

FEDERAL SPECIFICATION

PAINT, TRAFFIC (HIGHWAY, WHITE AND YELLOW)

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers paint suitable for application to traffic bearing surfaces such as Portland cement, concrete, bituminous pavement, and plain or vitrified brick surfaces of streets, highways, bridges, tunnels, and parking lots.

1.2 Classification.

1.2.1 Types: Paint shall be of the following types, as specified in the invitation for bids, contract, or order (see 6.2):

Types:
I - Slow Drying
II - Fast Drying

1.2.2 Color. Traffic paint shall be furnished in two colors, white and yellow, as specified (see 3.4.1 and 6.2).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

PPP-P-1892 - Paint, Varnish, Lacquer and Related Materials; Packaging, Packing, and Marking of.
TT-B-1325 - Beads (Glass Spheres) Retro-Reflective

Federal Standards:

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.

Fed. Std. 595 - Colors.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston; New York; Washington, DC; Atlanta; Chicago; Kansas City, MO; Fort Worth; Denver; San Francisco; Los Angeles; and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

- D 185 - Test for Coarse Particles in Pigments, Pastes, and Paints
- D 562 - Test for Consistency of Paints Using the Stormer Viscometer
- D 711 - No Pick-up Time of Traffic Paints
- D 869 - Evaluating Degree of Settling of Paint
- D 968 - Test for Abrasion Resistance of Coatings of Paint, Varnish, Lacquer, and Related Materials by the Falling Sand Method
- D 969 - Degree of Resistance of Traffic Paint to Bleeding
- D 1210 - Fineness of Dispersion of Pigment-Vehicle Systems
- D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- D 1309 - Settling Properties of Traffic Paint During Storage
- D 1475 - Density of Paint, Varnish, Lacquer, and Related Products
- D 1729 - Visual Evaluation of Color Differences of Opaque Materials
- D 2244 - Instrumental Evaluation of color differences of Opaque Materials
- D 2805 - Hiding Power of Paints
- E 97 - Directional Reflectance Factor, 45-deg, 0-deg, of Opaque Specimens by Broad-Band Filter Reflectometry
- E 260 - General Gas Chromatography Procedures
- G 23 - Operating Light-Exposure Apparatus (Carbon-Arc Type) with and without Water for Exposure of Nonmetallic Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Air Pollution Regulations (SCAQMD)

Rules 102 and 1113

(Application for copy should be addressed to the South Coast Air Quality Management District, 9150 Flair Drive, El Monte, CA 91131.)

3. REQUIREMENTS

3.1 General. Traffic paint shall be ready-mixed for use.

3.2 Ingredients. The supplier may use any combination of nonvolatile ingredients provided the paint meets all the requirements specified herein. The paint shall conform to the requirements of SCAQMD Rule 1113 for the intended application (see 6.1).

3.2.1 Special Marking. Each unit container and shipping container marking shall include the weight of volatile organic compound (VOC) in grams per liter and pounds per gallon of paint, referenced to SCAQMD Rule 1113, and shall specify that the paint is to be used without thinning under normal environmental and application conditions.

3.3 Quantitative requirements. The mixed paint shall meet the requirements specified in table I for the appropriate type.

TABLE I. QUANTITATIVE REQUIREMENTS OF MIXED PAINTS

	Type I	Type II
Pigment, percent by weight.		
White	54 min.	57 min.
Yellow	54 min.	57 min.
Nonvolatile vehicle, percent by weight of vehicle	31 min.	41 min.
Uncombined water, percent by weight of paint	1.0 max.	1.0 max.
Coarse particles and skins (retained on a No. 325 sieve) percent by weight of pigment	1.0 max.	1.0 max.

TABLE I. QUANTITATIVE REQUIREMENTS OF MIXED PAINTS

	Type I	Type II
Consistency, Krebs Units	70 - 80	70 - 80
Weight per gallon, lbs.	10.7 min.	12.0 min.
Drying time for no pick-up, minutes	30 max.	5 max.
Bleeding ratio	0.90 min.	0.90 min.
Fineness of grind, Hegman	2 min.	2 min.
Directional reflectance of white paint, percent	85 min.	85 min.
Dry opacity 1/ White	0.96 min.	0.96 min.
Yellow	0.96 min.	0.96 min.
Abrasion resistance (baked film), liters of sand White	35 min.	35 min.
Yellow	30 min.	30 min.
Abrasion resistance (weathered film), liters of sand White	26 min.	26 min.
Yellow	23 min.	23 min.

1/ When applied at a wet-film thickness equivalent to a spreading rate of 7.85 m²/L (320 ft.²/gallon).

3.4 Paint qualitative requirements

3.4.1 Color. The white paint shall have the daylight directional reflectance specified in table I. The yellow paint, when tested as specified in 4.3.4, shall not be more than 6.0 CIE L* a* b* units different than color 33538 of Fed. Std. No. 595.

3.4.2 Condition in container. The paint shall not show excessive settling in a freshly-opened full can, and shall be easily redispersed with a paddle to a smooth homogeneous state. The paint shall show no curdling, livering, caking, lumps, skins, or color separation.

