

METRIC

DOD-P-24655

23 October 1985

## MILITARY SPECIFICATION

PAINT, UNDERWATER HULL, ANTICORROSION  
(METRIC)

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

## 1. SCOPE

1.1 Scope. This specification covers anticorrosion coating systems for application on steel or aluminum underwater hull surfaces underneath Navy antifouling coatings.

1.2 Classification. Coating systems shall be of the following types, classes and grades (see 6.2.1):

- Type I - Two component epoxy system.
- Type II - Two component polyurethane system.
- Type III - One component solvent evaporation system.
- Class 1 - Curing range above 31 degrees Celsius (°C)  
(87 degrees Fahrenheit (°F)).
- Class 2 - Curing range 11 to 30°C (51 to 86°F).
- Class 3 - Curing range 1 to 10°C (33 to 50°F).
- Class 4 - Curing range below 0°C (32°F).
- Grade A - Coatings with a solids content of 50 percent  
by volume minimum.
- Grade B - Coatings with a solids content of 80 percent  
by volume minimum.

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

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.

FSC 8010

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DOD-P-24655

## SPECIFICATIONS

## FEDERAL

- PPP-P-1892 - Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of.

## MILITARY

- MIL-A-21412 - Anode, Corrosion Preventive, Magnesium Alloy, Cast or Extruded Shapes with Cast-In Cores.  
 MIL-P-24441 - Paint, Epoxy-Polyamide, General Specification for.  
 MIL-P-24441/1 - Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type I.  
 MIL-P-24441/2 - Paint, Epoxy-Polyamide, Exterior Topcoat, Haze Gray, Formula 151, Type I.  
 MIL-P-24441/5 - Paint, Epoxy-Polyamide, Exterior Topcoat, Dark Gray, Formula 154-R<sub>0</sub> = 3.6, Type I.

## STANDARDS

## FEDERAL

- FED-STD-141 - Paint, Varnish, Lacquer, and Related Materials; Methods for Sampling and Testing.  
 FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A 109 - Standard Specification for Steel, Strip, Carbon, Cold-Rolled. (DoD adopted)  
 D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Tester. (DoD adopted)  
 D 522 - Standard Test Method for Elongation of Attached Organic Coatings with Conical Mandrel Apparatus. (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 714 - Standard Method of Evaluating Degree of Blistering of Paints. (DoD adopted)  
 D 1141 - Standard Specification for Substitute Ocean Water. (DoD adopted)  
 D 1296 - Standard Test Method for Odor of Volatile Solvents and Diluents. (DoD adopted)  
 D 1475 - Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products. (DoD adopted)

DOD-P-24655

- D 1729 - Standard Practice for Visual Evaluation of Color Differences of Opaque Materials. (DoD adopted)
- D 2196 - Standard Test Methods for Rheological Properties of Non-Newtonian Materials By Rotational (Brookfield) Viscometer. (DoD adopted)
- D 2369 - Standard Test Method for Volatile Content of Solvent-Reducible Paints. (DoD adopted)
- E 308 - Standard Practice for Spectrophotometry and Description of Color in CIE 1931 System. (DoD adopted)
- G 8 - Standard Test Methods for Cathodic Disbonding of Pipeline Coatings.

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

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Rules and Regulations - Rule 102, 442, and 443

(Application for copies should be addressed to the South Coast Air Quality Management District, 9150 E. Flair Drive, El Monte, CA 91731.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

3.1 Qualification. The coating system 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 set for the opening of bids (see 4.3 and 6.3).

3.2 Materials. The coating systems shall be pigmented, formulated, and manufactured to produce a uniform, high quality product in accordance with the requirements of this specification. The anticorrosion coatings shall be compatible with Navy and commercial antifouling coatings of both the ablative and nonablative types.

3.2.1 Solvent. The solvent portion of the coating systems shall be in accordance with the following requirements:

- (a) A combination of hydrocarbons, alcohols, aldehydes, ethers, or ketones having an olefinic or cycloolefinic type of unsaturation except perchloroethylene: 5 percent maximum.

