

TT-P-002119 (NAVY-YD)  
June 24, 1980  
SUPERSEDING  
(See 6.3)

## INTERIM FEDERAL SPECIFICATION

### PAINT, LATEX-BASE, HIGH-TRAFFIC AREA, FLAT AND EGGSHELL FINISH (LOW LUSTRE), (FOR INTERIOR USE)

This Interim Federal specification was developed by the Naval Facilities Engineering Command, Department of the Navy, Code 0432, 200 Stovall Street, Alexandria, VA 22332, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers ready-mixed, lead-free, latex paints for high-traffic areas either in flat or low lustre as required to be used on interior walls and ceilings.

#### 1.2 Classification.

1.2.1 Classes. Latex paint covered by this specification shall be of the following classes as specified (see 6.2):

Class 1 - Flat  
Class 2 - Eggshell (Low-Lustre)

#### 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:

H-B-420 - Brush, Paint, Flat, Metal-Bound.  
SS-L-30 - Lath, Sheathing, and Wallboard, Gypsum.  
TT-P-650 - Primer, Coating, Latex Base, Interior, White (for  
Gypsum Wallboard).  
TT-S-179 - Sealer, Surface: Pigmented Oil, Plaster and Wallboard.  
LLL-B-1188 - Building Board, Hard Pressed Vegetable Fiber  
(Laminated).

##### Federal Standards:

Fed-STD-141 - Paint, Varnish, Lacquer, and Related Materials;  
Methods of Inspection, Sampling, and Testing.  
FED-STD-595 - Colors.

FSC 8010

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(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, US Government Printing Office, Washington, DC 20402.)

(Single copies of this specification and other product 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, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, 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 otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM):

- D523 - Specular Gloss.
- D562 - Consistency of Paints Using the Stormer Viscometer.
- D1475 - Density of Paint, Varnish, Lacquer, and Related Products.
- D2486 - Scrub Resistance of Interior Latex Flat Wall Paints.
- D3273 - Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- D3274 - Evaluating Degree of Surface Disfigurement of Paint Films by Fungal Growth of Soil and Dirt Accumulation.
- D3335 - Low Concentrations of Lead in Paint by Atomic Absorption Spectrophotometry.
- D3359 - Measuring Adhesion by Tape Test.
- D3450 - Washability Properties of Interior Architectural Coatings.

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

### 3. REQUIREMENTS

3.1 Material. The paint, as received, shall consist of the pigment and vehicle specified, so combined as to produce a paint meeting all the requirements of this specification. The paint shall be free from material which will be toxic to personnel under normal conditions of use.

3.1.1 Pigments. The pigments, including extenders, shall be light fast and alkali resistant.

3.1.2 Vehicle. The vehicle shall be of the latex type, i.e., a stable aqueous dispersion of synthetic resin particles prepared by emulsion polymerization. Small additions (not in excess of 10 percent) of emulsified modifying resins needed to meet the performance requirements of this specification may be made.

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3.2 Quantitative requirements. The quantitative requirements of the paint shall be as specified in Table I and II.

TABLE I. Quantitative requirements.

Characteristics	Requirements			
	Class 1		Class 2	
	Minimum	Maximum	Minimum	Maximum
Pigment, percent by weight of paint	30	39	20	35
Nonvolatile organic material, percent by weight of paint	14	18	19	25
Weight per gallon, pounds	10	-	-	-
Viscosity, Krebs-Stormer, shearing rate 200 rpm				
Grams	225	500	200	350
Equivalent Krebs Units (K.U.)	85	110	82	100
Dry hard, minutes	-	30	-	30
Directional reflectance, 45 deg., 0 deg., white only	-	-	86	-
Opacity, contrast ratio when applied at 630 square feet per gallon (15.6 square meters per liter)				
Dry	0.95	-	0.95	-
Rewetted	0.93	-	0.93	-
Reflectance, white only (percent)	79	83	-	-
Yellowness, accelerated, white color number 37875 only	-	0.07	-	-
Specular gloss (sheen)				
85 deg.	1	8	10	-
60 deg.	-	-	-	35
Fineness of grind	4	-	6	-
Lead content, percent by weight of total nonvolatile (as metal)	-	0.06	-	0.06

TABLE II. Opacity for tints.

