

**METRIC**

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**MILITARY SPECIFICATION****COATING SYSTEM, NONSKID, FOR ROLL OR  
SPRAY APPLICATION (METRIC)**

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

**1. SCOPE**

1.1 Scope. This specification covers nonskid, coating systems for application to weather decks, flight decks, and hangar decks of air capable amphibious aviation and aviation ships. Coatings are applied by spraying, rolling, or troweling.

1.2 Classification. The coating systems covered by this specification shall be furnished in the following types, compositions, grades, and classes as specified (see 6.2.1):

Type I - General-purpose deck coating.  
IA - High volatile organic content  
IB - Low volatile organic content

Type II - General-purpose interior or exterior deck coating (high flash point).  
IIA - High volatile organic content  
IIB - Low volatile organic content

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.

AMSC N/A

FSC 8010

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Type III - General purpose resilient deck coating (for use on wooden decks or where flexibility is required and where increased weight is not a factor).

IIIA - High volatile organic content

IIIB - Low volatile organic content

Composition G - General use abrasive deck coating.

Composition L - Limited use aircraft carrier landing and run-out area deck coating (not abrasive to the steel arresting cable).

Grade A - High durability.

Grade B - Standard durability.

Class 1 - For application by roller or trowel.

Class 2 - For application by spray.

## 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.

## SPECIFICATIONS

### FEDERAL

- O-E-760 - Ethyl Alcohol (Erhanol); Denatured Alcohol; Proprietary Solvents and Special Industrial Solvents.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-C-96 - Can, Metal, 28 Gage and Lighter.
- PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons).

### MILITARY

- MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5.
- MIL-D-16791 - Detergents, General Purpose (Liquid, Nonionic).
- MIL-S-22698 - Steel Plate and Shapes, Weldable Ordinary Strength and Higher Strength: Hull Structural.
- MIL-L-23699 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base.
- MIL-F-24385 - Fire Extinguishing Agent, Aqueous Film Forming Foam (AFFF) Liquid Concentrate, For Fresh and Sea Water.
- DOD-G-24508 - Grease, High Performance, Multi-Purpose (Metric).
- MIL-H-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, NATO Code Number H-537.

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## STANDARDS

## \*FEDERAL

- FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.
- FED-STD-595 - Colors.

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-147 - Palletized Unit Loads.
- MIL-STD-1623 - Fire Performance Requirements and Approved Specifications for Interior Finish Materials and Furnishings (Naval Shipboard Use).

2.1.2 Other Government document. The following other Government document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

## DEPARTMENT OF TRANSPORTATION (DOT)

Code of Federal Regulations CFR, Title 49

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Copies of specifications, standards, and publications 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)

- B 117 - Standard Method of Salt Spray (Fog) Testing.
- C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates. (DoD adopted)
- D 523 - Standard Test Method for Specular Gloss. (DoD adopted)
- D 659 - Standard Method of Evaluating Degree of Chalking of Exterior Paints.
- D 1141 - Standard Specification for Substitute Ocean Water. (DoD adopted)
- D 1652 - Standard Test Method for Epoxy Content of Epoxy Resins. (DoD adopted)
- D 1729 - Standard Practice for Evaluation of Color Differences of Opaque Materials. (DoD adopted)
- D 1737 - Standard Test Method for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus.

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## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) (Continued)

- D 1957 - Standard Test Method for Hydroxyl Value of Fatty Oils and Acids.
- D 2073 - Standard Test Methods for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines, Amidoamines, and Diamines by Referee Potentiometric Method.
- D 2572 - Standard Test Method for Isocyanate Groups in Urethane Materials or Prepolymers. (DoD adopted)
- D 3278 - Standard Test Methods for Flash Point of Liquids by Setaflash Closed-Cup Apparatus.
- F 718 - Standard Shipbuilders and Marine Paints and Coatings Product/Procedure Data Sheet. (DoD adopted)
- G 53 - Standard Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.

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

## STEEL STRUCTURES PAINTING COUNCIL (SSPC)

- SP5 - Specification for White Metal Blast Cleaning.

(Application for copies should be addressed to the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.)

(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. Coating systems furnished under this specification shall be those systems which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.1.1 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 may be substituted for the characteristics in table I, provided appropriate data are submitted by the contractor. Quality conformance inspections shall be as specified (see 4.4).

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TABLE I. Identification characteristics.

Characteristic	Two-part coating		Aggregate	One-part coating or combined mixture
	Base material, component A	Curing agent, component B		
Chemical nature (percent of each material which comprises 2 percent or more of the coating)	X	X		X
Percent resin solids by mass	X	X		X
Percent pigment by mass	X	X		X
Percent volatile matter by mass				X
Percent aggregate by mass	X			X
Aggregate size distribution (ASTM C 136)			X	
Aggregate composition (percent of each material which comprises 10 percent or more of the aggregate)			X	
Mass per liter (gallon), kilograms (pounds)	X	X		X
Epoxy content <sup>1/</sup> (ASTM D 1652)	X			
Active amine hydrogen content <sup>2/</sup> (ASTM D 2073)		X		
Pigment analysis	X	X		$\frac{3/}{3/}$
Infrared spectrum of resin	X	X		$\frac{3/}{X}$
Volatile organic content (grams voc/liter coating less water)				
60 specular gloss <sup>4/</sup> (ASTM D 523)				X

<sup>1/</sup> Isocyanate content, ASTM D 2572, if applicable.<sup>2/</sup> Hydroxyl content, ASTM D 1957, if applicable.<sup>3/</sup> One-part coating only; these analyses are done on the individual components of two-part coatings.<sup>4/</sup> The gloss value shall be the average of 10 readings on a panel prepared by drawing down a 50 mil film of the topcoat on a primed panel.

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3.2 Composition. The coating system shall consist of a nonslip topcoat and anti-corrosive primer. The primer may be omitted at the contractor's discretion if the topcoat is designed as a self-priming system. The type III coating system may also contain one or two intermediate coats. The topcoat shall consist of an organic binder, pigments, and a nonslip aggregate. The primer shall consist of an organic binder and pigments to protect the deck against corrosion and promote adhesion between the deck and the other coatings. The intermediate coats of the type III coating system shall contain an organic binder and pigments which will impart flexibility to the system and provide a means of filling irregularities in the substrate. The coatings may be provided as one or two parts.

3.3 Abrasion of cable (composition L only). The composition L coating system shall produce a maximum average wear of the arresting cable test wire of 0.0102 mm (0.4 mils).

3.3.1 Appearance of the dried coating. When applied in accordance with the manufacturer's directions, the primer and intermediate coats, if any, shall dry to a smooth, uniform film free of spotting, streaking, mud cracking, wrinkling, cratering or blistering. When class 1 material is applied by napless roller, the topcoat shall have a textured appearance of roughly parallel rows of raised coating, forming peaks or ridges. When the class 1 coating is applied by roller or trowel, the aggregate shall be uniformly distributed, and shall present a coarse, rough appearance. The class 1 material shall have sufficient sag resistance to retain the raised, textured appearance in the dried coating. When the class 2 material is applied by spray, the topcoat shall present a uniformly coarse, rough appearance over the entire surface. The aggregate shall be distributed uniformly over the surface, and shall protrude prominently above the resin matrix.

3.3.2 Application properties. When separate samples of class 1 material are conditioned and mixed at 10, 24, and 32 degrees Celsius ( $^{\circ}\text{C}$ ) (50, 75 and 90 degrees Fahrenheit ( $^{\circ}\text{F}$ )), they shall mix easily with no curdling or separation of ingredients. When applied by roller or trowel to metal surfaces at 10, 24, and 49 $^{\circ}\text{C}$  (50, 75 and 120 $^{\circ}\text{F}$ ), respectively, there shall be no excess drag or accumulation of coating on the roller, and no excessive spattering of the coating. The appearance of the class 1 coating system shall meet the applicable requirements specified in 3.3.1. When separate samples of the class 2 material are conditioned and mixed at 10, 24, and 32 $^{\circ}\text{C}$  (50, 75, and 90 $^{\circ}\text{F}$ ), they shall mix easily with no curdling or separation of ingredients. When applied by spray to metal surfaces at 10, 24, and 49 $^{\circ}\text{C}$  (50, 75, and 120 $^{\circ}\text{F}$ ), respectively, the material shall flow evenly without running, dripping, spattering or cobwebbing. The appearance of the class 2 coating system shall meet the applicable requirements specified in 3.3.1.

