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MIL-DTL-15090D

6 November 1996

SUPERSEDING

MIL-E-15090C

30 March 1982

(See 6.10)

## DETAIL SPECIFICATION

## ENAMEL, EQUIPMENT, LIGHT GRAY, (NAVY FORMULA NO. 111)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers a 340 gram per liter (maximum) (2.8 pound per gallon [maximum]) volatile organic content (VOC) complying paint. The paint is a light gray equipment enamel (Navy Formula No. 111) for shipboard use as a topcoat on equipment, machinery, furniture and electrical equipment, such as switchboard installations. This product may be used wherever VOC air pollution regulations apply. The light gray equipment enamel covered by this specification is an air dry, solvent base coating for use in all interior dry areas including applications covered by reactor plant painting schedules (see 6.5).

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, SEA 03R42, Naval Sea Systems Command, 2531 Jefferson Davis Hwy, Arlington, VA 22242-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
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AMSC N/A

FSC 8010

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

## MIL-DTL-15090D

**2.2 Government documents.**

**2.2.1 Specifications, standards, and handbooks.** The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

**SPECIFICATIONS****FEDERAL**

- TT-P-645 - Primer, Paint, Zinc-Molybdate, Alkyd Type.
- TT-T-291 - Thinner, Paint Mineral Spirits, Regular and Odorless.

**DEPARTMENT OF DEFENSE**

- MIL-A-22262 - Abrasive Blasting Media Ship Hull Blast Cleaning.
- MIL-P-24441 - Paint, Epoxy Polyamide General Specification for.

**STANDARDS****FEDERAL**

- FED-STD-141 - Paint, Varnish, Lacquer and Related Materials: Methods of Inspection, Sampling and Testing.
- FED-STD-595 - Colors Used in Government Procurement.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

**2.2.2 Other Government documents, drawings, and publications.** The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

**ENVIRONMENTAL PROTECTION AGENCY (EPA)**

40 CFR CH. 1, Part 60, Appendix A, Method 24 - Determination of Volatile Organic Content, Water Content, Density, Volume Solids and Weight Solids of Surface Coatings.

40 CFR Part 261, Appendix II, Toxicity Characteristic Leaching Procedure (TCLP).

**UNITED STATES GOVERNMENT PRINTING OFFICE (USGPO)**

Federal Register, Volume 47, Number 103, Appendix A, Pages 23376 - 23389.

## MIL-DTL-15090D

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

**2.3 Non-Government publications.** The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

**AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)**

- D 50 - Standard Test Method for Chemical Analysis of Yellow, Orange, Red, and Brown Pigments Containing Iron and Manganese. (DoD adopted)
- D 344 - Standard Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts.
- D 476 - Standard Specification for Titanium Dioxide Pigments. (DoD adopted)
- D 523 - Standard Test Method for Specular Gloss. (DoD adopted)
- D 562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer. (DoD adopted)
- D 563 - Standard Test Method for Phthalic Anhydride Content of Alkyd Resins and Resin Solutions. (DoD adopted)
- D 714 - Standard Test Method for Evaluating Degree of Blistering of Paints. (DoD adopted)
- D 823 - Standard Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels. (DoD adopted)
- D 869 - Standard Test Method of Evaluating Degree of Settling of Paint. (DoD adopted)
- D 1210 - Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems. (DoD adopted)
- D 1296 - Standard Test Method for Odor of Volatile Solvents and Diluents. (DoD adopted)
- D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes. (DoD adopted)
- D 1364 - Standard Test Method for Water in Volatile Solvents (Karl Fischer Reagent Titration Method). (DoD adopted)
- D 1475 - Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products. (DoD adopted)
- D 1542 - Standard Test Method for Quantitative Detection of Rosin in Varnishes. (DoD adopted)
- D 1849 - Standard Test Method for Package Stability of Paint. (DoD adopted)
- D 2244 - Standard Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates. (DoD adopted)
- D 2245 - Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints. (DoD adopted)

## MIL-DTL-15090D

## ASTM'S (Continued)

- D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity. (DoD adopted)
- D 2369 - Standard Test Method for Volatile Content of Coatings. (DoD adopted)
- D 2698 - Standard Test Method for Determination of the Pigment Content of Solvent-Reducible Paints by High-Speed Centrifuging. (DoD adopted)
- D 3278 - Standard Test Methods for Flash Point of Liquids by Setaflash Closed-Cup Apparatus. (DoD adopted)
- D 3359 - Standard Test Methods for Measuring Adhesion by Tape Test. (DoD adopted)
- D 3652 - Standard Test Method for Thickness of Pressure-Sensitive and Gummed Tapes. (DoD adopted)
- D 4400 - Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator.
- D 4764 - Standard Test Method for Determination by X-Ray Fluorescence Spectroscopy of Titanium Dioxide Content in Paint.
- E 1252 - Standard Practice for General Techniques for Qualitative Infrared Analysis.
- F 718 - Standard for Shipbuilders and Marine Paints and Coatings Product/Procedure Data Sheet. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

## STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SP 10 - Surface Preparation Specification No. 10 Near-White Blast Cleaning.

(Application for copies should be addressed to Steel Structures Painting Council, 2100 Wharton Street, Suite 310, Pittsburgh, PA 15203.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Navy Formula Number 111. Enamel shall consist of a safflower oil alkyd resin, pigments, extender pigments, and solvent listed in table I which, when combined, shall result in a paint conforming to all the quantitative and qualitative requirements of the applicable paragraphs of this specification.

## MIL-DTL-15090D

TABLE I. Navy formula number 111.