DOD-P-24655

- (b) A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethylbenzene, methyl benzoate, and phenyl acetate: 8 percent maximum.
- (c) A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene, or toluene: 20 percent maximum.

Solvents shall not exceed 20 percent by volume of the coating material. The contractor shall provide certification of compliance to the above requirements. The volatile thinner shall be in accordance with any solvent system in accordance with Rule 102 of the South Coast Air Quality Management District. The contractor shall provide certification to this effect (see 4.9).

3.3 Color. Coating systems shall be composed of coats having a 45 degree directional reflectance of not less than 30 with exception of the prime coat. Succeeding coats shall be of contrasting color, and the top or finish coat shall be white, gray, or a very light pastel shade.

3.4 Description. Where coatings are composed of components to be mixed at the time of application, the minimum proportions for any component shall be at least 5 percent by volume of the total. Coating systems shall consist of at least two coats.

3.5 Pot life. The pot life of the types I and II coatings, mixed and ready for application, shall be a minimum of 4 hours at 21°C (70°F), and 80 percent relative humidity, when tested in accordance with 4.5.1.

3.6 Drying or curing time. The classes 1, 2, 3 and 4 coating systems shall require no more than 24 hours between coats when applied and dried at their respective temperature ranges (see 1.2) and shall be ready for overcoating with antifouling paint within that time frame when tested in accordance with 4.5.

3.7 Flash point. Coatings shall not flash at temperatures lower than 26°C (80°F) when tested in accordance with 4.5.

3.8 Application characteristics. The coating systems shall be readily applied by brush and spray, using commercially available equipment. The coatings shall exhibit reasonable leveling without excessive sagging when applied at proper film thickness as recommended by the manufacturer. Adhesion between coats shall be adequate for performance in service without undue restrictions concerning timing, temperature, or other conditions associated with application (see 4.5).

3.9 Immersion resistance. The coating systems, when tested in accordance with 4.5.2, shall show no film failure other than moderate change in appearance and a maximum failure of 1 percent of the total area. Coatings shall show no pinhole rusting, loss of adhesion, or blisters larger than 1.5 millimeters (mm) (1/16 inch). Very fine blisters or surface imperfections that may appear during the first 10 cycles of the test whose rate of growth is negligible or very slow shall not be counted.

3.9.1 Adhesion. Coating systems shall show no loss of adhesion when tested in accordance with 4.5.5.

DOD-P-24655

3.10 Service performance. The coating systems shall continue to provide excellent protection against corrosion with a total of 10 percent maximum touch-up for a minimum period of 5 years (see 4.6).

3.11 Condition in container. When tested in accordance with 4.5, the coatings shall be usable, shall be readily broken up with a paddle to a smooth uniform consistency, and shall not liver. The coating shall not increase more than one-third in viscosity, or alternately shall have no viscosity increase which cannot be compensated for by addition of a maximum of 5 percent by volume of thinner similar to that used in the coating, or increase more than one-fifth in time of dry, nor show any other objectionable properties for at least 1 year.

3.12 Toxicity. The material shall have no adverse effect on the health of personnel when used for the intended purpose (see 4.8). Questions pertinent to this effect shall be referred by the contracting activity to the appropriate service medical department which will act as advisor to the contracting activity.

3.13 Identification characteristics. Values for identification characteristics shall be provided by individual contractors for characteristics as specified in table I. The values shall be established for each coating system prior to qualification testing. The purpose of these values is to serve as a basis for determining that the material being offered is essentially the same as that which was approved under qualification testing. Subject to approval by the Naval Sea Systems Command (NAVSEA), alternative means of identification (for example, infrared spectrographic examination and chemical analysis) may be substituted for the characteristics in table I, provided appropriate data are submitted by the contractor. Quality conformance inspection shall be as specified (see 4.4).

DOD-P-24655

TABLE I. Identification characteristics values.