3.3.3 Coefficient of friction. The coefficient of static friction for the coating system shall be determined on topcoats which have been subjected to 50 cycles of wear (conditioning of surface) and on topcoats which have completed the wear test as specified in 4.6.17. The test shall be performed on dry, wet and oily substrates, and the minimum values for each grade are specified in table II.

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TABLE II. Coefficient of friction, minimum.

	Dry	Wet	Oily
Initial:			
Grade A	0.95	0.90	0.80
Grade B	.90	.85	.75
After wear:			
Grade A	.90	.85	.75
Grade B	.80	.75	.65

3.3.4 Color. The coating shall be supplied in haze gray, color 36270 from FED-STD-595, as specified in the data ordering document (see 6.2.1). The color shall be a visual match to the specified color chip.

3.3.5 Condition in container. Liquid one-part coatings, and individual components of two-part coatings, shall not show skinning, livering, curdling, or separation of ingredients, nor shall they show any hard settling of grit which cannot be dispersed to a uniform consistency by 5 minutes stirring.

### 3.3.6 Coverage.

3.3.6.1 Topcoats. Grade A, class 1 nonskid topcoat shall cover not less than 0.49 square meters per liter ( $\text{m}^2/\text{L}$ ) (20 square feet per gallon ( $\text{ft}^2/\text{gal}$ )) nor more than 0.74  $\text{m}^2/\text{L}$  (30  $\text{ft}^2/\text{gal}$ ). Grade B, class 1 nonskid topcoat shall cover not less than 0.61  $\text{m}^2/\text{L}$  (25  $\text{ft}^2/\text{gal}$ ) nor more than 0.86  $\text{m}^2/\text{L}$  (35  $\text{ft}^2/\text{gal}$ ). Grades A and B, class 2 nonskid topcoat, shall cover not less than 1.23  $\text{m}^2/\text{L}$  (50  $\text{ft}^2/\text{gal}$ ).

3.3.6.2 Primers. Primers shall cover substrate between 3.68 and 12.27  $\text{m}^2/\text{L}$  (150 and 500  $\text{ft}^2/\text{gal}$ ).

3.3.7 Drying time. The maximum drying time of the topcoat shall be 48 hours at 10°C (50°F), 24 hours at 24°C (75°F) and 24 hours at 49°C (120°F). The maximum drying time of the primer and intermediate coats shall be 24 hours at 10°C (50°F), 18 hours at 24°C (75°F), and 16 hours at 49°C (120°F). In addition, the primer and intermediate coats shall allow an open time (for application of the next coat) of at least 36 hours.

3.3.8 Fire resistance. The coating system shall be in accordance with the requirements of MIL-STD-1623.

3.3.9 Flash point. The minimum flash point for each component of types I and III systems shall be 27°C (80°F) and for type II systems shall be 94°C (200°F).

3.3.10 Flexibility (type III only). The type III coating system shall show no breaking, cracking or loss of adhesion at the bend. Failure within 5 mm of the edge of the panel shall be ignored.

3.3.11 Immersion resistance. The coating system shall show no softening, loss of adhesion, separation between coats of the system, discoloration, or other signs of deterioration.

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3.3.12 Impact resistance. The minimum impact resistance of each grade of nonskid coating shall be as specified in table III.

TABLE III. Impact resistance, minimum, percent.

	4 days	14 days
Grade A	95	100
Grade B	70	90

3.3.13 Pot life. The pot life of each coating in the system shall be measured at three temperatures, and the minimum values for each type are specified in table IV.

TABLE IV. Minimum pot life, hours.

	10°C (50°F)	24°C (75°F)	32°C (90°F)
Grade A	3	2	1
Grade B	6	4	2

3.3.14 Resistance to accelerated aging by light and water. The coating system shall show no loss of adhesion or separation between coats of the system when exposed to ultraviolet light and condensation of water. The topcoat shall show no cracking or checking, no more chalking than is indicated by a rating of 6, and shall continue to match the specified standard color chip.

3.3.15 Resistance to accelerated corrosion. The coating system shall show no loss of adhesion, separation between layers of the system, or corrosion of the steel substrate beyond a 9 mm (3/8-inch) radius from the centers of the impact areas.

3.3.16 Resistance to wear. The percent weight loss on wear of the coating system shall not exceed 10 percent for grade A, or 40 percent for grade B.

3.3.17 Resistance to weather. Panels exposed to weather shall show no more chalking than is indicated by a rating of 6, no cracking or checking of the topcoat, no loss of adhesion or separation between coats of the coating system or between the coating system and the substrate, and shall continue to match the specified standard color chip.

3.3.18 Storage stability (see 4.2.1).

3.3.18.1 Long-term storage stability. The liquid one-part coating, or components of two-part coatings which have been stored for 1 year in their original containers at room temperature shall, when mixed in accordance with the directions specified in 3.4, produce a coating system which meets all the requirements of this specification.



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3.3.18.2 Accelerated storage stability. The storage stability shall perform as specified in 4.6.19.2 after which the coating system shall meet the requirements of 3.3.18.1.

3.3.19 Thickness. The average overall minimum thickness of the cured coating system, including aggregate, shall be 0.75 mm (30 mils).

3.3.20 Mass. The mass of the cured coating system, including aggregate, shall not exceed 0.484 g/cm<sup>2</sup> (450 g/ft<sup>2</sup>) for types I and II, grade A and shall not exceed 0.215 g/cm<sup>2</sup> (200 g/ft<sup>2</sup>) for types I and II, grade B. The weight of the cured type III coating system shall not exceed 0.807 g/cm<sup>2</sup> (750 g/ft<sup>2</sup>) for all grades.

### 3.4 Materials (see 4.2.1).

3.4.1 Asbestos content. The coating system shall contain no asbestos.

3.4.2 Toxic materials. The material 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 activity.

3.4.3 Derivatives of ethylene glycol. The coating system shall contain no esters or ethers derived from ethylene glycol.

3.4.4 Material safety data sheet. The contractor shall provide a completed material safety data sheet (MSDS) at the time of contract award. The MSDS form is OSHA-20 and found as part of FED-STD-313. The MSDS shall also be included with each shipment of material covered by this specification (see 4.2.1).

3.4.5 Volatile organic content. The nonskid deck coating system shall have no more than 340 grams of volatile organic compounds for the high volatile organic content for type IA; IIA and IIIA and 295 grams/liter of volatile organic compounds for the low volatile organic content for type IB; IIB; and type IIIB of coating less water (see 4.2.1(f)). The volatile organic content of the system shall be calculated from the volatile organic content of each individual coating of that system using the following formula:

$$\text{VOC (system)} = (aA+bB+cC+dD)/(a+b+c+d)$$

A, B, C, D = VOC of each coating (g/l)

a, b, c, d = recommended spreading rate of each coating  
(liter/square meter or 1/ft<sup>2</sup>)

3.5 Directions for mixing and applying. The manufacturer shall provide written directions for mixing and applying his products used in the coating system on each container. These directions shall cover both small (1 liter or 4 liter) (1 quart or 1 gallon) and field (19 liter) (5 gallon) kit procedures, and shall specifically state the differences, if any, between the two. These directions shall be in the format specified in ASTM F 718 and shall include, as a minimum, information on the mixing ratios by mass and by volume, induction time, pot life, upper and lower temperature and humidity limits for application, coverage per liter (gallon), and safety precautions (see 4.2.1).

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3.6 Performance in service. The coating system shall show no wear through, cracking, breaking, loss of adhesion or other deficiency which would adversely affect its performance as specified in table V.

TABLE V. Service life periods.

