

NOT MEASUREMENT  
SENSITIVE

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29 FEBRUARY 1996  
SUPERSEDING  
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## FEDERAL SPECIFICATION

### POLYURETHANE COATING: SELF-PRIMING TOPCOAT, LOW VOLATILE ORGANIC COMPOUND (VOC) CONTENT

The General Services Administration has authorized  
the use of this federal specification by all Federal Agencies.

#### 1 SCOPE

1.1 Scope. This specification covers the requirements for a lead-free, chromate-free, cadmium-free self-priming, polyurethane coating material. This low VOC (maximum of 420 grams/liter [g/l]) coating may be used, where authorized, in place of the standard epoxy primer/polyurethane topcoat systems for the protection of metallic and non-metallic substrates. This coating is suitable for both electrostatic and non-electrostatic spray applications (see 6.1).

1.2 Coating kit. This coating is supplied as a kit, consisting of two components. Component A (base) and Component B (activator) are packaged in separate containers, and are supplied in the volume mixing ratio required by the manufacturer to produce a sprayable admixed coating.

1.3 Part numbers. Part numbers for cataloging purposes may be assigned in accordance with 6.9.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 4.1.4.2B120-3, Highway 547, Lakehurst, NJ 08733-5100, 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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## 2 APPLICABLE DOCUMENTS

## 2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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 6.2b).

## SPECIFICATIONS

## FEDERAL

QQ-A-250/4	-	Aluminum Alloy 2024, Plate and Sheet
QQ-A-250/5	-	Aluminum Alloy Alclad 2024, Plate and Sheet
PPP-P-1892	-	Paint, Varnish, Lacquer, and Related Materials; packaging, Packing and Marking of

## MILITARY

MIL-C-5541	-	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-H-5606	-	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
MIL-T-5624	-	Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8
MIL-A-8625	-	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-G-21164	-	Grease, Molybdenum Disulfide, for Low and High Temperatures, NATO Code Number G-353
MIL-L-23699	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number 0-156
MIL-R-81294	-	Remover, Paint, Epoxy, Polysulfide and Polyurethane Systems
MIL-T-81772	-	Thinner, Aircraft Coating
MIL-H-83282	-	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, Metric, NATO Code Number H-537
MIL-C-85570	-	Cleaning Compound, Aircraft, Exterior

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## STANDARDS

## FEDERAL

FED-STD-141	-	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
FED-STD-313	-	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
FED-STD-595	-	Colors Used in Government Procurement

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the DoDSSP - Customer Service, Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, 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.

## CODE OF FEDERAL REGULATIONS (CFR)

## DEPARTMENT OF LABOR

29 CFR 1910.1200	-	Occupational Safety and Health Standards - Hazard Communications
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## DEPARTMENT OF TRANSPORTATION

49 CFR 171-178	-	Subchapter C - Hazardous Materials Regulations
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(Application of copies of the Code of Federal Regulations (CFR) should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.)

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (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 6.2b).

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## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- |             |   |   |
|-------------|---|---|
| ANSI-Z1.4   | - | Sampling Procedures and Tables for Inspection by Attributes                                 |
| ANSI-Z129.1 | - | American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals |

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |            |   |   |
|------------|---|---|
| ASTM-B117  | - | Standard Test Method of Salt Spray (Fog) Testing  |
| ASTM-D185  | - | Standard Test Methods for Coarse Particles in Pigments, Pastes, and Paints  |
| ASTM-D522  | - | Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings  |
| ASTM-D523  | - | Standard Test Method for Specular Gloss   |
| ASTM-D823  | - | Standard Test Methods for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels |
| ASTM-D1200 | - | Standard Test Method for Viscosity by Ford Viscosity Cup  |
| ASTM-D1210 | - | Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems  |
| ASTM-D1296 | - | Standard Test Method for Odor of Volatile Solvents and Diluents   |
| ASTM-D1640 | - | Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature                   |
| ASTM-D1654 | - | Standard Test Methods for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments               |
| ASTM-D2197 | - | Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion  |
| ASTM-D2244 | - | Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates              |
| ASTM-D2247 | - | Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity                                  |
| ASTM-D2803 | - | Standard Test Method for Filiform Corrosion Resistance of Organic Coatings on Metal                                   |
| ASTM-D2805 | - | Standard Test Method for Hiding Power of Paints by Reflectometry  |

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ASTM-D3335	-	Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM-D3432	-	Standard Test Method for Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by Gas Chromatography
ASTM-D3718	-	Standard Test Method for Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
ASTM-D3924	-	Standard Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
ASTM-D3960	-	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM-E275	-	Standard Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near-Infrared Spectrophotometers
ASTM-G26	-	Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM-G85	-	Standard Practice for Modified Salt Spray (Fog) Testing

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

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

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

### 3. REQUIREMENTS

**3.1 Qualification.** The coatings furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) at the time of award of contract (see 4.3 and 6.6). Any change in the formulation, with the exception of specific circumstances (see 6.15), of a qualified product will necessitate its requalification. The material supplied under contract shall be identical, within manufacturing tolerances, to the product receiving qualification.

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3.2 Material. Materials specified herein shall be of such a quality as to produce products conforming to the requirements of this specification.

3.3 Toxicity. When required, the manufacturer shall certify (see 6.12) that the coatings supplied under this specification have no adverse effect on the health of personnel when used for their intended purpose and with the precautions listed in 5.2 through 5.2.1. A Material Safety Data Sheet (MSDS) shall be prepared and submitted in accordance with FED-STD-313. The MSDS shall also meet the requirements of 29 CFR 1910.1200 (see 6.8). Questions pertinent to the effect(s) of these coatings on the health of personnel using them shall be referred by the procuring activity to the appropriate medical service, who will act as its adviser. Paragraphs 6.3 and 6.3.1 contain additional information on polyurethane coatings and personnel protective methods when handling these coatings.

3.4 Composition. The prepared coating shall require no dwell time prior to use. When tested in accordance with ASTM D3335 (see 4.6 and table I), no component of the coating shall contain cadmium, cadmium compounds, or more than 0.06 percent by weight of lead metal or lead compounds. Less than 0.06 percent by weight of lead compounds is considered "lead-free." When tested in accordance with ASTM D3718 (see 4.6 and table I), the coating shall not contain chromium. The total free isocyanate in the admixed coating shall not exceed 1.0 percent by weight, when tested in accordance with ASTM D3432 (4.6 and table I).

3.4.1 Binder. The polymeric binder of the coating shall be compatible with the other components within the coating, such as pigments, solvents, and additives. It shall be compatible with common metallic and non-metallic substrates and assist in the formation of a coating that meets all requirements specified herein.

3.4.2 Solvent content. All solvents necessary for thinning purposes shall be supplied as part of either the base or the activator component of the coating kit. The resistivity of the solvents shall be suitable for electrostatic and non-electrostatic spray application. When tested in accordance with ASTM D3960 (see 4.6 and table I), the maximum volatile organic compound (VOC) content of the admixed coating shall be 420 g/l.

3.4.3 Thinner. The admixed coating shall be compatible with thinner conforming to MIL-T-81772, Type I. Halogenated solvents and/or chlorinated solvents shall not be used in the formulation of this product.