Minimum contrast ratio for tinted paints applied at 630 square feet per gallon (15.6 square meters per liter)

Opacity		
Directional reflectance, percent	Dry	Rewetted[1]
80 and above	0.95	0.93
78	0.96	0.94
76	0.96	0.94
74	0.97	0.95
72	0.97	0.95
70	0.98	0.96
68	0.98	0.96
66	0.98	0.96
64 and below	0.99	0.97

Note: [1] The maximum difference between dry and rewetted opacity shall not exceed 0.02, i.e., if dry opacity is 0.96 the rewetted opacity shall not be less than 0.94.

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### 3.4 Qualitative requirements.

3.4.1 Condition in container. The paint, as received, shall be ready-mixed and shall show no evidence of mold growth, livering, skinning, putrefaction, rust from corrosion of the container, or hard settling pigment. Any settled pigment shall be readily dispersible in the liquid portion by hand stirring to form a smooth homogeneous paint, free from persistent foam.

3.4.2 Storage stability. When tested as specified in 4.4.3, the paint, as received, shall have consistency change no greater than 5 K.U. for class 1 and 10 K.U. for class 2. After completion of this test, the paint from each sample shall dry to a smooth uniform finish when applied to a wall board panel.

3.4.3 Color. The color shall be as specified in the procurement document (see 6.2). When tested as in 4.4.4, the color shall match with standard chip FED-STD-595 or other color standard as agreed upon by Contracting Officer and Contractor.

3.4.4 Flexibility. When tested as described in 4.4.5, the paint shall show no evidence of cracking, chipping, or flaking.

3.4.5 Working properties. The paint shall be easily applied by brush, roller, or spray equipment as tested in 4.4.6. The paint shall show no streaking or foaming.

3.4.6 Appearance of dried paint. When applied by brushing or rolling as specified in 4.4.6, the paint shall dry to a smooth, uniform finish free from craters and other defects caused by bubble retention. There shall be no "shiners" or flashing, no streaking, and no conspicuous laps or objectional brush marks. The difference in 85 deg. or class 1 and 60 deg. for class 2 specular gloss between the base, the latex-base primed, the oil-based primed and the joint cement surface of the test panels shall not be more than two units and the difference in reflectance shall not be more than 1 percent as tested in 4.4.6.

3.4.7 Odor. The odor shall not be putrid or otherwise offensive or irritating before, during, and after application. There shall be no residual odor after 24 hours of drying.

3.4.8 Self-lifting properties. The paint shall produce no lifting, softening, or other film irregularities upon recoating a previously painted surface when tested as in 4.4.6.

3.4.9 Scrubbability. When tested as specified in 4.4.8, paint film shall not be worn through in the panel in fewer than 300 brush cycles for class 1 and 400 brush cycles for class 2.

3.4.10 Washability. When tested as specified in 4.4.9, the soiling mixture shall be substantially removed without any exposure of the undercoat. The reflectance of the cleaned area shall be not less than 95 percent of the value measured on unsoiled area before the test. The 60 deg. specular gloss shall not be less than 80 percent nor more than 120 percent of the original gloss for class 2. The 85 deg. specular gloss shall not be greater than 20 for class 1. The color difference between the cleaned and unsoiled area shall not be greater than 5.

3.4.11 Water resistance. When tested as specified in 4.4.10, the film shall show no wrinkling, blistering, re-emulsification, or other changes.

3.4.12 Alkali resistance. When tested as specified in 4.4.11, the paint film shall show no change in hue and not more than very slight changes in lightness and gloss. The film shall show no wrinkling, blistering, re-emulsification, or other changes.

3.4.13 Fungus resistance. When examined as specified in 4.4.13, paint film shall have a rating of five or greater as described in ASTM D3274. There shall be no bacterial slime on the panels.

3.4.14 Adhesion. When tested as specified in 4.4.15, the paint film shall show no loss of adhesion less than that specified in ASTM D3359, classification 4.

3.4.15 Streaking. A film of thoroughly mixed paint, flowed on a glass panel and dried in a nearly vertical position shall show no evidence of streaking or separation of any of the paint components when tested as specified in 4.4.16.

### 3.5 Class 1.

3.5.1 Resistance to reflectance variation. When tested as specified in 4.4.17, the overall appearance of the panel, including the color of tinted paints, shall be substantially uniform. Any variation in reflectance of the film between the coated sealed and coated and unsealed areas shall not exceed 1.0 percent. Example: A coating that shows reflectance readings of 52.3 percent and 63.3 percent on the portion of the penetration chart is at the maximum limit of acceptability with respect to reflectance variation.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor 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 supplies and services conform to prescribed requirements.