	Composition G (months)	Composition L (landings)
Grade A	18	15,000
Grade B	6	5,000

## 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.

4.2 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).

4.2.1 Certification data/report. When specified in the contract or order, each lot of coating material shall be certified (see 6.2.2).

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4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory designated by the Naval Sea Systems Command (NAVSEA). Qualification tests shall consist of the tests specified in 4.6 and 4.8. The service test shall be conducted on a carrier flight deck as specified in 4.8 after successful completion of all laboratory tests in 4.6 with the exception of 4.6.18 and 4.6.19.1 which shall be performed concurrently.

4.3.1 Qualification samples. For qualification testing, a sample of a nonskid coating system shall be submitted to the designated laboratory to cover 186 square meters (2000 square feet). One liter (1-quart) samples of all resins in the system and a 1-liter (1-quart) sample of the nonslip aggregate shall also be submitted for qualification testing.

4.3.2 Extension of qualification. Approval of qualification for Navy haze gray color 36076 of FED-STD-595 shall constitute approval for other colors of the same type, grade and class. Approval of qualification for composition L shall also constitute approval of qualification of that system for composition G of the same type, grade and class. Approval of qualification for type II shall also constitute approval of qualification of that system for type I of the same grade, class and composition. Approval of qualification for type III does not constitute approval for type I and II.

4.4 Quality conformance inspection.

4.4.1 Lot. For purposes of sampling, inspecting, and testing, a lot shall be comprised of not more than one manufacturing batch. A batch is defined as the end product of a single manufacturing process which begins with several raw materials and includes one or more constituent operations. When coatings are comprised of components to be mixed at the time of application, any change in raw materials in either component shall constitute a new lot. The size of the lot shall be measured in units of 3.785 liters (1 gallon).

4.4.1.1 Sampling for quality conformance inspection.

4.4.1.1.1 Sampling for inspection of packaging. A random sample of containers offered for delivery shall be selected as specified in MIL-STD-105 at inspection level I and an acceptable quality level (AQL) of 2.5 percent defective to verify fill, closure, marking, packaging, packing and other requirements not involving tests. The lot size shall be the number of shipping containers in the lot offered for delivery.

4.4.1.1.2 Sampling for lot acceptance testing. From each lot of material offered for delivery, a random sample of containers shall be selected in accordance with MIL-STD-105 at inspection level S-1 and an acceptable quality level of 4.0 percent defective, and submitted to the lot acceptance tests specified in 4.4.4.

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4.4.2 Examination of containers. Each container randomly selected from the lot offered for delivery shall be examined for defects of construction of the container and of the closure, for evidence of leakage, and for unsatisfactory markings; each container selected shall also be tested to determine the amount of contents. Any container in the sample having one or more defects or under required fill shall be rejected, and if the number of rejected containers in any sample exceeds the acceptance number for the sampling plan in accordance with MIL-STD-105 which was used, the lot represented by the sample shall be rejected.

4.4.3 Inspection of packaging. An inspection shall be made to determine that the preservation, packing, marking, and labeling comply with the requirements of section 5 of this specification. For examination of interior packaging, the sample unit shall be one shipping container fully prepared for delivery. Defects of closure shall be examined on shipping containers fully prepared for delivery.

4.4.4 Lot acceptance tests. Each lot of nonskid coating offered for delivery shall be subjected to the tests specified in table VI.

TABLE VI. Lot acceptance tests.

Characteristics	Requirement paragraph	Test paragraph
Abrasion of the arresting cable <sup>1/</sup>	3.3	4.6.1
Appearance of the dried coating	3.3.1	4.6.2
Application properties	3.3.2	4.6.3
Coefficient of friction <sup>1/</sup>	3.3.3	4.6.4
Color	3.3.4	4.6.5
Condition in container	3.3.5	4.6.6
Drying time	3.3.7	4.6.8
Flash point	3.3.9	4.6.10
Flexibility <sup>1/</sup>	3.3.10	4.6.11
Impact resistance <sup>2/</sup>	3.3.12	4.6.13
Pot life	3.3.13	4.6.14
Resistance to wear <sup>1/</sup>	3.3.16	4.6.17
Thickness <sup>1/</sup>	3.3.19	4.6.20
Mass <sup>1/</sup>	3.3.20	4.6.20

<sup>1/</sup> Needs only to be performed on first lot and every 19,000 liters (5000 gallons) thereafter.

<sup>2/</sup> Perform this test on duplicate panels cured 4 days at room temperature only on every lot and entire test on first lot and every 19,000 liters (5000 gallons) thereafter. The seawater immersion testing condition can be omitted for lot acceptance testing.

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#### 4.5 Preparation for testing.

4.5.1 Standard conditions. In case of dispute, tests shall be performed at standard testing conditions, which are  $23 \pm 2^{\circ}\text{C}$  ( $73.5 \pm 5^{\circ}\text{F}$ ) and a relative humidity of  $50 \pm 5$  percent, with the exception of 4.6.3 which shall be performed at the temperatures specified.

4.5.2 Preparation of steel panels. Ordinary strength steel panels 3-mm (1/8-inch) thick in accordance with grade A of MIL-S-22698 shall be abrasive-blasted to a uniform white-metal finish in accordance with SSPC SP5 to a 51 to 102 micrometers (2 to 4 mil) profile. This finish is characterized by the removal of all foreign matter, the absence of visible residues and discolorations, a gray-white uniform color, and a slightly roughened surface. The panels shall then be cleaned with oil-free air or vacuum, and protected from moisture during storage.

4.5.3 Preparation of test panels. Steel panels prepared as specified in 4.5.2 shall be primed with the primer, if any, designated by the contractor (see 3.2 and 3.5). If the contractor specifies a high and low limit of film thickness for the primer, two sets of panels shall be prepared, one at the high limit and one at the low limit of film thickness, for the tests specified in 4.6.12, 4.6.13, 4.6.15, 4.6.16 and 4.6.18. The primer film thickness on test panels shall be within a tolerance of plus or minus 12 micrometers (0.5 mils). The primer shall be allowed to dry for the time specified by the contractor (see 3.5). The intermediate coats, if any, and topcoat shall be mixed, kept at standard conditions during the induction time, if any, applied, as specified in the contractor's instructions (see 3.5), and allowed to cure for 14 days at standard conditions unless otherwise specified in the test method. Class 1 coatings shall be rolled for all tests except 4.6.3.

4.6 Tests. Tests shall be conducted in accordance with the procedures specified herein. Each result shall be compared with the applicable requirement in 3.3, and evaluated for conformance.

4.6.1 Abrasion of arresting cable (composition L only). Three 250 by 150 by 3 mm (10 by 6 by 1/8 inch) test panels shall be prepared as specified in 4.5.3. Each panel shall be conditioned by running 50 cycles in the cable abrasion tester specified herein before determination of the abrasion of the arresting cable. Each panel shall be used to abrade a new 3-mm (1/8-inch) diameter, 300 mm (12-inch) long cold-rolled steel rod. The diameter of each rod shall be measured before use to the nearest 0.0025 mm (0.1 mil) in ten places which will come in contact with the test panel. The rod shall be held in a jig in the test apparatus as shown on figure 1. After completion of 200 cycles in the abrasion machine, the rod shall be removed from the jig and the diameter of the rod shall be measured to the nearest 0.0025 mm (0.1 mil) in the same ten places. The difference in thickness in each of the ten places shall be computed. The wear of each rod shall be the average of these ten values. The average of the wear of the three rods shall be computed, and this value shall be used to determine conformance.

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4.6.1.1 Cable abrasion test apparatus. The test apparatus is shown on figures 1 and 2, and may be constructed with the following features:

- (a) A carriage on which the 250 by 150 by 3 mm (10 by 6 by 1/8 inch) panel is attached. The panel shall be securely fastened to the carriage, and shall be moved in a reciprocating motion 225 mm (9 inches) along its long axis at a frequency of 30 cycles per minute.
- (b) A jig which holds the 300 mm (12-inch) steel rod in contact with the test panel, with the axis of the rod horizontal at a right angle to the direction of motion of the reciprocating carriage. The clamps holding the rod shall not come into contact with the test panel, and shall not permit the rod to bend, twist, or rotate during the test. The jig shall be constructed so as to put the rod under a load of  $13.6 \pm 0.1$  kilograms (kg) ( $30 \pm 1/4$  pounds) during the test.

