



# AEROSPACE MATERIAL SPECIFICATION

**AMS1424™****REV. S**Issued 1992-01  
Revised 2023-07

Superseding AMS1424R

Fluid, Aircraft Deicing/Anti-Icing, SAE Type I

## RATIONALE

Section 3.5.3 has been revised to include the mid-speed ramp. Section 3.1 has been modified and 1.3.4 and 3.4.4.1 have been removed per the recommendations of the Electrochemical Dehydrolysis of Glycols and AMS4916 Titanium Corrosion Workgroup.

### 1. SCOPE

#### 1.1 Form

This foundation specification (AMS1424S) and its associated category specifications (AMS1424/1 and AMS1424/2) cover a deicing/anti-icing material in the form of a fluid.

##### 1.1.1 Foundation and Category Specifications

This foundation specification establishes the requirements for all Type I deicing/anti-icing fluids, defines glycol (conventional and non-conventional) based and non-glycol based fluids, and contains additional properties and requirements that apply to both glycol (conventional and non-conventional) and non-glycol based products.

#### 1.2 Application

The fluid is generally used heated and either diluted with water, or as supplied, for the removal of deposits of ice, snow, and frost on exterior aircraft surfaces prior to take off.

1.2.1 Consult the aircraft manufacturer's maintenance manual and service letters to determine any restrictions relating to the use of deicing/anti-icing fluids for type and model of aircraft being treated (refer to AS6285).

1.2.2 The manufacturer shall determine and report the lowest operational use temperature (LOUT) for the recommended dilutions of their fluid(s).

1.2.2.1 The LOUT for an SAE Type I fluid is the lowest temperature at which the fluid has been tested and certified in accordance with the appropriate aerodynamic acceptance tests (3.5.3) while maintaining the 18 °F (10 °C) freezing point buffer (refer to AS6285).

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### 1.3 Precautions

- 1.3.1 The deicing/anti-icing formulation may be mildly toxic, and contact with human skin and eyes should be avoided. Prolonged exposure to concentrations of vapor and wind-borne mists should be avoided. Consult the manufacturer's Safety Data Sheet for further information.
- 1.3.2 A fluid meeting all other requirements of this specification may not meet the aerodynamic acceptance test in the concentrated form. This fluid shall only be used diluted to the ratios which meet the aerodynamic acceptance test criteria.
- 1.3.3 The fluid shall have a minimum flash point of 212 °F (100 °C) and should be used with extreme care when applied in the immediate vicinity of heaters or engine exhausts.
- 1.3.4 Reserved
- 1.3.5 Slippery conditions may exist on the ground or on equipment following deicing/anti-icing procedures.
- 1.3.6 A fluid meeting this specification is unique to the manufacturer and may be adversely affected by mixing with other aircraft deicing/anti-icing fluids. Adverse effects may also result from the mixing of glycol (conventional and non-conventional) based and non-glycol based aircraft deicing/anti-icing fluids and should be tested prior to use. Users of AMS1424/1 and AMS1424/2 Type I fluids shall ensure that the Type I fluid is compatible with the AMS1428 Type II, Type III, or Type IV fluid that is used in combination with the Type I fluid.
- 1.3.7 At the option of the user, the manufacturer shall demonstrate the fluid as supplied or at intended use dilution and heated to intended use temperature, applied through a commercial deicing/anti-icing vehicle system to an inclined flat or curved surface, preferably an aircraft wing or horizontal stabilizer, at pressures and flow rates normal for intended use, does not cause foam which does not rapidly collapse, and fluid surface shall not have the appearance of snow or slush. Observe fluid for wetting, film breaks, crawling, or fisheyes. Observe how long the sprayed film is continuous and how long it remains on the aircraft wing leading edge without breaks.
- 1.3.8 Deicing/anti-icing fluids should be compatible with carbon brake material. Refer to AS6285 and the aircraft manufacturer's maintenance and service documents for further information on fluid use. The industry standard test method for compatibility is AIR5567.

### 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 any 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 processes, 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.