Ingredients <u>1</u> /	Kilograms	Pounds <u>2</u> /	Weight %
Soya Safflower alkyd resin <u>3</u> /	163.16	357.5	31.6
Titanium dioxide <u>4</u> /	45.50	100.3	8.9
Yellow iron oxide <u>5</u> /	3.49	7.7	0.68
Carbon black <u>6</u> /	0.32	0.7	0.06
Calcium carbonate <u>7</u> /	95.53	206.2	18.2
Magnesium silicate <u>8</u> /	52.98	116.8	10.3
Paint thinner <u>9</u> /	86.64	191.0	16.9
Dispersant <u>10</u> /	2.49	5.5	0.49
Suspending agent <u>11</u> /	5.65	12.45	1.11
Antiskinning agent <u>12</u> /	0.830	1.83	0.16
Anti-float <u>13</u> /	1.13	2.50	0.22
Calcium drier (6%) <u>14</u> /	2.49	5.5	0.49
Cobalt drier (12%) <u>15</u> /	0.245	0.54	0.05
Neodymium drier (12%) <u>16</u> /	2.45	5.4	0.48
Bipyridal drier <u>17</u> /	0.295	0.65	0.06
Mica1 <u>18</u> /	52.75	116.3	10.3

1/ Ingredients listed in the footnotes were used in the development of the paint.

Choice of ingredients necessary to meet all the quantitative and qualitative requirements of this specification is the responsibility of the manufacturer. The ingredients chosen shall be of the same chemical type as the ingredient listed in the footnotes. Substitution of chemically different ingredients is not allowed. For example, a soya oil alkyd may not be substituted for the safflower oil alkyd.

2/ This formulation makes approximately 100 gallons when made in pounds.

3/ McWhorter Technologies, Inc., Resin 57-5816, 90 percent solids safflower oil.

4/ ASTM D 476, Types III or IV, Trioxide America, Inc., TR-63.

5/ Harcross Pigments, Inc., YLO-3288D.

6/ Cabot Corp., Newburyport, MA, "Black Pearls L".

7/ Omycarb-5, from OMYA, Inc., Proctor, VT.

8/ R.T. Vanderbilt Co., Norwalk, CT, "Nytal 300".

9/ Mineral Spirits, Ashland Chemicals Co., Columbus, OH.

10/ Nuosperse 657, Huls America, Piscataway, NJ.

11/ Bentone 38 Gel, Niles Chemical Paint Co..

12/ Skino #2, Methyl Ethyl Ketoxime, OMG Mooney Chemicals, Cleveland, OH.

13/ Troysol AFL, Troy Chemical Co., Newark, NJ.

14/ Chem-All, Calcium Carboxylate, OMG Mooney Chemicals, Cleveland, OH.

15/ Chem-All, Cobalt Carboxylate, OMG Mooney Chemicals, Cleveland, OH.

16/ Neo-Chem 250, Cobalt Carboxylate, OMG Mooney Chemicals, Cleveland, OH.

17/ DRI-Rx, Cobalt Carboxylate, OMG Mooney Chemicals, Cleveland, OH.

18/ Mica 3000, KMG Minerals, Inc., Kings Point, NC.

**3.3 Toxic products.** The enamel shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency (see 6.3).

## MIL-DTL-15090D

3.4 **Manufacture.** Component raw materials shall be mixed and ground as required to produce a product which is uniform, stable, free from grit, and suitable for the purpose intended. The product shall be readily broken up with a paddle to a smooth uniform consistency, and shall not liver, thicken, curdle, gel, nor show any objectionable application properties.

3.5 **Quantitative requirements.** The enamel shall conform to the quantitative requirements in table II and the following paragraphs (see 4.5).

TABLE II. Quantitative requirements.

Characteristics	Requirements	
	Minimum	Maximum
Pigment, percent by weight (%WT)	47.1	50.1
Volatile, %WT	24.9	18.9
Nonvolatile vehicle, %WT (calculated by difference)	28.0	31.0
Phthalic anhydride, %WT of non-volatile vehicle	-----	0.0
Phenolic resin, %WT of non-volatile vehicle	-----	0.1
Water, percent by weight of paint	-----	0.5
Coarse particles and skins, %WT of paint	-----	0.5
Weight per gallon, kilograms (kg) [pounds (lb)]	4.900 (10.8)	5.352 (11.8)
Fineness of grind	5	-----
Flashpoint, degrees Celsius (°C) [degrees Fahrenheit (°F)]	38 (100)	-----
Gloss, 60° Specular	35	50
Viscosity, Krebs units	-----	90
Time of drying to touch, hours	-----	2
Time of drying to recoat, hours	-----	6
Sag, mils	4	-----
VOC, grams solvent per liter of paint, kg/Liter (kg/L) [pounds per gallon (lb/gal)]	-----	340 (2.8)

3.5.1 Hazardous material content.

3.5.1.1 Hazardous metals and asbestos. When tested in accordance with 4.6.6.1 and 4.6.6.2, the content of each soluble hazardous metal and the total hazardous material content of the enamel shall be not greater than the values listed in tables III and IV.

## MIL-DTL-15090D

TABLE III. Hazardous soluble metals content.

Soluble metal and/or its compounds	Maximum, mg/L
Antimony and its compounds	15.0
Arsenic and its compounds	5.0
Barium and its compounds (excluding barite)	100.0
Beryllium and its compounds	0.75
Cadmium and its compounds	1.0
Chromium (IV) compounds	5.0
Chromium and its chromium (III) compounds	560.0
Cobalt and its compounds	80.0
Copper and its compounds	25.0
Fluoride salts	180.0
Lead and its compounds	5.0
Mercury and its compounds	0.2
Molybdenum and its compounds	350.0
Nickel and its compounds	20.0
Selenium and its compounds	1.0
Silver and its compounds	5.0
Tantalum and its compounds	100.0
Thallium and its compounds	7.0
Tungsten and its compounds	100.0
Vanadium and its compounds	24.0
Zinc and its compounds	250.0

TABLE IV. Total hazardous metals and asbestos material content.