4.6.2 Appearance of the dried coating. The panels used in the drying time test (see 4.6.8) shall be evaluated for conformance to the requirements specified in 3.3.1. The appearance of the primer and each intermediate coat shall be observed before application of the subsequent coat.

4.6.3 Application properties. A 250 by 150 by 3 mm (10 by 6 by 1/8 inch) primed steel panel (two panels for class 1 coatings) shall be equilibrated at the temperature at which the application properties are to be determined. The coating shall be mixed in accordance with the instructions provided (see 3.5), the mixing properties shall be evaluated, the induction time (if any) shall be observed, the coating shall be conditioned at the appropriate temperature for one-half of the specified pot life period for that temperature, and the coating shall be applied to the steel panel. For this test, material from the pot life test specified in 4.6.14 shall not be used. Class 1 material shall be spread over the panel with the roller, and then rolled in one direction to produce the characteristic rolled appearance (see 3.3.1). The class 1 coating shall be trowelled onto the second panel using a V-notched trowel the notches of which shall be 6.3 mm (1/4 inch) deep and 12.6 mm (1/2 inch) across. Class 2 material shall be sprayed in several passes to produce a uniform finish (see 3.3.1). During mixing and application, the coating shall be observed and evaluated for conformance with 3.3.2. These panels shall be used for the drying time test in 4.6.8.

4.6.4 Coefficient of friction. This test shall be performed on 250 by 150 by 3 mm (10 by 6 by 1/8 inch) panels before (that is, after undergoing 50 conditioning cycles) and after wear in the cable abrasion tester in 4.6.1. The coefficient of friction test apparatus is specified below and is shown on figure 2.

4.6.4.1 The test panel shall be secured on the moving platform and the sled of the NAVSSES Slipmeter shall be placed onto the panel. The hook on the sled shall be attached to the hook on the force gauge, and the force to be applied by the sled shall be along the axis of the force gauge. The gauge shall be set to zero, and set to display the highest force encountered. The platform shall be started in motion at a rate of  $254 \pm 51$  mm ( $10 \pm 2$  inches) per minute, and the panel allowed to travel 100 mm (4 inches). The highest force encountered by the sled shall be recorded during the test. The coefficient of friction shall be computed by dividing the reading on the gauge by the mass of the sled.



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4.6.4.2 For class 1 coatings, panels on which the nonskid has been rolled parallel to the 250-mm (10-inch) dimension shall be used. Five replicate measurements shall be made; the panel shall be turned 180 degrees and five additional measurements shall be made. The average of the ten readings shall be computed and the average shall be used in conformance with 3.3.3.

4.6.4.3 This test shall be performed on panels before wear, that is, panels which have undergone 50 cycles in the cable abrasion tester to remove the highest peaks and ridges. The panel shall then be wetted with synthetic sea water in accordance with ASTM D 1141, and the test shall be repeated. The panels shall then be rinsed in tap water to remove the synthetic sea water, dried at 120°C (250°F) for 1 hour, and cooled to standard conditions. The panel shall then be wetted with aircraft turboshaft engine oil in accordance with MIL-L-23699, and the test shall be repeated. The after wear test shall be performed under dry, wet and oily conditions as above on separate panels which have been subjected to 500 cycles of wear for class 1 and 350 cycles of wear for class 2 in the cable abrasion tester.

4.6.4.4 Test apparatus. The NAVSSES Slipmeter is shown on figures 3 and 4, and shall be constructed with the following features:

- (a) A steel sled having a flat surface 100 by 125 mm (4 by 5 inches), and a thickness of 25 to 40 mm (1 to 1.5 inches). One 100 mm (4-inch) side of the sled shall have a screw eye in the center of the face to which the force gauge is attached. The 100 by 125 mm (4 by 5 inch) face of the sled shall be covered with vulcanized neoprene rubber having a Shore "A" hardness of  $65 \pm 5$  and a thickness over its entire surface of 3 mm (1/8 inch). The edges of the rubber shall be square, and not beveled. The total weight of the sled with the rubber facing shall be  $2.7 \pm 0.2$  kg ( $6.0 \pm 0.5$  pounds). The force moving the sled shall be parallel to the nonskid panel, and shall not tend to lift the sled from the panel.
- (b) A force gauge which measures 0 to 4.5 kg (0 to 10 pounds), reads out directly in kg (pounds) on an electronic display to hundredths of a pound, and can be preset to lock onto the highest force encountered. A Chatillon Gauge Model DFG-10 has been found satisfactory for this purpose.
- (c) A platform which moves across a 100 mm (4-inch) distance at a constant speed of 300 mm (12 inches) per minute. The platform shall have provisions to hold the nonskid panel firmly during the test to prevent twisting or lifting of the panel without interfering with the motion of the sled.

4.6.4.4.1 Other methods to move the sled across the panel are acceptable. Some methods use a portable motor which moves the force gauge 100 mm (4 inches) at a rate of about 300 mm (12 inches) per minute; the force gauge is connected to the sled with a light chain.

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4.6.5 Color. A 250 by 150 by 3 mm (10 by 6 by 1/8 inch) steel panel shall be prepared as specified in 4.5.2, and primed in accordance with the instructions specified (see 3.5). A 200 mm (8-inch) long drawdown of the class 1 system shall be prepared using a 100 mm (4-inch) wide, 50-mil drawdown bar. For class 2, the coating shall be sprayed as specified in 4.5.3. The panel shall be allowed to cure for 96 hours at standard conditions. The color shall be compared to the specified standard color chip in accordance with the procedure outlined in ASTM D 1729 for a critical match.

4.6.6 Condition in container. The liquid one-part coating, or components of two-part coatings, shall be examined visually for the defects specified in 3.3.5. The presence of ingredients which cannot be redispersed within 5 minutes by hand stirring with a paddle for 4 liter (1 gallon) or smaller quantities or stirring with a power mixer for 19 liter (5 gallon) quantities shall constitute a failure of this requirement.

4.6.7 Coverage. A 914 by 914 by 3 mm (36 by 36 by 1/8 inch) steel panel shall be prepared as specified in 4.5.2. Priming shall be done in accordance with the directions provided in 3.5 and the amount of primer used shall be volumetrically determined after returning all unused portions of primer to the can from the sides of the panel and application utensils. The topcoat shall be applied in accordance with the directions provided in 3.5. The quantity of topcoat used shall be volumetrically determined after returning all unused portions of coating to the can from the sides of the panel and application utensils. The average of two determinations shall be used to determine conformance.

4.6.8 Drying time. Three 152 by 152 by 3 mm (6 by 6 by 1/8 inch) (nominal) panels shall be prepared in accordance with 4.6.3 each at one of the temperatures specified in 3.3.7 and maintained at that temperature. The drying time of the primer and intermediate coats shall be determined by applying the subsequent coat at the minimum allowable drying time for that temperature. Any softening or lifting of these coatings shall constitute failure. The finished panels shall be kept at the specified temperature for the allowed drying time. Immediately, 16 layers of Kaydry wipers or equivalent shall be placed onto the surface of the coating system and a 2.25 kg (5-pound) cylindrical weight with a diameter of 66 mm (2.625 inches) placed on the tissue. After 15 minutes, the weight shall be removed and the paper examined. Staining or discoloration on the paper caused by the coating constitutes failure of this test. The appearance of these panels shall be evaluated as specified in 4.6.2.

4.6.9 Fire resistance. The coating system shall be evaluated in accordance with the procedure specified in MIL-STD-1623. The average of three panels shall be used to determine conformance.

4.6.10 Flash point. The flash point shall be determined in accordance with ASTM D 3278 on thoroughly-stirred one-part coatings or on two-part coatings immediately after mixing the components.

