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METRIC
MIL-PRF-24667A(NAVY)
14 August 1992
SUPERSEDING
MIL-C-24667(NAVY)
11 September 1986

PERFORMANCE SPECIFICATION

# COATING SYSTEM, NON-SKID, FOR ROLL OR SPRAY APPLICATION (METRIC)

This specification is approved for use by the 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 non-skid coating systems for application to weather decks, flight decks, and hangar decks of air capable amphibious aviation and aviation ships. Coatings are applied to steel, aluminum, reinforced plastic and wood surfaces by spraying, rolling, or trowelling.

1.2 Classification. The coating systems covered by this specification shall be furnished in the following types and compositions as specified (see 6.2).

1.2.1 Types. The types of non-skids shall consist of the following:

Type I - High durability, rollable deck coating.
Type II - Standard durability, rollable or trowell deck coating.
Type III - Standard durability, rollable resilient deck coating (for use on exterior wooden decks or where flexibility is required and where increased weight is not a factor).
Type IV - Standard durability, sprayable deck coating.

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 55Z3, Department of the Navy, 2531 National Center Bldg 3, Washington, DC 20362-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1.2.2 Compositions. The composition of non-skid shall be designated by "G" (General Use) or "L" (Limited Use) as follows:

Composition G - General use abrasive deck coating (Types I, II, III and IV).

Composition L - Limited use aircraft carrier landing and run-out area deck coating which is not abrasive to the steel arresting cable (composition L shall be for types I and II only, does not apply to types III and IV).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

O-E-760 - Ethyl Alcohol (Ethanol); Denatured Alcohol; Proprietary Solvents and Special Industrial Solvents.
PPP-C-96 - Can, Metal, 28 Gage and Lighter.
PPP-F-320 - Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade) and Cut Shapes.
PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 through 12 gallons).

MILITARY

MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5/JP-8 ST.
MIL-A-8243 - Anti-Icing and Deicing-Defrosting Fluids.
MIL-C-9084 - Cloth, Glass, Finished for Resin Laminates.
MIL-D-16791 - Detergents, General Purpose (Liquid, Non-ionic).
MIL-L-19140 - Lumber and Plywood, Fire Retardant Treated.
MIL-S-22698 - Steel Plate, Shapes and Bars, Weldable Ordinary Strength and Higher Strength, 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-I-45208 - Inspection System Requirements.
MIL-H-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, Metric, NATO Code Number H-537.

STANDARDS

FEDERAL

FED-STD-141 - Paint, Varnish, Lacquer, and Related Materials: Methods for Sampling and Testing.

FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.

FED-STD-595 - Colors Used in Government Procurement.

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.

MIL-STD-1623 - Fire Performance and Approved Specifications for Interior Finish Materials and Furnishings.

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

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

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

40 Code of Federal Regulation (CFR) Ch. 1, Subpart C - Characteristics of Hazardous Waste, Part 261.24 Toxicity Characteristics, Table 1, Maximum Concentration of Contaminants for the Toxicity Characteristic.

40 Code of Federal Regulation (CFR) Ch. 1, Part 261 Appendix II - Method 1311 Toxicity Characteristic Leaching Procedure (TCLP).

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

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Occupational Health and Safety Administration, 29 CFR Parts 1910, 1915, 1917, 1918, 1926 and 1928 - Hazard Communication Act, Final Rule.

(Application for copies of other Government documents are available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES

California Administrative Code Title 22, Division 4, Chapter 30, Minimum Standards for Management of Hazardous and Extremely Hazardous Waste, Section 66699, Persistent and Bioaccumulative Toxic Substance and Section 66700 Waste Extraction Test, Pg. 679-681 (Register 90, Nos. 38-41; 10-12-90).

