TT-P-110C
April 13, 1977
SUPERSEDING
Fed. Spec. TT-P-110B

FEDERAL SPECIFICATION

PAINT, TRAFFIC BLACK (NONREFLECTORIZED)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers a black, nonreflectorized traffic paint for marking odd obliterating markings on runways and highways.

1.2 Classification.

1.2.1 Types. The paint shall be of the following types (see 6.2).

Type I - Conventional Dry.
Type II - Fast Dry.

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 Specification:

PPP-P-1692 - Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of.

Federal Standards:

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

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 523 - Specular Gloss.
D 562 - Consistency of Paints Using the Stormer Viscosimeter.
D 711 - No-Pick-Up Time of Traffic Paint.
D 968 - Abrasion Resistance of Coatings of Paint, Varnish, Lacquer, and Related Products by the Falling Sand Method.
D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
D 1729 - Visual Evaluation of Color Differences of Opaque Materials.
D 2369 - Volatile Content of Paints.
G 23 - Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer and Related Products.

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

3. REQUIREMENTS

3.1 Materials. The selection of materials is left to the discretion of the manufacturer, provided the formulated product meets the requirements of the specification.

3.1.1 The manufacturer is given latitude in the selection of solvents or blends of solvents provided the material meets the requirements specified in 3.1.1.1 and 3.1.1.2.

3.1.1.1 The volatile solvent, when tested as specified in 4.4.9, shall not contain more than 0.4 percent of benzene.

3.1.1.2 The volatile solvent, when tested as specified in 4.4.9, shall conform by volume to the requirements controlling the emission of solvents into the atmosphere as called out in (a), (b), (c), (d), and (e).

(a) A combination of aldehydes or branched chain ketones: 20 percent maximum.
(b) A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethylbenzene; 8 percent maximum.
(c) A combination of ethylbenzene or toluene: 20 percent maximum.
(d) A combination of solvents with olefinic or cyclo-olefinic unsaturation: 5 percent maximum.
(e) Total of (a) + (b) + (c) + (d) = 20 percent maximum.

3.2 Quantitative requirements.

TABLE I. Quantitative requirements of mixed paints

Characteristics	Minimum	Maximum
Pigment, percent by weight of paint	40	50
Nonvolatile vehicle, percent by weight of vehicle	31	--
Consistency, Krebs-Stormer, Shearing Rate 200 RPM:		
Type I	70	82
Type II	77	95
Drying time (no pick-up time), minutes:		

Type I	--	30
Type II	--	4
85 deg. Specular gloss	--	10
Uncombined water, percent by weight of paint	--	0.5
Coarse particles and skins, percent by weight of pigment	--	0.5

3.3 Qualitative requirements.

3.3.1 Condition in container. When tested as specified in table II, the paint shall not show excessive settling in a freshly-opened full container, and shall be easily redispersed with a paddle to a smooth, homogeneous state. The paint shall show no curdling, livering, caking, lumps, or skins.

TABLE II. Index

Characteristics	Applicable ASTM method	Applicable Method No. Fed. Test Method Std. No. 141	Requirement reference	Test para. reference
Percentage of pigment	---	4021	Table I	---
Nonvolatile vehicle	D 2369	4051	Table I	---
Consistency, Krebs-Stormer	D 562	---	Table I	---
Drying time	D 711	---	Table I	---
85 deg. specular gloss	D 523	---	Table I	4.4.10
Uncombined water	---	4081	Table I	---
Coarse particles and skins	---	4092	Table I	---
Condition in container	---	3011	3.3.1	---
Color	D 1729	---	3.3.2	4.4.2
Flexibility	---	6221	3.3.3	4.4.3
Water resistance	D 1308	---	3.3.4	4.4.4
Appearance of sprayed film	---	4331	3.3.5	4.4.5
Dry opacity [1]	---	4122	3.3.6	---
Abrasion resistance	D 968, G 23	---	3.3.7	4.4.6
Accelerated weathering	G 23	---	3.3.8	4.4.7
Storage stability:				
Partially full container	---	3021	3.3.9.1	4.4.8.1
Full container	---	---	3.3.9.2	4.4.8.2
Solvent analysis	D 3272	7356	3.1.1	4.4.9

[1] A black and white sealed chart may be substituted for black and white carrara glass. Morest Chart No. 03B or equal is satisfactory.

3.3.2 Color. When tested as specified in 4.4.2, the color of the paint shall match color chip No. 37038 of Fed. Std. 595.

3.3.3 Flexibility. The paint shall show no cracking, flaking, or loss in adhesion when tested as specified in 4.4.3.

3.3.4 Water resistance. The paint shall show no softening, blistering, loss of adhesion, or other evidence of deterioration other than a 15 percent change in gloss when tested as specified in 4.4.4.