Metal	Maximum Wgt.%
Antimony and its compounds	0.015
Arsenic and its compounds	0.001
Asbestos	0.00001
Barium and its compounds (excluding barite)	0.10
Beryllium and its compounds	0.0002
Cadmium and its compounds	0.0005
Chromium (IV) compounds	0.0005
Chromium and its chromium (III) compounds	0.56
Cobalt and its compounds	0.005
Copper and its compounds	0.01
Fluoride salts	0.18
Lead and its compounds	0.005
Mercury and its compounds	0.0002
Molybdenum and its compounds	0.035
Nickel and its compounds	0.02
Selenium and its compounds	0.001
Silver and its compounds	0.001
Tantalum and its compounds	0.100
Thallium and its compounds	0.007

## MIL-DTL-15090D

TABLE IV. Total hazardous metals and asbestos material content - Continued

Metal	Maximum Wgt. %
Tungsten and its compounds	0.100
Vanadium and its compounds	0.01
Zinc and its compounds	0.25

3.5.1.2 Hazardous air pollutants (HAPS). When tested in accordance with 4.6.7, the content of HAPS solvents in the total enamel shall be not greater than the weight percent (%WT) values listed in table V.

TABLE V. Hazardous solvent contents.

Hazardous solvent	Maximum, %WT
Benzene	0.05
Chlorinated solvent(s), total Carbon tetrachloride Chloroform (trichloromethane) Methylene chloride (dichloromethane) Tetrachloroethylene (perchloroethylene) 1,1,1 - Trichloroethylene (methyl chloroform) Trichloroethylene	0.05
Ethyl benzene	0.05
Methyl, ethyl, and butyl mono-ethers of ethylene glycol and methyl, ethyl, and butyl ethylene glycol acetates, total (Methyl, ethyl and butyl cellosolves and methyl, ethyl and butyl cellosolve acetates)	0.05
Methyl ethyl ketone (MEK)	0.05
Methyl isobutyl ketone (MIBK)	0.05
Toluene	0.05
Xylene (all forms), total	0.10

3.6 Qualitative requirements. The enamel shall meet the following qualitative requirements.

3.6.1 Rosin and rosin derivatives. When tested in accordance with 4.6.8, the test result for rosin and rosin derivatives shall be negative.

3.6.2 Odor. When tested as specified in table VI, the odor shall be characteristic of the volatiles permitted and used.

3.6.3 Color. When tested in accordance with 4.6.9, the color shall match color number 26307 of FED-STD-595. The measured color deviation terms [Delta ( $\Delta$ ) E,  $\Delta A$ ,  $\Delta B$ ,  $\Delta L$ ] from color number of FED-STD-595 in Commission Internationale de l'Eclairage (CIE; International Commission on Illumination) LAB units shall be not greater than the 0.5 CIELAB unit.



## MIL-DTL-15090D

3.6.4 Flexibility. When tested in accordance with 4.6.10, the enamel shall show no evidence of cracking or flaking.

3.6.5 Adhesion. When tested as in accordance with the requirements of table VI, pressure sensitive tape conforming to ASTM D 3652 shall not remove more than two of the paint squares from its substrate.

3.6.6 Condition in container.

3.6.6.1 Condition in container - new. When tested as specified in 4.6.11, a freshly opened full container of enamel shall be free from lumps, abnormal thickening, or livering and shall show no more pigment settling or caking than can be readily reincorporated to a smooth, uniform state. The product shall be readily broken up with a paddle or mechanical mixer to a smooth uniform consistency in 5 minutes and shall not show any objectionable properties such as livering, gelling, pigment float, curdling, hard caking or gummy sediment for at least 1 year after date of manufacture. The enamel shall not exceed 95 Krebs Units in viscosity, shall not exceed 8 hours dry hard time and shall conform in all respects to this specification.

3.6.6.2 Condition in container - partially full container. When tested in accordance with 4.6.12, the enamel shall show no livering, curdling, hard caking or gummy sediment. After aging, it shall mix readily by paddle or mechanical mixer in 5 minutes to a smooth uniform state and any skin formed shall be easily removed.

3.6.7 Dilution stability. When tested in accordance with the requirements of table VI, the enamel shall remain stable and uniform when thinned a maximum of 10 percent. The thinned enamel shall show no precipitation curdling or separation. Slight pigment settling is permitted. Any thinning shall not cause the enamel to exceed the maximum allowed VOC limits.

3.6.8 Brushing properties. When tested in accordance with the requirements of table VI, the enamel shall brush satisfactorily in all respects and shall dry to a smooth uniform film free from gloss variation, brush marks, seeds, runs, sags and streaks.

3.6.9 Spraying properties. When tested in accordance with the requirements of table VI, the enamel shall spray satisfactorily in all respects and shall show no running, sagging, streaking or pronounced orange peel. The film shall air dry and show no seeding, dusting, floating, fogging, mottling, hazing, or other film defects.

3.6.10 Knife adhesion. When tested in accordance with the requirements of table VI, a 0.001 inch (nominal) dry film of enamel shall adhere tightly to and shall not flake, chip, powder or crack from the metal. The cut shall show beveled edges.

3.6.11 Water resistance and film hardness. When tested in accordance with the requirements of 4.6.14, a film of enamel prepared as specified in 4.6.1(d) shall show no wrinkling or blistering immediately after removal of the panel from water. The enamel shall have a hardness of 4H when tested in accordance with 4.6.14. After 24 hours air drying the portion of the panel which was immersed shall also have a hardness of 4H.

## MIL-DTL-15090D

**3.6.12 Compatibility.**

**3.6.12.1 Compatibility - recoatability (touchup).** When tested in accordance with the requirements of 4.6.15, adhesion shall be rated 3B or better.

**3.6.12.2 Compatibility with primers and undercoats.** When tested in accordance with 4.6.16, the enamel shall show no signs of incompatibility such as blistering, wrinkling or peeling.

**3.6.13 Blister resistance.** When tested in accordance with 4.6.17, a film of the coating shall have a ASTM D 714 blister rating of 8 or better and be rated "Few" or better 300 hours. Blister growth shall be limited to a ASTM D 714 blister rating of 6 and be rated "Few" at 300 hours and 500. Blisters within 6.3 millimeter (mm) (0.25 inch) of all edges shall be disregarded.