4.6.11 Flexibility (type III). The type III coating shall be tested over a 25.4 mm (1-inch) mandrel in accordance with ASTM D 1737 and examined for cracking, breaking or loss of adhesion immediately after bending. The panels shall be prepared and treated in such a manner that the ridges in the profile run parallel to the axis of the bend.



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4.6.12 Immersion resistance. Thirty-two 150 by 50 by 3 mm (6 by 2 by 1/8 inch) (nominal) panels shall be prepared as specified in 4.5.3 (16 at each primer thickness): Sixteen panels (eight of each primer thickness) shall be subjected to two impacts from a falling steel ball (see 4.6.13); the impacts shall be 100 mm (4 inches) apart and equidistant from the edges and sides of the panels. Each of seven widemouth jars with tightly-fitting caps shall be filled to a depth of 75 mm (3 inches) with one of the following materials:

- (a) Grease in accordance with DOD-G-24508.
- (b) JP-5 jet fuel in accordance with MIL-T-5624.
- (c) Hydraulic fluid in accordance with MIL-H-83282.
- (d) Ethyl alcohol in accordance with O-E-760.
- (e) Aircraft engine turboshaft lubricating oil in accordance with MIL-L-23699.
- (f) Detergent in accordance with MIL-D-16791, 0.5 percent solution in synthetic sea water in accordance with ASTM D 1141.
- (g) Aqueous fire fighting foam in accordance with MIL-F-24385, 10 percent solution in synthetic sea water in accordance with ASTM D 1141.

Four panels, one impacted and one unimpacted for each primer thickness, shall be placed in each jar, each panel resting on its 50 mm (2-inch) side, with one-half immersed and one-half above the test material. The jars shall be sealed tightly and kept at standard conditions for 4 weeks for all fluids except JP-5 and ethyl alcohol which shall be tested for 24 hours only. Upon removal from the immersion medium, the panels shall be probed with a chisel and compared with the identical untested control panel to detect signs of softening, loss of adhesion, or separation between layers of coating, and otherwise examined for conformance to 3.3.12. The panels immersed in JP-5 and ethyl alcohol shall be allowed a 2-hour recovery period before evaluation. All other panels shall be examined for conformance immediately after removal from the immersion medium.

4.6.13 Impact resistance. Sixteen 150 by 150 by 3 mm (6 by 6 by 1/8 inch) test panels shall be prepared as specified in 4.5.3 (eight at each primer thickness). Immediately before testing, four panels (two of each primer thickness) shall be subjected to each of the following treatments: (a) No treatment; (b) 4 hours at 0°C (32°F); (c) 4 hours at 70°C (158°F); (d) 15 days of immersion in room temperature synthetic seawater in accordance with ASTM D 1141.

4.6.13.1 Immediately upon removal from treatment, each panel shall be subjected to 25 impacts by a 0.9 kg (2-pound) solid steel ball (approximate diameter 60 mm (2.37 inches)) dropped from a height of 2.5 meters (8 feet). The steel ball shall be held in a fixed position by an electromagnet provided with a centering tip, such as that shown on figure 5, and shall fall freely without a guide directly onto the panel. The panel shall be placed on a steel base such as that shown on figure 6, which is at least 40 mm (1.5-inches) thick and is fitted with guides to position the panel for each impact. Successive points of impact shall form a 5 by 5 pattern, enclosed within an area of about 58 square centimeters (9 square inches), in which the impacts are equally spaced 20 mm (3/4 inch) center-to-center from their nearest neighbors. The impacts on the steel panel shall be made in the sequence specified on figure 7.

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4.6.13.1.1 Upon completion of each impact test, the panel shall be probed by hand with a hand held, sharpened steel cold chisel in an area that received no impacts in order to judge the force needed to remove the coating. The panel shall then be probed in the impact area with the chisel, using a force less than that used in the non-impact area, and coating which has been loosened by the impact of the steel ball shall be removed from the panel.

4.6.13.1.2 The percentage of coating system remaining intact and tightly adhering to the panel shall be evaluated as follows: In the 5 by 5 pattern of impacts, there are 40 pairs of impacts separated by 20 mm (3/4 inch). In every case in which one or more layers of the coating system has been removed, either by the impact of the steel ball or by the chisel, so as to connect one pair of impacts, the percentage of intact coating system is reduced by 2.5. Thus, a passing value of 90 percent indicates that no more than four pairs of adjacent impacts are connected. Results for duplicate panels tested under the same conditions shall be averaged. Failure of one of the eight conditions (four treatments at two primer thicknesses) constitutes failure of this test.

4.6.14 Pot life. Sufficient coating to fill a standard 1-liter (1-quart) can to within 13 mm (1/2 inch) of the top shall be mixed in accordance with the directions provided in 3.5. If an induction time is called for in the directions, the mixed components shall be kept at standard conditions during the induction time. The pot life shall be measured from the end of the induction time, if any, and the mixed coating shall be held at the temperature specified for the pot life. None of the mixed coating shall be removed for other tests during the determination of the pot life. At the end of the specified pot life, the coating shall meet all the requirements of this specification. (For lot acceptance tests, only performance at the end of pot life shall be determined by application properties (see 4.6.3) when applied to primed 150 by 150 mm (6 by 6 inch) steel plates and impact testing (see 4.6.13) at 4 days cure.)

4.6.15 Resistance to accelerated aging by light and water. Six 150 by 75 by 3 mm (6 by 3 by 1/8 inch) test panels shall be prepared as specified in 4.5.3 (three at each primer thickness). Four of the panels (two at each primer thickness) shall be subjected to two impacts from a falling steel ball (see 4.6.13); each impact shall be 25 mm (1 inch) from the edge and 40 mm (1.5 inches) from the sides of the panel. The panels shall be tested as specified in ASTM G 53 for 1000 hours in an accelerated weathering tester (Q-U-V Cabinet, The Q-Panel Corporation, Cleveland, OH; Atlas UVCON, The Atlas Electric Devices Company, Chicago, IL; or equal) which operates on alternate 4-hour periods of ultraviolet light at 60°C and 4-hour periods of condensation at 40°C. The lamps shall be UV-B lamps number QFS-40 or equal. At the completion of the exposure period, the chalking shall be determined in accordance with ASTM D 659 and the panels shall be visually evaluated for compliance with 3.3.15. The panels shall be washed with mild soap and water, rinsed and allowed to dry overnight before evaluating color in accordance with the procedure specified for a general match in ASTM D 1729.

4.6.16 Resistance to accelerated corrosion. Four 150 by 75 by 3 mm (6 by 3 by 1/8 inch) test panels shall be prepared as specified in 4.5.3 (two at each primer thickness), except that both sides and the edges of these panels shall be primed. Two of the panels (one from each primer thickness) shall receive two impacts from a falling steel ball as specified in 4.6.13. The impacts shall be 25 mm (1 inch) from the end and 40 mm (1.5 inches) from the sides of

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the panel. Panels shall be tested for 1000 hours in a salt fog cabinet as specified in ASTM B 117. The coating system shall be examined for loss of adhesion and separation between coats. A portion of the coating shall be removed from each steel panel, and the underlying steel shall be observed for corrosion under the coating system.

**4.6.17 Resistance to wear.** Three panels 250 by 150 by 3 mm (10 by 6 by 1/8 inch) shall be prepared as specified in 4.5.3. The mass of each panel shall be measured to the nearest 0.5 gram before application of the coating system. Each panel shall be abraded by the cable abrasion tester specified in 4.6.1 for 50 cycles and then its mass determined. The panel shall be worn an additional 450 cycles for class 1 coatings or an additional 300 cycles for class 2 coatings. For abrasive coatings, the wire in the cable abrasion tester shall be replaced after the first 50 cycles and every 150 cycles thereafter. After completion of the wear, the final coating mass shall be taken. The percent of determined mass loss is calculated as follows:

$$\text{Percent mass loss} = 100 \times (M2 - M3) / (M2 - M1)$$

M1 = Mass of panel before coating

M2 = Mass at 50 cycles

M3 = Mass at end of test

The average percent of determined mass loss of the three panels shall be computed, and this value used to determine conformance.