Characteristics	Coating component <sup>1/</sup>	Coating <sup>2/</sup>	Coating system <sup>3/</sup>
Chemical nature	X		
Percent of principal constituents (15 percent or more of total)	X		
Percent pigment	X		
Percent nonvolatile vehicle	X		
Percent volatile	X		
Mass per liter (L), gallon	X	X	
Color	X	X	
Viscosity	X	X	
Flash point	X	X	
Odor	X	X	
Pot life		X	
Drying or curing time		X	X
Gloss and appearance		X	X
Recoatibility		X <sup>4/</sup>	X <sup>4/</sup>
Adhesion		X <sup>4/</sup>	X <sup>4/</sup>
Flexibility		X	X
Resistance to boiling water immersion (identification standard)			X <sup>4/</sup>
Cathodic disbondment resistance			X <sup>4/</sup>
Mixing instructions		X <sup>5/</sup>	
Application instructions			X <sup>5/</sup>

1/ Coating compounds are individually packaged components such as base component (part A) and converter component or hardener (part B). Indicate only applicable characteristics. For example, percent pigment is not applicable to curing solutions.

2/ Coating is the resin base and converter as mixed for application.

3/ Coating system is total system (number and type of coats and approximate dry film thickness as tested for qualification approval).

4/ Not required for each lot. Shall be run at least once every 6 months.

5/ Required once only. Shall be furnished with request for test.

3.14 Blister resistance. Paint system shall show no blistering when subjected to synthetic seawater immersion in accordance with 4.5.6.

3.15 Resistance to cathodic disbondment. The coating shall be compatible with impressed current cathodic protection and shall not exhibit a disbonded area greater than 10 percent of the disbonded area of the control when tested in accordance with 4.7.

3.16 Material safety data sheet. The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is form OSHA-20 and found as part of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification.

## DOD-P-24655

## 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 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Inspection system. The contractor shall provide and maintain an inspection system in accordance with the data ordering documents included in the contract or order (see 6.2.2).

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 inspection shall be conducted at a laboratory satisfactory to NAVSEA. Qualification inspection shall consist of the tests specified in 4.5, 4.6 and 4.7.

4.3.1 Ingredient samples. The contractor shall submit to the designated laboratory 4 L (1 gallon (gal)) each of parts A and B components, or a 4 L (1 gal) sample of a one-component coating.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the tests specified in table II, the results of which shall conform to the requirements of section 3.

4.4.1 Sampling. Two representative random samples from each batch number in the shipment shall be tested.

4.4.2 Acceptance. Acceptance of batches shall be based on compliance with all of the required tests specified in table II.

DOD-P-24655

4.5 Test procedures. Tests shall be conducted in accordance with table II. Test plates of the nature and size specified in the applicable test method shall be coated in accordance with the contractor's application instructions. The individual coatings shall be mixed in accordance with the contractor's mixing instructions.

TABLE II. Test procedures.

Characteristic	Applicable test method in FED-STD-141	Applicable ASTM test method	Quality conformance inspection	Qualification inspection
Pigment	4021 (using suitable extraction mixture)	-----	X	X
Volatiles		D 2369	X	X
Nonvolatile vehicle (calculated by difference)	4053	-----	X	X
Viscosity		(Krebs-Stormer) D 562 or (Brookfield) D 2196	X	X
Mass per liter (gallon)		D 1475	X	X
Flash point		D 93	X	X
Odor		D 1296	X	X
Color (quality conformance inspection)		D 1729	X	-----
Color (qualification)		E 308	-----	X
Drying (curing) time	4061	-----	X	X
Flexibility (conical mandrel)		D 522	X	X



## DOD-P-24655

TABLE II. Test procedures. - Continued

Characteristic	Applicable test method in FED-STD-141	Applicable ASTM test method	Quality conformance inspection	Qualification inspection
Application (as modified by contractor's instruction)	2131 or 2141	-----	-----	X
Condition in container	3011	-----	X	X
Gloss <sup>1/</sup>		D 523	X	X

<sup>1/</sup> The panel prepared for gloss shall also be visually examined for surface smoothness, irregularities, and appearance.

4.5.1 Pot life. The coating shall be in conformance with 3.5 when mixed for use from the components in accordance with the contractor's instructions in a suitable container so as to result in approximately 1 L (1 quart) of finished material. Testing shall be conducted at the lower temperature limit for the applicable class and 50 percent relative humidity. The time between mixing and the loss of adequate brushing and spraying properties shall be determined. The actual temperature, humidity, and the time of loss of adequate brushing and spraying properties shall be reported up to a 48 hour period.