3.3.5 Appearance of sprayed film. When tested as specified in 4.4.5, the sprayed film shall dry to a smooth, uniform finish free from roughness, grit, unevenness, and other surface imperfections.

3.3.6 Dry opacity. The paint shall have a contrast ratio of not less than 1.00 at a dry film thickness of 0.076 mm (0.003 in) when tested as specified in table II.

3.3.7 Abrasion resistance. When tested as specified in 4.4.6, removal of the paint films shall require not less than 20 liters of sand for type I material and not less than 30 liters of sand for type II material.

3.3.8 Accelerated weathering. When tested as specified in 4.4.7, there shall be no discernible whitening of the weathered paint film when it is viewed perpendicularly.

3.3.9 Storage stability.

3.3.9.1 Partially full container. The paint shall show no skinning, livering, curdling, or gummy sediment, when tested as specified in 4.4.8.1, and shall remix to a smooth homogeneous state.

3.3.9.2 Full containers. When stored as specified in 4.4.8.2, the paint shall show no skinning, livering, curdling, hard, dry caking, or gummy sediment. In addition, the paint shall remix readily to a smooth, homogeneous state, and shall meet the viscosity and drying time requirements in table I.

3.3.10 Special marking. The supplier shall supply thinning instructions for the paint (see 5.2).

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 orders 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 of preparation for delivers. The packaging, packing, and marking shall be inspected in accordance with the requirements of PPP-P-1892.

4.3 Testing of the end item.

4.3.1 Lot. The paint shall be assembled into 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 and defined as the end product of all raw materials mixed, blended, or processed in a single operation.

4.3.2 Sampling of the end item. For the purpose 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.

4.3.3 The supplier shall submit to the contracting officer a certificate of compliance indicating that the paint complies with the storage stability requirement as specified in 3.3.9.2. When certificates of compliance are submitted, the Government reserves the right to test such items to determine the validity of the certificate.

4.4 Test procedures.

4.4.1 The paint shall be tested according to the test methods indicated in table II. Unless otherwise specified, standard testing conditions are a temperature of 23 deg. +/- 1 deg. C (73 deg. +/- 2 deg. F) and a relative humidity of 50 +/- 5 percent. All test reports shall contain the individual values utilized in expressing the final result. All tests shall be evaluated for conformance to the requirements specified in section 3. Failure to pass any test, or noncompliance with any requirement, shall be cause for rejection of the sample.

4.4.2 Color. Apply a wet film of 0.381 mm (0.015 in) to a white, opaque surface (sealed chart) and allow to dry at standard conditions for 24 hours. Evaluate for compliance with the requirements in 3.3.2 by using ASTM D 1729.

4.4.3 Flexibility. Apply a wet film thickness of 0.127 mm (0.005 in) with a film applicator to a steel panel conforming to method 2011 of Fed. Test Method Std. No. 141. Dry the paint film at standard conditions in a horizontal position for 18 hours, then bake in an oven at 50 deg. +/- 2 deg. C (122 deg. +/- 4 deg. F) for 2 hours, cool to standard conditions for at least 1/2 hour, and bend as described in method 6221 of Fed. Test Method Std. No. 141 over a 13 mm (1/2 in) diameter rod and examine, without magnification, for compliance with the requirement in 3.3.3.

4.4.4 Water resistance. Apply a wet-film thickness of 0.381 mm (0.015 in) with a film applicator to a clean glass plate. Let dry in a horizontal position at standard conditions for 72 hours. Immerse one-half of the painted plate in distilled water at standard conditions for 18 hours as specified in ASTM D 1308, sec. 5.4. Allow the plate to air-dry for 2 hours at standard conditions and evaluate for compliance to the requirement in 3.3.4.

4.4.5 Appearance of sprayed film. Method 4331 shall be used to determine compliance with the requirement in 3.3.5. Type I paint shall be sprayed 203 to 254 mm (8 to 10 in) from the test panel, and type II paint shall be sprayed 152 to 203 mm (6 to 8 in) from the test panel.

4.4.6 Abrasion resistance. Make drawdowns of 0.105 +/- 0.003 mm (0.004 +/- 0.0001 in) dry film thickness on glass panels prepared in accordance with method 2021 of Fed. Test Method Std. No. 141.

4.4.6.1 Baked films. Air dry the glass panels for 24 hours at standard conditions and then bake 3 hours at 105 deg. +/- 3 deg. C (221 deg. +/- 6 deg. F). After baking, condition the panels for 30 minutes at standard conditions, and then run the abrasion resistance test as specified in 4.4.6.3.

