

INCH-POUND

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19 June 1991
 SUPERSEDING
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 (See 6.9)

MILITARY SPECIFICATION

PAINT, ANTIFOULING, VINYL (FORMULAS NO. 121, 121A, 129 AND 129A)

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

1. SCOPE

1.1 Scope. This specification covers vinyl, antifouling paint, formulas number 121, 121A, 129, and 129A.

1.2 Classification. Paint covered by this specification should be of the following types and classes, as specified (see 6.2):

Type I - Red antifouling paint.

Class 1 - Formula No. 121 (contains Tricresyl phosphate).

Class 2 - Formula No. 121A (Tricresyl phosphate free).

Type II - Black antifouling paint.

Class 1 - Formula No. 129 (contains Tricresyl phosphate)

Class 2 - Formula No. 129A (Tricresyl phosphate free)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 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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SPECIFICATIONS

FEDERAL

- RR-S-366 - Sieve, Test.
- TT-P-645 - Primer, Paint, Zinc Molybdate, Alkyd Type.
- TT-T-656 - Tricresyl Phosphate.
- LLL-R-626 - Rosins: Gum, Wood, and Tall Oil.
- PPP-P-1892 - Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of.

MILITARY

- MIL-P-15169 - Pigment, Cuprous Oxide
- MIL-P-23236 - Paint Coating Systems, Fuel and Salt Water Ballast Tanks. (Metric)
- 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-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.
- FED-STD-595 - Colors Used in Government Procurement.

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

2.1.2 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)

Code of Federal Regulations (CFR) 40, CH. 1, Part 60, Appendix A, Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids and Weight Solids of Surface Coatings.

Code of Federal Regulations (CFR) 40, Parts 150 through 180 - Federal Insecticide, Fungicide and Rodenticide Act.

OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION (OHSA)

Code of Federal Regulations (CFR) 29, Parts 1910, 1915, 1917, 1918, 1926 and 1928 - Hazard Communication Act, Final Rule.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by 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.)

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2.2 Non-Government publications. The following document(s) 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 FOR TESTING AND MATERIALS (ASTM)

- D 283 - Standard Methods of Chemical Analysis of Cuprous Oxide and Copper Pigments. (DoD adopted)
- D 562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer. (DoD adopted)
- D 769 - Standard Specification for Black Synthetic Iron Oxide.
- D 846 - Standard Specification for Ten-Degree Xylene. (DoD adopted)
- D 912 - Standard Specification for Cuprous Oxide for Use in Antifouling Paints. (DoD adopted)
- D 1153 - Standard Specification for Methyl Isobutyl Ketone. (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 1364 - Standard Test Method for Water in Volatile Solvents (Fischer Reagent Titration Method). (DoD adopted)
- D 1475 - Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products. (DoD adopted)
- D 1729 - Standard Practice for Visual Evaluation of Color Differences of Opaque Materials. (DoD adopted)
- D 2244 - Standard Method for Calculation of Color Differences from Instrumentally Measured Coordinates. (DoD adopted)
- D 2369 - Standard Test Method for Volatile Content of Coatings. (DoD adopted)
- D 2698 - Standard 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 Setflash Closed-Cup Apparatus. (DoD adopted)
- D 3623 - Standard Method for Testing Antifouling Panels in Shallow Submergence.
- E 97 - Standard Test Method for Directional Reflectance Factor, 45-Deg 0-Deg, of Opaque Specimens by Broad-Band Filter Reflectometry. (DoD adopted)

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

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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2.3 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 Qualification. The paints furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of contract (see 4.3 and 6.4).

3.2 Composition. The paint shall consist of ingredients conforming to the applicable specifications in the proportions specified (see tables I and II). The component raw materials shall be incorporated and ground in such a manner as to produce a product which is uniform, free from grit and in full conformity with the requirements of this specification.

TABLE I. Formulas 121 and 121A.

Ingredients	Specifications	Parts by weight <u>1/</u>	
		Formula 121	Formula 121A
Cuprous oxide	MIL-P-15169 or ASTM D 912	1440	1440
Rosin	LLL-R-626, type 1, class A, grade WW or WG	215	215
Vinyl resin <u>2/</u>	-----	55	55
Tricresyl phosphate	TT-T-656	50	<u>3/</u>
Methyl isobutyl ketone <u>4/</u>	ASTM D 1153	165	165
Xylene	ASTM D 846	115	115
Antisettling agent <u>5/</u>	-----	<u>5/</u>	<u>5/</u>

- 1/ Use of pounds as weight units results in a volume slightly in excess of 100 gallons.
- 2/ The resin used shall be a vinyl chloride - vinyl acetate copolymer. It shall contain 85 to 88 percent vinyl chloride and 12 to 15 percent vinyl acetate. The resin shall have a specific gravity from 1.35 to 1.37. Material shall be furnished as a powdered white solid, not less than 98 percent of which shall pass through a number 20 sieve conforming to RR-S-366 (see 6.5).
- 3/ Type and amount of plasticiser used in formula 121A shall be specified by the manufacturer. Plasticiser shall not be volatile when tested to EPA method 24 in accordance with CFR 40.
- 4/ This material shall contain less than 1 percent of methyl normal-butyl ketone.
- 5/ Type and amount of antisettling agent used in formulas 121 and 121A shall be specified by the manufacturer so as to meet the requirements of 3.4.7 and 3.4.8.

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TABLE II. Formulas 129 and 129A.