4.5.2 Immersion resistance. The coating system shall comply with 3.9 when applied in accordance with the contractor's instructions to coat completely two 150 by 300 by 3 mm (6 by 12 by 1/8 inch) blasted hot rolled mild steel plates. The blast pattern shall be approximately 0.08 mm (3 mils) depth for coating systems of at least 0.13 mm (5 mils) thickness and 0.04 mm (1.5 mils) for systems less than 0.13 mm (5 mils) thick, have completely removed all mill scale, rust and rough edges and be similar to the average areas encountered in blasted tanks prior to coating. Unless otherwise specified (see 6.2.1), 24 hours dry time shall be allowed between coats and 168 hours at 21°C (70°F) between the last coat and first immersion.

4.5.3 Test for evaluating anticorrosion hull coating. The coated panels shall be subjected to 20 cycles (or to prior failure) of the following test cycle:

- (a) Immerse panels for 1 week in 3 percent salt water solution comprised of commercial table salt dissolved in distilled water, at a temperature of 27 ± 6°C (80 ± 10°F).

## DOD-P-24655

- (b) The immersion specified in (a) above constitutes one complete test cycle. This cycle shall be repeated and coating deterioration reported after each complete cycle. If coating is still satisfactory after 20 cycles, wipe lightly with a soft cloth and fresh water, allow 48 hours to thoroughly dry and recoat the central upper third of one side of each panel, masking the portion from the edge to 13 mm (1/2 inch) inward, with one coat of the finish coating of the coating systems (or primer and finish coat if appropriate). Allow 1 week drying time, and complete immersion test and five additional test cycles. On the recoated area, adhesion of the added coating readily discerned to be less than half the adhesion between the original coats shall be considered failure. Inspect for conformance to 3.9.

**4.5.4 Recoatability.** Recoatability for qualification of the coating systems shall be determined in accordance with 3.9 and 4.5.2. For identification characteristics in connection with acceptance of individual lots, after 24 hours dry time, the panel specified in 4.5.2 shall be recoated on one side with the finish coat of the coating system (or primer and finish coat if appropriate) allowed 72 hours dry time and then be immersed in the same medium specified in 4.5.3 for 24 hours, and examined as specified in 4.5.3.

**4.5.5 Adhesion.** A separate panel similar to the panel tested in 4.5.4 shall be prepared at the same time. Adhesion of each coat shall be tested by knife just prior to application of the next coat and of the coating systems just prior to the time of immersion of the panel specified in 4.5.4. After the immersion periods for the panel specified in 4.5.4, the adhesion between the immersed and the retained panel shall be compared for conformance with 3.9.1.

**4.5.6 Resistance to blistering.** Resistance to blistering shall be determined from total immersion in synthetic seawater of panels prepared in accordance with 4.5.6.1 and tested in accordance with 4.5.6.2.

**4.5.6.1 Preparation of panels.** Panels shall be ordinary strength steel conforming to ASTM A 109, cold rolled, 150 by 300 by 3 mm (6 by 12 by 1/8 inch) blasted to a uniform white appearance with a minimum surface profile of 0.025 to 0.050 mm (1.0 to 2.0 mils) peak to valley. Panels shall be cleaned before and after blasting using a solvent mixture of 1:1 xylene and isopropanol. Panels shall be prepared in duplicate. Paint shall be applied to both sides and all edges of each panel to a dry film thickness of 0.175 to 0.225 mm (7 to 9 mils). Apply paint using standard spray equipment allowing 16 to 24 hours dry time between coats at  $23 \pm 3^\circ\text{C}$  ( $73.4 \pm 5^\circ\text{F}$ ). Condition coated panels for 1 week after application of final coat at  $23 \pm 3^\circ\text{C}$  ( $73.4 \pm 5^\circ\text{F}$ ).