(Application for copies should be addressed to the Hazardous Material Laboratory, State of California, Dept of Health Services, 2151 Berkeley Way, Berkeley, CA 94704.)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 229 - Specification for Steel Wire, Oil-Tempered for Mechanical Springs.
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 660 - Standard Method of Evaluating Degree of Checking of Exterior Paints.
D 661 - Standard Method of Evaluating Degree of Cracking of Exterior Paints.
D 1141 - Specification for Substitute Ocean Water.
D 1652 - Standard Test for Epoxy Content of Epoxy Resins.
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 2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.
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.
D 3951 - Standard Practice for Commercial Packaging.
D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
D 4541 - Pull-Off Strength of Coatings Using Portable Adhesion Testers.
F 137 - Standard Test Method for Flexibility of Flooring Materials.

ASTM (Continued)

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 Non Metallic Materials.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1137.)

AMERICAN WOOD PRESERVES ASSOCIATION STANDARD

P5-85 - C-2 Chromated Copper Arsenate Preservative.

(Application for copies should be addressed to American Wood Preserves Association Standard, P.O. Box 849, Stevernville, MD 21666.)

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.)

United Nations:

UN - Performance Oriented Packaging.

(Application for copies should be addressed to: Labelmaster Master, 5724 North Pulaski Road, Chicago, IL 60646.)

U.S. National Committee CIE

(Application for copies should be addressed to: International Commission on Illumination) Publications Office, Philips Lighting Co., Philips Square, CN6800, Somerset, NJ 08873-6800.)

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

## 3. REQUIREMENTS

3.1 Qualification. Coating systems furnished under this specification shall be those systems which are approved by the qualifying activity for listing on the applicable qualified products list (QPL) at the time of award of the contract (see 4.3 and 6.4).

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 individual coating which comprises the 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. Quality conformance inspections shall be as specified (see 4.4).

3.2 Composition. The total non-skid coating system shall consist of a non-skid topcoat, anti-corrosive primer (for metal decks only), or primer (for wood and fiberglass decks) any needed intermediate coatings and color topping coatings. The composition of each individual coating of the non-skid coating system is the manufacturer's responsibility subject only to the limitations of 3.24. Each individual coating of the non-skid coating system may be provided as one or two parts. Types I, II, and III non-skid coatings and type III underlayment intermediate coatings shall be formulated for application by roller or trowel. Type IV coatings shall be formulated for application by spray only.

3.3 Abrasion of cable (composition L only). When tested in accordance with 4.6.1, the composition L non-skid coating system shall produce a maximum average wear of the arresting cable test wire of 0.025 millimeters (mm) (1.0 mil; 0.001 inch (in)).

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 % 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 (% of each material which comprises 10% or more of the aggregate) | | | X | |
| Mass (kilograms per liter, [kg/L], pounds per gallon [lbs/gal]) | X | X | | X |
| Epoxy content 1/ (ASTM D 1652) | X | | | |
| Active amine hydrogen content 2/ (ASTM D 2073) | | X | | |

See footnotes at end of table.

TABLE I. Identification characteristics - Continued.

| Characteristic | Two-part coating | | Aggregate | One-part coating or combined mixture |
|---|---|---|---|---|
| | Base material, component A | Curing agent, component B | | |
| Pigment analysis | X | X | | 3/ |
| Infrared spectrum of resin | X | X | | 3/ |
| Volatile organic content (VOC) (grams per liter [g/L] coating less water) | | | | X |
| 60° specular gloss 4/ (ASTM D 523) | | | | X |

1/ Isocyanate content, ASTM D 2572, if applicable.
2/ Hydroxyl content, ASTM D 1957, if applicable.
3/ One-part coating only; these analyses are done on the individual components of two-part coatings.
4/ The gloss value shall be the average of 10 readings on a panel prepared by drawing down a 50 mil (0.050 in) film of the topcoat on a primed panel. Films of aggregate containing coatings shall be drawn down after aggregate has been sieved out.