Ingredients	Specifications	Parts by weight <u>1/</u>	
		Formula 129	Formula 129A
Cuprous oxide	MIL-P-15169 <u>2/</u>	1161	1161
Black iron oxide	ASTM D 769 <u>2/</u>	256	256
Rosin	LLL-R-626, type 1, class A, grade WW or WG	186	186
Vinyl resin <u>3/</u>	-----	46	46
Tricresyl phosphate	TT-T-656	40	<u>4/</u>
Methyl isobutyl ketone <u>5/</u>	ASTM D 1153	173	173
Xylene	ASTM D 846	112	112
Antisettling agent <u>6/</u>	-----	<u>6/</u>	<u>6/</u>

- 1/ Use of pounds as weight units results in a volume slightly in excess of 100 gallons.
- 2/ These pigments shall be selected to enable the finished product to comply with color, directional reflectance and all other requirements of this specification. Products which have been used in the past to meet these requirements include American Chemet Corporation's Purple Copp LoLo Tint 97N copper oxide and Pfizer Minerals, Pigments and Metals Division Williams BK-5099 black iron oxide.
- 3/ The resin used shall be a vinyl chloride - vinyl acetate copolymer. It shall contain 85 to 88 percent vinyl chloride and 12 to 15 percent vinyl acetate. The resin shall have a specific gravity from 1.35 to 1.37. Material shall be furnished as a powdered white solid, not less than 98 percent of which shall pass through a number 20 sieve conforming to RR-S-366 (see 6.5).
- 4/ Type and amount of plasticiser used in formula 129A shall be specified by the manufacturer. Plasticiser shall not be volatile when tested to EPA method 24 in accordance with CFR 40.
- 5/ This material shall contain less than 1 percent of methyl normal-butyl ketone.
- 6/ Type and amount of antisettling agent used in formulas 129 and 129A shall be specified by the manufacturer so as to meet the requirements of 3.4.7 and 3.4.8.

3.3 Quantitative requirements. Paint shall be as specified in the quantitative requirements in tables III and IV when tested as specified in 4.3.

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TABLE III. Quantitative requirements.

Characteristics	Requirements <u>1/</u>			
	Formula 121		Formula 121A	
	Minimum	Maximum	Minimum	Maximum
Pigment, percent by weight <u>1/</u> <u>2/</u>	68.6	72.6	73.8	77.8
Volatiles, percent by weight <u>1/</u>	----	13.7	----	14.1
Nonvolatile vehicle, percent by weight <u>1/</u> <u>2/</u> <u>3/</u>	11.2	15.2	11.6	15.6
Water, percent by weight of finished paint	----	0.5	----	0.5
Coarse particles and skins, as residue retained on standard no. 325 mesh sieve of RR-S-366, percent by weight of finished paint	----	0.2	----	0.2
Consistency, Krebs-Stormer shearing rate of 200 revolutions per minute (r/min): grams equivalent Krebs units	220	475	220	475
Weight per unit volume: pounds per gallon <u>1/</u>	20.4	----	19.9	----
Fineness of grind	3	----	3	----
Time to dry hard - minutes	----	90	----	90
Total copper in pigment, percent by weight of pigment	86.0	----	86.0	----
Tricresyl phosphate, percent by weight <u>1/</u> <u>4/</u>	1.4	3.4	----	0.0
Directional reflectance, percent	----	----	----	6
Flash point, °F <u>5/</u>	75	----	75	----
Volatile organic content (VOC), grams per liter in ready to apply condition	----	340	----	340

- 1/ Where percentages are listed for composition or weight per gallon is listed, the values are for the formulation appearing in table I. Calculations are made with the weight of optional ingredients assigned a nominal value of zero. Manufacturers shall provide actual weight ingredients used for calculations.
- 2/ Maximum-minimum range is plus or minus 2 percent of table I.
- 3/ Nonvolatile vehicle includes rosin and vinyl resins.
- 4/ Maximum-minimum range is plus or minus 1 percent of table actual.
- 5/ Degrees Fahrenheit (°F).

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TABLE IV. Quantitative requirements.

Characteristics	Requirements <u>1/</u>			
	Formula 129		Formula 129A	
	Minimum	Maximum	Minimum	Maximum
Pigment, percent by weight <u>1/ 2/</u>	69.8	73.8	71.3	75.3
Volatiles, percent by weight <u>1/</u>	----	14.4	----	14.7
Nonvolatile vehicle, percent by weight <u>1/ 2/ 3/</u>	9.8	13.8	10.0	14.0
Water, percent by weight of finished paint	----	0.5	----	0.5
Coarse particles and skins, as residue retained on standard no. 325 mesh sieve of RR-S-366, percent by weight of finished paint	----	0.2	----	0.2
Consistency, Krebs-Stormer shearing rate of 200 r/min: grams equivalent Krebs units	220	475	220	475
Weight per unit volume: pounds per gallon <u>1/</u>	19.7	----	19.3	----
Fineness of grind	3	----	3	----
Time to dry hard - minutes	----	90	----	90
Total copper in pigment, percent by weight of pigment	86.0	----	68.5	----
Tricresyl phosphate, percent by weight <u>1/ 4/</u>	1.0	3.0	----	0.0
Directional reflectance, percent	----	----	----	6
Flash point, °F <u>5/</u>	75	----	75	----
Volatile organic content (VOC), grams per liter in ready to apply condition	----	340	----	340

- 1/ Where percentages are listed for composition or weight per gallon is listed, the values are for the formulation appearing in table II. Calculations are made with the weight of optional ingredients assigned a nominal value of zero. Manufacturers shall provide actual weight ingredients used for calculations.
- 2/ Maximum-minimum range is plus or minus 2 percent of table II actual.
- 3/ Nonvolatile vehicle includes rosin and vinyl resins.
- 4/ Maximum-minimum range is plus or minus 1 percent of table actual.