**4.5.6.2 Testing of panels.** Immerse panels in synthetic seawater prepared in accordance with ASTM D 1141 and maintained at  $88 \pm 3^\circ\text{C}$  ( $190 \pm 5^\circ\text{F}$ ) for a period of 336 hours (14 days). Remove the panels, wash, dry, and hand sand one side of each panel to a dull finish with No. 100 emery cloth. Wash, dry, and recoat the sanded side. Immerse in  $38^\circ\text{C}$  ( $100^\circ\text{F}$ ) synthetic seawater for 336 hours (14 days). Remove the panels and examine for degree of blistering in accordance with ASTM D 714. Blisters appearing within 6 mm (1/4 inch) from the edge of the panel shall be disregarded. Panels shall meet the requirements of 3.14.

## DOD-P-24655

4.6 Service performance. Service performance shall conform to the requirements of 3.10, based on durability data from underwater hull anticorrosion tests.

4.7 Cathodic disbondment. The test procedures described herein are designed to determine the comparative cathodic disbondment characteristics of commercial anticorrosive hull coatings versus the currently approved system in accordance with MIL-P-24441. The test procedures have been adopted from ASTM G 8. The purpose of the testing is to demonstrate that the commercial anticorrosive coating submitted for approval as a qualified hull coating shall be compatible with an impressed cathodic protection (ICCP) system, in accordance with 3.15.

4.7.1 Test panel preparation. Prepare duplicate test panels coated with the anticorrosion system submitted for approval together with duplicate test panels coated with the currently approved coating in accordance with MIL-P-24441. The coating in accordance with MIL-P-24441 shall be applied in three separate coats as follows:

Coat no. 1 - MIL-P-24441/1, Formula 150, 2 to 3 mils dry film thickness (DFT)

Coat no. 2 - MIL-P-24441/2, Formula 151, 2 to 3 mils DFT

Coat no. 3 - MIL-P-24441/5, Formula 154-R<sub>0</sub> = 3.6, 2 to 3 mils DFT

The total DFT of the coated panels in accordance with MIL-P-24441 shall be between 0.175 to 0.225 mm (7 to 9 mils). The coatings shall be applied to ordinary strength steel plates (ASTM A 109, cold rolled). The dimensions of the test plates shall be 300 by 300 by 3 mm (12 by 12 by 1/8 inch) thick. The test plates shall be pre-drilled so as to provide a 5 mm (3/16 inch) diameter hole 13 mm (1/2 inch) from the plate edge on any centerline. The test plates shall be blasted to a uniform white appearance with a surface profile of between 0.025 to 0.050 mm (1.0 to 2.0 mils) (peak to valley). Care should be exercised during blasting of the test plates so as to prevent excessive warpage of the plates. Prior to painting, a 600 mm (2 feet (ft)) length of insulated electrical lead wire (AWG no. 14, stranded copper, type CP insulation) shall be mechanically connected to the test panel at the pre-drilled hole using a brass machine screw (10/24, 13 mm (1/2 inch) length), nut and washers. After connection, the electrical continuity of the lead wire and connection to the panel shall be checked by a resistance measurement with a volt-ohm-meter. The resistance shall be less than 0.01 ohm. After making and checking the lead wire connection, the connection shall be coated using 3M Co. Scotchweld Structural Epoxy No. 1838, or equal. After making the lead wire connection to the test panel, the edges of the test panel shall be stripe painted so as to extend a minimum of 13 mm (1/2 inch) from the edge. The stripe coat shall set to touch before the full prime coat is applied. After stripe painting the edges, the test panels shall be painted using standard spray equipment. The system in accordance with MIL-P-24441 shall be allowed to dry for 16 to 24 hours between coats at  $21 \pm 3^{\circ}\text{C}$  ( $70 \pm 5^{\circ}\text{F}$ ). The coating to be qualified shall be allowed to dry in accordance with the best practice deemed acceptable by the contractor. After application, the dry film thickness of the coated test panels shall be measured and recorded. The coated test panels shall be inspected with a low voltage (67.5 volts) wet sponge-type holiday detector. Coating holidays shall be repaired. Prior to the start of

DOD-P-24655

the test, each coated test panel shall receive an intentional holiday centered on one side of the test panel. The holiday shall be made by drilling a radial hole through the coating, using a drill that has a diameter of 6 mm (0.25 inch). The hole shall not penetrate the metal panel, but shall remove all coating within the drill diameter, leaving exposed bright metal.