3.4.3 Skinning. The paint shall not skin within 48 hours in a three-quarters filled, tightly closed container when tested as specified in 4.3.7.

3.4.4 Storage stability. The paint shall show a minimum rating of 6 when tested as specified in table II.

3.4.5 Flexibility and adhesion. The paint shall show no cracking, flaking or loss of adhesion when tested as specified in 4.3.5.

3.4.6 Water resistance. The paint shall show no softening, blistering, color change, loss of adhesion, or other evidence of deterioration when tested as specified in 4.3.6.

3.4.7 Dilution stability. The thinned paint shall be uniform and show no separation, curdling, or precipitation after reduction in the proportions of eight parts by volume of the packaged material with one part by volume of the appropriate thinner.

3.4.8 Spraying properties. The paint as received, or diluted no more than specified in 3.4.7, shall have satisfactory spraying properties when applied (and held in a horizontal position) to tinplate or aluminum surfaces at a wet film thickness of approximately 381 um (0.015 inch).

3.4.9 Appearance. The sprayed film (see 3.4.8) shall dry to a smooth, uniform condition, free from roughness, grit, and other surface imperfections.

3.4.9.1 Appearance after accelerated weathering. The panels prepared and weathered in paragraph 4.3.3.2 shall be evaluated prior to abrasion testing for appearance and color change. The white paint shall show no more than a slight discoloration. The yellow paint shall be within the tolerance limits specified in 3.4.1.

3.5 Material Safety Data Sheet. A material safety data sheet shall be prepared for the paint by the manufacturer in accordance with Fed. Std. No. 313 and submitted to the Contracting Officer (See 6.2).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Inspection and testing of the end item.

4.2.1 Lot. The paint shall be assembled in lots as specified in MIL-STD-105. In MIL-STD-105, the words "essentially the same conditions" shall be interpreted to mean a manufacturer's batch, which is defined as the end product of all raw materials mixed, blended, or processed in a single operation.

4.2.2 Inspection of the end item. Sampling for visual examination shall be in accordance with MIL-STD-105. The inspection level shall be S-4 with an acceptable quality level (AQL) of 2.5 percent defective. The sample unit shall be one unit container prepared for delivery. Check for the following: leaks, rust, damage (dents, bruises, scratches), film defects, improper marking, and other deficiencies.

4.2.3 Sampling of the end item for testing. For the purposes of sampling, the lot shall be expressed in units of gallons. Samples from lots shall be taken in accordance with MIL-STD-105 using inspection level S-2 and an acceptable quality level (AQL) of 2.5.

4.2.4 Inspection of preparation for delivery. An examination shall be made to determine that packaging, packing, and marking of the end item comply with the applicable requirements of section 5. The sample unit shall be one complete shipping container. Sampling shall be in accordance with MIL-STD-105. The inspection level shall be S-2, and the AQL shall be 4.0 expressed in terms of percent defective.

4.3 Test procedures

4.3.1 The tests indicated in Table II shall be conducted in accordance with Fed. Test Method Std. No. 141 or an ASTM method as indicated. Unless otherwise specified, all tests shall be conducted at standard conditions which are 23 + 1°C (73 + 2°F) and relative humidity of 50 + 4 percent. All test reports shall contain the individual values utilized in expressing the final result. Failure to pass any test or noncompliance with any requirement shall be cause for rejection of the sample.

TABLE II. TEST METHODS

characteristics	Fed. Test Method Std. No. 141 or ASTM method	Section of this specification giving requirements	Section of this specification with further reference
Solvent	ASTM E 260	3.2	
Percentage of pigment	4021	Table I	
Nonvolatile vehicle	4051	Table I	
Uncombined water	4081	Table I	
Coarse particles and skins	ASTM D 185	Table I	
Consistency	ASTM D 562	Table I	
Weight per gallon	ASTM D 1475	Table I	
Drying time	ASTM D 711	Table I	
Bleeding ratio	ASTM D 969	Table I	4.3.2
Fineness of grind	ASTM D 1210	Table I	
Directional reflectance	ASTM E 97	Table I	
Dry opacity	ASTM D 2805	Table I	
Abrasion resistance	ASTM D 968	Table I	4.3.3
Color	ASTM D 2244	3.4.1	4.3.4
Condition in container	3011	3.4.2	
Skinning	3021	3.4.3	4.3.7
Storage stability	ASTM D 1309	3.4.4	
Flexibility and adhesion	6221	3.4.5	4.3.5
Water resistance	ASTM D 1308	3.4.6	4.3.6
Dilution stability	4203	3.4.7	
Spraying properties	2131, 4331	3.4.8	
Appearance	3011	3.4.9	

4.3.2 Bleeding ratio. The bleeding ratio shall be determined in accordance with ASTM D 969, except as specified below.

4.3.2.1 Panel preparation. The panel shall be 127 x 254 mm (5 x 10 inches) cut at least 5 inches from the edge of a roll of standard 15-lb asphalt-saturated felt. A 127 x 127 mm (5 x 5 inches) non-bleeding surface shall be affixed over one end of the panel. (Tape resistant to the paint solvent may be used.) The wet paint shall be applied to the non-bleeding surface and drawn down on the panel with a film applicator to obtain a wet-film thickness of $381 \pm 2 \mu\text{m}$ (0.015 ± 0.0001 inches). Allow the paint to dry in a horizontal position for 48 hours.