3.4 Qualitative requirements. The paint shall meet the qualitative requirements specified (see 3.4.1 through 3.4.12).

3.4.1 Odor. The odor of the paint shall be characteristic of the volatiles permitted when tested as specified (see 4.6.2.1).

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3.4.2 Color. The color of formulas 121 and 121A shall be characteristic of the ASTM D 912 pigments used. The color of formulas 129 and 129A shall be equal to or slightly darker than FED-STD-595 number 37056 when tested as specified in 4.6.2.6.

3.4.3 Compatibility with thinner. There shall be no evidence of incompatibility when tested as specified in 4.6.2.7.

3.4.4 Adhesion. The paint shall show good adhesion when tested as specified in 4.6.2.8. There shall be no loss of adhesion to the primer nor any intercoat delamination between coats of the antifouling paint.

3.4.5 Film characteristics. The panel, prepared as specified (see 4.6.2.8) after a 24-hour drying time, shall be smooth and uniform and shall show no evidence of cracking, alligating, or other defects when examined as specified (see 4.6.2.9).

3.4.6 Surface appearance. A flow-out film on glass of the unreduced paint, prepared and examined as specified (see 4.6.2.10), shall exhibit a surface smooth in appearance and free of defects, such as pinholes, coarse particles, skins, or agglomerates of any kind.

3.4.7 Condition in container. A freshly opened, full container of paint, when tested as specified (see 4.6.2.11), shall be free from lumps, abnormal thickening or livering and shall show no more pigment settling or caking than can be readily reincorporated by hand stirring with a paddle or by mechanical agitation to a smooth, uniform state.

3.4.8 Storage stability. Previously unopened, original container of paint stored as required in 3.4.8.1 and 3.4.8.2 and tested in accordance with 4.6.2.12 and methods listed in table V shall be capable of being readily dispersed within 5 minutes when mixed with a paddle or by mechanical agitation to a smooth uniform condition and shall not vary from the requirements of tables III and IV by more than the following:

- (a) Consistency shall be not greater than five Krebs units higher or lower than specified herein;
- (b) time of dry hard not more than 60 minutes longer than the maximum specified herein;
- (c) color shall be as specified herein, and
- (d) shall be readily applied to a thickness of 0.005 inches wet film thickness by brush, roller and spray with no sagging, running, or streaking.

3.4.8.1 Long term storage stability. After storage in accordance with 4.6.2.12, paint shall be capable of meeting the requirements of 3.4.8.

3.4.8.2 Qualification and lot acceptance quality conformance inspection storage stability. After storage as specified in 4.6.2.12, paint shall meet the requirements of 3.4.8.

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3.4.9 Infrared spectra of isolated vehicle. Band position, shape and relative intensities of each spectrum shall match the spectrum obtained from the known sample with the same thickness and instrument settings when determined as specified (see 4.6.2.13).

3.4.10 Resistance to tropical biofouling organism attachment. Panels prepared and tested as specified in 4.6.2.14 shall not biofoul in excess of the requirements in 3.4.10.1 and 3.4.10.2. Loss of test paint by failure of primer adhesion to panel substrate material or peeling due to loss of adhesion of test paint to primer or to itself shall invalidate the test and shall be grounds for mandatory retesting. Blisters that do not peel or break shall be ignored.

3.4.10.1 Formulas 121 and 121A. Paint shall have a fouling rating of 95 (slime excepted) for a period of 2 years when rated in accordance with ASTM D 3623. Area within 1/2 inch of panel edges may be ignored during examination for biofouling rating.

3.4.10.2 Formulas 129 and 129A. Paints shall have a fouling rating of 95 (slime excepted) for a period of 1 year when rated in accordance with ASTM D 3623. Area within 1/2 inch of panel edges may be ignored during examination for biofouling rating.

3.4.11 Toxicity. Contractor optional ingredients shall not have undue toxic effects. Contractor shall prepare container label instructions for the paint in accordance with the requirements of CFR 29, parts 1910, 1915, 1917, 1918, 1926 and 1928 - Hazard Communication Act, Final Rule.

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

3.4.13 EPA FIFRA registration. Manufacturers shall obtain an Environmental Protection Agency Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), CFR 40, parts 150-180 antifouling pesticide registration number for formula 121A and formula 129A products submitted for qualification to this specification. The label obtained with this registration shall be like figure 2 or figure 3 modified to reflect the company EPA registration number.

3.4.14 Volatile organic content (VOC). Paints submitted shall not exceed 340 grams per liter (g/L) organic volatile content when tested in accordance with 4.6.2.5.

3.5 Material safety data sheet (MSDS). The contracting activity shall be provided a material safety data sheet at the time of contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.7).

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification tests apply to all types and classes of paint, and shall be conducted at a laboratory satisfactory to the Naval Sea Systems Command. Qualification tests shall consist of all tests specified in 4.6, 4.7 and table V.

4.3.1 Requalification. Requalification shall be required every 6 years, and shall consist of conducting all tests specified (see 4.3). The contractor shall apply for qualification of any or all of the antifouling coatings listed in 1.2.