3.5 Component properties.

3.5.1 Condition in container. The coating, after standing without agitation for a minimum of 14 days, shall be capable of being mixed by hand by vigorously stirring with a paddle, and, within 5 minutes, shall be smooth, homogeneous and pourable when tested in accordance with 4.6.1.

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The coating shall be free of grit, skin, seeds, lumps, foreign contaminants, abnormal thickening or livering, and shall not exhibit pigment floatation or excessive settling that cannot be reincorporated to a smooth, homogeneous state by mixing with a hand paddle. The containers shall exhibit no deformation due to internal pressure, when examined in accordance with 4.4.3.2.

3.5.2 Storage stability. The coating, as packaged by the manufacturer, shall meet all requirements specified herein for a minimum period of one year, when stored at a daily ambient air temperature of 1.7° to 46°C (35° to 115°F).

3.5.3 Accelerated storage stability. The coating components, as packaged by the manufacturer, shall be stored at 57° ±3°C (135° ±5°F) for 24 hours and then cooled to room temperature, in accordance with 4.6.2. After cooling to room temperature, the coating shall exhibit no trace of gelation or particulate matter, either suspended in solution or settled on the inner surface of the container.

3.6 Liquid properties.

3.6.1 Fineness of grind. Fifteen (15) minutes after mixing, the fineness of grind of the coating shall be tested in accordance with ASTM D1210 (see 4.6 and table I). The fineness of grind (measured on the Hegman scale) shall be as follows:

- 1) minimum of 7 for gloss colors;
- 2) minimum of 5 for camouflage (flat or lusterless) colors.

3.6.2 Coarse particles. Coarse particles retained on a number 325 sieve shall be a maximum of 0.5 percent by weight of pigment of the application ready coating, when tested in accordance with ASTM D185 (see 4.6 and table I).

3.6.3 Odor. The odor of the coating, as packaged components and as a film after application, shall be characteristic of the thinners used and shall not be obnoxious, when tested in accordance with ASTM D1296 (see 4.6 and table I). The air-dried coating shall retain no residual odor 48 hours after application.

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3.6.4 Viscosity and pot life. The viscosity of the admixed coating, when tested in accordance with ASTM D1200 (see 4.6 and table I) through a number 4 Ford cup, shall be as follows:

Time from mix	Time through a No. 4 Ford cup (seconds)
Initially	25, maximum (max.)
2 hours	35, max.
4 hours	45, max.
6 hours	no gel

### 3.7 Film properties.

3.7.1 Drying time. The admixed coating, when tested in accordance with ASTM D1640 (see 4.6 and table I) and 4.5 through 4.5.2, shall be set-to-touch within 2 hours and dry-hard within 8 hours.

3.7.2 Surface appearance. The admixed coating, when applied to a vertically and a horizontally mounted test panel in accordance with 4.5 through 4.5.2 and air-dried for 24 hours, shall dry to a uniform, smooth surface, free from runs, sags, bubbles, streaks, hazing, seeding, dusting, floating, mottling, or other film defects.

3.7.3 Color. The admixed coating, when applied to test panels in accordance with 4.5 through 4.5.2 and tested in accordance with ASTM D2244 (see 4.6 and table I), shall maintain a good visual match with the specified color chip in FED-STD-595. The delta E of the applied coating shall be equal to, or less than, 1.0 (using the CIELAB color scale) to be considered a good visual match.



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3.7.4 Infrared reflectance. Color chips of the coating, when submitted in accordance with 4.3.1, shall be tested in accordance with 4.6.3 for total infrared reflectance (specular and diffuse). The maximum limits for infrared reflectance for these colors shall be in accordance with the following:

FED-STD-595 Color number	Maximum reflectance (percent) at wavelengths		
	1500 nm	2000 nm	2500 nm
34095	8	8	8
36081	10	10	10
35237	16	14	12
36320	24	19	15
36375	28	22	16

3.7.5 Gloss. The specular gloss of the coating, when applied to test panels in accordance with 4.5 through 4.5.2 and when tested in accordance with ASTM D523 (see 4.6 and table I) shall be as follows:

- (a) a maximum 85° specular gloss of 9 for camouflage colors;
- (b) the 60° specular gloss shall be as follows:

Color type	Minimum	Maximum
Gloss	90	—
Semi-gloss	15	45
Camouflage (flat or lusterless)	---	6

3.7.6 Opacity (hiding power). When tested on a black and white paper chart at a dry-film thickness of 50.8 mm (2.0 mils) in accordance with ASTM D2805 (see 4.6 and table I), the coating shall have a minimum contrast ratio (C) of 0.90.

3.7.7 Adhesion (wet tape and scrape). The coating, applied to test panels in accordance with 4.5 through 4.5.2, shall be immersed in water maintained at 66° ±3°C (150° ±5°F) for 7 days. Within 5 minutes of removal from the water immersion, the coating shall not pull away from the substrate when tested in accordance with Method 6301 of FED-STD-141 (see 4.6 and

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Table I) and shall resist removal by a 3-kilogram (kg) weight, when tested in accordance with ASTM D2197 (see 4.6 and table I).

### 3.7.8 Flexibility.

3.7.8.1 Ambient flexibility. The applied coating, when tested in accordance with 4.6.4.1, shall maintain the following ambient flexibility:

Color type	Minimum impact elongation
Gloss	40%
Camouflage	20%

3.7.8.2 Low-temperature flexibility. The applied coating, conditioned and tested at  $-51^{\circ} \pm 3^{\circ}\text{C}$  ( $-60^{\circ} \pm 5^{\circ}\text{F}$ ), shall exhibit no cracking, peeling, or loss of adhesion when bent over a 1/2-inch (in.) mandrel in accordance with 4.6.4.2.

### 3.8 Resistance properties.

3.8.1 Fluid resistance. The applied coating, when tested in accordance with 4.6.5, shall withstand immersion in the following fluids at the specified temperatures:

Fluid	Fluid temperature	Time of immersion
Lubricating oil (conforming to MIL-L-23699)	$121^{\circ} \pm 3^{\circ}\text{C}$ ( $250^{\circ} \pm 5^{\circ}\text{F}$ )	24 hours
Hydraulic fluid (conforming to MIL-H-5606)	$66^{\circ} \pm 3^{\circ}\text{C}$ ( $150^{\circ} \pm 3^{\circ}\text{F}$ )	24 hours
Hydraulic fluid (conforming to MIL-H-83282)	$66^{\circ} \pm 3^{\circ}\text{C}$ ( $150^{\circ} \pm 5^{\circ}\text{F}$ )	24 hours
JP-5 fuel (conforming to MIL-T-5624)	Room temperature	7 days

Four hours after removal from each fluid, the coating shall exhibit no blistering, softening, dark staining, or other film defects. Slight staining of the coating is acceptable.

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3.8.2 Weather resistance. The applied coating shall withstand exposure for 500 hours in xenon-arc weatherometer when tested in accordance with 4.6.6, while maintaining the following requirements:

- 1) 60° specular gloss shall be:
  - a) minimum of 90 for gloss colors;
  - b) minimum of 15 for semi-gloss colors; and
  - c) maximum of 6 for camouflage colors.
- 2) The coating color shall remain unchanged (Delta E value equal to, or less than, 1.0, using the CIELAB color scale), when tested in accordance with ASTM D2244 (see 4.6 and table I).