### 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](http://www.sae.org).

|           |                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------|
| AMS1424/1 | Deicing/Anti-Icing Fluid, Aircraft, SAE Type I Glycol (Conventional and Non-Conventional) Based |
| AMS1424/2 | Deicing/Anti-Icing Fluid, Aircraft, SAE Type I Non-Glycol Based                                 |
| AMS2470   | Anodic Treatment of Aluminum Alloys, Chromic Acid Process                                       |

|             |                                                                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AMS2475     | Protective Treatments, Magnesium Alloys                                                                                                                                                               |
| AMS4037     | Aluminum Alloy, Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated                                                                                    |
| AMS4041     | Aluminum Alloy, Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (2024, -T3 Sheet/-T351 Plate with 1-1/2% Alclad), Solution Heat Treated, Cold Worked and Naturally Aged                               |
| AMS4049     | 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                                                |
| AMS4376     | Plate, Magnesium Alloy, 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H26), Cold Rolled and Partially Annealed                                                                                                        |
| AMS4911     | Titanium Alloy, Sheet, Strip, and Plate, 6Al - 4V, Annealed                                                                                                                                           |
| AMS5045     | Steel, Sheet and Strip, 0.25 Carbon, Maximum, Hard Temper                                                                                                                                             |
| AMS5886     | Alloy, Corrosion and Heat-Resistant, Bars, Forgings, and Rings, 50Ni - 20Cr - 20Co - 5.8Mo - 2.2Ti - 0.45Al, Consumable Electrode or Vacuum Induction Melted, 2100 °F (1149 °C) Solution Heat Treated |
| AMS-P-83310 | Plastic Sheet, Polycarbonate, Transparent                                                                                                                                                             |
| AIR5567     | Test Method for Catalytic Carbon Brake Disk Oxidation                                                                                                                                                 |
| ARP1917     | Clarification of Terms Used in Aerospace Metals Specifications                                                                                                                                        |
| AS5900      | Standard Test Method for Aerodynamic Acceptance of AMS1424 and AMS1428 Aircraft Deicing/Anti-Icing Fluids                                                                                             |
| AS5901      | Water Spray and High Humidity Endurance Test Methods for AMS1424 and AMS1428 Aircraft Deicing/Anti-Icing Fluids                                                                                       |
| AS6285      | Aircraft Ground Deicing/Anti-Icing Processes                                                                                                                                                          |

## 2.2 ANSI Accredited Publications

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

ANSI Z400.1/Z129.1-2010

## 2.3 APHA Publications

Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001, 202-777-2742 or [www.apha.org](http://www.apha.org).

Standard Methods for the Examination of Water and Waste Water

## 2.4 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](http://www.astm.org).

|           |                                                                                                  |
|-----------|--------------------------------------------------------------------------------------------------|
| ASTM C672 | Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals                             |
| ASTM D93  | Flash Point by Pensky-Martens Closed Tester                                                      |
| ASTM D445 | Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) |

|            |                                                                                                   |
|------------|---------------------------------------------------------------------------------------------------|
| ASTM D891  | Specific Gravity of Liquid Industrial Chemicals                                                   |
| ASTM D1177 | Freezing Point of Aqueous Engine Coolants                                                         |
| ASTM D1193 | Reagent Water                                                                                     |
| ASTM D1331 | Surface and Interfacial Tension of Solutions of Surface-Active Agents                             |
| ASTM D1568 | Sampling and Chemical Analysis of Alkylbenzene Sulfonates                                         |
| ASTM D1747 | Refractive Index of Viscous Materials                                                             |
| ASTM D3278 | Flash Point of Liquids by Setaflash-Closed-Cup Apparatus                                          |
| ASTM D4052 | Test Method for Density and Relative Density of Liquids by Digital Density Meter                  |
| ASTM D4177 | Automatic Sampling of Petroleum and Petroleum Products                                            |
| 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 or 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 F519  | Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals |
| ASTM F945  | Stress-Corrosion of Titanium Alloys by Aircraft Engine Cleaning Materials                         |
| ASTM F1105 | Preparing Aircraft Cleaning Compounds, Liquid Type, Solvent Based for Storage Stability Testing   |
| ASTM F1110 | Sandwich Corrosion Test                                                                           |
| ASTM F1111 | Corrosion of Low-Embrittling Cadmium Plate by Aircraft Maintenance Chemicals                      |

## 2.5 Organization for Economic Cooperation and Development (OECD) Publications

Available from OECD, 2, rue André Pascal, Cedex 16, 75016 Paris, France, Tel: +33 1.45.24.82.00 or [www.oecd.org](http://www.oecd.org).

