



1. SCOPE

1.1 Scope. This specification establishes requirements for a coating material with low volatile organic compound (VOC) content suitable for topcoat application.

1.2 Classification. The coating material shall be furnished in the following types and classes as specified:

- Type I - Standard
- Type II - Low Infrared Reflective (IR)
- Class 1 - General Usage Hydraulic Fluid Resistant
- Class 2 - Phosphate Ester Hydraulic Fluid Resistant

1.3 Application. The coating covered by this specification when mixed as specified by the manufacturer shall produce a material of suitable viscosity for application to vertical and horizontal surfaces by spray application.

1.4 Colors. The coating shall be furnished in any color and gloss range, as designated in FED-STD-595. Special colors shall be furnished, as specified by the procuring activity.

1.4.1 Qualification Colors. Colors for qualification samples shall be as listed in Table I, for all types and classes of coating.

TABLE I

GLOSS CONDITION	COLOR NAME	FED-STD-595 (Color Number)
High Gloss	White	17925
Lusterless	Gray	36320

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

LIST OF CURRENT SHEETS

NO.	REV.	NO.	REV.	NO.	REV.	NO.	REV.
1	1	7	NEW	13	NEW	19	NEW
2	NEW	8	NEW	14	NEW	20	NEW
3	NEW	9	NEW	15	NEW	21	NEW
4	NEW	10	NEW	16	NEW	22	NEW
5	NEW	11	NEW	17	NEW	23	NEW
6	NEW	12	NEW	18	NEW	24	NEW

① INACTIVE FOR NEW DESIGN AFTER APRIL 15, 1993. NO SUPERSEDING STANDARD.

CUSTODIAN	Materials and Structures Committee	THIRD ANGLE PROJECTION	
PROCUREMENT SPECIFICATION	TITLE COATING: LOW VOLATILE ORGANIC COMPOUND, FOR TOPCOAT APPLICATIONS	CLASSIFICATION SPECIFICATION	
		NAS 1545	Documents Sheet 1 of 24

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WASHINGTON, D.C. 20005

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APPROVAL DATE OCT. 1993 REVISION 1 15 APRIL 1993

SPECIFICATIONS

FEDERAL

QQ-A-250/5	Aluminum Alloy, Alclad 2024, Plate and Sheet.
TT-P-143	Paint, Varnish, Lacquer and Related Materials; Packaging, Packing, and Marking.
UU-T-106	Tape Pressure-Sensitive Adhesive, Masking, Paper.

MILITARY

MIL-T-5624	Turbine Fuel, Aviation, Grades JP-4 And JP-5.
MIL-A-8625	Anodic Coatings, For Aluminum and Aluminum Alloys.
MIL-P-23377	Primer Coating; Epoxy Polyamide, Chemical and Solvent Resistant.
MIL-L-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base.
MIL-H-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, NATO Code Number H-537.
MIL-C-87936	Cleaning Compound, Aircraft Exterior Surfaces, Water Dilutable.

STANDARDS

FEDERAL

Fed. Test Method Std. NO. 141	Paint, Varnish, Lacquer and Related Materials; Method of Inspection, Sampling and Testing.
FED-STD-595	Colors.
29 CFR 1910.1200.	Material Safety Data Sheets; Preparation and Submission of.

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-109	Quality Assurance Terms And Definitions.
MIL-STD-129	Marking For Shipment And Storage.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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NAS Documents



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Sheet 2

STANDARDS (CONTINUED)

NATIONAL AEROSPACE

NAS 1534 PRIMER COATING: LOW VOLATILE ORGANIC COMPOUND, CHEMICAL AND SOLVENT RESISTANT

Application for copies should be addressed to The National Standards Association, 5161 River Road, Bethesda, MD 20816.

- 2.2 Other Publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117	Salt Spray (Fog) Testing.
ASTM D522	Elongation of Attached Organic Coatings With Conical Mandrel Apparatus, Test for.
ASTM D523	Specular Gloss, Test For.
ASTM D562	Consistency of Paints.
ASTM D1193	Reagent Water.
ASTM D1200	Viscosity of Paints, Varnishes, and Lacquers by Ford Viscosity Cup.
ASTM D1210	Fineness of Dispersion of Pigment-Vehicle Systems.
ASTM D1296	Odor of Volatile Solvents And Diluents.
ASTM D1308	Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
ASTM D1640	Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
ASTM D1849	Package Stability of Paint.
ASTM D2247	Testing Coated Metal Specimens at 100% Relative Humidity.
ASTM D2369	Volatile and Nonvolatile Content of Paints.
ASTM D2370	Elongation and Tensile Strength of Free Films of Paint, Varnish, Lacquer, and Related Products with a Tensile Testing Apparatus, Test for.
ASTM D2621	Infrared Identification of Vehicle Solids From Solvent-Type Paints.