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

- (a) Quality conformance inspection (see 4.3).
- (b) Inspection of packaging inspection (see 4.5).

### 4.3 Quality conformance inspection.

4.3.1 Sampling and inspection. Sampling and inspection shall be in accordance with method 1011, 1021, and 1031 of FED-STD-141 as applicable.

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4.4 Tests. Samples selected in accordance with 4.3 shall be tested as specified in Table III, and 4.4.1 through 4.4.17. Nonconformance to the requirements of the applicable test methods or failure to pass any test shall be cause for rejection of the lot which the sample represents.

TABLE III. Tests and Methods.

Characteristic	Requirement Reference	Test Method	Note	Paragraph Reference
Pigment	Table I	-----	-	4.1
Consistency	Table I	D562	1	-----
Weight per gallon	Table I	D1475	1	-----
Nonvolatile organic material	Table I	-----	-	4.4.1
Viscosity	Table I	D562, 4281	1 & 2	-----
Drying time	Table I	4061	2 & 3	-----
Reflectance	Table I	6121	2	-----
Opacity, dry	Table I & II	4121	4	-----
Opacity, rewetted	Table I & II	-----	-	4.4.12
85 deg. specular gloss	Table I	D523, 6103	1 & 2	-----
60 deg. specular gloss	Table I	D523, 6101	1 & 2	-----
Yellowness accelerated (white only)	Table I	6132	1	-----
Fineness of grind	Table I	4411	2	-----
Lead content	Table I	D3335	1	4.4.14
Condition in container	3.4.1	3011	2	4.4.2
Storage stability	3.4.2	-----	-	4.4.3
Color	3.4.3	4250	2	4.4.4
Flexibility	3.4.4	6221	-	4.4.5
Working properties	3.4.5	-----	-	4.4.6
Appearance	3.4.6	-----	-	4.4.7
Odor	3.4.7	4401	2	-----
Self-lifting	3.4.8	-----	-	-----
Scrubbability	3.4.9	D2486	1 & 5	4.4.8
Washability	3.4.10	D3450, 6141	1 & 2	4.4.9
Water resistance	3.4.11	-----	-	4.4.10
Alkali resistance	3.4.12	-----	-	4.4.11
Fungus resistance	3.4.13	D3273, D3274	1 & 6	4.4.13
Adhesion	3.4.14	-----	-	4.4.15
Streaking	3.4.15	-----	-	4.4.16
Resistance to reflectance variation	3.5.1	-----	-	4.4.17

## Notes:

- [1] ASTM Method.
- [2] FED-STD-141.
- [3] Apply a film with a 0.025-inch (approximately 0.005-inch (0.035 millimeters (mm) gap clearance) Bird film applicator or any other doctor blade which produces a film of the same thickness.
- [4] Procedure B, Method A.
- [5] An additional weight of 454 g (1 pound) placed on the brush holder to expedite the procedure.
- [6] Test organisms. The organisms used in the fungus-resistance test specified in Table III may be obtained from the American Type Culture Collection, 12301 Parklawn Dr., Rockville, MD 20853 or for service use, from the Commander, US Army Natick Research and Development Command, ATTN: Food Science Laboratory, Natick, MA 01760.



4.4.1 Pigment and nonvolatile material. Spread thinly, approximately 5 grams of well-mixed paint sample over the surface of a tared petri dish of borosilicate glass, approximately 10 centimeters in diameter, and obtain exact total weight. Dry in a vented regular oven at 105 +/- 2 deg. Celcius (C) (224 +/- 4 deg. Fahrenheit (F)) to constant weight. This requires overnight drying. After obtaining the weight of the total nonvolatile material, ash in a muffle furnace, raising temperature gradually to 475 +/- 25 deg. C (875 +/- 35 deg. F). Allow 2 hours for complete combustion of the organic material. The furnace pigment is very light and easily scattered. Place sample in dessicator to cool to room temperature. Obtain the weight of the ashed material.

#### 4.4.1.1 Calculations.

Weight of total nonvolatile material - weight of ashed material = weight of nonvolatile organic material

$$\frac{\text{wt. of ash} \times 100}{\text{total wt. of sample}} = \text{pigment, percent by weight of paint}$$

$$\frac{\text{wt. of nonvolatile organic material} \times 100}{\text{total wt. of sample}} = \text{nonvolatile organic material, percent by weight of paint}$$

4.4.2 Condition in container. Examine the paint as received in accordance with method 3011 of FED-STD-141 for compliance with 3.4.1.