**3.6.14 Surface appearance.** When tested in accordance with 4.6.18, after drying for 24 hours, a flow-out film on glass of the mixed enamel shall exhibit a surface smooth in appearance and free of defects, such as pinholes, coarse particles, skins or agglomerates of any kind.

**3.6.15 Hiding power.** When tested in accordance with 4.6.19, the enamel shall be considered to pass the hiding power test if the contrast lines between the white and black areas on the chart are invisible when viewed through the paint film.

**3.6.16 Safflower alkyd identification.** When tested in accordance with 4.6.20, the alkyd oil shall be safflower.

**3.6.17 Pigment identification.** When tested in accordance with 4.6.21, the pigment in the enamel shall conform to the requirements of table I.

**4. VERIFICATION**

**4.1 Classification of inspections.** The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.2).
- (b) Conformance inspection (see 4.3).

**4.2 First article inspection.** First article inspection shall be performed on a sample (see 6.4). First article testing shall include all tests specified in 4.5.

**4.3 Conformance inspection.** When specified by the contracting officer instead of first article inspection (see 6.4), conformance inspection shall be conducted in accordance with methods 1011, 1022, and 1031 of FED-STD-141 and shall consist of the tests in table VI marked with an asterisk (\*).

**4.4 Lot acceptance.** Lots shall be accepted by the Government inspector only upon receipt of a satisfactory test report.

## MIL-DTL-15090D

4.5 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in table VI and the applicable paragraphs in 4.6.

TABLE VI. Test procedures.

Test	Requirement	Test	FED-STD-141 test method	ASTM test method
Pigment content*	Table II	-----	-----	D 2698
Volatiles content*	Table II	-----	-----	D 2369
Nonvolatile vehicle content	Table II	-----	4053.1	-----
Phthalic anhydride	Table II	4.6.2	-----	D 563
Phenolic resin	Table II	4.6.3	5141	-----
Water content	Table II	-----	-----	D 1364
Coarse particles/skins*	Table II	-----	4092.1	-----
Weight per gallon*	Table II	-----	-----	D 1475
Fineness of grind*	Table II	-----	-----	D 1210
Flash point*	Table II	-----	-----	D 3278
Gloss	Table II	-----	-----	D 523
Viscosity*	Table II	-----	-----	D 562
Time of drying to touch	Table II	4.6.4	4061.2	-----
Time of drying to recoat	Table II	4.6.4	4061.2	-----
Sag resistance*	Table II	-----	-----	D 4400
VOC grams/liter*	Table II	4.6.5		
Hazardous metals and asbestos content	3.5.1.1	4.6.6.1 and 4.6.6.2	-----	-----
Hazardous solvent contents	3.5.1.2	4.6.7		
Rosin/rosin derivatives	3.6.1	4.6.8	-----	D 1542
Odor	3.6.2	-----	-----	D 1296
Color	3.6.3	4.6.9	-----	D 823 and D 2244
Flexibility	3.6.4	4.6.10	6221	-----
Adhesion	3.6.5	-----	-----	D 3359 Method B
Condition in container - new	3.6.6.1	4.6.11	-----	D 869
Condition in container - partially full container	3.6.6.2	4.6.12		
Dilution stability	3.6.7	-----	4203.1	-----
Brushing properties*	3.6.8	-----	4321.2	-----

## MIL-DTL-15090D

TABLE VI. Test procedures - Continued.

Test	Requirement	Test	FED-STD-141 test method	ASTM test method
Spraying properties*	3.6.9	-----	2131.1 and 4331.1	-----
Knife adhesion	3.6.10	-----	6304.1	-----
Water resistance and film hardness	3.6.11	4.6.14	-----	D 1308
Compatibility - recoat-ability (touchup)	3.6.12.1	4.6.15		
Compatibility with primers and undercoats	3.6.12.2	4.6.16	-----	-----
Blister resistance	3.6.13	4.6.17	----	D 2247 and D 714
Surface appearance	3.6.14	4.6.18	-----	-----
Hiding power	3.6.15	4.6.19	-----	D 344
Safflower oil identification	3.6.16	4.6.20	-----	D 2245
Pigment identification	3.6.17	4.6.21		D 50 and D 4764

4.6 Test procedures.4.6.1 Panel preparation. Unless otherwise specified:

- (a) Steel panels shall be prepared for testing by abrasive blasting to a near white metal surface in accordance with SSPC SP 10 to achieve a minimum 2.0 mil surface profile. The blasted panels shall be solvent wiped to remove any traces of oil or residue, blown dry with dry air, wrapped in plastic and stored in either a desiccator or in air-tight storage prior to coating. The abrasive used for blasting shall comply with the requirements of MIL-A-22262 and shall be listed on the current qualified products list.
- (b) MIL-P-24441 Formula 150 Types III and IV shall comply with the requirements of the appropriate MIL-P-24441 specification sheet and be listed on the current qualified products list, shall be applied at 3 to 4 mils dry film thickness (DFT) and cured for 48 hours at ambient laboratory room temperature.
- (c) TT-P-645 primer shall comply with the requirements of TT-P-645, shall be applied at 1 to 3 mils DFT and cured for 48 hours at ambient laboratory room temperature.
- (d) Enamel to this specification (MIL-E-15090) shall be applied at 2 to 3 mils DFT and cured for 48 hours at ambient laboratory room temperature.

## MIL-DTL-15090D

4.6.2 Phthalic anhydride. Phthalic anhydride content shall be determined in accordance with ASTM D 563. A suitable portion of the vehicle, collected during the determination of pigment and evaporated on a steam bath until the volume has been reduced to approximately 10 milliliters (mL), shall be used as the sample. The alcoholate precipitate obtained shall be corrected use of the methods specified in ASTM D 563. (If desired, phthalic anhydride content may be determined on the vehicle isolated by high-speed centrifuging in accordance with ASTM D 2698. Phthalic anhydride content shall be in accordance with the requirements of table II.