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- ASTM D2650 Chemical Composition of Gases by Mass Spectrometry, Test for.
- ASTM D2794 Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D2805 Hiding Power of Paints.
- ASTM D3335 Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy.
- ASTM D3432 Free Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by Gas Chromatography.
- ASTM D3792 Water Content of Waterborne Paints by Direct Injection into a Gas Chromatograph, Test for.
- ASTM D3960 Determining Volatile Organic Content (VOC) of Paints and Related Coatings.
- ASTM G26 Recommended Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water 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.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.

- AS 1241 Fire Resistant Phosphate Ester Hydraulic Fluid For Aircraft, Type IV, Class 1.

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., SAE Order Dept, 400 Commonwealth Drive, Warrendale, PA 15096.)

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Federal Hazardous Substances Labeling Act

(Application for copies should be addressed to the U. S. Department of Health, Education and Welfare, Food and Drug Administration, Washington, D. C. 20203.)

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3. REQUIREMENTS

3.1 Qualification. The primers furnished under this specification shall be products which have been qualified to the requirements of this specification at the time set for opening of bids (see 4.3 and 6.3). Any change in the formulation of a qualified product will necessitate its requalification.

3.1.1 Retention of Qualification. To retain qualification, the Manufacturer shall verify by certification, that his product has not been changed in any way. The time span allowed before requalification becomes mandatory, shall be two (2) years unless the manufacturer has furnished material to this specification in the interim following initial qualification. It is the responsibility of the manufacturer to retain qualification by certification.

3.1.2 Temporary Qualification. Upon successful completion of the qualification tests specified herein, except for Storage Stability (paragraph 3.4.2), a coating material may receive temporary approval for this specification. Final approval shall then be based on successfully passing the tests for storage stability.

3.2 Toxicity. The manufacturer shall certify that the coatings contain no substance known to be toxic to the user under normal conditions of usage. Material Safety Data Sheets, (MSDS) shall be prepared and submitted in accordance with 29 CFR 1910.1200 to the procuring agency for this material (see 4.5). The formulation of this coating shall not contain lead or aziridine.

3.3 Composition. The coating shall be furnished in one or more components. The vehicle shall be a resin system meeting the requirements of this specification.

3.3.1 Aromatic Diisocyanates. If the coating is a urethane based material, the material (as mixed ready for application), shall contain no aromatic diisocyanate compounds when tested in accordance with the requirements of 4.8.3.

3.3.2 Free Aliphatic Diisocyanate. If the coating contains aliphatic diisocyanate, the free diisocyanate in the as-mixed coating shall not exceed one (1) percent by weight when tested in accordance with 4.8.4.

3.3.3 Volatile Organic Compounds. The coatings, when ready for application, shall contain no more than 420 grams per liter of volatile organic compounds (VOC) less water, when tested per 4.8.5, 4.8.5.1, and 4.8.5.2.

3.3.3.1 Thinner (Reducer). The thinner (if required) shall be specified by the coating manufacturer. Thinner shall not cause the coating to exceed 420 grams (VOC) per liter, when tested per 4.8.5, 4.8.5.1, and 4.8.5.2.

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3.3.4 Infrared Signature. The infrared signature of the as-received coating (both Type I and Type II) shall be established at the time of qualification from three (3) separate batches. Each new batch shall be tested for its infrared signature. The IR signature of the new batch shall match the averaged signature of the qualification lots within 10% of the peak values. Additional major peaks or missing major peaks (observed previously), when tested in accordance with the provisions of 4.8.6.1 shall be cause for rejection of the batch.

3.3.4.1 Type II Infrared Signature. The maximum percent infrared total reflectance of the Type II topcoat, when determined in accordance with the provisions of 4.8.6.2 shall be less than 10% that of magnesium carbonate throughout the range of 1000 to 2700 nanometers.

3.3.5 Total (Solids) Contents. The total solids content for the admixed components shall not vary from the established percentage by more than ± 2 percent. The nonvolatile content of each of the components shall be determined separately in accordance with 4.8.7.

3.4 Component Requirements.

3.4.1 Appearance and Condition in Container. Freshly opened full containers of the coating material shall be free from lumps, skins, grit, flocculent resinous precipitates, and coarse particles. The coating shall show no more settling than can be dispersed by five minutes of agitation to a smooth homogeneous condition, when tested as specified in 4.8.8.

3.4.2 Storage Stability. Previously unopened packaged components, after a minimum storage period of at least one year from date of manufacture, in a temperature range of 5° to 40°C (40° to 100°F) shall meet all the requirements specified herein plus scoring no less a rating than an average of seven (7) for:

- a.) Formation of skins,
- b.) Changes in pressure (either positive or negative),
- c.) Corrosion of the container,
- d.) Odors of spoilage,
- e.) Presence of grains 3.18 mm (.125 inch) diameter,
- f.) Presence of gelatinous lumps, or
- g.) Presence of streaks in a brushed film; when tested in accordance with 4.8.9.

3.4.2.1 Accelerated Storage Stability. The product, as packaged by the manufacturer, shall meet all the requirements specified in 3.4.2 after 7 days, when stored in accordance with 4.8.9.1.

3.4.2.2 Shelf Life - Shelf life shall be one year from the date of manufacture. Shelf life may be extended, one time only, for one additional year upon verifying conformity to 3.4.1, 3.5.1, 3.5.2, 3.5.6, 3.6.2, and 3.7.1.

3.4.2.3 Freeze/Thaw Stability. The product as packaged by manufacturer shall score no less than seven (7) average rating when tested in accordance with 4.8.9.2

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3.5 Mixed Coating Requirements

3.5.1 Spraying Properties and Surface Appearance. Sprayed coats of the mixed coating, thinned if required, to meet viscosity as specified in 3.5.3, shall be smooth, uniform and free of bubbles, pinholes, holidays, and other film irregularities. The spray-applied films, dried under the conditions specified in 4.7 through 4.7.4, shall provide a surface free from grit seeds, streaks, blisters, orange peel, or other surface defects when observed as indicated in 4.8.10. Surface defects caused by the primer shall not be cause for rejection.

3.5.2 Dry Time. The applied coating shall air dry within the following maximum time periods when tested in accordance with the noted paragraph.

a. Dust Free	45 minutes	4.8.11 lint or powder method
b. Dry to Recoat	2 hours	4.8.11
c. Resistance to Marring by Tape	4 hours	4.8.11.1
d. Dry to Stack (Print free time)	6 hours	4.8.11
e. Dry Hard	7 hours	4.8.11

3.5.2.1 Resistance to Marring by Taping. All colors and gloss ranges shall be sufficiently cured after 4 hours drying time at standard conditions to permit taping without permanent marring of the painted surface.

3.5.3 Viscosity. The viscosity for all colors and gloss ranges of the freshly mixed material shall be adjusted, in accordance with 3.5.1, to the viscosity recommended by the manufacturer for spray application. After standing for six hours in a closed container and if necessary with addition of a volume of thinner, specified by the manufacturer, (that doesn't exceed the VOC limitation) the coating shall still be sprayable as determined by measuring the viscosity in accordance with 4.8.12. No more than 5 seconds increase in viscosity shall be allowed.

3.5.4 Settling. After standing undisturbed for 6 hours, the mixed and ready to use coating material shall be free of curdling, precipitation, and separation which cannot be easily redispersed by manually remixing.

3.5.5 Odor. The odor of the coating as packaged, or as a wet (or dry) film after application, shall be characteristic of the resins and thinners used and shall not be obnoxious when tested in accordance with 4.8.13.

3.5.6 Pot Life. The coating material after mixing and reducing for spray shall have a minimum pot life of 6 hours. After standing for 6 hours, the material shall conform to the requirements specified in 3.5.1 (Spraying Properties), 3.5.2 (Drying Time), 3.5.3 (Viscosity), 3.5.4 (Settling), and 3.5.5 (Odor). Continuous agitation is permissible during the pot life determination.

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- 3.5.7 Fineness of Grind. The fineness of grind of the mixed paint shall be not less than 7 for the gloss coatings and not less than 5 for the lusterless coatings. The tests shall be made 1 hour after mixing, in accordance with 4.8.15.

3.6 Optical properties

- 3.6.1 Color. The color of the coating applied in accordance with 4.7, after drying 7 days at standard conditions, shall match the FED-STD-595 chip as indicated in 1.4.1, when tested as indicated in 4.8.16. After an exposure of 50 hours in a weatherometer as specified in 4.8.28, or to one (1) year of outdoor weather as specified in 4.8.29, slight visible staining shall not constitute failure. Slight staining is defined for the purpose of this specification as that discoloration which is visually detectable when the exposed coating is compared to an unexposed coated panel of the same material.

- 3.6.2 Gloss. The specular gloss of the spray applied coating measured in accordance with 4.8.17, after drying 7 days at standard conditions per 4.6, after 500 hours of weatherometer exposure per 4.8.28, or after one (1) year of outdoor exposure per 4.8.29, shall meet the requirements of Table II. Prior to measuring the gloss, the exposed panels shall be lightly cleaned in a dilute (1:10) solution of detergent conforming to MIL-C-87936 Type I, or equivalent, in distilled or deionized water, rinsed in distilled or deionized water, and then blotted dry with clean lint free paper or cloth toweling. The panels shall then be dried at standard conditions for one hour before measuring the gloss.

TABLE II

Specular Gloss

	As Applied With 16 hours dry time		After Weathering 500 Hours per 4.8.28		After Exposure 300°F-4 hours	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Measured at 60°						
Gloss Colors(60°)		90		80		80
Lusterless Colors	7	0	7	0	7	0
Measured at 85°						
Lusterless Colors	3	0	3	0	3	0

- 3.6.3 Hiding Power. The minimum contrast ratio of white and light tint coatings at a maximum dry film thickness of 0.05 mm (0.002 inch) shall be 0.95 when tested in accordance with 4.8.18.

3.7 Mechanical Properties

- 3.7.1 Wet Tape Adhesion. The coating applied to panels in accordance with 4.7, cured for 7 days at standard conditions, and immersed in fluids in accordance with Table IV, shall exhibit no loss of adhesion between

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