EH (plasticizer)*	(12)	0.40	4.0
Flash Rust Inhibitor	(13)	0.40	4.0
Preservative	(14)	0.10	1.0
Thickener	(15)	0.18	2.0
Colorants	(16)	X	X

Characteristics of Paint:

VOC, grams per liter, g/L, ASTM Designation: D 6886	100 Maximum
Density, grams per milliliter, ASTM Designation: D 1475	1.16 to 1.21
Nonvolatile content, percent, ASTM Designation: D 2369	52.5-56.2
Pigment content, percent, ASTM Designation: D 3723	17.2-21.1
Titanium Dioxide content, lbs/gal TiO ₂ ASTM Designation: D 1394.	1.5-1.01
Consistency, ASTM Designation: D562, grams	150-200

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(Equivalent KU)	74-79
High-shear viscosity, ASTM Designation: D4278 0 to 5-P cone, shear rate 12 000 s ⁻¹	0.5 to 0.7
pH	8.8-9.1
Fineness of grind, Hegman, ASTM Designation: D1210	6 Minimum
Specular Gloss, ASTM Designation: D523 @ 20°	13-24
@ 60°	45-57
Color Tolerance, ASTM Designation: D2244,	2 ΔE Maximum
BYK Gardner, CIE L*a*b*, 10° Standard observer, Illuminant D 65	
Color Tolerance after 300 hours of UV-exposure, ASTM Designation: D 4587, Cycle-2, UVA-340 bulbs	4 ΔE Maximum
Contrast ratio, ASTM D-2805, 5mil wet film on black-white Leneta chart, Form 2A- Opacity.	0.97 Minimum
Film hardness by pencil test, ASTM Designation: D3363	3B Minimum
Salt Fog Exposure, 100 hours, ASTM Designation: B117	
Rust rating, ASTM Designation: D 610	10 minimum
Blistering, ASTM Designation: D 714	No more than 8F
Drying time, 4 mils wet film, ASTM Designation: D 1640	
Set to touch, hours	½ maximum
Dry through, hours	1 maximum

Paint Raw Materials:

1. Water
2. Tamol® 165A (Rohm & Haas)
3. Surfynol® CT-131 (Air Products)
4. Surfynol® 104 DPM (Air Products)
5. Ammonium Hydroxide (28%)
6. Ti-Pure® R-706 (Du Pont)
7. Vicron 15-15 (Specialty Minerals Inc.)
8. Foamaster® 111 (Henkel)
9. Avanse® MV-100 (Rohm and Haas)
10. (Dowanol® DPM) Di (propylene glycol) methyl ether, (Dow Chemical Co.)

11. (Texanol®) 2,2,4-Trimethylpentanediol-1, 3-monoisobutyrate, (Eastman Chemical Co.)
12. TEG-EH (Eastman Chemical Co.)
13. Sodium Nitrite (15% solution)
14. PROXEL® BD20 (Avecia Inc.)
15. Acrysol® RM-12W (Rohm and Haas)
16. Degussa Aqua-Chem® 895 colorants

Packaging:

The containers shall be new, round and of no more than five-gallon capacity. Pails larger than three gallons shall be standard, full open head. One gallon and larger containers shall have ears and bails. All containers shall be suitably lined or constructed so as to prevent any reaction between the container and contents and also must comply with U.S. Department of Transportation or I.C.C. Regulations as applicable.

Labels must be marked with the volatile organic compound (VOC) content, mixing instructions and the following provision in addition to any other labeling required:

Application:

The paint shall be applied to a total dry film thickness of 1.5 mil minimum and 3 mil maximum. This coating is intended for spray application, however limited application can be made by brush. Paint should not be applied when the ambient or surface temperature is above 100°F or below 50°F, when the relative humidity exceeds 75 percent, or when the surface temperature is less than 5°F above the dew point.

Clean-up:

Use tap water for clean up. 10% ammonia, acetone or other suitable solvent may be used to remove dried paint from spray guns and other equipment.

Appendix:

The following table shows suggested colorant quantities for common colors used by the Department.

Colorant/ pigment starting point amounts, Lbs./ 100 gal.

	White	SF-Blue	Ranch Green	Concrete Gray	Tan
Fed 595B color#	*	*	24491	26408	*
Titanium dioxide	150.00	150.00	124.00	150.00	110.00
(16) Red Oxide, 895-1006				0.22	12.00
Yellow Oxide, 895-1806			12.89	10.60	120.00
Phthalo Green, 895-5505		5.70	4.45		
Phthalo Blue, 895-7205		2.30			
Lamp Black, 895-9905		0.54	0.94	1.55	0.94

*Color chip on file with the Transportation Laboratory