4.3.2 Ingredient samples. For qualification, the contractor shall submit to the designated laboratory, 1 gallon each of all liquid ingredients, 5 pounds of cuprous oxide, 2 pounds each of all other solid ingredients and 2 gallons of finished paint.

4.4 Quality conformance inspection. Quality conformance tests for acceptance of individual lots shall consist of tests specified in table IV and 4.6, with the exception of storage stability (see 4.6.2.12) and resistance to tropical fouling organism attachment (see 4.6.2.14), with results meeting the applicable requirements of section 3 (see 6.3 and appendix).

4.4.1 Lot. A lot shall consist of paint of the same type, class and grade from a single uniform batch or a uniform blend of batches offered for delivery at one time.

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4.4.2 Sampling. Two representative random samples from each lot shall be tested. The samples shall be packaged in separate containers. Minimum size for each sample shall be 1-quart.

4.4.3 Acceptance of individual lots. Acceptance of individual lots shall be based on compliance of finished paint with lot conformance to this specification (see 4.4.1).

4.5 Standard laboratory conditions. If laboratory test conditions are not specified in the test method, the standard test conditions shall apply. The standard test conditions shall be the prevailing atmospheric pressure, 22 ± 2 degrees Celsius ($^{\circ}\text{C}$) and 50 ± 5 percent relative humidity.

4.6 Test procedures.

4.6.1 Ingredient materials. The ingredient materials submitted shall be tested to determine compliance with the applicable specifications.

4.6.2 Finished paint. The finished paint shall be tested in accordance with table V, and as specified herein. If specified in the contract or order (see 6.2), additional chemical and physical tests shall be run to determine the ingredients and proportions specified (see tables I and II). Failure of any sample to pass any test and noncompliance with the requirements of the specification shall be cause for rejection of the lot represented by the sample.

TABLE V. Test procedures.

Test	Applicable FED-STD-141 test method	Applicable ASTM test method
Pigment (use extraction mixture G)	4021.1	----
Volatiles	----	D 2369
Nonvolatile vehicle	4053.1	----
Water	----	D 1364
Coarse particles and skins (use extraction mixture B)	4092.1	---
Consistency, gram equivalent Krebs units	----	D 562
Weight per unit volume	----	D 1475
Fineness of grind	----	D 1210
Copper content of pigment	----	D 283
Drying time	4061.2	----
Tricresyl phosphate or plasticiser	7371	----
Directional reflectance	----	E 97
Flash point	----	D 3278
Volatile organic content	1/	----
Odor	----	D 1296

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Color		
Formulas 121, 121A, 129, and 129A	----	D 1729
Formulas 129 and 129A (disputes only)	----	D 2244
Compatibility with thinner	4203.1	----
Condition in container	3011.2	----
Storage stability	2/	
Infrared spectra	----	D 2698
Resistance to tropical biofouling	----	D 3623

1/ Determine as specified in 4.6.2.5 herein.

2/ Determine as specified in 4.6.2.12 herein.

4.6.2.1 Odor. The odor test of ASTM D 1296 shall be conducted to meet the requirements of 3.4.1.

4.6.2.2 Drying time. Drying time shall be determined by method 4061.2 of FED-STD-141 under standard laboratory conditions and examined for conformance to tables III and IV requirements. Draw down the test film on clean plate glass to a wet film thickness of approximately 0.0020 inch using a blade with 0.0040 inch clearance.

4.6.2.3 Total copper. Determine total copper in accordance with ASTM D 283 and examine for conformance to tables III and IV requirements.

4.6.2.4 Tricresyl phosphate. Tricresyl phosphate content shall be determined by method 7371 of FED-STD-141 or any suitable chromatography procedure that yields equivalent results when examined for conformance of tables III and IV requirements.

4.6.2.5 Volatile organic content (VOC). VOC shall be determined in accordance with CFR 40, CH. 1, Part 60, appendix A, (U.S. EPA) method 24. VOC shall not exceed the requirements in 3.4.14. Contractor shall file certification of VOC compliance (see 4.6.2).

4.6.2.6 Color. The color of paints shall be determined in accordance with ASTM D 1729. Check for compliance with 3.4.2.

4.6.2.7 Compatibility with thinner. Compatibility with thinner shall be determined in accordance with method 4203.1 of FED-STD-141, using 50 milliliters (mL) of paint and 50 mL of the thinner. Observe immediately after mixing and also 30 minutes after mixing; examine for conformance to 3.4.3. Use xylene and methyl isobutyl ketone mixed 1:1 by volume to thin paint where air pollution regulations for solvents do not apply. Report any defects in accordance with method 4203.1 of FED-STD-141.

4.6.2.8 Adhesion. Apply a coat (0.3 to 0.4 mil dry) of MIL-P-24441, formul 150 primer. After drying to a tacky state under standard laboratory conditions,

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the paint exhibits good adhesion to the primer and conforms to 3.4.4. Six parallel cuts shall be made 6 inches long and 1/4 inch apart.

4.6.2.9 Film characteristics. Examine the panel prepared in 4.6.2.8 for conformance to 3.4.5.

4.6.2.10 Surface appearance. Prepare a flow-out film of the paint by pouring approximately 15 mL of the unreduced paint 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 upper edge. Next, place the panel in an almost vertical position and allow to drain. After 24 hours under standard laboratory conditions, examine the film for compliance with 3.4.6. 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.

4.6.2.11 Condition in container. Determine package condition in accordance with method 3011.2 of FED-STD-141, and observe for compliance with 3.4.7.