3.4 Appearance of the dried coating. When tested in accordance with 4.6.2, 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 non-skid coatings are applied by napless roller, the non-skid topcoat shall have a textured appearance of roughly parallel rows of raised coating, forming peaks or ridges. When the types I, II, and III non-skid coatings are applied by napped roller or trowel, the aggregate shall be uniformly distributed, and shall present a coarse, rough appearance. The non-skid coating shall have sufficient sag resistance to retain the raised, textured appearance in the dried coating. When the type IV 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. A sample of the non-skid topcoat shall also be included with each shipment of material covered by this specification (see 5.8).

3.5 Application properties. When tested in accordance with 4.6.3, separate samples of each individual coating of the non-skid coating system which have been conditioned and mixed at 10, 24, and 32 degrees Celsius (°C) (50, 75 and 90 degrees Fahrenheit (°F)), shall mix easily with no curdling or separation of ingredients. When the types I, II, and III non-skid topcoat coatings are applied by roller or trowel to metal surfaces at 10, 24, and 49°C (50, 75 and 120°F), respectively, there shall be no excess drag or accumulation of coating on the roller, and no excessive spattering of the coating. When type IV is applied by

spray to metal surfaces at 10, 24, and 49°C (50, 75, and 120°F), respectively, the material shall flow evenly without running, dripping, spattering or cobwebbing. The appearance of the coating systems shall meet the applicable requirements specified in 3.4.

3.6 Coefficient of friction. The coefficient of static friction of the coating system, when tested in accordance with 4.6.4, 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. When tested in accordance with 4.6.4, the minimum values for each type shall be in accordance with table II.

TABLE II. Coefficient of friction, minimum.

| | Dry | Wet | Oily |
|---|---|---|---|
| Initial: | | | |
| Type I | 0.95 | 0.90 | 0.80 |
| Types II, III and IV | 0.90 | 0.85 | 0.75 |
| After wear: | | | |
| Type I | 0.90 | 0.85 | 0.75 |
| Types II, III and IV | 0.85 | 0.75 | 0.65 |

3.7 Color. The non-skid topcoats and color toppings shall be supplied in one of the following colors from FED-STD-595, as specified (see 6.2): Red to match color 31136; yellow to match color 33538; olive drab to match color 34088; dark gray to match color 36076; haze gray to match color number 36270, ocean gray to match 36173; black to match color 37038; green to match 14062; and white to match color 37875. The color shall be characteristic of the pigments used and shall match the above FED-STD-595 number specified when tested as specified in 4.6.5.

3.7.1 Color deviation. The color deviation of the non-skid topcoat and color topping from an unopened, original container shall be obtained as specified in 4.6.5. The measured color deviation from FED-STD-595 color number specified, measured in CIE [Commission Internationale de l'Eclairage (International Commission on Illumination)] system units (CIELAB), shall not exceed: delta (Δ) E = 0.5 CIELAB units, Δ A = ± 0.3 CIELAB units, Δ B = ± 0.3 CIELAB units, and Δ L = ± 0.3 CIELAB Lab units.

3.8 Condition in container. When tested in accordance with 4.6.6, liquid one-part coatings, and individual components of two-part coatings, shall not show skinning, livering, curdling, or separation of ingredients, nor hard settling which cannot be dispersed to a uniform consistency by 15 minutes of agitation stirring. When tested in accordance with 4.6.5, the CIELAB color difference of the mixed non-skid topcoat and color topping shall meet the requirements of 3.7 and 3.7.1. After a standing period for 2 hours without further mixing, the CIELAB color difference of the non-skid topcoat and color topping shall be tested in accordance with 4.6.5. The CIELAB color difference measured for 2 hour old mixed non-skid and color topping shall not exceed 0.5 CIELAB units from the color values measured after stirring but before the 2 hour standing period.

