SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS1425 REV. D

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Cancelled 2010-05

Superseded by AMS1424

Deicing Fluid, Aircraft Ethylene Glycol Base

RATIONALE

This specification is no longer in use as it has been replaced by AMS1424.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of May 2010 and has been superseded by AMS1424. The requirements of the latest issue of AMS1424 shall be fulfilled whenever reference is made to the cancelled AMS1425. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS1424.

Cancelled specifications are available from SAE.

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http://www.sae.org/technical/standards/AMS1425D

1. SCOPE:

1.1 Form: This specification covers an ethylene glycol base deicing fluid in the form of a concentrated liquid.

1.2 Application: Primarily for use on exterior surfaces of parked aircraft for the removal of frozen deposits of frost and ice. May be applied in either the concentrated or diluted form.

1.3 Precautions:

1.3.1 This deicing formulation 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.

1.3.2 Although the fluid has a minimum flash point requirement of 100°C (212°F), it should be used with extreme care when applied around heaters or engine exhausts.

1.3.3 Caution should be exercised in the use of aqueous glycol deicing solutions in and around aircraft having silver or silver-coated electrical/electronic circuitry. Dehydrolysis reactions, which result In fire, may occur when such aqueous glycol solutions contact silver or silver-coated circuits, such as defectively insulated wires, switches, or circuit breakers, which are carrying direct current.

1.3.4 Airport authorities are required to ascertain the friction coefficient of the runway following contamination by the deicing fluid.

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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

AMS-2470 - Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS-2475 - Protective Treatments, Magnesium Alloys
AMS-2825 - Material Safety Data Sheets
AMS-4037 - Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn, (2024;-T3 Flat Sheet, -T351 Plate), Solution Heat Treated
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 - 0.23Cr, (Alclad 7075; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS-4376 - Magnesium Alloy Plate, 3.0Al - 1.0Zn, (AZ31B-H26), Cold Rolled and Partially Annealed
AMS-4911 - Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS-4911 Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS-5045 - Steel Sheet and Strip, 0.25 max Carbon, Hard Temper

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 56 - Flash Point by Tag Closed Tester
ASTM D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D 891 - Specific Gravity of Liquid Industrial Chemicals
ASTM D 1177 - Freezing Point of Aqueous Engine Coolant Solution
ASTM D 1193 - Reagent Water
ASTM D 1568 - Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM D 4057 - Manual Sampling of Petroleum and Petroleum Products
ASTM D 4177 - Automatic Sampling of Petroleum and Petroleum Products
ASTM E 70 - pH of Aqueous Solutions with the Glass Electrode
ASTM F 483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F 484 - Stress Crazing of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds
ASTM F 485 - Effects of Cleaners on Unpainted Aircraft Surfaces

2.2 (Continued):

ASTM F 502 - Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces
ASTM F 519 - Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals
ASTM F 945 - Stress-Corrosion of Titanium Alloys by Aircraft Engine Cleaning Materials
ASTM F 1105 - Preparing Aircraft Cleaning Compounds, Liquid Type, Solvent-Based, for Storage Stability Testing
ASTM F 1110 - Sandwich Corrosion Test
ASTM F 1111 - Corrosion of Low-Embrittling Cadmium Plate by Aircraft Maintenance Chemicals

2.3 U.S. Government Publications: Available from Naval Publications and Forms Center, Attn: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

2.3.1 Military Specifications:

MIL-P-25690 - Plastic, Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant

2.3.2 Military Standards:

MIL-STD-290 - Packaging of Petroleum and Related Products

2.4 APHA Publications: Available from American Public Health Association, 1015 Eighteenth Street, NW, Washington, DC 20036.

Standard Methods for the Examination of Water and Waste Water

3. TECHNICAL REQUIREMENTS:

3.1 Material: The composition of the fluid shall be an ethylene-glycol base and shall otherwise be optional with the manufacturer. The fluid shall contain additives, such as wetting agents, corrosion inhibitors, etc, as required to produce a product meeting the requirements of 3.2.

3.1.1 Biodegradabilty: The fluid shall be not less than 90% biodegradable. Results of biodegradability studies conducted in accordance with "Standard Methods for the Examination of Water and Waste Water," 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:

3.1.1.1 A statement of ecological behavior of the fluid.

3.1.1.2 The total oxygen demand (TOD) of the fluid, expressed in pounds of oxygen per pound of fluid.

3.1.1.3 Percent of the fluid degraded in five days

3.1.1.4 Presence, in percent by weight, of nitrate

3.2 Properties: The fluid shall conform to the following requirements; tests shall be performed in accordance with specified test methods:

3.2.1 Fluid As-Received in Concentrated Form: Shall be as follows:

3.2.1.1 Flash Point: Shall be not lower than 100°C (212°F), determined in accordance-with ASTM D 56.

3.2.1.2 Specific Gravity: Shall be within ±0.015 of the preproduction value established in 4.2.3, determined in accordance with ASTM D 891.

3.2.1.3 Hard Water Compatibility: The fluid, diluted 1:1 by volume with standard hard water according to 3.2.1.3.1, when submitted to the test of 3.2.1.3.2, shall not show any insoluble deposit or increase in turbidity greater than the freshly-made control sample diluted 1:1 by volume with ASTM D 1193, Type IV, water, and the pH shall be within ±0.5 of the initial value.

