

TT-E-505B
February 4, 1985
SUPERSEDING
TT-E-505A
February 10, 1960

FEDERAL SPECIFICATION

ENAMEL (ODORLESS, ALKYD, INTERIOR, HIGH GLOSS)

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

1 SCOPE. This specification covers one type of odorless, high-gloss, interior enamel.

2 APPLICABLE DOCUMENTS

2.1 The following documents of the issue 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:

TT-T-291 - Thinner, Paint, Mineral Spirits, Regular and Odorless
PPP-P-1892 - 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 for Sampling and Testing

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 the date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

D 185 - Coarse Particles in Pigments, Pastes, and Paints
D 523 - Specular Gloss
D 562 - Consistency of Paints Using the Stormer Viscometer
D 563 - Phthalic Anhydride Content of Alkyd Resins and Resin Solutions
D 1210 - Fineness of Dispersion of Pigment-Vehicle Systems
D 1296 - Odor of Volatile Solvents and Diluents

- D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- D 1542 - Qualitative Tests for Rosin in Varnishes
- D 1640 - Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
- D 1729 - Visual Evaluation of Color Differences of Opaque Materials
- D 1849 - Package Stability of Paint
- D 2369 - Volatile Content of Coatings
- D 2698 - Pigment Content of Solvent-Type Paints by High-Speed Centrifuging
- D 2801 - Leveling Characteristics of Paints by Draw-Down Method
- D 2805 - Hiding Power of Paints
- D 3273 - Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- D 3274 - Evaluating Degree of Surface Disfigurement of Paint Films by Fungal Growth or Soil and Dirt Accumulation and Adjunct No. 12-432740-00 - Pictorial Standards of Coating Defects
- D 3278 - Flash Point of Liquids by Setaflash Closed Tester
- D 3335 - Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
- E 97 - 45-deg, 0-deg Directional Reflectance Factor of Opaque Specimens by Broad-Band Filter Reflectometry
- E 260 - General Gas Chromatography Procedures

(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. Pigments and nonvolatile vehicle shall be selected by the supplier to meet all requirements of this specification. Volatile material shall be an odorless thinner meeting requirements (a) through (d) below when tested as specified in table II.

- (a) A combination of hydrocarbons, alcohols, aldehydes, ethers, esters or ketones having olefinic or cyclo-olefinic unsaturation: 5 percent by volume maximum.
- (b) A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethylbenzene, methyl benzoate and phenyl acetate: 8 percent by volume maximum.
- (c) A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20 percent by volume maximum.
- (d) Total of (a) through (c) above: 20 percent by volume maximum.

3.2 Qualitative requirements.

3.2.1 Condition in container. When tested as specified in table II, the enamel shall be free from skins, seeds, and livering; and shall show no more pigment settling or caking than can be redispersed to a uniform condition by 5 minutes hand stirring.

3.2.2 Skinning. A sealed, three-quarters filled container of enamel shall not skin within 48 hours when tested as specified in table II.

3.2.3 Accelerated storage stability. When tested as specified in 4.3.1, the enamel shall show no skinning, gelling, or pigment settling which cannot be redispersed to a uniform condition by 5 minutes hand stirring. The aged enamel shall meet the fineness of dispersion, consistency, and application properties requirements.

3.2.4 Odor. When tested as specified in table II, the odor of the enamel shall be similar to TT-T-291, type III.

3.2.5 Color. When tested as specified in table II at complete hiding, the color of the enamel shall be a critical match to the color specified.

3.2.6 Flexibility. When tested as specified in 4.3.2, the enamel shall not crack or flake.

3.2.7 Application properties.

3.2.7.1 Brushing properties. When tested as specified in 4.3.3, the enamel shall brush without drag, and shall dry to a smooth uniform film free from seeds, runs and brushmarks.

3.2.7.2 Spraying properties. When tested as specified in 4.3.4, the enamel shall spray easily without sagging or running; and shall dry to a smooth uniform film free from dusting, pigment float, haze or orange peel.

3.2.8 Recoating. Recoating a dried film of enamel as specified in 4.3.5 shall not cause lifting or wrinkling, and shall dry to a smooth uniform film.

3.2.9 Water resistance. When tested as specified in 4.3.6, the enamel shall not show blistering or wrinkling when examined immediately after removal from distilled water. When examined 24 hours after removal, the portion of the panel which was immersed shall show no change in hardness and shall retain a minimum of 90 percent of the initial 60 deg. specular gloss.