4.6.3 Phenolic resins. Test for phenolic resins shall be in accordance with FED-STD-141, Method 5141. Use a portion of the separated nonvolatile vehicle for the test. Phenolic resin content shall be in accordance with the requirements of table II.

4.6.4 Time of drying. Drying time to touch shall be determined in accordance with method 4061.2 of FED-STD-141, except that the specified conditions of temperature and humidity shall apply only for referee tests in case of dispute. All other tests shall be conducted under prevailing laboratory conditions. Time of drying to touch and time of drying to recoat shall be in accordance with the requirements of table II.

4.6.5 Volatile organic content (VOC). VOC shall be determined in accordance with 40 CFR, CH. 1, Part 60, Appendix A, (U.S. EPA) method 24. The VOC content shall be in accordance with the requirement of table II.

4.6.6 Soluble and total metal content.

4.6.6.1 Asbestos, soluble and total metal content, except tantalum and tungsten. Asbestos, soluble and total metal content, except tantalum and tungsten, shall be determined on a dry paint film of the enamel in accordance with the 40 CFR, Part 261, Appendix II, Toxicity Characteristic Leaching Procedure (TCLP) and the appropriate test in table VII. Asbestos shall be analyzed in accordance with the method in the Federal Register, Volume 47, Number 103, Appendix A, pages 23376-23389 and the results shall be recorded as percent by weight of the dry paint film. Soluble metal content shall be reported as milligrams per liter (mg/L). Total metal content shall be reported as percent by weight of the dry paint film. The test results for asbestos and each individual metal shall be in accordance with the requirements of 3.5.1.1. Tantalum and tungsten soluble metal content and total metal content shall be analyzed as specified in 4.6.6.2.

## MIL-DTL-15090D

TABLE VII. Test methods for evaluating solid waste.

Metal	Physical/Chemical Methods, SW-846 Metal/material Digestion Test Method
All metals, except chromium (VI)	3050
Chromium (IV)	3060
Antimony	7040 or 7041
Arsenic	7060 or 7061
Barium	7080 or 7081
Cadmium	7131
Total chromium	7190
Lead	7421
Mercury	7470 or 7471
Nickel	7520 or 7521
Selenium	7740 or 7741
Silver	7760 or 7761
	Test method in Methods for Chemical Analysis of Water and Waste, EPA- 600/4-020, USEPA, 1979
Beryllium	210.1 or 210.2
Cobalt	219.1 or 219.2
Copper	220.1 or 220.2
Fluoride	340.1, 340.2, or 340.3
Molybdenum	246.1 or 246.2
Thallium	279.1 or 279.2
Vanadium	286.1 or 286.2
Zinc	289.1 or 289.2

4.6.6.2 Tantalum and tungsten content. Tantalum and tungsten content of the enamel shall be determined using any appropriate spectroscopy test method. The tests shall be conducted in accordance with the equipment manufacturer's directions for the use of the instrument. Paint manufacturer is responsible for establishing data supporting the test method choice and analytical accuracy. Test results for tantalum and tungsten shall be in accordance with the requirements of 3.5.1.1.

4.6.7 Hazardous solvent content. Hazardous solvent content shall be determined in accordance with Methods 7356 and 7360 of FED-STD-141. Solvent fractions shall be identified in accordance with ASTM E 1252. Test results shall be reported as percent by weight of the total paint. The test results for each solvent shall be in accordance with the requirements of 3.5.1.2.

4.6.8 Rosin and rosin derivatives. The test for rosin and rosin derivatives shall be in accordance with ASTM D 1542. A portion of the separated volatile vehicle shall be used for the test. The test result shall be in accordance with the requirement in 3.6.1.

## MIL-DTL-15090D

## 4.6.9 Color testing.

4.6.9.1 Color. Test specimens shall be prepared in accordance with ASTM D 823 Test Methods C or E using a nominal 0.006 in blade film applicator on to a clear plate glass of not less than 3/8 inch (nominal) thickness which has been ground to a uniform finish with 1F carborundum. The color shall be determined in accordance with ASTM D 2244 using an instrument having a D<sub>65</sub> light source (10 degree observer) or C (2 degree observer), a 45 degree illumination angle, a 0 degree viewing angle. The instrument shall be calibrated in accordance with manufacturer instructions and shall be demonstrated to read the color of National Institute for Science and Technology (NIST [formerly National Bureau of Standards; NBS]) traceable standards with color deviations not greater than allowed in 3.6.3. After calibration of the instrument, measure the CIE color values of not less than two color number 26307 of FED-STD-595 color cards which were received from the Government not greater than 1 year prior to the date of this use. Making at least three readings per card taken at 1 inch intervals on the long axis, 1 inch from the edge. Calculate E for each color card. Determine the mean values of E and the CIE color values for the color cards. If any individual CIE color value differs from the mean color value by more than 0.05, use a different color card and recalculate the mean values. These mean values will be used to calculate the color difference values. Measure the CIE color values of the test enamel using the values of three readings taken at 1 inch intervals on the long axis, 1 inch from the edge. Calculate the mean CIE color values of the test enamel. Calculate the color difference terms. If using an instrument that automatically calculates the color differences, enter the color card mean values as the base line for the color difference calculations. Color shall be in accordance with the requirements of 3.6.3.

4.6.9.2 Instrumental color deviation determination. Test specimens shall be prepared in accordance with ASTM D 823 Test Methods C or E using a nominal 0.006 in blade film applicator on to a clear plate glass of not less than 3/8 in (nominal) thickness which has been ground to a uniform finish with 1F carborundum. The color deviation shall be determined in accordance with ASTM D 2244 using a instrument having a D<sub>65</sub> light source (10 degree [°] observer) or C (2° observer), a 45° illumination angle, a 0° viewing angle. The instrument shall be calibrated in accordance with manufacturer instructions and shall be demonstrated to read the color of National Institute for Science and Technology (NIST [formerly National Bureau of Standards; NBS]) traceable standards with color deviations not greater than allowed in 3.6.3. After calibration of the instrument, measure the CIE color values of not less than two color number 26307 of FED-STD-595 color cards which were received from the Government not greater than 1 year prior to the date of this use. Making at least three readings per card taken at 1 inch intervals on the long axis, 1 inch from the edge. Calculate E for each color card. Determine the mean values of E and the CIE color values for the color cards. If any individual CIE color value differs from the mean color value by more than 0.05, use a different color card and recalculate the mean values. These mean values will be used to calculate the color difference values. Measure the CIE color values of the test enamel using the values of three readings taken at 1 inch intervals on the long axis, 1 inch from the edge. Calculate the mean CIE color values of the test enamel. Calculate the color difference terms. If using an instrument that automatically calculates the color differences, enter the color card mean values as the base line for the color difference calculations. The results of the color difference calculations shall be in accordance with the requirements of 3.6.3.



## MIL-DTL-15090D

**4.6.9.3 Referee color matching.** If the enamel measured in accordance with 4.6.9.1 does not match the color card when visually examined, the discrepancy shall be resolved by an independent laboratory certified to the NIST National Volunteer Laboratory Accreditation Program for paint testing. When tested in accordance with ASTM D 823, the test enamel, prepared as in 4.6.9.1, shall visually match the color number 26307 of FED-STD-595 color card that most closely corresponds to the mean values calculated in 4.6.9.1. Color shall be in accordance with the requirements of 3.6.3.

**4.6.9.4 Alternative color measuring equipment.** Manufacturers can qualify alternative color measuring equipment to NAVSEA or GSA by demonstrating that the particular instrumentation to be used measures the color parameters with the accuracy needed for color deviation. The manufacturer shall demonstrate the alternate instrumentation can provide color parameters that result in the color defined in 3.6.3 and establish correlation factors for converting his instrument's color parameters into those of equipment meeting 4.6.9.1 by measuring an acceptable Navy formula 111 enamel previously measured on an instrument meeting the requirements of 4.6.9.1.

**4.6.10 Flexibility.** Flexibility shall be determined in accordance with method 6221 of FED-STD-141. The enamel shall be applied to a flat metal plate of approximately 31 gauge by means of a doctor blade capable of yielding a dry film thickness of  $0.0010 \pm 0.0003$  inch. The panel shall be allowed to air-dry for 2 hours then baked for 24 hours at  $100$  to  $105^{\circ}\text{C}$  ( $210$  to  $221^{\circ}\text{F}$ ). The panel shall then be removed from the oven and allowed to stand for 30 minutes at ambient laboratory conditions. The panel shall then be bent over a  $1/8$ -inch mandrel and the film examined at the bent under a magnification of five diameters. Flexibility shall be in accordance with the requirements of 3.6.4.

**4.6.11 Condition in container.** Determine package condition in accordance with FED-STD-141, Method 3011 and observe for compliance with 3.6.6.1. The unopened full container of enamel shall be heated slightly to  $23 \pm 2^{\circ}\text{C}$  ( $73 \pm 4^{\circ}\text{F}$ ). Evidence of pressure or vacuum in the unopened container shall be noted. The container shall then be opened and examined for evidence of skinning, corrosion of container interior, odor of putrefaction, rancidity or souring. If the sample is in a 1-liter (1-quart) or smaller container, the character of the lower (or settled) layer shall be determined with a spatula as specified in ASTM D 869. If the sample is larger than 1-quart, this step shall be omitted. After the initial examination, the paint shall be hand-stirred 300 stirs in 2 minutes with a spatula appropriate to the container, stirring so as to ensure uniform distribution of any settled material. Immediately after stirring, the consistency of the paint shall be measured using the Krebs-Stormer viscometer. The stored paint shall be applied to a test panel and after it has dried the paint film shall be examined for grains, gelatinous lumps, and streaks caused by such grains or lumps at least  $0.8$  mm ( $1/32$  inch) in diameter or larger. Condition in container shall be in accordance with the requirements of 3.6.6.1.

**4.6.12 Storage stability - partially full container.** Storage stability shall be tested in accordance with ASTM D 1849. A 1-liter (1-quart) can shall be filled approximately three-quarters full of the test specimen paint, closed tightly with a lid and placed inside a 4-liter (1-gallon) or larger container which shall also be sealed. The weight of the sealed sample shall be determined. The sealed sample shall be stored for 1 month at  $52 \pm 1^{\circ}\text{C}$  ( $125 \pm 2^{\circ}\text{F}$ ) to simulate some of the effects of storage for 6 months to a year at  $23 \pm 2^{\circ}\text{C}$  ( $73 \pm 3.5^{\circ}\text{F}$ ). At



## MIL-DTL-15090D

the end of the storage period, the sample shall be conditioned to ambient laboratory conditions. The sample shall be reweighed (without shaking) to determine if there has been a loss of weight through faulty closure. The can shall then be opened and the contents examined for skinning, seeding, settling, gellation, separation, can corrosion and odor of putrefaction, rancidity, or souring. Carry out the rest of the test specified in ASTM D 1849 as specified. Condition in container shall be in accordance with the requirements of 3.6.6.2.

4.6.13 Dilution stability. Dilution stability with thinner shall be determined in accordance with method 4203.1 of FED-STD-141. Fifty mL of enamel and 50 mL of paint thinner conforming to grade 1 of TT-T-291 shall be used. Observations shall be made immediately after mixing and 30 minutes after mixing. Check for compliance with 3.6.7.