#### 4.4.3 Storage stability.

4.4.3.1 Specimens and exposure. Fill two resin-lined friction-top 1-pint cans with the sample paint, as received, and close the cans tightly. Expose one can and contents three times to the following freeze-thaw cycle.

- (a) Low temperature of -9.4 +/- 2 deg. C (+15 deg. +/- 4 deg. F) for 16 hours.
- (b) High temperature of 25 +/- 3 deg. C (77 deg. +/- 5 deg. F) for 8 hours.

Store the other sample in an oven at 49 +/- 2 deg. C (120 deg. +/- 4 deg. F) for 14 days.

#### 4.4.3.2 Procedure.

- (a) At the completion of the exposure test, measure the consistency (method 4281 of FED-STD-141) of both specimens and compare with the original consistency to determine compliance with the requirements of 3.4.2.
- (b) Brush the paint on a composition or gypsum wall board panel, observe while brushing and after drying whether the paint is normal and usable in all respects. Compare with the unexposed paint with respect to freedom from coagulation, agglomeration, speckiness, and changed in sheen or color.

4.4.4 Color. The film shall be applied to a clean, smooth, plate glass panel with a 0.003-inch (approximately 0.006-inch (0.0762-mm) gap clearance) Bird Film applicator, or any other doctor blade which produces a film of the same thickness as that produced by the Bird doctor blade, and shall be allowed to dry for 24 hours. Compare the color of the dried film in accordance with method 4250 of FED-STD-141.



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4.4.5 Flexibility. The paint film shall be applied to an electrolytic tin plate panel (see Note) prepared in accordance with method 2012 of FED-STD-141. Draw down a film using a 0.002-inch (approximately 0.004-inch (0.0508-mm) gap clearance) film applicator. Air dry for 24 hours at a temperature of 23 +/- 1 deg. C (73 +/- 2 deg. F), then heat for 3 hours at 105 +/- 2 deg. C (224 +/- 4 deg. F). After heating, condition the panel for 30 minutes at a temperature of 23 +/- 1 deg. C (73 +/- 2 deg. F) and a relative humidity of 50 +/- 4 percent. Bend the panel over a 1/8-inch (3.18-mm) mandrel, and examine in accordance with method 6221 of FED-STD-141 for compliance with 3.4.4.

Note: Available from the Q-Panel Company, 15601 Industrial Parkway,  
Cleveland, OH 44135

4.4.6 Working properties. Prepare four, 1-foot square panels of composition board (LLL-B-1188) such as Upson Board or gypsum wallboard (SS-L-30). Leave the first panel bare. On the second panel, apply one coat of latex priming coat (TT-P-650) at a spreading rate of 450 square feet per gallon (11 square meters per liter). On the third panel, apply one coat of surface sealer (TT-S-179) at a spreading rate of 450 square feet per gallon (11 square meters per liter). On the fourth panel, apply joint cement of low absorption or of the same type used to fill plasterboard joints so that a 6-inch (153 mm) wide strip 1-1116-inches (28-mm) high in the center with feathered edges is produced. Sand the rough spots after the joint cement has dried. Allow the four panels to dry for 24 hours, and then apply the sample paint at a spreading rate of 450 square feet per gallon (11 square meters per liter) on each panel using a 5-inch (124-mm) brush conforming to H-B-420, grade AA. Allow the panels to dry for 3 hours; then apply a second coat over half of each panel at a spreading rate of 450 square feet per gallon (11 square meters per liter). Apply a second coat to the remaining halves of each panel using a 6-inch (153-mm) mohair roller with 1/8-inch (3.18-mm) pile depth. While applying the second coat observe leveling, brush drag, and film irregularities such as softening or lifting. After a 24 hour drying period, obtain gloss and reflectance readings in accordance with methods 6010 and 6121 of FTD-STD-141, respectively, on the roller-coated and brushed surfaces for a total of eight different readings each. After examining for deficiencies as specified in 3.4.6 and 3.4.8, apply a spray coat over one of the panels to determine the sprayability of the paint.

4.4.7 Appearance of dried film. The dried film of the paint as applied in 4.4.6 shall be examined for compliance with 3.4.6.

4.4.8 Scrub resistance. Determine the scrub resistance in accordance with ASTM D2486 and observe for compliance with 3.4.9.

4.4.9 Washability. Prepare the panels with an undercoat in accordance with method 6047 of FED-STD-141. Soil and test the panels according to method 6141, except recharge the sponge after every 25 cycles until a total of 100 cycles have been run. Observe for compliance with 3.4.10.