3.2.10 Mildew resistance. When tested and evaluated as specified in table II, the enamel shall attain a minimum rating of 8.

3.3 Quantitative requirements. The enamel shall meet the quantitative requirements specified in table I.

TABLE I

Characteristics	Minimum	Maximum
Pigment, volume percent of total nonvolatile	19	21
Total nonvolatile, percent mass of enamel	69	71
Nonvolatile vehicle, percent mass of vehicle	54	56
Phthalic anhydride, percent mass of nonvolatile vehicle	24	--
Coarse particles and skins, percent mass of pigment	--	0.5
Flash point, deg. C (deg. F)	43 (110)	--
Water, percent mass of enamel	--	0.5
Consistency, KU	75	80
Drying time, tack free, hours	--	6
Dry through, hours	--	12

TABLE I (Continued)

Characteristics	Minimum	Maximum
Yellowness index difference after accelerated yellowing (reflectivities 80 and over only)	--	0.10
Rosin and rosin derivatives	--	negative
Leveling index	5	--
Sag index	7	--
Fineness of dispersion	7	--
60 deg. specular gloss (after 168 hours air drying)	70	--
Washability characteristics after test:		
Reflectance, percent of that measured prior to washing	98	--
60 deg. gloss, percent of that measured prior to washing	70	--
Contrast ratio (11.0 sq. m/L (450 sq. ft/gal))		
Reflectivity 80 and over	0.95	--
76 - 79	0.96	--
72 - 75	0.97	--
68 - 71	0.98	--
61 - 67	0.99	--
60 and lower	1.00	--
Lead, percent mass of nonvolatile	--	0.06

3.4 Special marking. Each unit container and shipping container shall be marked with the volatile organic content (VOC) in grams per liter and pounds per gallon.

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or order, the contractor is responsible for the performance of all inspection requirements specified herein using facilities acceptable to the Government. The Government reserves the right to perform any of the inspections set forth herein where such inspections are deemed necessary to assure that the enamel conforms to prescribed requirements.

4.2 Classification of inspections. Inspections shall be classified as follows:

- (a) Quality conformance inspection (see 4.3).
- (b) Inspection of preparation for delivery (see 4.2.1).

4.2.1 Preparation for delivery. A random sample of filled containers shall be selected in accordance with MIL-STD-105, inspection level S-2, acceptable quality level (AQL) 2.5 percent defective, and examined for compliance with the requirements of 3.4 and section 5.

4.3 Quality conformance inspection. The enamel shall be tested in accordance with the methods specified in table II and as otherwise specified herein to determine compliance with the requirements of section 3. Unless otherwise specified, all tests shall be conducted at conditions specified in section 9 of Fed. Test Method Std. No. 141. Failure of any test shall be cause for rejection of the lot from which the sample was taken.

TABLE II. Index

Characteristics	Requirement Paragraph	Test Methods		
		Fed. Test Method Std. No. 141	ASTM Method	Reference Paragraph
Volatile analysis	3.1	---	E 260	---
Condition in container	3.2.1	3011	---	---
Skinning	3.2.2	3021	---	---
Accelerated storage	3.2.3	---	D 1849	4.3.1
Odor	3.2.4	---	D 1296	---
Color	3.2.5	---	D 1729	---
Flexibility	3.2.6	6221	---	4.3.2
Brushing properties	3.2.7.1	4321	---	4.3.3
Spraying properties	3.2.7.2	4331	---	4.3.4
Recoating	3.2.8	---	---	4.3.5
Water resistance	3.2.9	---	D 1308	4.3.6
Mildew resistance	3.2.10	---	D 3273, D 3274	---
Pigment volume	Table I	4311	---	---
Total nonvolatile	Table I	---	D 2369	---
Nonvolatile vehicle	Table I	---	D 2698	---
Phthalic anhydride	Table I	---	D 563	---
Coarse particles	Table I	---	D 185	---
Flash point	Table I	---	D 3278	---
Water	Table I	4081	---	---
Consistency	Table I	---	D 562	---
Drying time	Table I	---	D 1640	---
Yellowness index difference	Table I	6131, 6132	---	---
Rosin and derivatives	Table I	---	D 1542	---
Leveling index	Table I	---	D 2801	---
Sag index	Table I	4494	---	---
Fineness of dispersion	Table I	---	D 1210	---
60 deg. specular gloss	Table I	---	D 523	4.3.7
Washability	Table I	6141	---	---
Contrast ratio	Table I	---	D 2805	---
Lead	Table I	---	D 3335	4.3.8

4.3.1 Accelerated storage. Store a full, sealed one-liter (one-quart) can of enamel for 30 days at 52 +/- 1 deg. C (125 +/- 2 deg. F) and evaluate condition as specified in ASTM D 1849. After evaluation, test for compliance to fineness of dispersion, consistency, and application properties.