4.3.2.2 Bleeding ratio determination. Immediately after the drying period, determine reflectance in accordance with ASTM E 97. Divide the average of three reflectance readings of the paint over the bleeding surface by the average of three reflectance readings of the paint over the non-bleeding surface to determine the bleeding ratio.

4.3.3 Abrasion resistance. Prepare two glass panels by a drawdown method to a dry-film thickness of $79 \pm 2 \mu\text{m}$ (0.0031 ± 0.0001 inches). Dry-film thickness shall be determined 24 hours after drawdown. Subject the panels to the abrasion test in accordance with ASTM D 968, except that the inside diameter of the metal guide tube shall be 18.97 to 19.05 mm (0.747 - 0.750 inches). Two (2.0) liters of unused sand shall be used for each of the three test runs per panel.

4.3.3.1 Baked film. Air dry one of the panels prepared in 4.3.3 for 24 hours, then bake for 3 hours at a temperature of $105 \pm 1^\circ\text{C}$ ($221 \pm 2^\circ\text{F}$). Condition the panel for 30 minutes at room temperature, then run the abrasion test and evaluate for compliance with table I.

4.3.3.2 Weathered films. Air dry one of the panels prepared in 4.3.3 for 48 hours. Subject the panel to accelerated weathering in accordance with ASTM G 23 using the Type D apparatus for 300 hours. Remove the panel and condition at room temperature for 24 hours. Examine for compliance to 3.4.9.1, then run the abrasion test, and evaluate for compliance with table I.

4.3.4 Color. Use the panels, prepared for the abrasion resistance (4.3.3). Determine the color difference of the yellow paint before and after weathering, in accordance with ASTM method D 2244.

4.3.5 Flexibility and adhesion. Determine flexibility and adhesion in accordance with method 6221 of Fed. Test Method Std. No. 141. Apply a wet film thickness of $127 \pm 2 \mu\text{m}$ (0.005 ± 0.0002 inch) with a film applicator to a 76 x 127 mm (3 x 5 inch) tin panel which has been solvent cleaned and lightly buffed with steel wool. Dry the paint film in a horizontal position for 18 hours, then bake in an oven at $50 \pm 1^\circ\text{C}$ ($122 \pm 2^\circ\text{F}$) for 2 hours, cool to room temperature for at least 1/2 hour, bend over a 6.4 mm (1/4-inch) diameter rod, and examine for compliance with 3.4.5.

4.3.6 Water resistance. Apply a wet-film thickness of $381 \pm 2 \mu\text{m}$ (0.015 ± 0.0001 inch) with a film applicator to a clean glass plate. Let dry in a horizontal position at room temperature for 72 hours. Immerse one-half the painted plate in distilled water at room temperature for 18 hours as specified in ASTM D 1308, allow to air-dry for two hours, and examine as specified in 3.4.6.

4.3.7 Skinning. Place 188 ml (6oz.) of the paint in a 250 ml (8-ounce) container, seal, and test in accordance with method 3021 of Fed. Test Method Std. No. 141. After 48 hours examine for compliance with 3.4.3.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The paint shall be packaged, packed, and marked in accordance with PPP-P-1892. The level of packaging shall be A or C, and the level of packing shall be A, B, or C, as specified (see 6.2). The paint shall be in 1-gallon metal cans, 5-gallon steel pails, or 30-gallon drums as specified (see 6.2).

6. NOTES

6.1 Intended use.

6.1.1 All types. These paints are intended for use on concrete, bituminous, brick, or stone surfaces of highways, bridges, tunnels, streets, or parking lots when applied at a wet film thickness of $381 \mu\text{m}$ (0.015 inch) by means of conventional traffic striping equipment. Paint stripes should preferably be reflectorized for night visibility by adding glass beads conforming to TT-B-1325 before the paint film dries or sets-up, using the drop-on method. The glass beads shall be evenly dispersed at a rate of 2.7 kilogram (6 pounds) per gallon of paint.

6.1.2 Specific types. Purchaser's choice of type of paint should depend on drying time requirements.

6.2 Ordering data. Purchasers should select the preferred options permitted herein include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type and color of paint required (see 1.2.1 and 1.2.2).
- (c) Packaging and packing level (see 5.1).
- (d) Size of container (see 5.1).
- (e) A Material Safety Data Sheet shall be prepared (See 3.5)

6.3 Basis of purchase. The paint should be purchased by volume, the unit being a U.S. gallon (3.785 liters) which at 15.5°C. (60° F.).

MILITARY COORDINATING ACTIVITY:

NAVY-YD

CUSTODIANS:

- Army - ME
- Navy - YD
- Air Force - 99

REVIEW:

- Air Force - 84
- Army - MR

CIVIL AGENCY COORDINATING ACTIVITY:

- COM - NBS
- DOT - HTO
- AGR - AFS
- VA - OSS
- HHS - NIH
- GSA - FSS

PREPARING ACTIVITY

- GSA - FSS