3.8.3 Humidity resistance. The applied coating shall withstand exposure to the following conditions without exhibiting loss of adhesion, blistering, softening or other film defect(s): 30 days in a humidity cabinet maintained at  $49^{\circ} \pm 2^{\circ}\text{C}$  ( $120^{\circ} \pm 3^{\circ}\text{F}$ ) and 100% relative humidity (RH), when tested in accordance with ASTM D2247 (see 4.6 and table I).

3.8.4 Heat resistance (color change). The applied coating shall withstand exposure to  $121^{\circ} \pm 3^{\circ}\text{C}$  ( $250^{\circ} \pm 5^{\circ}\text{F}$ ) for 4 hours, when tested in accordance with 4.6.7, without experiencing a color change (Delta E equal to, or less than, 1.0 using the CIELAB color scale), when tested in accordance with ASTM D2244 (see 4.6 and table I).

3.8.5 Solvent resistance (cure). The applied coating shall withstand a minimum of 50 passes with a cloth rag soaked in methyl-ethyl-ketone (MEK) solvent, when tested in accordance with 4.6.8. Rubbing through to bare metal indicates failure of the coating, due to improper cure.

3.8.6 Tape resistance. The applied coating shall exhibit no permanent marring by masking tape applied after eight hours air dry, when tested in accordance with 4.6.9.

3.8.7 Corrosion resistance.

3.8.7.1 Salt spray. The applied coating shall withstand exposure to:

- 1) 5% salt spray for 2000 hours, in accordance with 4.6.10.1 and ASTM B117; and
- 2) sulfur dioxide ( $\text{SO}_2$ )/salt spray for 500 hours, in accordance with 4.6.10.1 and ASTM G85.

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After removal from each of the above test solutions, the coating shall exhibit no blistering, pitting, or uplifting. There shall be no extensive corrosion in the scribe nor any corrosion extending from the scribe. A slight amount of general surface corrosion is permitted within the scribe.

3.8.7.2 Filiform. The applied coating shall exhibit no filiform corrosion extending beyond ¼-in. (6.4 mm) from the scribe, after exposure to 12 normal (N) hydrochloric acid (HCl) for one hour and then a humidity cabinet (80 ±5% RH) for 1000 hours, in accordance with 4.6.10.2. A majority of the filaments shall be less than 1/8-in. (3.2 mm) in length.

3.8.8 Water resistance. The coating, when applied to test panels in accordance with 4.5 through 4.5.2, shall withstand immersion in water maintained at 66° ±3°C (150° ±5°F) for 7 days, without exhibiting signs of blistering, uplifting, softening, or other coating defects.

### 3.9 Working properties

3.9.1 Mixing. All components of the coating shall mix readily, with a hand-held paddle, to a homogeneous product.

3.9.2 Application. When mixed and ready for application, the coating material shall be homogeneous. When spray applied, the coating material shall yield a smooth, uniform film. When reducing the coating, caution must be taken to not exceed the maximum VOC content of 420 g/l.

3.9.3 Cleanability. The coating, when applied to test panels in accordance with 4.5 through 4.5.2, shall maintain a minimum cleaning efficiency of 80 percent, when cleaned with the cleaning compound (see 4.6.11.2.2) in accordance with 4.6.11 through 4.6.11.2.4.

3.9.4 Strippability. The coating shall be applied to test panels in accordance with 4.5 through 4.5.2. A minimum of 90 percent of the coating shall be stripped within 60 minutes with the use of paint remover conforming to MIL-R-81294, Type I or II, when tested in accordance with 4.6.12.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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

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

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

4.3 Qualification inspection. Qualification inspection shall consist of all the examinations and tests in this specification.

4.3.1 Qualification inspection samples. Samples of coating submitted for qualification inspection shall consist of the following:

- a. A two-quart kit of the coating, conforming to the following FED-STD-595 color numbers: 17925 and 36375. The samples shall be submitted in containers of the type to be used in filling contract orders.
- b. Color chips of the coating conforming to the following FED-STD-595 color numbers: 34095, 36081, 35237, 36320, 36375. The color chips shall consist of the coating applied to test panels conforming to 4.5 and 4.5.1 to a dry-film thickness of 51 to 66 mm (2.0 to 2.6 mils).
- c. The qualification inspection samples shall be identified as indicated and forwarded to the laboratory designated in the letter of authorization (see 6.6):
  - Qualification test samples
  - Federal Specification TT-P-2756A, color number \_\_\_\_
  - POLYURETHANE COATING: SELF-PRIMING TOPCOAT, LOW VOLATILE ORGANIC COMPOUND (VOC) CONTENT
  - Manufacturer's name and product number
  - Submitted by (name and date) for qualification testing in accordance with authorization (reference authorizing letter)

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4.3.2 Test report. In addition to the qualification test samples, the manufacturer shall furnish to the qualification activity: (a) one copy of the MSDS (see 3.3); (b) a certified test report showing that the material conforms to the requirements of this specification; and (c) certification that the following chemicals were not used in the formulation of this coating: methylene chloride, trichloroethane and trichlorotrifluoroethane.

4.3.3 Retention of qualification. In order to obtain qualification of products approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that its product(s) comply with the requirements of this specification. Unless otherwise specified by the qualifying activity, the time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The certification action shall be initiated by the qualifying activity.

#### 4.4 Quality conformance inspection.

4.4.1 Lot formation. A lot shall consist of all coating of the same color, manufactured at one time from one batch, forming part of one contract, and submitted for acceptance. A batch shall consist of all coating material manufactured during one continuous operation.

4.4.1.1 Batch data. When required (see 6.2), the manufacturer shall furnish with each batch and/or lot a certified test report (see 6.12) showing that the material has satisfactorily passed the quality conformance inspection (see 4.4.3). When required (see 6.2), the manufacturer shall certify that there has been no formulation or process change from that which resulted in the production of the qualification inspection sample.

4.4.2 Retention sample. A minimum of one complete kit of the coating shall be selected at random from each batch by an authorized government representative and forwarded to the laboratory designated by the procuring activity.

#### 4.4.3 Examinations.

4.4.3.1 Tests. The quality conformance examination shall consist of all tests specified in section 3, with the exception of storage stability (3.5.2), infrared reflectance (3.7.4), weather resistance (3.8.2), humidity resistance (3.8.3), corrosion resistance (3.8.7), cleanability (3.9.3), and strippability (3.9.4). Samples for tests shall consist of two complete, unopened kits selected at random from each batch. Containers shall only be opened when being tested. There shall be no failures. Failure shall result in rejection of the batch and may justify removal of the product from the QPL (see 4.3).

4.4.3.2 Examination of packaging and marking. An examination shall be made to ensure compliance with section 5 of this specification. Samples shall be selected from each lot in accordance with ANSI-Z1.4, inspection level S-2. The lot size for this examination shall be the

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number of kits fully prepared for delivery. If palletization is required (see 4.4.3.4 and 6.2), kits fully prepared for delivery shall be examined prior to being palletized. Acceptance criteria shall be as specified in the contract or purchase order (see 6.2 and 6.11.1). Defects are defined in the following list.

Examine	Defect
Packaging	Containers not as specified, closures not as specified. Leakage or seepage of contents. Non-conforming component, component missing, damaged or otherwise defective. Rusted, bulged or distorted container.
Marking	Data, including directions for use, omitted, illegible, incorrect, or not in accordance with contract requirements.

4.4.3.3 Visual inspection of filled containers. Samples selected at random for examination in accordance with 4.4.3.2 shall be examined for proper filling and weight, and excessive internal pressure.

4.4.3.4 Examination for palletization. If palletization is required (see 6.2), an examination shall be made to ensure that there are no defects. Defects are as defined in the following list.

Examination	Defect
Finished dimension	Length, width, or height exceeds maximum specified requirement.
Palletization	Pallet pattern not as specified. Interlocking of loads not as specified. Load not bonded with required straps.
Weight	Exceeds maximum load limits.
Marking	Omitted, incorrect, illegible, of improper size, location, sequence or method of application.

4.4.4 Rejection and retest. Failure in any quality conformance test shall result in the rejection of that batch and shall constitute sufficient justification for removal from the qualified products list. Rejected material shall not be resubmitted for acceptance without written approval from the Commander, Naval Air Warfare Center - Aircraft Division, Code 4.3.4.1, M/S 3, Bldg. 2188, Patuxent River, MD 20670-5304. The application for resubmission shall contain full particulars concerning previous rejections and measures taken to correct these deficiencies. Samples for retest shall be randomly selected (see 4.4.3) and forwarded to the designated testing activity.

4.5 Test panels. The dimensions for all test panels, with the exception of test panels for the cleanability test (4.6.11) shall be 0.020 by 3 by 6 in (0.5 by 76.2 by 152.4 mm). The dimensions



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of the cleanability test panels shall be 0.020 by 2.5 by 6 in. (0.5 by 64 by 152.4 mm). With the exception of flexibility (4.6.4) and filiform (4.6.10.2) testing, test panels shall be aluminum alloy, conforming to QQ-A-250/4 (T3 temper). Test panels for the flexibility test shall be aluminum alloy conforming to QQ-A-250/4 (0 temper) and anodized in accordance with MIL-A-8625, Type I. Test panels for the filiform test shall be aluminum alloy conforming to QQ-A-250/5 (T3 temper). All test panels shall be prepared under laboratory conditions (see 4.6).

4.5.1 Panel preparation. With the exception of the flexibility test (4.6.4), the panels shall be treated with conversion coating to produce coatings conforming to MIL-C-5541, Class 1A.

4.5.2 Application of coating for testing of film properties. The coating shall be spray applied in accordance with ASTM D823 to a dry-film thickness of 51 to 66  $\mu\text{m}$  (2.0 to 2.6 mils). Prior to testing, the applied coating shall be allowed to air dry for a minimum of fourteen (14) days at  $21^{\circ} \pm 5^{\circ}\text{C}$  ( $70^{\circ} \pm 10^{\circ}\text{F}$ ) and  $50 \pm 10\%$  RH.

4.6 Test methods. The tests of this specification shall be conducted in accordance with table I and 4.6.1 through 4.6.12 with test panels prepared in accordance with 4.5 through 4.5.2, when directed. Unless otherwise specified in the test method or paragraph, all testing shall be conducted under laboratory test conditions in accordance with ASTM D3924 and in duplicate. Unless otherwise stated in the test method or paragraph, room temperature is defined as  $21^{\circ} \pm 5^{\circ}\text{C}$  ( $70^{\circ} \pm 10^{\circ}\text{F}$ ) and relative humidity of  $50 \pm 10\%$ .

TABLE I. Test methods.

Requirement paragraph	Test	Test method paragraph	FED-STD-141 Method Number	ASTM Test Method
3.4	Free isocyanate content	---	---	D3432
3.4	Lead and cadmium content	---	---	D3335
3.4	Chromium content	---	---	D3718
3.4.2	Volatile organic compound (VOC) content	---	---	D3960
3.4.3	Thinner	---	---	---
3.5.1	Condition in container	4.6.1	---	---
3.5.2	Storage stability	---	---	---
3.5.3	Accelerated storage stability	4.6.2	---	---
3.6.1	Fineness of grind	---	---	D1210



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TABLE 1. Test methods.

Requirement paragraph	Test	Test method paragraph	FED-STD-141 Method Number	ASTM Test Method
3.6.2	Coarse particles	---	---	D185
3.6.3	Odor	---	---	D1296
3.6.4	Viscosity and pot life	---	---	D1200
3.7.1	Drying time	---	---	D1640
3.7.2	Surface appearance	---	---	---
3.7.3	Color	---	---	D2244
3.7.4	Infrared reflectance	4.6.3	---	---
3.7.5	Gloss	---	---	D523
3.7.6	Opacity (Hiding power)	---	---	D2805
3.7.7	Adhesion (wet tape and scrape adhesion)	---	6301	D2197
3.7.8.1	Ambient flexibility	4.6.4.1	---	---
3.7.8.2	Low-temperature flexibility	4.6.4.2	---	D522
3.8.1	Fluid resistance	4.6.5	---	---
3.8.2	Weather resistance	4.6.6	---	G26, D2244
3.8.3	Humidity resistance	---	---	D2247
3.8.4	Heat resistance (color change)	4.6.7	6051	D2244
3.8.5	Solvent resistance (cure)	4.6.8	---	---
3.8.6	Tape resistance	4.6.9	---	---
3.8.7.1	Corrosion resistance (5% salt spray and SO <sub>2</sub> /salt spray)	4.6.10.1	---	B117, G85, and D1654
3.8.7.2	Corrosion resistance (filiform)	4.6.10.2	---	D2803, D1654
3.8.8	Water resistance	---	---	---

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TABLE I. Test methods.

Requirement paragraph	Test	Test method paragraph	FED-STD-141 Method Number	ASTM Test Method
3.9 - 3.9.2	Working properties (Mixing and application)	---	---	---
3.9.3	Cleanability	4.6.11	---	---
3.9.4	Strippability	4.6.12	---	---

4.6.1 Condition in container. Allow each unopened component to stand without agitation for at least 14 days in a closed container. Mix by hand with a paddle and examine the coating for conformance to 3.5.1.

4.6.2 Accelerated storage stability. The full, unopened containers of each component shall be stored at  $57^{\circ} \pm 3^{\circ}\text{C}$  ( $135^{\circ} \pm 5^{\circ}\text{F}$ ) for 24 hours and then cooled to room temperature. During the storage period, it is advised that the coating containers be placed in a larger, vented container to confine any splash that may occur if the lid of the unopened container is blown off by gassing. Upon removal, if the container is deformed, do not open; dispose of container properly. Deformation of the container constitutes failure. If the container is not deformed, open it cautiously and examine its contents for conformance to 3.5.3.

4.6.3 Infrared reflectance. The color chip test panels submitted for infrared reflectance analysis (see 4.3.1) shall be tested for conformance to 3.7.4. The total infrared reflectance (specular and diffuse) shall be measured relative to barium sulfate with a spectrophotometer (Perkin-Elmer LAMBDA 9, or equivalent). ASTM E275 may be used to compare performance of the equivalent unit to the LAMBDA 9.

#### 4.6.4 Flexibility.

4.6.4.1 Ambient flexibility. Two test panels, when prepared in accordance with 4.5 through 4.5.2, shall be tested with a GE Impact-Flexibility Tester (see 6.14.4), or equivalent, at  $21^{\circ} \pm 5^{\circ}\text{C}$  ( $70^{\circ} \pm 10^{\circ}\text{F}$ ) and  $50 \pm 10\%$  RH. Place the coated panel, film downward, on the rubber pad at the bottom of the impactor guide. Drop the impactor on the panel so that the impression of the entire rim of the impactor is made in the panel. Reverse the impactor ends; drop the impactor on the panel adjacent to the first area of impact. Use ten power (10x) magnification to detect fine surface cracking. Measure the percent elongation, corresponding to the largest spherical impression at which no cracking occurs. Examine the coating for conformance to 3.7.8.1.

4.6.4.2 Low-temperature flexibility. Two test panels, when prepared in accordance with 4.5 through 4.5.2, shall be tested in accordance with ASTM D522, Method "B," "Cylindrical Mandrel

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Test." Prior to testing, the test panels shall be conditioned at  $-51^{\circ} \pm 3^{\circ}\text{C}$  ( $-60^{\circ} \pm 5^{\circ}\text{F}$ ) for four hours. The test shall be performed at  $-51^{\circ} \pm 3^{\circ}\text{C}$  ( $-60^{\circ} \pm 5^{\circ}\text{F}$ ), using a ½-in. (12.8 mm) mandrel. After testing, the coating film shall be examined using unaided (normal vision) eyesight for conformance to 3.7.8.2.

4.6.5 Fluid resistance. Four test panels, prepared in accordance with 4.5 through 4.5.2, shall be separately immersed in fluids, as follows:

- a. 24 hours in lubricating oil conforming to MIL-L-23699 at a temperature of  $121^{\circ} \pm 3^{\circ}\text{C}$  ( $250^{\circ} \pm 5^{\circ}\text{F}$ );
- b. 24 hours in hydraulic fluid conforming to MIL-H-83282 at a temperature of  $66^{\circ} \pm 3^{\circ}\text{C}$  ( $150^{\circ} \pm 5^{\circ}\text{F}$ );
- c. 24 hours in hydraulic fluid conforming to MIL-H-5606 at a temperature of  $66^{\circ} \pm 3^{\circ}\text{C}$  ( $150^{\circ} \pm 5^{\circ}\text{F}$ ); and
- d. 7 days in turbine engine fuel conforming to MIL-T-5624 at room temperature (see 4.6).

Four hours after removal from each fluid, the coating shall be examined for conformance to 3.8.1.

4.6.6 Weather resistance. Two test panels, prepared in accordance with 4.5 through 4.5.2, shall be exposed for 500 hours in a xenon-arc weatherometer (Atlas Electric Devices Company or equivalent) that is cycling between 102 minutes of light only, and 18 minutes of light and water spray. After exposure, the coating shall be examined for conformance to 3.8.2. The following conditions shall apply when tested according to ASTM G26, Type BH:

Black body temperature in cabinet:	$60^{\circ} \pm 3^{\circ}\text{C}$ ( $140^{\circ} \pm 5^{\circ}\text{F}$ )
Relative humidity in cabinet:	$50 \pm 5\%$
Intensity of Xenon-arc:	0.3 to 0.4 watt/meter <sup>2</sup> at 340 nanometer (nm) wavelength

4.6.7 Heat resistance (color change). Prepare two test panels in accordance with 4.5 through 4.5.2. One test panel shall act as control, the other as the test specimen. Expose the test specimen to  $121^{\circ} \pm 3^{\circ}\text{C}$  ( $250^{\circ} \pm 5^{\circ}\text{F}$ ) for 4 hours, in accordance with FED-STD-141, Method 6051. After exposure, the coating shall be tested in accordance with ASTM D2244 to determine the Delta E value. Examine for conformance to 3.8.4.

4.6.8 Solvent resistance (cure). Two test panels shall be prepared in accordance with 4.5 through 4.5.2. A cotton, terrycloth rag shall be soaked in methyl-ethyl-ketone solvent and rubbed back and forth 25 times (50 passes) over the coating with firm finger pressure. The coating shall be examined for conformance to 3.8.5.

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4.6.9 Tape resistance. Two test panels shall be prepared in accordance with 4.5 through 4.5.2, with the exception that the test panels shall be air-dried for 8 hours after coating application. A 1-in. (25.4 mm) wide strip of masking tape (3M Company #250 or equivalent) shall be applied to each panel, adhesive side down, and pressed down with one pass of a 2-kg (4.5-pound) roller to adhere the tape to the panel. The tape shall remain in contact with the panel for one hour. Remove the tape carefully and examine the coating for conformance to 3.8.6.

4.6.10 Corrosion resistance.

4.6.10.1 Salt spray. Prepare four test panels in accordance with 4.5 through 4.5.2. Two straight, intersecting lines shall be scribed diagonally across the surface of each panel using a carbide-tipped pencil-type tool such that the scribe lines travel through the coating and into the substrate. The scribe tool and scribe method shall conform to ASTM D1654. Place two of the test panels in a 5 percent salt spray cabinet for 2000 hours and in accordance with ASTM B117. Place the other two test panels in an SO<sub>2</sub>/salt spray cabinet for 500 hours and test in accordance with ASTM G85. The specimens shall be examined for conformance to 3.8.7.1.

4.6.10.2 Filiform. Prepare two test panels in accordance with 4.5 through 4.5.2. Two straight, intersecting lines shall be scribed diagonally across the surface of each test panel using a carbide-tipped pencil-type tool such that the scribe lines travel through the coating and into the substrate. The scribe tool and scribe method shall conform to ASTM D1654. Place the panels vertically in a desiccator containing 12 normal (N) hydrochloric acid for one hour. Within 5 minutes of removal from the desiccator, place the panels in a humidity cabinet maintained at 40° ±2°C (104° ±3°F) and 80 ±5% RH for 1000 hours. After removal from the humidity cabinet, examine the test panels for filiform corrosion, as described in ASTM D2803, and for conformance to 3.8.7.2.

4.6.11 Cleanability. The cleanability test method shall be performed as follows. See 6.14 to 6.14.3 for additional information applicable to this test method.

4.6.11.1 Preparation of artificial soil. Place 50.0 ±0.5g of carbon black (see 6.14.1) and 500.0 ±1.0g of hydraulic fluid, conforming to MIL-H-83282, in a one quart jar. Homogenize the soil using a high shear (such as a Cowles dispersator, or equivalent) mixer for 15 ±1 minutes. Prior to application of the soil, stir or shake the mixture by hand.

4.6.11.2 Preparation of test panels. Prepare two test panels in accordance with 4.5 through 4.5.2. Using a clean, hog bristle brush, lightly scrub the coating of each panel with a 1.0 percent (by weight) solution of Alconox detergent (see 6.14.1), or equivalent, in reagent water. Rinse each panel thoroughly three times with reagent water. Dry the test panels for a minimum of 18 hours at 49° ±2°C (120° ±4°F). Using ASTM D2244, determine the L value of the coating. This will be value "A."

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4.6.11.2.1 Soiling of test panels. Using a soft-bristle brush, coat the painted surfaces of test panels with each of the prepared soils. Remove excess soil by covering the test panel surface with folded absorbent tissue and exerting pressure by rolling the tissue with a 5 lb. rubber roller. Repeat this blotting procedure twice. Brush the soiled surface in one direction only and parallel to the long dimension of the test panel, using 10 strokes of the hog bristle brush. Bake the test panel at  $105^{\circ} \pm 2^{\circ}\text{C}$  ( $221^{\circ} \pm 4^{\circ}\text{F}$ ) for  $60 \pm 1$  minutes. Using ASTM D2244, determine the L value of the coating. This will be value "B."

NOTE: The cleanability test (4.6.11.2.3) must be performed within 4 hours of soiling the test panels.

4.6.11.2.2 Preparation of cleaning compound. Prepare the cleaner (MIL-C-85570, Type II, control formulation) by mixing these compounds in the following order:

	<u>Parts by weight</u>
1. Igepal CO-630 <u>1</u> /	10.0
2. Monamid 150-CW <u>2</u> /	5.0
3. Dipropylene glycol methyl ether	10.0
4. Deionized water	71.5
5. Benzotriazole	0.5

Blend until homogeneous, then reduce pH to 8.0 with glacial acetic acid. Add the following and blend until homogeneous:

Hostacor 2098 <u>3</u> /	2.0
Morpholine	<u>1.0</u>
TOTAL	100.0

The final pH of the cleaning compound shall be in the range of 8.5 to 9.5.

Notes: 1/ Rhône-Poulenc or equivalent (see 6.14.3).  
2/ Mona Industries, Inc. or equivalent (see 6.14.3).  
3/ Hoechst-Celanese Corp. or equivalent (see 6.14.3).

4.6.11.2.3 Procedure. Within 4 hours of soiling the test panels, conduct the cleanability test in the following manner:

- Mix 1 part cleaner to 9 parts reagent water (by volume) at room temperature.
- Prepare a template (see figure 1) to anchor the test panel to the wear tester at a  $45^{\circ}$  angle to the stroke of the sponge.
- Place a soiled test panel in the template.

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- d. Mount the template and test panel in a wear tester (such as the Gardner Heavy Duty Wear Tester (see 6.14.4)) fitted with a cellulose sponge (see 6.14.2) in place of the wear surface. NOTE: Cut the sponge such that the dimension parallel to the cleaning stroke is 3.5 in. (90 mm) and the width is 2.75 in. (70.0 mm). The combined weight of the dry sponge and the cleaning head of the wear tester shall be a minimum of 1350 grams and a maximum of 1400 grams. It is recommended that Velcro-type strips be used to attach the nylon web side of the sponge to the cleaning head.
- e. Saturate the sponge with the diluted cleaning compound and pour enough of the diluted cleaner on the test panel to completely cover the coating. Allow the cleaner to dwell on the coating for 60 ± 5 seconds.
- f. Clean the test panel using 5 cycles of the wear tester. Immediately turn the test panel 90° in the template and clean for an additional 5 cycles.
- g. Remove the test panel and rinse it under a flowing stream of water at room temperature.
- h. Allow the test panel to air dry and, using ASTM D2244, determine the L value of the coating. This will be value "C."

4.6.11.2.4 Calculation. Calculate the cleaning efficiency achieved on each test panel as follows (value "A" from 4.6.11.2, value "B" from 4.6.11.2.1, and value "C" from 4.6.11.2.3):

$$\text{Cleaning efficiency (\%)} = [(C - B) \div (A - B)] \times 100;$$

Examine for conformance to 3.9.3.

4.6.12 Strippability. Two test panels, when prepared in accordance with 4.5 through 4.5.2, and weathered in accordance with 4.6.6, shall be placed on a rack at a 60° angle to the horizontal. Enough paint remover, conforming to MIL-R-81294, Type I or II, shall be poured along the upper edge of each test panel to completely cover the coating surface. After 60 minutes exposure time, the loosened film shall be brushed off and the panels shall be rinsed while brushing under a stream of cool water. The test panels shall be examined for conformance to 3.9.4. The amount of coating stripped in this manner is determined by the percentage of substrate surface area exposed.

## 5. PACKAGING

5.1 Packaging, packing, and marking. The coating shall be packaged, packed, and marked in accordance with PPP-P-1892. The level of preservation shall be A or C and the level of packing shall be A, B, or C, as specified (see 6.2). The size of the kit should be specified (see 6.9.1) for procurement. The size of the components in one kit need not be the same. For multi-component coatings, each component shall be packaged separately and marked as specified in 5.2. The containers shall be thoroughly dry before filling and filled in a dry atmosphere.

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5.2 Marking and labeling. In addition to the marking specified in PPP-P-1892, individual cans and containers shall bear printed labels showing the following nomenclature and information:

- Specification TT-P-2756A, "Polyurethane Coating: Self-Priming Topcoat, Low Volatile Organic Compound (VOC) Content."
- Component A or B (as applicable)
- Color (name and FED-STD-595 color number)
- Manufacturer's name and product number.
- Date of manufacture by month and year.
- Batch number.
- VOC content in grams/liter of admixed coating.
- Net contents.
- Mixing and thinning instructions.

All unit and intermediate packs of toxic and hazardous chemicals and materials shall be labeled in accordance with all applicable laws, statutes, regulations and ordinances, including federal, state, and municipal requirements. In addition, all unit containers (including those that serve as shipping containers, such as pails and drums) shall be marked with the applicable precautionary information detailed in ANSI Z129.1.

The following is to be included on a printed sheet with each kit:

#### Precautions

- a. The surface to be coated must be clean (free of oil, dust, etc.)
- b. Spray equipment must be adequately grounded. Clean equipment immediately after use with thinner conforming to MIL-T-81772, Type I.
- c. Mix only the amount of coating to be used within 4 (four) hours of mixing.
- d. Coating from one vendor, or individual component, shall never be mixed with that of another vendor. Components from different kits are not interchangeable. For example, Component A in white shall not be used with Component B in gray.
- e. Apply over pretreated metal. Apply over appropriately prepared organic matrix composite surfaces. Apply over appropriately prepared organic coating systems
- f. Do not open any container that is bulged or deformed. Dispose of any container that is bulged or deformed.
- g. Open component B carefully. If the contained material is not clear, dispose of it.



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5.2.1 Precautionary markings - container. In addition to labeling specified in 49 CFR 171-178, the following labeling shall appear on each container and on each shipping container:

CAUTION

THIS COATING MATERIAL IS TOXIC AND FLAMMABLE AND SHALL NOT BE USED IN CONFINED AREAS, WHERE THERE ARE OPEN FLAMES, ARCING EQUIPMENT, HOT SURFACES, OR WHERE SMOKING IS PERMITTED.

USE ONLY WITH ADEQUATE VENTILATION.

AVOID BREATHING OF VAPOR.

DO NOT GET IN EYES, ON SKIN, ON CLOTHING.

IN CASE OF CONTACT WITH EYES AND/OR SKIN,  
FLUSH EYES AND/OR SKIN WITH PLENTY OF WATER.  
FOR EYES, GET MEDICAL ATTENTION.

5.2.2 Special marking. When requested by the procuring activity to modify solvent and/or additives to improve application, the manufacturer shall include a notice on the individual containers indicating what modifications were done and for what purpose (see 6.15).



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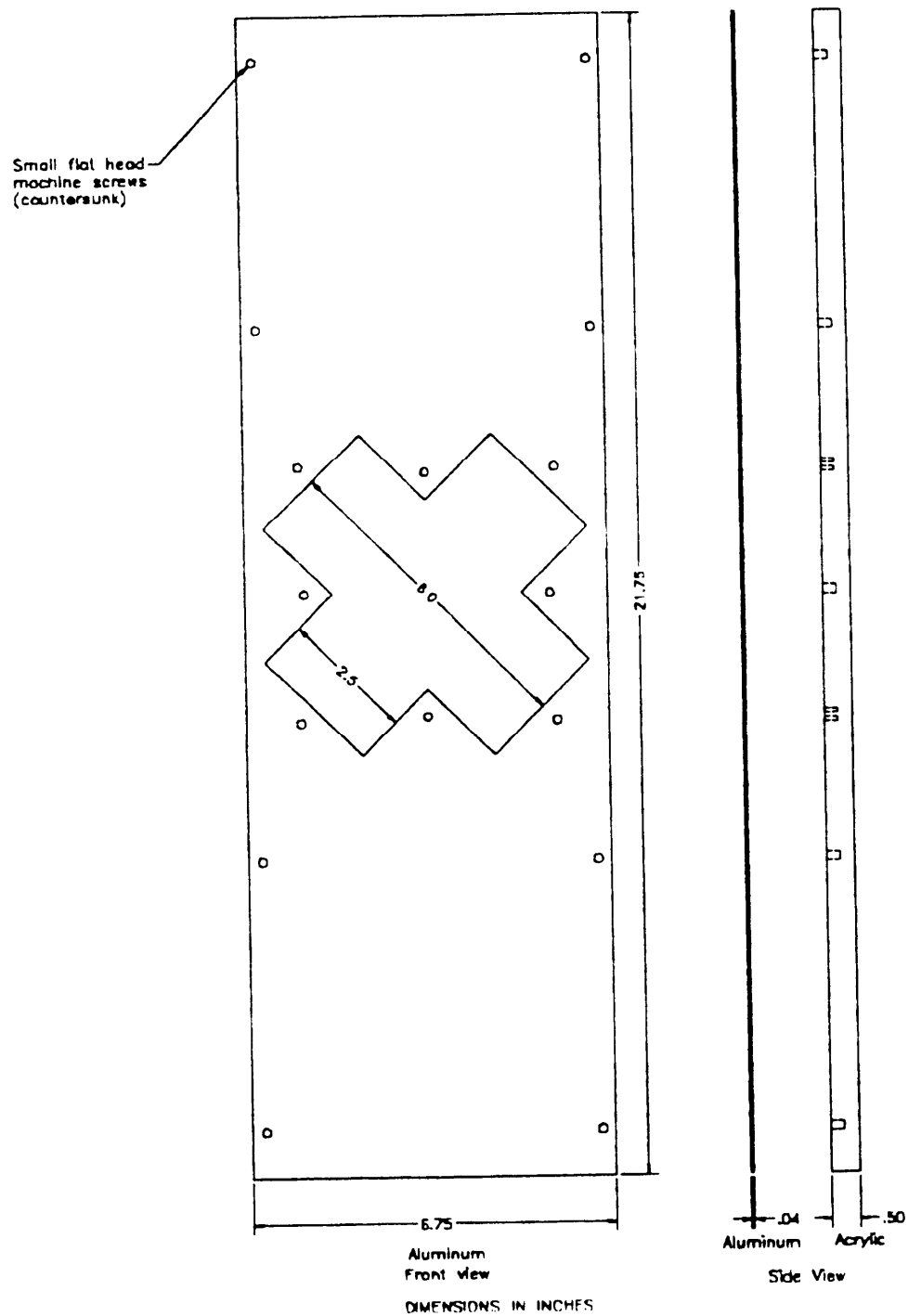


FIGURE 1. Cleanability test panel template.

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## 6. NOTES

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

6.1 Intended use. This material is a self-priming, polyurethane coating that is intended for use on aircraft, weapons systems, and other applications where metallic and polymeric substrates require protection. This coating may be used in place of standard primer/topcoat systems where authorized. No additives are required. This coating material contains a maximum volatile organic compound (VOC) content of 420 grams/liter.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of this specification, including any amendments.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. Kit desired, including the quantity and size of containers (see 6.9).
- d. Color number and name (see 6.9).
- e. Level of preservation, packaging, packing, and marking (see 5.1 and 5.2).
- f. Specify if palletization is required (see 5.1).
- g. Data requirements (see 6.12).
- h. FAR clause 52.223-3.

6.3 Toxicity. Some free isocyanate is released during the mixing and application of multi-component polyurethane coatings. Released free isocyanates can produce a significant irritation to the skin, eyes, and respiratory tract. Personnel exposed to free isocyanates may develop an allergic pulmonary sensitization, particularly if there is an inhalation of the vapor and mist produced during spray application. This sensitization may cause an asthmatic reaction with wheezing, dyspnea, and cough. Once sensitized, further exposure cannot be tolerated. For this reason, there is a restriction on the issuance and use of this material. Personnel exposed to free isocyanates on a regular basis should receive a periodic medical exam that includes a chest roentgenograph (X-ray), pulmonary function tests, and an evaluation of any respiratory disease or history of allergy. Periodic testing of pulmonary functions may aid in detecting the onset of pulmonary sensitization.

6.3.1 Personnel protective methods. Eye protection and appropriate clothing to prevent repeated or prolonged skin contact should be worn while applying material that contains free isocyanates. Additional information pertaining to protective equipment and other necessary precautions should be available from the coating application facility's Occupational Safety and Health Office.

6.4 Moisture. Polyurethane materials should be kept dry. The presence of moisture degrades the quality of the coating. Packaging of the materials should be done in a dry atmosphere. Solvents and resins should be examined for evidence of contamination before they are incorporated, even if they are of "urethane grade." "Urethane grade" solvents and thinners may become contaminated with water in tank cars or storage tanks. The purchase of "urethane grade" solvents and thinners is no guarantee that

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excessive moisture is not present. It is therefore recommended that all users check for moisture contamination.

6.4.1 Method to detect water in polyurethane coatings. The following is a suggested method that may be used to determine the presence of water: Add one drop of aluminum secondary butoxide to 100 ml of the solvent in a stoppered flask; shake well. An appreciable amount of turbidity indicates the presence of water.

6.5 Composition of isocyanate components. It is suggested that no methyl-ethyl-ketone (MEK) be used in the isocyanate component. It may degrade the isocyanate portion of the resin.

6.6 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the applicable Qualified Products List (QPL-TT-P-2756), 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 for award of contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Commander, Naval Air Systems Command (AIR-434), Arlington, VA 22243; however, information pertaining to qualification of products should be obtained from the Commander, Naval Air Warfare Center - Aircraft Division, Code 4.3.4.1, M/S 3, Bldg. 2188, Patuxent River, MD 20670-5304.

6.7 Subject term (key word) listing.

Aliphatic polyurethane  
Material Safety Data Sheets  
Qualified Products List (QPL)  
Isocyanate  
Methyl-ethyl-ketone (MEK)  
Corrosion resistance

6.8 Material Safety Data Sheets (MSDS). Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313 is at variance with the CFR, 29 CFR 1910.1200 shall take precedence, modify and supplement FED-STD-313. The pertinent government mailing addresses for submission of data are listed in Appendix B of FED-STD-313.

6.9 Part or identifying number (PIN). Part numbers may be coded as follows:

<u>TTP2756</u>	-	<u>XXX</u>	-	<u>XXXXX</u>
Specification identifier		Kit size designator (see 6.9.1)		Color designator (see 6.9.2)

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6.9.1 Kit size designation codes. The four digit kit size designation in the part number assignment should be as follows:

<u>Kit size</u>	<u>Kit size designator (see 1.2)</u>
1 pint (0.47 liter)	01P
1 quart (0.94 liter)	01Q
2 quarts (1.89 liters)	02Q
2 gallons (7.57 liters)	02G
10 gallons (37.85 liters)	10G

6.9.2 Color designation codes: The five digit color designator is the FED-STD-595 color number. The following is a list of colors frequently used by the Department of Defense, but is not a list of all of the colors authorized, used, or available:

<u>Colors</u>	<u>FED-STD-595 color number</u>	<u>Color name</u>
Gloss colors:	11136	Red
	13538	Orange-yellow
	14187	Green
	15044	Insignia blue
	15180	Blue
	16440	Light gray
	17038	Black
	17925	Untinted white
Semi-gloss colors:	25200	Blue
	26231	Gray
Camouflage (low gloss) colors:	34095	Field green
	34097	Green
	35190	Blue
	35237	Blue gray
	35450	Light blue
	36081	Flat gray
	36231	Lusterless gray
	36320	Dark gray
	36375	Medium gray
	36440	Light gray
	36495	Aircraft gray
	37038	Black

6.10 Material Safety Data Sheet (MSDS). 29 CFR 1910.1200 requires that the MSDS for each hazardous chemical used in an operation must be readily available to personnel using the material. Contracting officers will identify the activities requiring copies of the MSDS.

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6.11 Acceptance criteria.

6.11.1 Packaging and marking. Previous revisions of this document specified an acceptable quality level (AQL) of 4.0 defects per hundred units, in accordance with MIL-STD-105.

6.11.2 Palletization. Previous revisions of this document specified an acceptable quality level (AQL) of 6.5 defects per hundred units, in accordance with MIL-STD-105.

6.12 Consideration of data requirements. The following Data Item Descriptions (DIDs) must be listed, as applicable, on the Contract Data Requirements List (DD Form 1423) when this specification is applied on a contract, in order to obtain the data, except where DoD FAR Supplement 227.405-70 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
3.3, 4.3.2, 4.4.1.1	DI-NDTI-80809A	Test/Inspection Reports	---

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

6.13 Safely handling MEK solvent. To minimize exposure to MEK solvent, it is recommended that personnel conducting the solvent resistance (cure) test (see 4.6.8) wear either butyl rubber or Teflon gloves and a half-face respirator equipped with organic vapor cartridges.

6.14 Cleanability test information.

6.14.1 Artificial soil information. Carbon black may be obtained from Columbian Chemical Company, 1600 Parkwood Circle, Suite 400, Atlanta, GA 30339 (phone 800-257-5076) under the trade name Raven 1040. Alconox Detergent is supplied by Alconox, Inc., 9E. 40th St., Suite 200, New York, NY 10016-0402 (phone 212-532-4040). Other products may provide equivalent performance.

6.14.2 Cellulose sponge information. Cellulose sponges (3M catalog #63) may be obtained from 3M, 3M Center, Bldg 223-3E-04, St. Paul, MN 55133 (telephone 800-852-9722). Other products determined to be equivalent may be used as a substitute.

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6.14.3 Cleaner component manufacturers. The following companies are potential vendors for the products used in 4.6.11.2.2. Other products may provide equivalent performance.

Rhône-Poulenc Surfactants and Specialty Division CN-7500 Cranbury, NJ 08512-7500  800-922-2189	Mona Industries, Inc. 76 E. 24th St. PO Box 425 Paterson, NJ 07544  201-345-8220	Hoechst-Celanese Corp. Colorants and Surfactants 5200-77 Center Drive Suite 220 Charlotte, NC 28217  800-255-6189 214-277-4000
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6.14.4 Wear tester and impact-flexibility tester information. Paul N. Gardner Co., Inc., 316 NE 1st St. Pompano Beach, FL 33060 (800) 762-2478.

6.15 Special application scenarios. Procuring activities may request manufacturers to make minor solvent and/or additive modifications to qualified products to optimize unique application scenarios. Examples include situations where faster drying time and shorter pot-life coatings are desired for plural-component spray equipment; and slower drying and improved leveling coatings are necessary for high temperature and high humidity application conditions. Only application characteristics are permitted to be modified; the cured coating (dry film) properties of the coating are not permitted to be changed. Any modified coatings must be clearly identified as such (see 5.2.2) and may only be furnished to the requesting activity. The specific modifications and labeling instructions should be detailed in any procurement request for the modified material. Additionally, the manufacturer is to inform the qualifying activity (see 6.6) of any modification to a qualified product.

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

## Custodians:

Army - MR  
Air Force - 99  
Navy - AS

## Review activities:

Navy - CG  
Army - MD, ME  
Air Force - 11, 84

## Civil coordinating agency:

GSA - FSS

## Preparing activity:

Navy - AS

(DOD Project No. 8010-0536)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

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

1. DOCUMENT NUMBER  
TT-P-2756A

2. DOCUMENT DATE (YYMMDD)  
29 FEBRUARY 1996

3. DOCUMENT TITLE  
POLYURETHANE COATING: SELF-PRIMING TOPCOAT, LOW VOLATILE ORGANIC COMPOUND (VOC) CONTENT

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE  
(Include Area Code)  
(1) Commercial:  
  
(2) DSN:  
(If Applicable)

7. DATE SUBMITTED  
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME  
COMMANDER  
NAVAL AIR WARFARE CENTER  
AIRCRAFT DIVISION

b. TELEPHONE NUMBER (Include Area Code)  
(1) Commercial (908) 323-7488 (2) DSN 624-7488

c. ADDRESS (Include Zip Code)  
CODE 4.1.4.2B120-3  
HIGHWAY 547  
LAKEHURST, NJ 08733-5100

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Defense Quality and Standardization Office, 5203 Leesburg Pike,  
Suite 1403, Falls Church, VA 22041-3466  
Telephone (703) 756-2340 DSN 289-2340