4.4.10 Water resistance. Prepare panels as specified in 4.4.8 and allow 120 hours for air drying after the application of the paint. Place five drops of distilled water on the paint and immediately cover the area with a (2-inch) 50 mm watchglass. After 4 hours, remove the watchglass and note any change in the appearance of the film. Remove water and allow 2 hours for recovery. Gently rub the film surface to determine whether the paint complies as specified in 3.4.11.

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4.4.11 Alkali resistance. Prepare panels as specified in 4.4.8 and allow 120 hours for air drying after the application of the paint. Place five drops of an 0.5 percent by weight aqueous sodium hydroxide solution on the paint and immediately cover the surface with an 2-1/16-inch (50-mm) watchglass. After 4 hours, remove the watchglass, wash off the solution, allow 2 hours for recovery, and examine for compliance as specified in 3.4.12.

4.4.12 Rewetted opacity. Apply a coat (1 5-mil (0.4-mm) wet film thickness) of water-white mineral oil (U.S.P. Liquid Petrolatum Heavy) by doctor blade over each of the dried test films prepared for determining the dry opacity. Allow to stand 10 minutes and determine the contrast ratio as described in method 4121 of FED-STD-141.

4.4.13 Fungus resistance. Test the paint in accordance with ASTM D3273 for compliance with 3.4.13.

4.4.14 Lead content. Determine lead content in accordance with ASTM D3335 for compliance with Table I.

4.4.15 Adhesion. Draw down a film of the paint on a plate glass panel which has a plane ground surface, and which has been cleaned as specified in method 2021 of FED-STD-141, with a 0.002-inch (approximately 0.004-inch (0.0508-mm) gap clearance) film applicator. Air dry the paint film for 24 hours and test for tape adhesion by method B of ASTM D3359.

4.4.16 Streaking. Flow the ready-mixed paint on a 4- by 6-inch (100-mm by 153-mm) plate glass panel (panel prepared in accordance to FED-STD-141, method 202), and allow the paint to dry for 18 hours. Evidence of the flowed film showing separation of the paint components shall constitute failure of test.

4.4.17 Resistance to reflectance variation. Apply the paint to a penetration chart (see Note), mounted on a suction box with a doctor blade giving a wet film thickness of 2.5 mils (0.6 mm) and a width of 100 mm (approximately 4 inches). Allow the material to dry, in a horizontal position, not less than 24 hours at 23 +/- 1 deg. C (73.5 deg. +/- 2 deg. F) and a relative humidity of 50 percent, +/- 4 percent. After the drying period, obtain 45 directional reflectance measurements in accordance with method 6121 of FED-STD-141 on the sealed and unsealed portions of the penetration chart and report the difference.

Note: Charts (from H K) obtained from the Leneta Company, P. O. Box 576, Ho-Ho-Kus, NJ are satisfactory.

4.5 Packaging inspection. The packaging, packing, and marking of the container shall be inspected to determine and verify conformance to the quality assurance provisions in Section 5.

## 5. PACKAGING

5.1 Packaging, packing, and marking. The paint shall be packaged in accordance with normal commercial practice using resin (corrosion-resisting) lined containers. The containers of paint shall be one-gallon cans or 5-gallon pails as specified (see 6.2). The packing and marking shall be in accordance with normal commercial practice.

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## 6. NOTES

6.1 Intended use. The latex-base paint covered by this specification is intended for use in high-traffic areas, i.e., hallways, living rooms, and bedrooms, where there is a high degree of personal contact. The paint is for use on interior wall and ceiling surfaces such as wallboard and plaster. It may be applied to previously painted wood, plaster or dry wall surfaces. Glossy finishes should be abraded by sanding or washing with a solvent type cleaner. For new work, a primer sealer such as TT-P-650 is recommended.

## 6.2 Ordering data.

6.2.1 Acquisition requirements. Purchasers should exercise any desired options offered herein, and acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Class required (see 1.2.1).
- (c) Color required (see 3.4.3).
- (d) Quantity and size of container required (see 5.1).

## 6.3 Supersession data. This specification is to be used in lieu of MIL-P-28643(YD).

6.4 Contract data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423 and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data specified below shall be delivered in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraph:

<u>Paragraph</u>	<u>Data requirement</u>	<u>Applicable DD 1664</u>
4.4.1	Certificate of Compliance	DI-E-2121

(Copies of Data Item Descriptions required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Preparing activity:

Navy - YD

Project No. 8010-N181