**4.6.18 Resistance to weather.** Three panels 250 by 150 by 3 mm (10 by 6 by 1/8 inch) shall be exposed to sun and salt spray at the Naval Research Laboratory Marine Corrosion Laboratory, Key West, FL for 6 months at an angle of 30 degrees from the horizontal. Before exposure, two of the panels shall be subjected to four impacts from a falling steel ball (see 4.6.13); the impacts shall be near the corners of the panel and 50 mm (2 inches) from both edges. The backs and edges of the panels shall be primed prior to exposure. At the end of the exposure period, the chalking of the panels shall be evaluated using ASTM D 659 and the panels shall be evaluated visually for compliance with 3.3.1.8. The panels shall then be washed with mild soap and water, rinsed, and allowed to dry overnight. The color shall be evaluated in accordance with the procedure specified for a general match in ASTM D 1729. Failure of any panel constitutes failure of this requirement.

**4.6.19 Storage stability.**

**4.6.19.1 Long-term storage stability.** A full 19 liter (5-gallon) pail or kit of the coating system shall be kept undisturbed for 1 year at standard conditions. After this period, the coating system shall comply with all of the requirements of this specification. Long-term storage stability shall be evaluated by running all of the lot acceptance tests.

**4.6.19.2 Accelerated storage stability.** A full 4-liter (1-gallon) can or kit of the coating system shall be kept undisturbed for a period of 4 weeks at a temperature of 49°C (120°F). After this period, the coating system shall comply with all of the requirements of this specification. Accelerated storage stability shall be evaluated by running all of the lot acceptance tests after equilibrating the coating system at standard conditions.

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4.6.20 Thickness and weight. Three ordinary strength steel panels (in accordance with MIL-S-22698, grade A), each 150 by 250 by 3 mm (6 by 10 by 1/8 inch), shall be prepared as specified in 4.5.2. The tare weight of each panel shall be determined to the nearest 0.1 gram, and the thickness of each panel shall be measured with a micrometer at 20 equally-distributed points. The nonskid coating system shall be applied to each panel in accordance with the instructions provided in 3.5 so as to completely cover the steel plates, and the coating system shall be allowed to cure for 96 hours. After curing, any excess coating shall be cleaned from the edge of the panels. The weight of each panel shall be determined to the nearest 0.1 gram, and the tare weight shall be subtracted to give the net weight of the coating. The three net weights shall be averaged and divided by 387 to convert to grams per square centimeter. The thickness of each panel shall be measured with a micrometer at each of the 20 points measured previously. The difference in thickness of the uncoated and coated steel panels at each of the 20 points shall be calculated. The thickness of each panel shall be the average of the 20 measured thicknesses. The average thickness of the three panels shall be computed, and this value shall be used to evaluate conformance.

4.7 Performance. When tested as specified in 4.6, the coating system shall meet all the requirements set forth herein as specified in 3.3.20 and as specified in table VII.

TABLE VII. Test references.

Title of test	Performance paragraph	Test paragraph
Abrasion of arresting cable	3.3	4.6.1
Appearance of the dried coating	3.3.1	4.6.2
Application properties	3.3.2	4.6.3
Coefficient of friction	3.3.3	4.6.4
Color	3.3.4	4.6.5
Condition in container	3.3.5	4.6.6
Coverage	3.3.6	4.6.7
Drying time	3.3.7	4.6.8
Fire resistance	3.3.8	4.6.9
Flash point	3.3.9	4.6.10
Flexibility (type III)	3.3.10	4.6.11
Immersion resistance	3.3.11	4.6.12
Impact resistance	3.3.12	4.6.13
Pot life	3.3.13	4.6.14
Resistance to accelerated aging by light and water	3.3.14	4.6.15
Resistance to accelerated corrosion	3.3.15	4.6.16
Resistance to wear	3.3.16	4.6.17
Resistance to weather	3.3.17	4.6.18
Storage stability	3.3.18	4.6.19
Thickness	3.3.19	4.6.20
Mass	3.3.20	

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4.8 Performance in service. A service test shall be conducted on a carrier flight deck in the landing area for composition L and in a nonlanding area for composition G. The coating system shall be mixed and applied according to the instructions furnished by the manufacturer (see 3.5). The coating system shall be examined after the test interval specified in table V for the appropriate type and grade and evaluated for conformance to 3.6. Type III shall be tested on a smaller ship as designated by NAVSEA.

## 5. PACKAGING

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

5.1 Preservation. (For military air shipments see 5.3.)

5.1.1 Cans for levels A and C. The coatings shall be furnished in 4- or 19-liter (1- or 5-gallon) cans or pails as specified (see 6.2.1). When the coating is composed of two components, it shall be supplied as a kit consisting of base material marked component A and curing agent marked component B. When component A is mixed with component B, the amount of material produced shall equal the size of the kit. Component A shall be furnished in 4-liter (1-gallon) cans or pails or in 19-liter (5-gallon) pails as specified (see 6.2.1). Component B shall be furnished in cans or pails of the appropriate size, and shall be fastened to the container of component A. Alternatively, components A and B shall be packaged individually in a double-compartmented 23- or 24.5-liter (6- or 6-1/2-gallon) pails (see 5.1.4).

5.1.2 Cans, levels A and C. Cans shall be in accordance with type V, class 2, of PPP-C-96. An interior coating is required for cans containing water-based coatings. Plan B coating and side seam stripping are required. Wire handles treated to resist corrosion are required for 4-liter (1-gallon) cans.

5.1.3 Four- and 19-liter (1- and 5-gallon) pails, levels A and C. Four- and 19-liter (1- and 5-gallon) pails shall be in accordance with type II, class 3 of PPP-P-704. An interior coating is required for cans containing water-based coatings. Wire handles treated to resist corrosion are required.

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5.1.4 Double-compartmented pail. The 23- or 24.5-liter (6- or 6-1/2-gallon) double-compartmented pail shall be in accordance with type II, class 5 or II of PPP-P-704. An interior coating is required for cans containing water-based coatings. Wire handles or bails treated to resist corrosion are required. The second compartment may be formed using a metal or plastic insert having a tray or saddle shape which is designed to rest over the edge of the pail. The insert shall fit tightly, and shall be of sufficient size to accommodate the packaged curing agent, component B. The pail, lid, and insert shall fit tightly without leaking. Gaskets may be used if necessary to ensure a leakproof fit.

5.2 Packing. Packing shall be levels A, B, or C as specified (see 6.2.1), (for military air shipments see 5.3).

5.2.1 Cans for level A. Coatings preserved as specified, shall be packed in wood or wood-cleated plywood boxes conforming to PPP-B-621 or PPP-B-601 over-seas type or class. Boxes shall be closed, reinforced or banded in accordance with the applicable box specification or appendix thereto.

5.2.2 Cans for levels B and C. Coatings preserved as specified shall be packed in a fiberboard box conforming to PPP-B-636, class weather resistant for level B and class domestic for level C. Fiberboard pads shall be placed on the bottom and tops of the cans. Boxes shall be closed in accordance with the applicable method specified in the appendix to PPP-B-636, which is method V for level B and method I for level C. Boxes for level B shall be waterproofed in accordance with method V of PPP-B-636 and shall be reinforced by nonmetallic banding or by pressure-sensitive reinforced tape.

5.2.3 Pails for levels A, B, and C. Four-liter (1-gallon) pails shall be packed as specified in 5.2.1. Nineteen liter (5-gallon) or double-compartmented 23- or 24.5-liter (6- or 6-1/2-gallon) pails require no further packing. When specified (see 6.2.1) pails shall be palletized in accordance with MIL-STD-147.

5.3 Military air shipments. For delivery by military aircraft, nonskid types I, II, and III systems preserved and packed as specified in 5.1 and 5.2 shall be either repacked or overpacked in containers conforming to DOT 5.513 or 17C, or MS27684. Containers shall be of the fuel removable cover type and covers shall be furnished with gaskets and bolted locking ring features.