OECD Environmental Data; Données OCDE sur l'environnement, Compendium (Contains OECD Methods 202 and 203)

## 2.6 U.S. Government Publications

Copies of these documents are available online at <http://epa.gov>.

EPA 40 CFR 136.3 Identification of Test Procedures

EPA 40 CFR 797.1300 Daphnid Acute Toxicity Test

EPA 40 CFR 797.1400 Fish Acute Toxicity Test

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

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

MIL-STD-870 Cadmium Plating, Low Embrittlement, Electrodeposited

### 3. TECHNICAL REQUIREMENTS

#### 3.1 Material

The composition of the fluid shall be optional with the manufacturer; however, the product shall be based on freezing point depressants, with additives, such that the finished product shall meet all requirements of this specification. The fluid shall not be thickened, neither shall it contribute to the creation of nor sustain the growth of mold.

##### 3.1.1 Definition of Glycol (Conventional and Non-Conventional) and Non-Glycol

For the purpose of classification for AMS1424 aircraft deicing/anti-icing fluid, freezing point depressants used to formulate AMS1424S Type I deicing/anti-icing fluids are classified as “glycol (conventional and non-conventional)” and “non-glycol.”

3.1.1.1 Glycol (conventional) is defined as ethylene glycol, diethylene glycol, or propylene glycol.

3.1.1.2 Glycol (non-conventional) is defined as organic non-ionic diols and triols, e.g., 1,3-propanediol, glycerine, and mixtures thereof, and mixtures with glycol (conventional).

3.1.1.3 Non-glycol is defined as all that is not glycol (conventional and non-conventional), such as organic salts, e.g., sodium formate, sodium acetate, potassium formate, potassium acetate, and any mixtures thereof. Mixtures of glycol (conventional and non-conventional) and non-glycol are defined as non-glycol.

##### 3.1.2 Requirements

3.1.2.1 Glycol (conventional and non-conventional) based fluids shall meet all technical requirements of this specification, except 3.1.3.

3.1.2.2 Non-glycol based fluids shall meet all the technical requirements of this specification, including 3.1.3.

##### 3.1.3 Non-Glycol Based Fluids

A fluid based on non-glycol freezing point depressants shall be tested as follows. Two pieces of AMS5886 bar, 35-mm diameter and 15-mm long, shall have one end of each machined flat. An 8.5-mm drill shall then be used to drill a centered hole 6.5-mm deep in one end to allow the milling of a cup-shaped depression. A 12.5-mm bull-nosed end mill shall be used to open up the drilled hole to produce a 7-mm deep depression. The cup shall then be finished by improving the surface with 600- $\mu$ m, 180- $\mu$ m, and 6- $\mu$ m diamond paste. The cups shall be cleaned and degreased using a suitable solvent and allowed to dry. One cup shall be filled with the candidate test fluid, the other with water conforming to ASTM D1193 Type IV. Both test pieces shall then be placed in an oven at  $221^{\circ}\text{F} \pm 5^{\circ}\text{F}$  ( $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ). The fluid shall then be allowed to evaporate by progressive increase in oven temperature at the rate of  $18^{\circ}\text{F}$  ( $10^{\circ}\text{C}$ ) per minute to a final temperature of  $482^{\circ}\text{F} \pm 10^{\circ}\text{F}$  ( $250^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ), where they shall be held at this temperature for 15 minutes  $\pm$  1 minute. Test pieces shall then be transferred to an air furnace set at  $1904^{\circ}\text{F} \pm 25^{\circ}\text{F}$  ( $1040^{\circ}\text{C} \pm 10^{\circ}\text{C}$ ) and held at this temperature for 2 hours  $\pm$  5 minutes.

Test pieces shall be removed and allowed to cool to ambient temperature. Microscopic examination of the polished cups at 500X magnification shall be undertaken; no corrosion worse than control shall be evident in the candidate test fluid cup.

The report shall include photographs of both cups after testing and the candidate test fluid cup shall be identified.

##### 3.1.4 Appearance

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