4.6.14 Water resistance and film hardness. Spray apply a  $75 \pm 25$  micrometer ( $\mu\text{m}$ ) ( $0.003 \pm 0.001$  inch) film of the enamel on an abrasive blast cleaned steel test panel. Cure at ambient laboratory temperature (approximately  $23^\circ\text{C}$  [ $73^\circ\text{F}$ ]) for 48 hours. Immerse 50% of the panel in room temperature distilled water for 24 hours. Test for the requirements of 3.6.11. The coated panel shall be placed on a firm horizontal surface. A set of calibrated drawing leads or equivalent calibrated wood pencils meeting the following hardness scale (6B-5B-4B-3B-B-HB-F-H-2H-3H-4H-5H-6H) shall be used in the test. Whichever pencil is used, it shall be held firmly against the film at a 45-degree angle (point away from the operator) and pushed away from the operator in a 6.5 mm ( $1/4$ -inch) stroke. The process shall be started with the hardest pencil and continued down the scale of hardness to either of two end points, the pencil that will not cut into or gouge the film (pencil hardness) or the pencil that will not scratch the film (scratch hardness). Hardness shall be in accordance with the requirements of 3.6.11.

4.6.15 Compatibility - recoatability (touchup). Prepare and prime three panels as specified in 4.6.1(d). Apply one coat at 2-3 mils DFT of enamel. Examine for incompatibility immediately after topcoat application and after 48 hours air-dry for hours at ambient room temperature. Conduct knife adhesion test in accordance with method 6304.1 of FED-STD-141. Test results shall be in accordance with the requirements of 3.6.12.1.

4.6.16 Compatibility with primers. Prepare and prime three panels as specified in 4.6.1. To the first panel apply a 2 to 3 mil primer coating TT-P-645; the second panel with 2 to 3 mils of MIL-P-24441 F.150 Type III paint and to the third panel apply 2 to 3 mil of MIL-P-24441 F.150 Type III paint. Apply one coat at 2-3 mils DFT of enamel. Examine for incompatibility immediately after topcoat application and after 48 hours air-dry for hours at ambient room temperature. Results shall be in accordance with the requirements of 3.6.12.2.

4.6.17 Blister resistance. Three test panels of the enamel shall be prepared and primed as specified in 4.6.1(d). Air-dry for 24 hours at ambient laboratory conditions. Test shall be conducted in accordance with ASTM D 2247 for 500 hours with written evaluations provided every 100 hours. Evaluations shall be conducted and blisters rated in accordance with ASTM D 714. Check for compliance with 3.6.13.

4.6.18 Surface appearance. Prepare a flow-out film of the enamel by pouring approximately 15 mL of the mixed enamel across a glass panel near the upper edge, while the panel is lying flat. Then tilt the panel to allow the coating to spread over all but the

## MIL-DTL-15090D

upper edge. Next, place the panel in an almost vertical position and allow to drain. After 24 hours, examine the film for compliance with 3.6.14. Coarse particles, skins, and agglomerates are characterized by being larger than the dispersed pigment in particle size and extending beyond the plane of the film.

4.6.19 Hiding power. The hiding of the paint shall be determined in accordance with ASTM D 344 except that the coating shall be applied to one square foot of the chart and to a dry film thickness of 3 mils as calculated from the weight per gallon of the paint and the weight of the paint sample applied to the chart. The hiding shall be in accordance with the requirements of 3.6.15.

4.6.20 Safflower oil analysis. The oil portion of the alkyd nonvolatile vehicle of the enamel shall be determined in accordance with ASTM D 2245. Results shall be in accordance with the requirements of 3.6.16.

4.6.20.1 Alternative analysis methods. Appropriate spectroscopic analysis methodology or other standard chemical analysis may be used as an alternative to ASTM D 2245. Such spectrographic equipment shall be calibrated and operated as recommended by the equipment manufacturer.

4.6.21 Pigment analysis. The presence of titanium dioxide shall be determined in accordance with ASTM D 4764. The presence of yellow iron oxide and calcium carbonate shall be determined in accordance with ASTM D 50. Results shall be in accordance with the requirements of 3.6.17.

4.6.21.1 Alternative analysis methods. Appropriate spectroscopic analysis methodology or other standard chemical analysis may be used as alternatives to ASTM D 50 and D 4764. Such spectrographic equipment shall be calibrated and operated as recommended by the equipment manufacturer.

4.7 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, packing, and marking for shipment, stowage, and storage shall be in accordance with the requirements of section 5.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

## MIL-DTL-15090D

**6.1 Intended use.** The enamel covered by this specification is intended for use as a finish or topcoat on furniture and equipment in marine service. This enamel is a non-lead, non-chromate, non-asbestos material. The dried paint film has been tested to USEPA standards and the paint debris is, as of the time of this specification, a non-hazardous waste. It may be applied by brush or spray and is suitable for any primed metal or wood structure. During development, this enamel was easily sprayed with a Binks #7 HTES (high transfer efficiency special) gun. The Navy formula no. 111 enamel is a gray color. This enamel has been formulated to comply with air pollution regulations which allow a maximum VOC of 340 grams of solvent minus water per liter of paint (2.8 pounds per gallon). The product contains 340 grams of solvent per liter of paint, as delivered and does not require thinning for brush or spray application.

**6.1.1** Baking enamel has been deleted from the previous version of this specification. Baking enamel intended for use on furniture, equipment, and so forth in non-reactor plant painting applications is now described by ASTM F 1178, Standard Specification for Enameling System, Baking, Metal Joiner Work and Furniture. Color requirement of paragraph 3.6.3 is applicable.

**6.1.2** Powder coating in the appropriate color of 3.6.3 is also an option for a baking version. Consult NAVSEA for powders acceptable in submarine applications.

**6.2 Acquisition requirements.** Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- (c) Whether first article inspection is required (see 3.1).
- (d) If material safety data sheets are required (see 3.7 and 6.6).
- (e) Packaging requirements (see 5.1 and tables VIII and IX).

**6.3 Toxicity.** Questions pertinent to this requirement should be referred by contracting activity to the qualifying activity. The qualifying activity will act as advisor to the contracting activity. The qualifying activity will arrange for review of questions by the appropriate departmental medical service.

**6.4 First article inspection.** When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first article production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.2. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspections to those bidders offering a product which has been previously acquired or tested by the government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

## MIL-DTL-15090D

6.5 Volatile organic content (VOC). Although the container marking specifically refer to the Federal regulations, the paints may be used anywhere else a product complying with 3.2 is allowed. This includes other air pollution control districts or similar areas controlling the emission of volatile organic solvents into the atmosphere.