5.3.1 New acquisition military aircraft shipments. When specified (see 6.2.1), new acquisitions of nonskid types I, II, and III to be delivered by military aircraft shall be directly packed into containers as specified in 5.3.

5.4 Marking. In addition to the special and additional markings required herein, interior packages and shipping containers shall be marked in accordance with MIL-STD-129, including the hazardous markings specified therein.

5.4.1 Colors of labels. The major bold lettering on all labels shall be red on a white background for composition G, and blue on a white background for composition L.



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5.4.2 Special marking. Each container of single-component coatings and each component container of two-component coatings shall be marked with the following additional information:

- (a) Number and date of this specification.
- (b) Type and class of topcoat.
- (c) Manufacturer's name and the address of the manufacturing location.
- (d) Manufacturer's QPL designation, lot number, and date of manufacture.
- (e) Contract number.
- (f) Color name and number from FED-STD-595.

5.4.3 Additional markings. In addition to other requirements, containers shall bear the following markings:

- (a) Each component container of two-component materials shall bear the following marking: "CAUTION: This is one component of a two component system which WILL NOT HARDEN unless both components are mixed together."
- (b) Containers of composition G coatings shall bear the following marking on the container and on the lid: "DO NOT USE IN CARRIER LANDING AREAS."
- (c) Containers shall bear the following markings:
  - (1) "INSTRUCTIONS FOR USE: Refer to the contractor's written instructions for mixing and application before beginning work."
  - (2) "CAUTION: Avoid skin contact during application. Ingredients may cause irritation or skin sensitization. In case of contact, wash skin thoroughly with soap and water."
  - (3) "This coating has a 1-year nonextendable shelf life and shall not be used after (insert the month and year which are one year later than the date of manufacture)."
- (d) Containers of material packed for military air shipment (see 5.3) shall include a statement, "COMPLIES WITH REQUIREMENTS FOR MILITARY AIR SHIPMENT."

5.5 Material safety data sheet. For shipping containers and palletized unit loads, a copy of the Material Safety Data Sheet shall be attached to the shipping document for each destination.

## 6. NOTES

6.1 Intended use. The coatings covered by this specification are intended for use on the flight and hangar decks of aircraft carriers and on the landing decks of air-capable amphibious aviation and aviation ships. Grade A provides longer durability, however the factor of increased weight should be considered when using this system.

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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, grade, class, and composition required (see 1.2).
- (c) Color required (see 3.3.4).
- (d) Level of preservation and packing required (see 5.1 and 5.2).
- (e) When size of cans or pails is specified (see 5.1.1).
- (f) If pails are to be palletized (see 5.2.3).
- (g) Packing for military air shipments (see 5.3.1).

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 paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.2.1	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 5010.12L., Vol. I, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications 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).



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**6.3 Qualification.** With respect to 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-24667 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 Shelf life.** For the cataloging, logistics, and storage functions of Federal acquisition and supply agencies, materials acquired under this specification shall be assigned a 1-year non-extendable shelf life (shelf life code F) beginning on the date of manufacture.

**6.5 Verification tests.** Verification tests may be performed and will consist of any tests determined by NAVSEA to be necessary to ensure that the material offered for delivery is the same as the material originally submitted for qualification under this specification. The Government reserves the right to perform inspections and tests not contained in this specification in order to determine that the requirements in section 3 are satisfied, and that the raw materials used in the manufacture of the material offered for delivery are the same as the raw materials used in the manufacture of the qualification sample.

**6.6** In addition to the requirements specified in 4.2.1, the certification data/report should include the following information:

- (a) Certification that the submitted coating system does not contain asbestos-containing materials, toxic materials, or esters or ethers derived from ethylene glycol as specified in 3.4.1, 3.4.2 and 3.4.3.
- (b) Certification that the submitted coating system has a 1 year storage stability as specified in 3.3.18.
- (c) Material safety data sheet as specified in 3.4.4.
- (d) Test report showing that the submitted material conforms to all requirements of this specification as specified in 4.6.2.1.
- (e) Directions for mixing and applying the system as specified in 3.5.
- (f) Certification that the submitted coating system meet the volatile content of 3.4.5.

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6.7 Supersession data. This specification supersedes MIL-D-23003A(SH) dated 25 February 1980 and MIL-D-24483A(SHIPS) dated 19 August 1974 as follows:

<u>DOD-C-24667(NAVY)</u>	<u>MIL-D-23003A(SH)</u>	<u>MIL-D-24483A(SHIPS)</u>
Type IA, IB, grade B, composition G		
Class 1	Type III	-----
Class 2	-----	Type I
Type IA, IB, grade B, composition L		
Class 1	Type IV	-----
Class 2	-----	Type II
Type IIA, IIB, grade B, composition G or L		
Class 1	Type V	-----
Class 2	-----	-----
Type IIIA, IIIB	Type III	-----

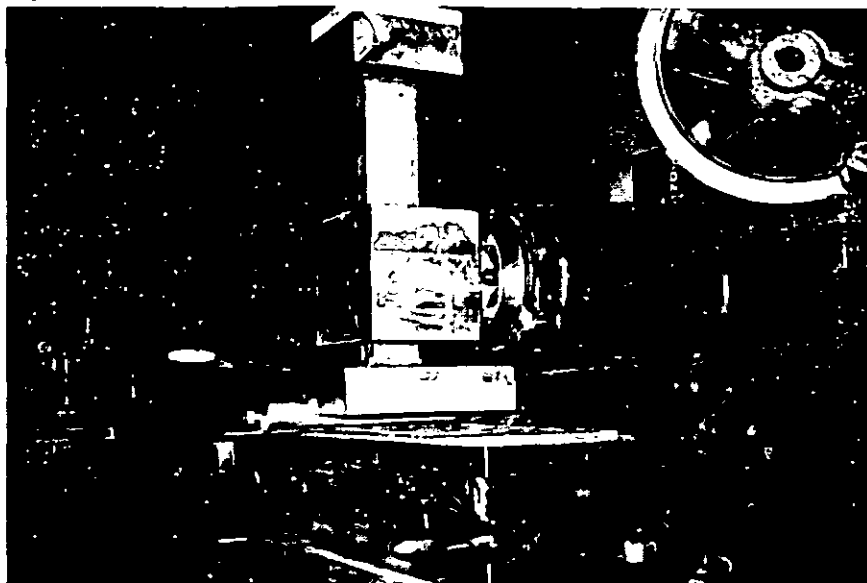
6.8 Subject term (key word) listing.

Color - spray application  
Nonskid  
Storage stability  
Topcoat

Review activity:  
Navy - AS

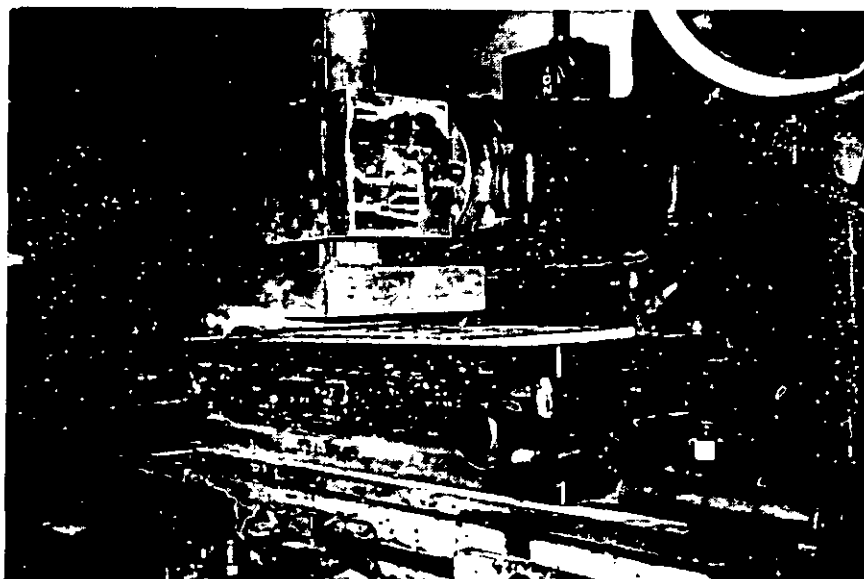
Preparing activity:  
Navy - SH  
(Project 8010-N272)