4.7.2 Test procedures. Test panels shall be vertically suspended and totally immersed in a plastic vessel (minimum capacity of 100 L (25 gallons)) filled with an electrolyte consisting of potable tap water to which has been added 1 percent by mass of each of the following technical grade salts, calculated on an anhydrous basis: sodium chloride, sodium sulfate, and sodium carbonate. The test panels shall be spaced equi-distantly from a magnesium anode (MIL-A-21412, class 2, type MRW-2.5f, 3 pound anode with a 5 foot length of AWG no. 12 solid copper wire with type TW insulation) centered in the test vessel. The side of the test panel with the holiday shall face the anode. The lead wires from each test panel shall be attached to the anode lead wire using a split bolt electrical connector. The initial liquid level in the test vessel shall be maintained by daily additions of potable water as required. The duration of the tests shall be 30 days. Upon termination of the test period, a physical examination of the test panels shall be performed. The physical examination shall determine the extent to which the coating has been disbonded around the intentional holiday. The extent of cathodic disbondment shall be determined by making cuts with a sharp knife through the coating intersecting at the holiday and lifting all loose or disbonded coating with the point of the knife. The area of disbondment shall then be estimated. Photographs shall be taken of each panel after the physical examination.

4.7.3 Report requirements. A report of the test results prepared by an independent laboratory shall be required. The report shall include the following: (1) average dry film thickness of each coated panel, (2) the unsealed area ( $\text{mm}^2$ ) of each test panel and (3) a photograph of each test panel (holiday site) upon completion of the physical examination.

4.7.4 Qualification criteria. The requirements for qualification based on the subject test shall be that the coating submitted for qualification shall not exhibit a disbonded area (the average of the 2 panels) greater than that which is specified in 3.15.

4.8 Toxicity. A manufacturer of material shall disclose the formulation of his product to the Chief, Bureau of Medicine and Surgery, Department of the Navy, Washington, DC 20372. The disclosure of proprietary information, which shall be held in confidence by the Bureau of Medicine and Surgery, shall include the name, formula, and approximate percentage by mass and volume of each ingredient in the product; the results of any toxicological testing of the product; and any such other information as may be needed to permit an accurate appraisal of any toxicity problem associated with the handling, storage, application, use, or disposal of the material in compliance with 3.12.

DOD-P-24655

4.9 Certification data/report. The contractor shall certify that each lot of paint is in accordance with this specification (see 6.2.2). In addition to the requirements covered by the data ordering document, the certification data/report shall include the following information:

- (a) Toxicological data and formulations required to evaluate the safety of the material for the proposed use (see 3.12).
- (b) Certification that volatility requirements are met (see 3.2.1).
- (c) Conformance of each lot of ingredient material, stating test results and source, as applicable (see 4.7.3).

4.10 Inspection of packaging. Sample packages and packs and the inspection of the packaging, 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 acquisition.)

5.1 Packaging, packing and marking. Unless otherwise specified (see 6.2.1), the coating shall be delivered in 4 or 20 L (1 or 5 gallon) amounts in suitable unitized packaging. The coating systems shall be packaged level A, B or C, packed level A, B or C, as specified (see 6.2.1), and marked in accordance with PPP-P-1892.

5.2 Marking. In addition to any special marking specified (see 6.2.1), mixing and use instructions as applicable and hazardous markings, such as flash point or identification of ingredients considered toxic (such as leaded pigments contained therein) shall be marked on each interior or exterior container.

5.3 Special marking. In addition to other markings required on the containers, there shall be the following statement: "The volatile content of the material in this container is not photochemically reactive as defined by Rule 102 of the South Coast Air Quality Management District" (see 6.4).

5.4 Precautionary markings. In addition to the markings in accordance with PPP-P-1892, all individual containers shall have the following markings:

"CAUTION: This coating 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."