6.6 Material safety data sheets and ASTM F 718 data sheet. Contracting officers will identify those activities requiring copies of completed material safety data sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313. In order to obtain the MSDS Federal Acquisition Regulation (FAR) clause 52.223.3 must be in the contract. The ASTM F 718 data sheet should be included with each shipment of the material covered by this specification (see 6.7).

6.7 Directions for use. The manufacturer should provide written directions on each container for the mixing and application of the enamel supplied and this direction shall include all information necessary to comply with OSHA Hazard Communication Act and FED-STD-313. In addition, the manufacturer shall prepare an ASTM F 718 data sheet which should separately detail requirements for small unit (pint, quart, gallon) and large unit (five-gallon) containers (see 6.6).

6.8 Suggested packaging. Suggested packaging requirements are contained in tables VIII and IX.

6.9 Subject term (key word) listing.

Alkyd  
Gray  
Equipment paint  
Lead free  
Chromium compound free

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

## MIL-DTL-15090D

TABLE VIII. Suggested packing and packaging.

Packaging	Recommended requirements for direct Government acquisitions
Unit of procurement	The paints covered by this specification should be purchased by volume. The unit of procurement should be in multiples of 1 L or 1 U.S. liquid gallon at 15.5 °C (60 °F).
Containers	<p>(a) The components should be furnished in cans of appropriate volume such as 3.78L (1-gallon) or multiples thereof.</p> <p>(b) Multiple friction plug containers should be in accordance with PPP-C-96, type V, class 2. Interior coatings should be as specified therein. Exterior coatings, including side seam stripping, should be as specified therein for plan B. Wire handles as specified therein, should be provided for the 1-gallon container. Closure of the properly filled and sealed cans should be as specified in the appendix thereto.</p> <p>(c) Pails should be to PPP-P-704.</p> <p>(d) All containers should comply with the requirements of the Uniform Freight Classifications (UFC), the National Motor Freight Classification (NMFC), and the applicable requirements of the Code of Federal Regulations 49CFR, Department of Transportation (DOT).</p>
Intermediate containers	<p>(a) Paints should be packaged in intermediate containers.</p> <p>(b) Intermediate containers should be close-fitting corrugated fiberboard boxes in accordance with UFC, NMFC and 49CFR requirements. Fiberboard used in the construction of interior (unit and intermediate) and exterior containers, including interior packaging forms, should conform to the PPP-F-320. PPP-F-320 classes should be domestic fire-retardant or weather resistant fire-retardant as specified.</p>

## MIL-DTL-15090D

TABLE VIII. Suggested packing and packaging - Continued.

Packaging	Recommended requirements for direct Government acquisitions
Commercial packaging	(a) Commercial packaging should be to ASTM D 3951. (b) All containers should comply with the requirements of the Uniform Freight Classifications (UFC), the National Motor Freight Classification (NMFC), and the applicable requirements of the Code of Federal Regulations 49CFR, Department of Transportation (DOT).
Packing	Packing should be specified as follows: Overseas delivery (Level A) packing. Intermediate containers of paint should be packed in close-fitting wood boxes conforming to PPP-B-601, overseas type, or PPP-B-621, class 2. Box closure and strapping should be as specified in the applicable box specification or the appendix thereto except that strapping should be flat and the finish B. Domestic delivery (Level B) packing. Level B packing should be as for level A, except that boxes should be domestic type or class and the strapping should be finish A or B. Commercial packing. The paint, in the specified unit and intermediate containers should, as applicable, be packed in multiples of like sizes in accordance with UFC, NMFC, and 49CFR requirements.
Palletization	Intermediate containers should be palletized in accordance with MIL-STD-147. Only one size unit or intermediate container should be placed on a pallet.
Packing for Navy acquisitions	Treated lumber and plywood. All lumber and plywood, including laminated veneer materials, used in shipping container and pallet construction, member, blocking, bracing, and reinforcing should be fire-retardant treated material in accordance with MIL-L-19140 as follows: (a) General use, weather resistant: MIL-L-19140, type II, Category I. (b) General use, non-weather resistant: MIL-L-19140, type I, Category I.
Material safety data sheets (MSDS) and ASTM F 718	A copy of the MSDS and ASTM F 718 should be attached to the shipping document for each destination (see 6.6).

## MIL-DTL-15090D

TABLE VIII. Suggested packing and packaging - Continued.

Packaging	Recommended requirements for direct Government acquisitions
Bar codes	Marking should include bar codes
Hazardous warnings	<p>(a) Labels should be in accordance with 29 CFR Parts 1910, 1915, 1917, 1918, 1926 and 1928, as well as PPP-P-1892.</p> <p>(b) All individual containers should have the following marking:</p> <p>"CAUTION: This paint contains volatile solvents, with probable hazardous vapors. Use with adequate ventilation. Avoid prolonged breathing of vapors or spray mists. The solvents are highly flammable, avoid open flame and smoking."</p> <p>(c) Each component container, shipping container, and palletized load should be marked with the appropriate hazardous symbol in accordance with FED-STD-313.</p>

TABLE IX. Suggested marking.

Marking type	Recommended marking
Volatile organic content (VOC)	"Contains a maximum of 340 grams of solvent of volatile organic content (VOC) per liter of paint per 40 CFR CH.1, part 60, Appendix A (EPA) Method 24."
OSHA Hazard Communication Act and FED-STD-313.	Markings should include all information necessary to comply with OSHA Hazard Communication Act and FED-STD-313.
Mixing and use instructions	Directions should include mixing, application equipment directions, limitations on thinning, temperature range for use and surface preparation recommendations. Directions should refer user to data sheets, MSDS and ASTM F 718 for information.

Custodians:  
Army - ME  
Navy - SH  
Air Force - 99

Preparing activity:  
Navy - SH  
(Project 8010-0956)