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SH 13036

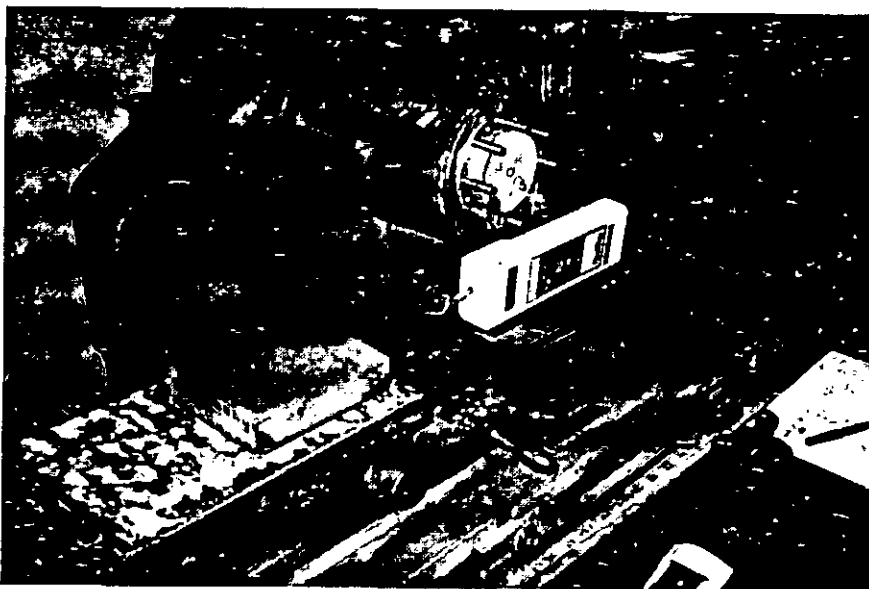
FIGURE 1. View of the NRL wire abrasion tester.



SH 13037

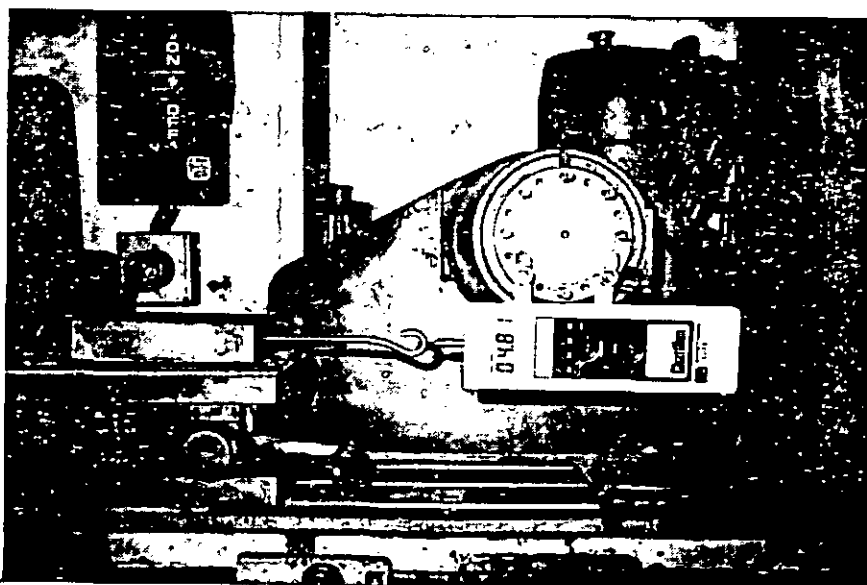
FIGURE 2. Closeup view of the NRL wire abrasion tester.

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SH13038

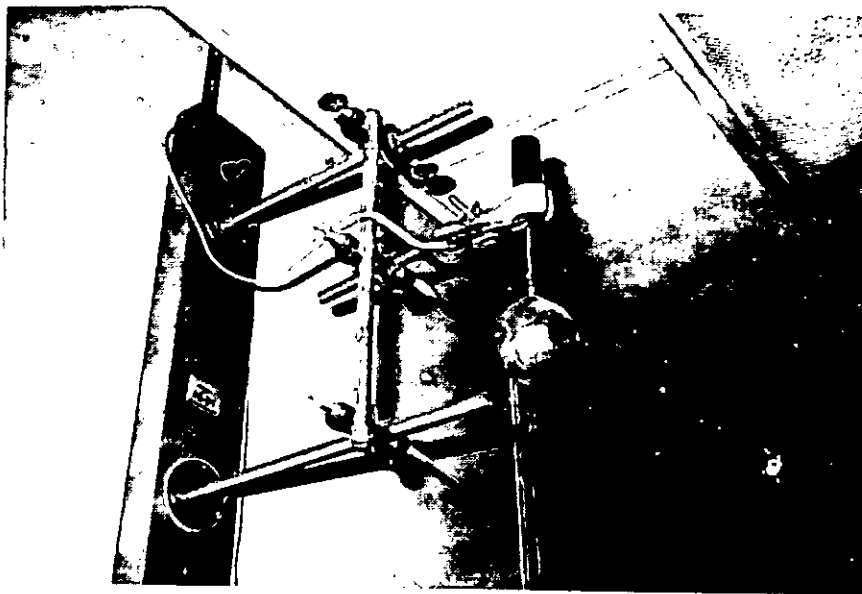
FIGURE 3. View of the coefficient of friction test, showing the NAVSSES slipmeter resting on a panel of nonskid coating.



SH13039

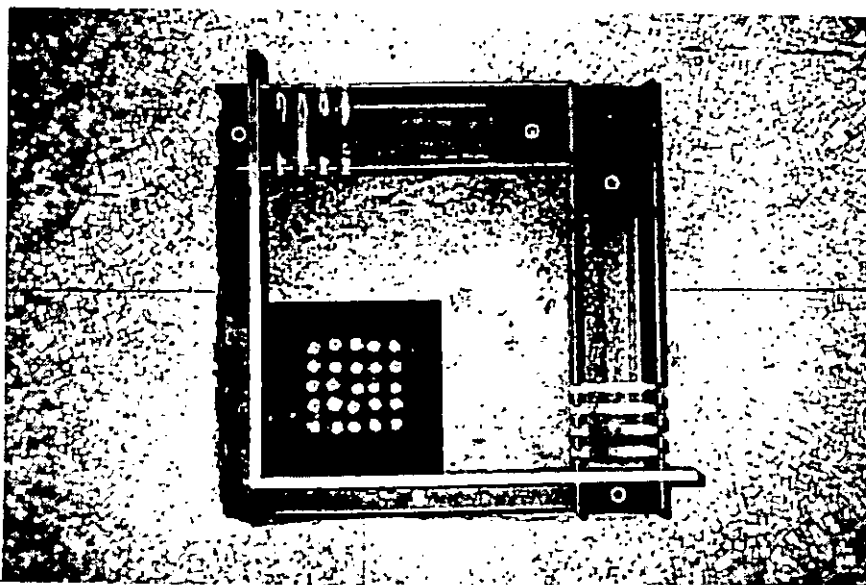
FIGURE 4. View of the coefficient of friction test, showing the direct reading electronic force gauge.

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SH 13040

FIGURE 5. Electromagnet with a centering tip with the 2-pound steel ball used for the impact resistance test.



SH 13041

FIGURE 6. The solid steel base, 2-inches thick, used for the impact resistance test, and the guides used to position the panel for successive impacts.

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2	15	11	7	3
6	19	23	20	16
10	22	25	24	12
14	18	21	17	8
1	5	9	13	4

SH 13042

FIGURE 7. The sequence in which 25 successive impacts are made during the impact resistance test.

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b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
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