4.3.2 Flexibility. Draw down the enamel on a clean, dry panel prepared in accordance with method 2012, Fed. Test Method Std. No. 141 with a film applicator to obtain a dry film thickness of 37 +/- 2 um (0.0015 +/- 0.0001 inch). Air dry 18 hours, bake 3 hours at 105 +/- 2 deg. C (221 +/- 4 deg. F), cool 1/2 hour at room temperature, and bend over a 3.18 mm (1/8 inch) diameter mandrel. Examine in accordance with method 6221, Fed. Test Method Std. No. 141 at 7 diameters magnification for compliance with 3.2.6.

4.3.3 Brushing properties. Determine brushing properties in accordance with method 4321,

Fed. Test Method Std. No. 141. Evaluate during brushing and after drying for compliance with 3.2.7.1.

4.3.4 Spraying properties. Reduce the enamel with not more than one part by volume of thinner conforming to TT-T-291, type III to 8 parts of enamel. Determine spraying properties in accordance with method 4331, Fed. Test Method Std. No. 141. Evaluate during spraying and after drying for compliance with 3.2.7.2.

4.3.5 Recoating. After the panel prepared in 4.3.3 has air dried 24 hours recoat with a second brush coat. Evaluate during brushing and after drying for compliance with 3.2.8.

4.3.6 Water resistance. Prepare a panel as in 4.3.2. Air dry 96 hours, measure 60 deg. specular gloss in accordance with ASTM D 523, and immerse half of the panel in distilled water at 23 +/- 1 deg. C (73 +/- 2 deg. F) for 18 hours in accordance with ASTM D 1308, paragraph 6.4. Evaluate immediately after removal and after 24 hours recovery. Measure the 60 deg. specular gloss of the immersed portion and evaluate for compliance with 3.2.9.

4.3.7 Specular gloss. Draw down the enamel on plane, opaque, white glass panels specified in 2.1.5 of method 2021, Fed. Test Method Std. No. 141 with a film applicator to obtain a wet film thickness of 76 +/- 2 um (0.003 +/- 0.0001 inch). Determine 60 deg. specular gloss in accordance with ASTM D 523 after 168 hours drying at standard conditions in a dust-free environment.

4.3.8 Lead content. Determine lead in accordance with ASTM D 3335 or by the use of an X-ray fluorescence spectrometer capable of determining lead at a minimum range of 0.03 through 1.0 percent mass of nonvolatile with an accuracy within plus or minus 5.0 percent. The X-ray method shall be used in case of dispute.

5 PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The enamel shall be furnished in quantities specified (see 6.2). The packaging, packing, and marking shall be in accordance with PPP-P-1892. The level of packaging shall be A, B, C, or as otherwise specified (see 6.2). The marking shall be civil, military, or as otherwise specified (see 6.2).

6 NOTES

6.1 Intended use. This is a high-grade synthetic full-gloss, odorless enamel, suitable for general interior use on walls and woodwork. This enamel is characterized by easy brushing, excellent color retention, good drying properties and freedom from aftertack, good water and soap resistance, and excellent flexibility. It also is washable and is useful in hospitals, kitchens, and bathrooms where maintenance of sanitary conditions is important. It can be used on properly primed walls of plaster, wallboard, and wood and metal trim. The enamel may be applied by brush, roller, or spray. It is recommended that the enamel be applied at a spreading rate of approximately 10 square meters per liter (400 square feet per gallon).

6.2 Ordering data. Purchasers should include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Color required.

- (c) Packaging, packing, and marking required.
- (d) Size of container required.

MILITARY INTEREST:

Coordinating Activity

Army - ME

Review Interest

Army - ME

User Interest

Marine Corps - MC

CIVIL AGENCY INTEREST

COM - NBS

VA - OSS

PREPARING ACTIVITY

GSA - FSS