4.4.6.2 Weathered films. Air dry the glass panels for 48 hours at standard conditions. Then, subject the panels to accelerated weathering, in an enclosed carbon arc lamp apparatus in accordance with ASTM G 23 for 300 hours. Remove the panels and condition for 24 hours at standard conditions, and then run abrasion resistance as specified in 4.4.6.3.

4.4.6.3 Test. Subject the panels prepared in 4.4.6.1 and 4.4.6.2 to the abrasion resistance test outlined in ASTM D 968, except that the inside diameter of the metal guide tube shall read from 18.97 to 19.05 mm (0.747 to 0.750 in). Evaluate the test results for compliance to the requirement in 3.3.7.

4.4.7 Accelerated weathering. Apply a wet film (drawdown) of 0.381 mm (0.015 in) on glass panels prepared in accordance with method 2021 of Fed. Test Method Std. No. 141. Air dry the panels for 72 hours at standard conditions. Allow one panel to remain at standard conditions and expose the other panel to accelerated weathering in an enclosed carbon-arc lamp apparatus in accordance with ASTM G 23 for 300 hours. After weathering, condition the panel for 24 hours at standard conditions. The weathered panel shall be compared with the panel which was not weathered for compliance with the requirement in 3.3.8.

4.4.8 Storage stability.

4.4.8.1 Partially full container. Determine skinning of the paint after 48 hours, in accordance with method 3021 of Fed. Test Method Std. No. 141, and evaluate for compliance with the requirement in 3.3.9.1.

4.4.8.2 Full container. A one-quart container, or an equivalent amount of smaller size containers, of the paint shall be stored in the original, unopened container or containers for 12 months from the date of manufacture at standard conditions and then shall be tested to determine compliance with the requirement in 3.3.9.2 (see 4.3.3).

4.4.9 Solvent analysis.

4.4.9.1 Solvent extraction. The solvent shall be extracted from the paint in accordance with ASTM D 3272.

4.4.9.2 Solvent composition. The solvent composition shall be determined in accordance with 4.4.9.3, method 7356 of Fed. Test Method Std. No. 141, and 4.4.9.4, to determine compliance with the requirement of 3.1.1.

4.4.9.3 Aromatic and oxygenated solvents. The 1.83 m (6 ft) column shall be installed and the operating conditions described in method 7356

of Fed. Test Method Std. No. 141 shall be followed. About 3 microliters of the isolated distillate shall be injected and the chromatogram scanned. The aliphatic solvents will emerge within 1 minute and the complete chromatogram should develop in about 5 minutes. From the position of the peaks observed on the chromatogram, an internal standard that will be free of interference shall be selected, such as cyclopentanol or cyclohexanol. Six-tenths of a milliliter of internal standard shall be added to 3 ml of the distillate. The sample shall be analyzed according to the above procedure. Peaks emerging after 1 minute are aromatic solvents along with any oxygenated solvents that may be present. The percent of aromatic and oxygenated solvents shall be calculated as follows:

$$\text{percent aromatic and oxygenated solvents, v/v} = \frac{A \times B}{C \times D}$$

Where A = Percent of internal standard added (in this case, 20).
B = Area of aromatic and oxygenated solvents.
C = Calibration factor for the internal standard. This factor is dependent on the internal standard used and on the performance of the chromatograph, and should be determined daily.
D = Area of the internal standard (in this case cyclopentanol or cyclohexanol).

4.4.9.4 Benzene. When the solvent is tested in accordance with 4.4.9.3, a trace benzene peak of not more than 2 percent of the toluene peak will be allowed in order to comply with the requirement of 3.1.1.1.

4.4.10 85 deg. specular gloss. Make a drawdown of the paint to a dry film thickness of 0.076 mm (0.003 in) on a white, opaque surface (sealed chart) and dry for 48 hours at standard conditions. Run 85 deg. specular gloss according to ASTM D 523 for compliance with the requirement in table I.

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 packaged in 1-gallon metal cans, 5-gallon steel pails or 55-gallon drums as specified (see 6.2).

5.2 Special marking. (See 3.3.10.)

6. NOTES

6.1 Intended use. Black traffic paint is intended for use on concrete, bituminous, brick, or stone surfaces of highways, bridges, tunnels, streets, or parking lots applied at a wet film thickness of 0.381 mm (0.015 in) by means of conventional traffic line stripping equipment. It may be used as an obliterating paint, for painting out white or yellow markings to permit remarking in a different manner. Type II is appropriate where rapid drying time is required and type I where a slower drying time can be tolerated.

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

(a) Title, number, and date of this specification.
(b) Type required (see 1.2).
(c) Level of packaging and packing required (see 5.1).
(d) Size and type of container required (see 5.1).
(e) Marking required (see 5.1 and 5.2).

Military Coordinating Activity:

Navy - YD

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-FSS
DOT-FAA

Preparing Activity:

GSA - FSS

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 30 cents each.