## 6. NOTES

6.1 Intended use. This anticorrosion coating system is intended for use on underwater hulls. Although the underwater hull anticorrosion performance requirements for all materials complying with this specification are the same, materials from different manufacturers may not necessarily be compatible with those of another and should not be used interchangeably.

DOD-P-24655

### 6.1.1 Coatings applications.

6.1.1.1 New applications. Coatings in accordance with this specification should be applied as specified in the contractor's instructions. For Naval ship applications, NAVSEA instructions govern when they conflict with, strengthen, or otherwise elaborate on contractor's instructions.

6.1.1.2 Touch-up applications. When touch-up becomes necessary, touch-up material should be obtained from the same contractor and applied in accordance with the contractor's instructions.

### 6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type, class or grade as specified (see 1.2).
- (c) Drying time if other than specified (see 4.5.2).
- (d) Level of packaging and packing required (see 5.1).
- (e) Size container required (see 5.1).
- (f) Special marking if required (see 5.2).

6.2.1.1 Acquisition guidance. Coatings in accordance with this specification vary to some extent in surface preparation required, and in the effect of high humidity, slight surface moisture, and temperature during applications. Requirements for specific products can be found in contractor's instructions. Many factors affect the total overall cost per square foot per year, possibly the least of which is the cost of the coating systems which average about 10 percent of the total cost. The number of coats per coating system and square foot coverage per liter or per gallon further complicate the equity of purchase solely on the basis of lowest cost per liter or cost per gallon. Contracting officers therefore should fully consider such factors.

6.2.1.2 Level B packaging. Level B packaging is intended to provide economical but limited protection and should be specified only when it is determined that the coating systems will be held in covered storage no more than 1 year from date of initial packaging.

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.410-6 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs.



## DOD-P-24655

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.1.2	Inspection system program plan	DI-R-4803	---
4.9	Certification data/report	UDI-A-23264	10.2.1

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L, Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publication and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 With respect to the products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-24655 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 5523, 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 shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

6.4 Volatile content. Although the container marking specifically refers to the Air Pollution District of Los Angeles County, the paint may be used anywhere else a product complying with 3.2.1 is allowed. This includes other air pollution control districts or similar areas controlling the emission of solvents into the atmosphere. Information regarding Los Angeles County Air Pollution Rules 102, 442 and 443 may be obtained from: South Coast Air Quality Management District.

DOD-P-24655

6.5 Material safety data sheets. 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.

6.6 Performance bond or guarantee by manufacturer. Manufacturers should put up a performance bond to guarantee that their coatings are in accordance with the requirements specified herein. Should the coatings delaminate, taking along the antifouling top coat, the manufacturer should agree to underwrite the cost of the underwater brush cleaning until the cost differential between the ablative antifouling system and the Navy nonablative standard antifouling system is reached.

Custodians:

Army - ME

Navy - SH

Preparing activity:

Navy - SH

(Project 8010-1069)

Review activity:

Army - MR

User activity:

Navy - CG



## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions - Reverse Side)*

<b>1. DOCUMENT NUMBER</b> DOD-P-24655	<b>2. DOCUMENT TITLE</b> Paint, Underwater Hull, Anticorrosion (METRIC)
<b>3a. NAME OF SUBMITTING ORGANIZATION</b>  	<b>4. TYPE OF ORGANIZATION (Mark one)</b> <input type="checkbox"/> VENDOR  <input type="checkbox"/> USER  <input type="checkbox"/> MANUFACTURER  <input type="checkbox"/> OTHER (Specify): _____
<b>b. ADDRESS (Street, City, State, ZIP Code)</b>  	
<b>5. PROBLEM AREAS</b> <b>a. Paragraph Number and Wording:</b>            <b>b. Recommended Wording:</b>            <b>c. Reason/Rationale for Recommendation:</b>           	
<b>6. REMARKS</b>           	
<b>7a. NAME OF SUBMITTER (Last, First, MI) - Optional</b>  	<b>b. WORK TELEPHONE NUMBER (Include Area Code) - Optional</b>  
<b>c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional</b>  	<b>8. DATE OF SUBMISSION (YYMMDD)</b>  

**INSTRUCTIONS:** In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

**NOTE:** This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification 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.

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