



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

SPECIFICATION

AMS 1426

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Revised

DEICING/ANTI-ICING FLUID Runways and Taxiways

1. SCOPE:

- 1.1 Form: This specification covers a corrosion-inhibited, biodegradable, chemical deicing/anti-icing material in the form of a liquid.
- 1.2 Application: Primarily for use on airport runways and taxiways for the prevention of and removal of frozen deposits of frost and ice.
- 1.3 Precautions: The deicing/anti-icing formulation supplied under requirements of this specification may be mildly toxic and contact with human skin and eyes should be avoided. Prolonged exposure to concentrations exceeding the established threshold limit values (TLV) for the product or its major components should also be avoided.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2470 - Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS 2475 - Protective Treatments, Magnesium Base Alloys
AMS 4037 - Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate)
AMS 4041 - Aluminum Alloy Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (Alclad 2024 and 1-1/2% Alclad 2024-T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate)
AMS 4049 - Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (Alclad 7075; -T6 Sheet, -T651 Plate)
AMS 4376 - Magnesium Alloy Plate, 3.0Al - 1.0Zn (AZ31B-H26)
AMS 4911 - Titanium Alloy Sheet, Strip, and Plate (6Al - 4V), Annealed

2.1.2 Aerospace Recommended Practices:

ARP 1511 - Corrosion of Low-Embrittling Cadmium Plate by Aircraft Maintenance Chemicals
ARP 1512 - Corrosion of Aluminum Alloys by Aircraft Maintenance Chemicals, Sandwich Test

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- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM A109 - Steel, Carbon, Cold-Rolled Strip
 ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals
 ASTM D56 - Flash Point by Tag Closed Tester
 ASTM D270 - Sampling Petroleum and Petroleum Products
 ASTM D891 - Specific Gravity of Industrial Aromatic Hydrocarbons and Related Materials
 ASTM D1177 - Freezing Point of Aqueous Engine Antifreeze Solution
 ASTM D1568 - Sampling and Chemical Analysis of Alkylbenzene Sulfonates
 ASTM D3278 - Flash Point of Liquids by Setaflash Closed Tester
 ASTM E70 - pH of Aqueous Solutions with the Glass Electrode
 ASTM F483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
 ASTM F484 - Stress Cracking of Acrylic Plastics in Contact with Liquid and Semi-Liquid Compounds
 ASTM F485 - Effects of Cleaners on Unpainted Aircraft Surfaces
 ASTM F502 - Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces
 ASTM F503 - Preparing Aircraft Cleaning Compounds, Liquid Type, for Storage Stability Testing
 ASTM F519 - Hydrogen Embrittlement Testing of Aerospace Materials

- 2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 15120 except as specified in 2.3.4 and 2.3.5.

2.3.1 Federal Specifications:

QQ-A-250/4 - Aluminum Alloy 2024, Plate and Sheet
 QQ-A-250/5 - Aluminum Alloy Alclad 2024, Plate and Sheet
 QQ-A-250/13 - Aluminum Alloy Alclad 7075, Plate and Sheet
 QQ-M-44 - Magnesium Alloy Plate and Sheet (AZ31B)
 QQ-S-698 - Steel, Sheet and Strip, Low Carbon

2.3.2 Military Specifications:

MIL-T-9046 - Titanium and Titanium Alloy Sheet, Strip and Plate
 MIL-P-25690 - Plastic, Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant

2.3.3 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

- 2.3.4 U.S. Department of Labor, Occupational Safety and Health Administration Forms: Available from regional offices of U.S. Department of Labor, Bureau of Labor Standards.

OSHA Form 20 - Material Safety Data Sheet

- 2.3.5 Department of Defense Forms: Available from the local or cognizant DOD Contract Administration Services component.

DD Form 1813 - Material Safety Data Sheet

3. TECHNICAL REQUIREMENTS:

- 3.1 Material: The composition of the fluid shall be optional with the manufacturer but shall contain glycols, urea, formamide, and corrosion inhibitors as required to produce a product meeting the requirements of 3.2.

3.2 Properties: The fluid shall conform to the following requirements; tests shall be performed in accordance with specified test methods on the product supplied in concentrated form, unless otherwise specified:

3.2.1 Specific Gravity: Shall be within ± 0.005 of the qualification value established as in 4.4.1, determined in accordance with ASTM D891.

3.2.2 pH: Shall be within ± 0.5 of the qualification value established as in 4.4.1, determined in accordance with ASTM E70.

3.2.3 Flash Point: Shall be not lower than 100° C (212° F), determined in accordance with ASTM D56 or ASTM D3278. In case of conflict, flash point determined in accordance with ASTM D56 shall apply.

3.2.4 Eutectic Point (Slush or Freeze Point): Shall be not higher than -23° C (-10° F), determined in accordance with ASTM D1177.

3.2.5 Corrosion of Metal Surfaces:

3.2.5.1 Sandwich Corrosion: Specimens, after test, shall show a rating not worse than 2, determined in accordance with ARP 1512.