4.6.2.12 Storage stability. Test as specified in 4.6.2.12.1, 4.6.2.12.2 and 4.6.2.12.3 as appropriate.

4.6.2.12.1 Long term storage stability. Paints in their original unopened containers shall disperse readily within 5 minutes when mixed with a paddle or mechanical agitation to a smooth uniform condition and shall meet the requirements of 3.4.8 after 2 years ambient laboratory storage.

4.6.2.12.2 Qualification short term storage test. (a) Store an unopened, original container of paint at nominal temperatures in the range minus 18°C (minus 32°F) to minus 1°C (minus 2°F) for 24 hours, return to nominal laboratory conditions and test for compliance to the requirements of 3.4.8. (b) Store an unopened, original container of paint at nominal temperatures in the range 38°C (100°F) to 55°C (132°F) for 24 hours, return to nominal laboratory conditions and test for compliance to the requirements of 3.4.8. Both paint samples shall disperse readily within 5 minutes when mixed with a paddle to a smooth uniform condition and shall meet the requirements of 3.4.8.

4.6.2.12.3 Short term lot acceptance - quality inspection tests for storage stability. (a) Store an unopened, original container of paint at temperatures in the range minus 18°C (minus 32°F) to minus 1°C (minus 2°F) for 24 hours, return to nominal laboratory conditions and test for compliance to the requirements of 3.4.8. (b) Store an unopened, original container of paint at temperatures in the range 38°C (100°F) to 55°C (132°F) for 24 hours, return to nominal laboratory conditions and test for compliance to requirements of 3.4.8. Both paint samples shall disperse readily within 5 minutes when mixed with a paddle or mechanical agitation to a smooth uniform condition and shall meet the requirements of 3.4.8.

4.6.2.13 Infrared spectra of isolated vehicle. Isolate vehicle in accordance with ASTM D 2698. Vacuum dry films of isolated vehicle for 30 minutes at 176°F on a rock salt plate. The films shall be of various thicknesses as needed to get good spectra. Record each spectrum from 2 to 15 micrometers within 24 hours of casting the film. Compare the spectra of the sample with the reference spectra obtained in the same manner from a known sample of vehicle made up in accordance with applicable tables I or II formula and examine for conformance to

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3.4.9.

4.6.2.14 Resistance to tropical biofouling organism attachment. Determine the resistance to tropical biofouling organism attachment as follows:

4.6.2.14.1 Test panel preparation. Panels shall be at least 25.4 centimeters by 30 centimeters by 0.3 centimeters (10 inches by 12 inches by 1/8 inches) (nominal measurements). Panels should be non-corroding, may be composed of any material acceptable to the testing organization and suitable for painting with the specified MIL-P-24441 primer and a 2-year continuous immersion in sea water. Submitting organizations shall ensure that panel materials are so that failure of the primer to adhere to the substrate will not obviate their biofouling evaluation. The number of coats of MIL-P-24441 formula 150 applied shall reflect the choice of panel material. Apply the first 0.002 inch (minimum) dry film thickness coat of the test paint while the last coat of primer is still in a tacky, but not wet, condition. Allow the first coat of test paint to dry a minimum of 4 hours, then apply a second 0.002 inch (minimum) dry film thickness coat of the test paint. Allow the prepared test panel to cure at least 24 hours before beginning the test. Any commercial product qualified to MIL-P-23236 may be substituted for the MIL-P-24441 primer at the submitter's risk.

4.6.2.14.2 Testing of panels. Panel tests shall be conducted in Biscayne Bay or Daytona Beach, Florida or Pearl Harbor, Hawaii in accordance with ASTM D 3623. Alternate test sites require specific prior approval by the Naval Sea Systems Command. Period for inspection and rating criteria shall be as specified in 3.4.10.1 and 3.4.10.2.

4.7 Toxicological product formulations. The contractor shall have the toxicological product formulations and associated information available for review by the contracting activity to evaluate the safety of the material for the proposed use.

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

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisitions.)

5.1 Preservation, packing and marking. The paint shall be preserved level A, B, or C, packed level A, B, or C, as specified (see 6.2), and marked in accordance with PPP-P-1892, including hazardous warnings (see 3.4.12), as applicable. Unless otherwise specified (see 6.2), the paint shall be furnished in 5-gallon pails in accordance with DOT 5, 6C and 17H.

5.1.1 Special marking. Each unit container shall be labeled as follows:

5.1.1.1 Type I (formula 121) and type III (formula 129) containers shall have affixed the appropriate figure 2 or figure 3 EPA approved label as shown on the samples herein.

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5.1.1.2 Type II (formula 121A) and type IV (formula 129A) containers shall have affixed the contractor's EPA approved label.

5.1.1.3 Containers shall be marked with the manufacturer's qualified products list designation and test number.

5.1.1.4 Containers shall also be marked as follows:

"Contains a maximum of 340 grams per liter of volatile organic content per 40 CFR CH. 1, Part 60, Appendix A, (U.S. EPA) method 24.

This product may be thinned 8 ounces per gallon with Methyl Isobutyl Ketone (MIBK) or Methyl Ethyl Ketone (MEK) and will contain less than 400 grams per liter volatile organic content (VOC).

Do not store in direct sunlight or where temperatures are less than 35°F or higher than 100°F."