3.2.1.3.1 Standard Hard Water: Dissolve 400 mg ± 5 calcium acetate $(CH_3C00)_2Ca•2H_20$, and 280 mg ± 5 magnesium sulfate $MgS0_4•7H_20$, both of analytical reagent quality, in 1 litre of ASTM D 1193, Type IV, water.

3.2.1.3.2 350 mL of the diluted fluid shall be heated to 95°C ± 1 (203°F ± 2) in a 500 mL glass jar fitted with a sealed cap or a water condenser for 30 days. At the end of 30 days, a visual inspection shall be performed, the pH measured, and the results compared with those of the fresh sample.

3.2.2 Fluid Tested Both as a Concentrate and as a Diluted Solution: Shall be as follows, determined on the fluid as-received and on a solution of the concentrated fluid diluted 1:1 by volume with ASTM D 1193, Type IV, water.

3.2.2.1 pH: Shall be within ±0.5 units of the preproduction value established in 4.2.3, determined in accordance with ASTM E 70.

3.2.2.2 Freezing Point:

3.2.2.2.1 The freezing point of the fluid diluted in accordance with 3.2.2 shall be lower than -20°C (-4°F), determined in accordance with ASTM D 1177.

3.2.2.2.2 The freezing point of the fluid as supplied shall be not greater than +4 C (+7 F) degrees from the preproduction value established in 4.2.3, determined in accordance with ASTM D 1177.

3.2.2.3 Viscosity: Shall be within ±5% of the preproduction value at -10°C (14°F), at 0°C (32°F), and at 50°C (122°F) established in 4.2.3 for maximum and minimum values, determined in accordance with ASTM D 445.

3.2.2.4 Corrosion of Metal Surfaces:

3.2.2.4.1 Sandwich Corrosion: Specimens, after test, shall show corrosion not worse than that on the control panels that have been treated with synthetic tap water. If control panels are not run, specimens, after test, shall show a rating not worse than 1, determined in accordance with ASTM F 1110.

3.2.2.4.2 Total Immersion Corrosion: The fluid shall neither show evidence of corrosion nor cause a weight change of any test panel greater than the following, determined in accordance with ASTM F 483:

Test Panel	Weight Change mg/cm^2 per 24 hours
AMS-4037 Aluminum Alloy, anodized as in AMS-2470	0.3
AMS-4041 Aluminum Alloy	0.3
AMS-4049 Aluminum Alloy	0.3
AMS-4376 Magnesium Alloy, dichromate treated as in AMS-2475	0.2
AMS-4911 or MAM-4911 Titanium Alloy	0.1
AMS-5045 Carbon Steel	0.8

3.2.2.4.3 Low Embrittling Cadmium Plate: Test panels, coated with low-embrittling cadmium plate, shall not show a weight change greater than 0.3 mg/cm^2 per 24 hours, determined in accordance with ASTM F 1111.

3.2.2.4.4 Stress Corrosion Resistance: The fluid shall not cause cracks in AMS-4911 or MAM-4911 titanium alloy, determined in accordance with ASTM F 945.

3.2.2.5 Hydrogen Embrittlement: The fluid shall be non-embrittling, determined in accordance with ASTM F 519, Type Ia, Ic, or 2a.

3.2.2.6 Effect on Transparent Plastic: The fluid, heated to 65°C ± 5 (149ºF ± 9), shall not craze, stain, or discolor MIL-P-25690 stretched acrylic-plastic, determined in accordance with ASTM F 484.

3.2.2.7 Effect on Painted Surfaces: The fluid, heated to 65°C ± 5 (149°F ± 9), 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 F 502.

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

3.2.3 Storage Stability: The fluid, tested for 30 days in accordance with ASTM F 1105, shall neither show separation from exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted 1:1 with ASTM D 1193, Type IV, water. The hot test shall be conducted at 80°C ± 10º (198°F ± 18ºC).

3.2.4 Performance: The fluid, used in accordance with manufacturer's recommendations, shall remove accumulated frozen deposits of frost and ice from the exterior surface of parked aircraft. Acceptance criteria and method of test shall be as agreed upon by purchaser and supplier.

3.3 Quality: The fluid, as received by purchaser, shall be homogeneous, uniform in color, and free from skins, lumps, and foreign materials detrimental to usage of the fluid.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the fluid shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the fluid conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for flash point (3.2.1.1), specific gravity (3.2.1.2), and pH (3.2.2.1) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for hard water compatibility (3.2.1.3), freezing point (3.2.2.2), viscosity (3.2.2.3), corrosion of metal surfaces (3.2.2.4), hydrogen embrittlement (3.2.2.5), effect on transparent plastic (3.2.2.6), effect on painted surfaces (3.2.2.7) and effect on unpainted surfaces (3.2.2.8) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the fluid to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling and Testing: Shall be in accordance with all applicable requirements of 4.3.1 or 4.3.2. A lot shall be all fluid produced in one continuous manufacturing operation from the same batches of raw materials and presented for vendor's inspection at one time:

4.3.1 Drum Shipments: ASTM D 1568.

4.3.2 Bulk Shipments: ASTM D 4057 or ASTM D 4177.