3.2.5.2 Total Immersion Corrosion: The fluid shall neither show evidence of corrosion nor cause a weight change of any single test panel greater than the following, determined in accordance with ASTM F483:

Test Panel	Weight Change (mg/cm ²)/24 hr
AMS 4037 or QQ-A-250/4 Aluminum Alloy, anodized as in AMS 2470	0.3
AMS 4041 or QQ-A-250/5 Aluminum Alloy (Optional)	0.3
AMS 4049 or QQ-A-250/13 Aluminum Alloy	0.3
AMS 4376 or QQ-M-44, Alloy AZ31B, Magnesium Alloy, dichromate treated as in AMS 2475	0.2
AMS 4911 or MIL-T-9046, Type III, Composition C, Titanium Alloy	0.1
ASTM A109, Temper No. 1, or QQ-S-698, Condition 1, Steel	0.8

3.2.5.3 Low-Embrittling Cadmium Plate: Test panels coated with low-embrittling cadmium plate shall not show a weight change greater than 0.3 (mg/cm²)/24 hr, determined in accordance with ARP 1511.

3.2.6 Hydrogen Embrittlement: The fluid shall be non-embrittling, determined in accordance with ASTM F519, Methods 1a, 1c, or 2a.

3.2.7 Effect on Transparent Plastics: The fluid shall not craze, stain, or discolor MIL-P-25690 stretched acrylic plastic, determined in accordance with ASTM F484. The fluid, likewise, shall not craze, stain, or discolor polycarbonate or polysulfone plastics, determined in accordance with test procedures specified in ASTM F484 on specimens stressed for 72 hr ± 1 to an outer fiber stress of 3000 psi (21 MPa).

3.2.8 Effect on Painted Surfaces: The fluid shall neither decrease the paint film hardness by more than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with ASTM F502.

3.2.9 Effect on Unpainted Surfaces: The fluid, tested in accordance with ASTM F485, shall neither produce streaking nor leave any stains requiring polishing to remove.

3.2.10 Rinsibility: The fluid shall be completely rinsible in tap water, determined in accordance with 3.2.10.1.

- 3.2.10.1 A 75 x 200 mm (3 x 8 in.) panel of clear glass shall be cleaned to provide a surface free of water-break, dried, and coated with the deicer/anti-icer fluid by pouring the fluid over the panel while it is held in a horizontal position. The coated panel shall be inclined at approximately 45 deg for 10 min. ± 0.5 , then placed in a horizontal position for 24 hr ± 0.25 at room temperature. After the 24 hr exposure, the panel shall be rinsed in tap water for 5 - 6 min., rinsed in distilled or de-ionized water, dried, and examined for visible traces of the deicer/anti-icer fluid.
- 3.2.11 Pavement Compatibility:
- 3.2.11.1 Scaling Resistance: The condition of the surface shall have a rating not greater than 2, determined in accordance with ASTM C672 except that a 25% by volume solution of the deicer/anti-icer fluid in tap water shall be substituted for calcium chloride.
- 3.2.11.2 Slipperiness: Friction limits shall be as follows, determined on concrete and asphalt surfaces, both wet and dry, using a Mu meter and with a deicer/anti-icer fluid thickness of 1 mm (0.04 in.) using a NASA depth gauge. A basis reading shall be determined on wet and dry concrete and wet and dry asphalt before application of the deicer/anti-icer fluid.
- 3.2.11.2.1 Wet Concrete: Shall be not less than the following:
- Initial Reading - 45% of basis reading on wet concrete
 - After 15 min. - 60% of basis reading on wet concrete
 - After 30 min. - 65% of basis reading on wet concrete
 - After 45 min. - 68% of basis reading on wet concrete
 - After 60 min. - 75% of basis reading on wet concrete
- 3.2.11.2.2 Dry Concrete: Shall be not less than the following:
- Initial Reading - 0.25 on Mu meter
 - At least 75% of the readings after 15 min., after 30 min., after 45 min., and after 60 min. shall be 0.34 or higher on Mu meter scale.
- 3.2.11.2.3 Wet Asphalt: All readings, as in 3.2.11.2.1, shall be not less than 85% of the basis reading on wet asphalt.
- 3.2.11.2.4 Dry Asphalt: All readings, as in 3.2.11.2.1, shall be not less than 85% of the basis reading on dry asphalt.
- 3.2.12 Biodegradability: The fluid shall be not less than 90% biodegradable. Results of biodegradability studies conducted in accordance with the latest edition of "Standard Methods for the Examination of Water and Waste Water", published by the U.S. Public Health Service, for biodegradability and bioassays shall, when requested by purchaser, be provided by the fluid manufacturer to purchaser and shall contain not less than the following information:
- 3.2.12.1 A statement of the ecological behavior of the fluid.
- 3.2.12.2 The 5-day total oxygen demand (TOD) of the fluid, expressed in pounds-oxygen to pounds-fluid.
- 3.2.12.3 Percent degraded in 5 days.
- 3.2.12.4 Presence, in percentages by weight, of sulfur, halogens, phosphate, nitrate, and heavy metals (lead, chromium, cadmium, mercury).
- 3.2.13 Storage Stability: The fluid, tested in accordance with ASTM F503, shall neither show separation from exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted to use concentration with deionized water.
- 3.2.14 Performance: The fluid, used in accordance with manufacturer's recommendations, shall remove normally accumulated frozen deposits of frost and ice from airport runways and taxiways.