3.9 Coverage.

3.9.1 Topcoats. When tested in accordance with 4.6.7, coverage shall be as follows:

(a) Type I non-skid topcoat shall cover not less than 0.49 square meters per liter ($m^2/L$) (20 square feet per gallon ($ft^2/gal$) nor more than 0.74 $m^2/L$ (30 $ft^2/gal$).
(b) Types II and III (rolled) non-skid topcoat shall cover not less than 0.61 $m^2/L$ (25 $ft^2/gal$) nor more than 0.86 $m^2/L$ (35 $ft^2/gal$).
(c) Types II and III (trowelled) non-skid topcoat shall cover not less than 0.49 $m^2/L$ (20 $ft^2/gal$) nor more than 0.54 $m^2/L$ (22 $ft^2/gal$).
(d) Type IV (sprayed) non-skid topcoat, shall cover no more than 1.5 $m^2/L$ (60 $ft^2/gal$).

3.9.2 Primers. When tested in accordance with 4.6.7, primers shall cover an abrasive blasted surface (with surface profile of 51 to 102 micro meters (2 to 4.5 mils)) to between 3.68 and 12.27 $m^2/L$ (150 and 500 $ft^2/gal$).

3.9.3 Intermediate coats (type III only). When tested in accordance with 4.6.7, intermediate coats shall cover not more than 0.54 $m^2/L$ (22 $ft^2/gal$).

3.10 Drying time. When tested in accordance with 4.6.8, the maximum drying times shall be as follows:

(a) The maximum drying time of the non-skid topcoat shall be 48 hours at 10°C (50°F), 24 hours at 24°C (75°F) and 16 hours at 49°C (120°F).
(b) The maximum drying time of the primer or 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 coat shall be allowed to dry for at least 36 hours (48 hrs max) at temperatures between 10°C (50°F) and 49°C (120°F) before application of the next coat. The intermediate coat (type II only) shall be allowed to dry for at least 36 hours (48 hrs max) at temperatures between 10°C (50°F) and 49°C (120°F) before application of the next coat.

3.11 Fire resistance. When tested in accordance with 4.6.9, the coating system shall be in accordance with the requirements of MIL-STD-1623.

3.12 Flash point. When tested in accordance with 4.6.10, the minimum flash point for each component of the non-skid system shall be 38°C (100°F) except color topping shall be 27°C (80°F).

3.13 Flexibility (type III only). When tested in accordance with 4.6.11, the type III coating system shall show no breaking, cracking or loss of adhesion at the bend. Failure within 12 mm (0.5 in) of the edge of the panel shall be ignored.

3.14 Immersion resistance. When tested in accordance with 4.6.12, the coating system shall show no softening, loss of adhesion, separation between coats of the system, discoloration, or other signs of deterioration.

3.15 Impact resistance. When tested in accordance with 4.6.13, the minimum impact resistance of each type of non-skid coating shall be in accordance with table III. Failure of any one of the four conditions tested in 4.6.13 to meet the requirements of table III constitutes failure of this test.

TABLE III. Impact resistance, minimum, percent.

| | No Treatment | 15 days Immersion |
|---|---|---|
| Type I (steel and reinforced plastic substrates) | 95 | 100 |
| Type II and IV (steel and reinforced plastic substrates) | 70 | 90 |
| Type III (steel, reinforced plastic, and douglas fir substrates) | 70 | 90 |

3.16 Pot life. When tested in accordance with 4.6.14, the minimum pot life values for each coating in the non-skid coating system (except type III intermediate coats) shall be in accordance with table IV.

TABLE IV. Minimum pot life, hours.

| | 10°C (50°F) | 24°C (75°F) | 32°C (90°F) |
|---|---|---|---|
| Type I | 3 | 2 | 1 |
| Types II III, & IV | 6 | 4 | 2 |

3.16.1 Pot life (type III intermediate coats). When tested in accordance with 4.6.14, the minimum pot life values for type III intermediate coats shall be in accordance with table V.

TABLE V. Minimum pot life, minutes.

| | 10°C (50°F) | 24°C (75°F) | 32°C (90°F) |
|---|---|---|---|
| Type III Intermediate Coats | 60 | 40 | 20 |

3.17 Resistance to accelerated aging by light and water. When tested in accordance with 4.6.15, the coating system shall: