STATE OF CALIFORNIA

Department of Transportation Specification

Light Blue Finish Paint
Waterborne Acrylic Latex/ FEVE Blend Vehicle
*(Specification PWB-175C)

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 a 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 2022 *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.

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-pint 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.: Barry Marcks, 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 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 colored light blue and used as a contrast to the PWB-176C Dark Blue finish paint. This coating is intended for spray application. Limited application can be made by brushing or rolling. This paint is an industrial maintenance coating and is not for residential use.

Predispersed colorants:

Chroma-Chem® 897 colorants were used in the development of this formulation. Minor adjustments of the amounts used may be necessary to match the colors specified due to manufacturing variations. Predispersed colorants from other manufacturers may not be compatible with this formulation. Colorants selected shall be low VOC, light fast and chemically resistant. They shall not contain lead, chrome, or zinc.

Composition:

Paint shall be mixed in the following sequence and proportions. Use sufficient time and agitation necessary to get a good grind viscosity with uniform dispersion. Minor adjustments may be necessary to obtain an acceptable batch of paint due to manufacturing variations. Do not exceed 100˚F during this operation. The binder blend ratio shall be 40% Lumiflon FE-4300 and 60% Avanse MV-100 by total weight of binder used.

Grind Ingredients	Weight Percent	Lbs. / 100gal
(1) Water	2.19	20.0
(2) Dispersant	0.04	0.40
(3) Surfactant	0.11	1.00
(4) Ammonium hydroxide (28%)	0.04	0.40
(5) Titanium dioxide	4.32	39.5

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 into the latex in the letdown. This should be done with moderate agitation.

Let Down Ingredients	Weight Percent	Lbs. / 100gal
(6) (Coalescent)	4.44	40.6
(7) Styrenated acrylic latex	51.67	472.0
(8) Fluoroethylene vinyl ether emulsion	34.45	314.7
(9) Flash rust inhibitor	0.22	2.0
(10) Defoamer	0.21	1.9
(11) Preservative	0.11	1.0
(12) Ammonium hydroxide (28%)	0.33	3.0
(13) Phthaloblue	1.19	10.9
(14) Phthalogreen	0.05	0.44

Let Down Ingredients	Weight Percent	Lbs. / 100gal
(15) Thickener-1	0.39	3.6
(16) Thickener-2	0.22	2.0

Caution: Acrysol® RM-12W and RM-995 are very effective rheology modifiers in combination. Add small amounts of Acrysol® RM-12W, then Acrysol RM-995 until the desired KU viscosity is obtained. After addition the final viscosity could continue to increase slightly for 24 hrs. It is highly recommended to make a small test batch of this coating before attempting full scale production.

Characteristics of Paint	Measurements
VOC, grams per liter, ASTM Designation: D 3960	100
Flash Point, ˚F, ASTM Designation: D 3828	>215
Density, grams per milliliter, ASTM Designation: D 1475	1.07 – 1.12
Nonvolatile content, percent, ASTM Designation: D 2369	47.1 – 52.0
Pigment content, percent, ASTM Designation: D 3723	4.5 – 5.0
Volume nonvolatile content, percent, ASTM Designation: D 2697	41.8 – 46.2
Consistency, ASTM Designation: D562, g (Equivalent KU)	180 – 221 78 - 85
High-shear viscosity, poise, ASTM Designation: D 4278 0 to 5-P cone, shear rate 12 000 s-1	0.4 – 0.6
pH	8.5 - 9.0
Fineness of grind, Hegman, ASTM Designation: D 1210	6 minimum
Contrast Ratio, ASTM Designation: D 2805, 150 µm clearance applicator	0.97 minimum
Specular Gloss, ASTM Designation: D 523	
@ 20°	45 – 55
@ 60°	75 – 85

Light blue color to match Caltrans color chip number PWB-110, Color chips are available from the Transportation Laboratory in Sacramento, CA.

Characteristics of Paint	**Measurements**
Color Tolerance, ASTM Designation: D2244, CIE 1976 L*a*b*, 10° Standard observer, Illuminant D 65	2 ΔE maximum
Color Tolerance after 4000 hours of UV- Exposure, ASTM Designation: D 4587, Cycle-2, UVA-340 bulbs	2.5 ΔE maximum
Color Development, ASTM Designation: D5326	0.7 ΔE maximum
Film hardness by pencil test, ASTM Designation: D 3363	2H minimum
Anti-Sag Index, ASTM Designation: D4400, Anti-Sag Meter, Type ASM-4, 4-24 Mils.	17.2 minimum
Titanium Dioxide, TiO2 content, ASTM Designation: E1621 Elemental Analysis by Wavelength Dispersive X-Ray Fluorescence Spectrometry. Use dried drawdown made with 15 mil fixed gap applicator blade, ASTM Designation: D823, Practice-E. or use ASTM Designation: D1394 Standard Test Methods for Chemical Analysis of White Titanium Pigments.	9.30% in dry film
Dry time at 25°C, 4 mils wet film, ASTM Designation: D1640	
Set to touch, hours	1/2 maximum
Dry through, hours	1 maximum

Material Ingredients of Paint:

1) Water
2) Tamol® 165A (Dow Chemical Co.)
3) Surfynol™ CT-111 (Evonik Industries AG)
4) Ammonium Hydroxide (28%)
5) Ti-Pure® R-706 (Du Pont)
6) Dowanol™ DPnB, Dipropylene glycol n-butyl ether, (Dow Chemical Co.)
7) Avanse® MV-100 (Dow Chemical Co.)
8) Lumiflon™ FE-4300 (AGC Chemicals Americas, Inc.)
9) Sodium Nitrite (15% aqueous solution)
10) Foamaster® 111(Cognis Corp.)
11) Proxel™ BD20 (Lonza Inc.)
12) Ammonium Hydroxide (28%)
13) Phthaloblue 897-7201 (Vibrantz Technologies)
14) Phthalogreen 897-5501 (Vibrantz Technologies)

15) Acrysol® RM-12W (Dow Chemical Co.)
16) Acrysol® RM-995 (Dow Chemical Co.)

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. For best results, HVLP spray application of this coating is recommended, limited application can be made by brush and roll. 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.