6. NOTES

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

6.1 Intended use. The copper oxide based paints supplied under this specification are intended to prevent biofouling (barnacles, etc.) from attaching to ship underwater hulls. Formulas 121 and 121A are red vinyl based paints with a service life of approximately 24 months. Formulas 129 and 129A paints are black vinyl based paint with a service life of approximately one year. These paints are suitable for use over TT-P-645 alkyd primer or MIL-P-24441 epoxy-polyamide paint. When used with MIL-P-24441 or other generic epoxy paints, these antifouling paints must be applied before the epoxy paint becomes fully hard. The basic formulations and the "A" formulations differ only in the plasticiser used. The basic formulations contain hazardous tricresyl phosphate.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, class and formula of paint required (see 1.2).
- (c) Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) Certifications (if any) required (see 4.4).
- (e) Required marking (see 5.1).
- (f) Level of packaging and level of packing required (see 5.1).
- (g) Size of container required, if other than as specified (see 5.1).
- (h) Marking required (see 5.1.1).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific

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the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.4, 4.6.2.5 and appendix	DI-MISC-80678	Certification/data report	----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 15931 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 51222, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests must be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4.1).

6.4.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.5 Vinyl resin viscosity. The vinyl resin specified (see tables I and II) is available in several viscosity grades. Intermediate grades can be made by blending. The manufacturer should use the grade or blend that brings his paint within specification limits. The proper blend may change from batch to batch if different cuprous oxide pigments are used. When blending is necessary, the best practice is to use the vinyl resin grades that will minimize the amount of the lower viscosity grade.

6.6 Conditions for use of level B preservation. When level B preservation is specified (see 5.1), this level of protection should be reserved for the acquisition of paint for resupply worldwide under known favorable handling, transportation, and storage conditions.

6.7 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets (MSDS) and ASTM F718 data sheets (see 3.4.12 and 3.5).

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6.8 Subject term (key word) listing.

Copper
Copper oxide
Volatile organic content (VOC)

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

Custodians:

Army - ME
Navy - SH

Preparing activity:

Navy - SH
(Project 8010-0404)

Review activity:

Army - MR

User activities:

Navy - MC, OS, CG

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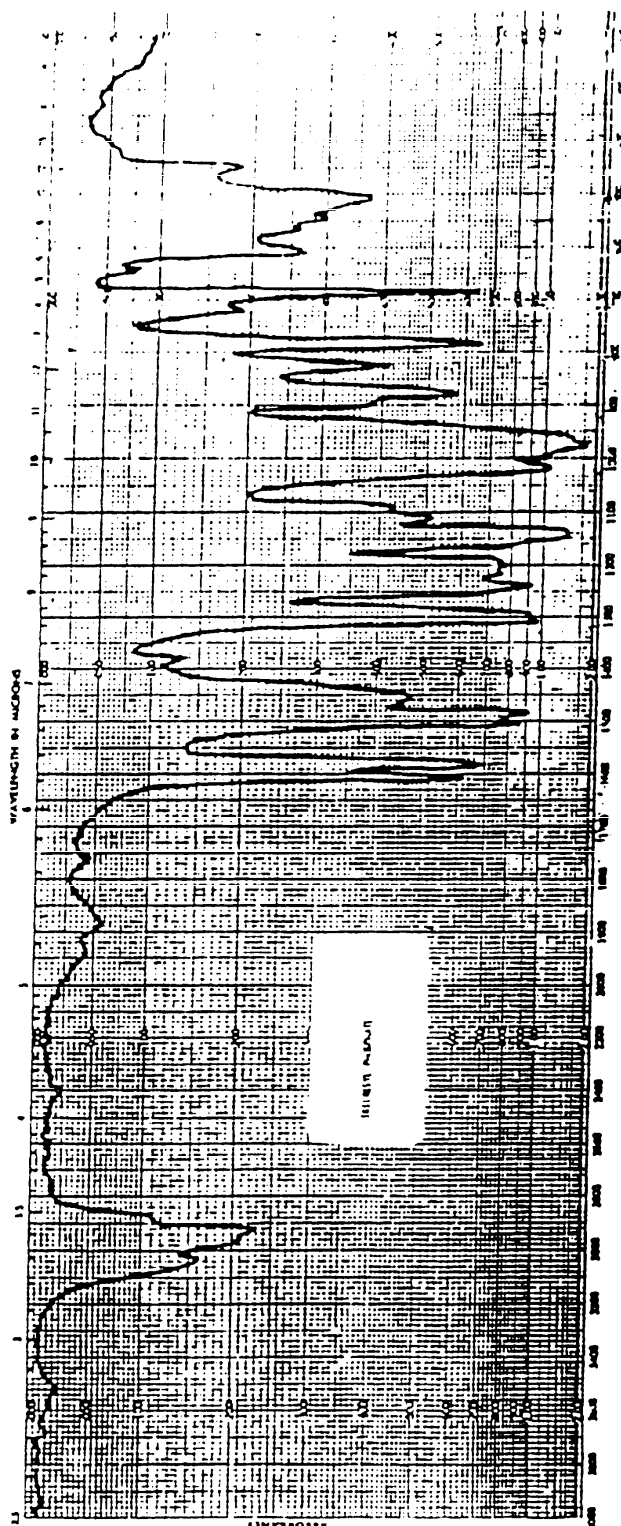


FIGURE 1. Infrared spectrum for tricresyl phosphate.

