



AEROSPACE MATERIAL SPECIFICATION

AMS3604™**REV. A**Issued 2015-03
Revised 2019-06

Superseding AMS3604

(R) Heat Resistant Aluminized Paint

RATIONALE

This revision revises the high temperature resistance requirement such that it no longer relies on subjective visual color evaluation. Also, appropriate tolerances have been added for rain erosion and filiform corrosion test methods.

1. SCOPE

1.1 Form

This specification establishes requirements for a heat resistant aluminized organic coating with sufficient corrosion and erosion resistance for the finished substrate.

1.2 Application

The coating material covered by this specification is typically applied to the exterior of aluminum nacelle inlet lipskins of aircraft. It is suitable for use in a service temperature range from -65 to +600 °F (-54 to +316 °C) where this maximum temperature is on an intermittent basis. It is intended to have an appearance visually similar to sulfuric acid anodized aluminum. The liquid coating is suitable for spray application with high volume low pressure (HVLP) paint spray equipment.

1.3 Classification

The coating material covered by this specification shall be classified as follows:

Type 1 - A chrome free epoxy coating with less than 850 g/l Volatile Organic Compound (VOC) content (see 3.3).

1.4 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS1424	Fluid, Aircraft Deicing/Anti-Icing, SAE Type 1
AMS3819	Cloths, Cleaning For Aircraft Primary and Secondary Structural Surfaces
AMS-QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
AMS-QQ-A-250/5	Aluminum Alloy Alclad 2024, Plate and Sheet
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
AS9100	Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
ASTM D740	Standard Specification for Methyl Ethyl Ketone
ASTM D1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
ASTM D1654	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D1974	Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes
ASTM D2244	Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D2369	Standard Test Method for Volatile Content of Coatings
ASTM D3335	Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D3363	Standard Test Method for Film Hardness by Pencil Test
ASTM D3718	Standard Test Method for Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4212	Standard Test Method for Viscosity by Dip-Type Viscosity Cups
ASTM D7091	Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

2.3 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-DTL-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-DTL-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-DTL-83133	Turbine Fuel, Aviation, Kerosene Type, JP-8 (NATO F-34), NATO F-35, and JP-8+100 (NATO F-37)

2.4 U.S. EPA

Available from the U.S. EPA National Library Network, U.S. EPA, Mail Code 3404T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, Tel: 202-566-0556, <http://www2.epa.gov/libraries>.

EPA-453/R-97-004	Control of Volatile Organic Compound Emissions from Coating Operations at Aerospace Manufacturing and Rework Operations
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2.5 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2000	Procedures for an Industry Qualified Product Management Process
PD2001	Manufacturer Request for Product Approval and Qualification Process
PRI QPL-AMS3604	Products Qualified Under AMS3604

2.6 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI Z400.1/Z129.1	Hazardous Workplace Chemicals - Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation
ISO 2431	Paint and Varnishes - Determination of Flow Time by Use of Flow Cups
ISO/IEC 17025	General Requirements for the Competence of Testing and Calibration Laboratories
ISO 11890-1	Determination of Volatile Organic Compound (VOC) Content

2.7 EN Publications

Available from European Standard Store Krimicka 134 318 13 Pilsen Czech Republic Tel: +420-377-921-379 www.en-standard.eu.

EN 3665	Test Methods for Paints and Varnishes - Filiform Corrosion Resistance Test on Aluminum Alloys
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3. TECHNICAL REQUIREMENTS

3.1 Materials

Composition of the material is not specified, providing the material will meet the performance requirements set forth in this specification.

3.1.1 Prohibited Materials

The coating material shall contain no more than 0.1% by weight cadmium when tested in accordance with ASTM D3335. The coating material shall also contain no more than 0.1% by weight lead when tested in accordance with ASTM D3335. In addition, the coating material shall contain no more than 0.1% by weight chromium when tested in accordance with ASTM D3718.

3.1.2 Toxicity

The coating material shall have no adverse effect on the health of personnel when used for its intended purpose in accordance with manufacturer's instructions and with appropriate handling procedures and precautions per the material safety data sheet (see 4.8.2).

3.2 Quality

The coating material, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practicable, and free from imperfections detrimental to the usage of the compound. There shall be no separation of ingredients that cannot be readily dispersed by hand mixing.

3.3 VOC Content

The volatile organic compound (VOC) content of the Type 1 admixed coating material (when prepared in accordance with manufacturer's instructions) shall be less than 850 g/L VOC content when tested in accordance with ASTM D3960 (calculate using 10.2 and Appendices X2 and X3) and ISO 11890-1 (calculate using Method 3). See 8.4 regarding background on this maximum VOC content.

3.4 Properties

The coating material, when prepared in accordance with the manufacturer's instructions, shall conform to the requirements shown in Table 1, determined in accordance with the specified test methods.

Table 1 - Properties

Paragraph	Property	Requirement	Test Method Paragraph
3.4.1	High Temperature Resistance	No coating loss or 5A, and maximum color difference (ΔE) of 4.0 when compared to unexposed coating	4.7.5.1
3.4.2	Low Temperature Resistance	No coating loss or 5A	4.7.5.2
3.4.3	Flexibility	No cracking or loss of adhesion	4.7.5.3
3.4.4	Corrosion Resistance - Salt Spray	No blisters, loss of adhesion, or corrosion beyond 0.125 inch (3.18 mm) from scribe	4.7.5.4
3.4.5	Corrosion Resistance - Filiform (Acid-Humidity)	No blisters, loss of adhesion, or corrosion beyond 0.125 inch (3.18 mm) from scribe	4.7.5.5
3.4.6	Fluid Immersion Resistance	Minimum of HB pencil hardness	4.7.5.6
3.4.7	Low Temperature Shock Resistance (Thermal Cycling from 160 °F to -65 °F)	No coating loss or 5A	4.7.5.7
3.4.8	Resistance to Methyl Ethyl Ketone Wipe	Shall not be removed to substrate	4.7.5.8
3.4.9	Rain Erosion	No coating removal past 0.25 inch (6.4 mm) from coating leading edges	4.7.5.9
3.4.10	Zahn or ISO Cup Viscosity - Mixed Material	Within range specified by manufacturer	4.7.5.10
3.4.11	Non-Volatile Content - Base	Within range specified by manufacturer	4.7.5.11
3.4.12	Weight per Gallon - Base and Curing Solution	Within range specified by manufacturer	4.7.5.12