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NET CONTENTS FIVE GALLONS

US NAVY

RED VINYL

ANTIFOULING PAINT

FORMULA 121

MILITARY SPECIFICATION
MIL-P-15931E

ACTIVE INGREDIENTS, CUPROUS OXIDE . . . 68.90%
INERT INGREDIENTS 33.10%
100.00%

KEEP OUT OF REACH OF CHILDREN

WARNING

SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS
EPA REGISTRATION NO. 41018-1

MANUFACTURED BY:	
COMPANY NAME	:
EPA ESTABLISHMENT NO.	:
ADDRESS	:
CONTRACT NO.	:
DATE OF MANUFACTURE	:
BATCH NO.	:
MANUFACTURED FOR	
DEPARTMENT OF THE NAVY	:
NAVAL SEA SYSTEMS COMMAND	:
WASHINGTON, D.C. 20362	:

FIGURE 2. Sample label for formula no. 121.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS

WARNING

IRRITATION IF SWALLOWED CAUSES EYE
Irritation do not get in eyes. Use with
adequate ventilation. Avoid contact
with skin and breathing. Avoid contact
with eyes. Wash face and hands after use.
Wear eye goggles or face shield and
respirator. Wear gloves when handling and
protective clothing when spraying or
spraying.
In case of contact with eyes,
immediately flush with plenty of water.
Get medical attention if irritation
persists. In case of skin contact, wash
hands and other exposed skin areas with
soap and water after use. If swallowed,
do not induce vomiting. Call a physician
immediately.

ENVIRONMENTAL HAZARDS

DO NOT CONTAMINATE WATER BY CLEANING
OF EQUIPMENT OR DISPOSAL OF WASTES.

PHYSICAL HAZARDS

FLAMMABLE - KEEP AWAY FROM HEAT AND
OPEN FLAME

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE
THIS PRODUCT IN A MANNER INCONSISTENT
WITH ITS LABELING

FOR USE IN COMMERCIAL SHIPYARDS ONLY

GENERAL DIRECTIONS - FOR USE ON SURFACES
SUBSTRATE IN PAINTING. WATERS DO NOT APPLY
BELOW 35 °F UNLESS CAN BE TAKEN TO INCLUDE
ABSENCE OF FROST OR ICE. SURFACES TO BE
PAINTED SHALL BE FREE OF OIL, GREASE,
AND OTHER SURFACE CONTAMINANTS. FOR
STEEL SURFACES APPLY ONLY DRY BRUSH APPROVED
ANTICORROSION SYSTEMS IN ACCORDANCE
WITH NAVY INSTRUCTIONS FOR WOOD AND
NONFERROUS SURFACES USE PRODUCTS AS
SPECIFIED BY THE NAVY

NOTE: WHEN PRODUCT IS USED IN CONFINED
AREAS OR AREAS BY SPRAYING WEAR A
RESPIRATOR. RESPIRATOR SHOULD BE APPROVED BY
THE ISSUING SUPERVISOR AND SAFETY
ADMINISTRATOR. CONSULT THE U.S. BUREAU
OF MINES AND THE NATIONAL INSTITUTE FOR
OCCUPATIONAL SAFETY AND HEALTH UNDER
THE PROVISIONS OF 29 CFR 11.

STORAGE AND DISPOSAL

PRECAUTIONS - DO NOT CONTAMINATE WATER
FOOD OR FEED OR STORAGE OF DISPOSAL
OPEN BURNING IS PROHIBITED

WASTE DISPOSAL - WASTE DISPOSAL - WASTE
MATERIALS SHOULD BE TREATED AS HAZARDOUS
MATERIALS OR MATERIALS THAT CANNOT BE
USED OR OTHERWISE REPRODUCED. SHOULD
BE REPRODUCED BY A LABELLED APPROVED FOR
REPRODUCTION OF ACTIVITY WITH THE NAVY
Hazardous Waste Manual, 203.911.

CONTAMINATED - WASTE DISPOSAL - WASTE
MATERIALS SHOULD BE TREATED AS HAZARDOUS
MATERIALS OR MATERIALS THAT CANNOT BE
REPRODUCED BY A LABELLED APPROVED FOR
REPRODUCTION OF ACTIVITY WITH THE NAVY
Hazardous Waste Manual, 203.911.

OTHER - CONSULT FEDERAL, STATE OR LOCAL
AGENCIES FOR APPROVED
ALTERNATIVE PROCEDURES

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NET CONTENTS FIVE GALLONS

US NAVY

BLACK VINYL
ANTI-FOULING PAINT

FORMULA 129

MILITARY SPECIFICATION
MIL-P-15931E

ACTIVE INGREDIENTS, CUPROUS OXIDE . . . 55.6%
INERT INGREDIENTS 44.4%
100.00%

KEEP OUT OF REACH OF CHILDREN

WARNING

SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS
EPA REGISTRATION NO. 41016-B

PRECAUTIONARY STATEMENTS
HAZARDOUS TO HUMANS

WARNING

CAUSES EYE IRRITATION. MANIPULATION OF
ASSEMBLY THROUGH SEAM AVOID CONTACT
WITH SEAM EYES OR CLOTHING WEAR
PROTECTIVE CLOTHING SUCH AS GLOVES
LONG SLEEVED COTTON SHIRT, LONG PANTS
AND HAT. MAY BE FATAL IF SWALLOWED OR
INHALED. DO NOT BREATHE DUST, VAPOR OR
SPRAY MIST. REMOVE CONTAMINATED
CLOTHING AND WASH BEFORE REUSE. WASH
THOROUGHLY WITH SOAP AND WATER AFTER
HANDLING.

WHEN SPRAYING AND/OR BANDING BOAT
SURFACE WEAR A MASK OR A RESPIRATOR
JOINTLY APPROVED BY THE MARINE
ENGINEERING AND SAFETY ADMINISTRATION
AND THE NATIONAL INSTITUTE FOR
OCCUPATIONAL SAFETY AND HEALTH.

IF SWALLOWED, DRINK PROMPTLY A LARGE
QUANTITY OF MILK, EGGS, WHITES, GELATIN
SOLUTION, OR IF THESE ARE NOT AVAILABLE,
DRINK LARGE QUANTITIES OF WATER. AVOID
ALCOHOL. GET MEDICAL ATTENTION.

IF IN EYES, FLUSH WITH PLenty OF WATER. GET
MEDICAL ATTENTION.

IF ON SKIN, WASH WITH PLenty OF SOAP AND
WATER. GET MEDICAL ATTENTION.

IF SWALLOWED REMOVE VICTIM TO FRESH AIR &
NOT BREATHING, GIVE ARTIFICIAL RESPIRATION.
PREFERABLY MOUTH TO MOUTH. GET MEDICAL
ATTENTION.

ENVIRONMENTAL HAZARDS

THIS MATERIAL IS TOXIC TO FISH. DO NOT
APPLY DIRECTLY TO WATER BY CLEANING OR
DISPOSAL OR DISPOSAL OF WASTES. DO NOT
ALLOW CHEST AND WAST GENERATED DURING
PAINT APPLICATION TO ENTER WATER. DISPOSE OF
PAINT DENSES IN AN APPROVED LANDFILL.

PHYSICAL OR CHEMICAL
HAZARDS

FLAMMABLE. KEEP AWAY FROM HEAT AND
OPEN FLAME.

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE
THIS PRODUCT IN A MANNER INCONSISTENT
WITH ITS LABELING.

FOR USE BY COMMERCIAL OR GOVERNMENT
BUYERS ONLY.

STORAGE AND DISPOSAL

DO NOT STORE IN CONTAMINATED WATER
FOOD, OR FEED. STORAGE OR DISPOSAL
OPEN DUMPING IS PROHIBITED.

PESTICIDE, SPRAY MISTING OR FOGGING WATER
THAT CANNOT BE USED ACCORDING TO LABEL
INSTRUCTIONS MUST BE DEPOSITED BY
ACCORDANCE TO APPLICABLE FEDERAL, STATE,
OR LOCAL PROCEDURES.

RECYCLABLE CONTAINERS: THESE CONTAINERS
FOR RECYCLING. THESE CONTAINERS ARE TO BE
RECYCLED IN ACCORDANCE WITH THE
INSTRUCTIONS ON THE PRODUCT AND DISPOSAL
OF IN A SANITARY MANNER, OR BY OTHER
APPROVED STATE AND LOCAL PROCEDURES.

GENERAL DIRECTIONS FOR USE ON SURFACES
AND OTHER SURFACES: DO NOT APPLY
BELOW 50°F UNLESS CARE IS TAKEN TO ENSURE
ADHESION OF PAINT TO SURFACES TO BE
PAINTED. SMALL SURFACES OF BRASS, COPPER,
AND OTHER SURFACE CONTAMINANTS. APPLY
BY ACCORDANCE WITH MANY SPECIFICATIONS
FOR STEEL SURFACES. APPLY ONLY OVER
APPROVED ANTI-CORROSION SYSTEMS IN
ACCORDANCE WITH NAVY INSTRUCTIONS FOR
WOOD AND NON-SERIOUS SURFACES USE
PREPARE AS SPECIFIED BY THE NAVY.

MANUFACTURED BY:	
COMPANY NAME	:
EPA ESTABLISHMENT NO.	:
ADDRESS	:
CONTRACT NO.	:
DATE OF MANUFACTURE	:
BATCH NO.	:
MANUFACTURED FOR DEPARTMENT OF THE NAVY NAVAL SEA SYSTEMS COMMAND WASHINGTON, D.C. 20382	

FIGURE 3. Sample label for formula no. 129.

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APPENDIX

CERTIFICATION/DATA REPORT TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers information that shall be included in the certification/data report when specified in the contract or order. This appendix is mandatory only when data item description DI-MISC-80678 is cited on the DD Form 1423.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. CERTIFICATION/DATA REPORT CONTENT

30.1 Certification/data reports. The contractor shall furnish certification/data reports for each lot of paint. The certification/data report shall include the following information:

- (a) Conformance of each lot of ingredient material to tables I and II, stating test results and source, as applicable (see 4.6.1).
- (b) Certification that volatility requirements are met (see 3.4.14).
- (c) Conformance to specification requirements and test results as specified (see 4.4) for finished paint.
- (d) Conformance to specification requirements for toxicological data as specified (see 4.7).
- (e) For formula 121A and formula 129A only: U.S. EPA pesticide registration numbers (see 3.4.13).

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-P-15931F	2. DOCUMENT DATE (YYMMDD) 91 JUNE 19
3. DOCUMENT TITLE PAINT, ANTIFOULING, VINYL (FORMULAS NO. 121, 121A, 129 AND 129A)		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME Technical Point of Contact (TPOC) Dr. Brenda S. Holmes	b. TELEPHONE (Include Area Code) (1) Commercial (703) 602-0213	(2) AUTOVON 332-0213
c. ADDRESS (Include Zip Code) Commander Naval Sea Systems Command, Code 5523 Washington, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	