



AEROSPACE STANDARD	AS1701™	REV. F
	Issued 1992-08 Revised 2017-01 Reaffirmed 2022-04 Superseding AS1701E	
Lubricant, Solid Film		

RATIONALE

This change renumbers some paragraphs in order to clarify product acceptance test requirements and makes minor editorial revisions.

1. SCOPE

This document covers the performance requirements for solid dry film lubricants, air dried or heat cured, for use in aerospace applications. These lubricants are intended to prevent galling, and may be capable of remaining effective for extended periods of time after exposure to extreme environmental conditions.

1.1 Field of Application

The solid film lubricants covered by this document are intended for aerospace applications exposed to extreme environments. Some may be suitable for use in a vacuum at temperatures ranging from -365 to +1400 °F (-221 to 760 °C).

1.2 Product Classification

This document defines the various classes of solid film lubricants, their temperature limitations, and compatibility usage (see Table 1).

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this document may involve the use of hazardous materials, this document does not address the hazards which may be involved in such use. The product vendor shall prepare materials safety data sheets (MSDS) in accordance with ANSI Z400.1 and abide by MSDS requirements to ensure familiarity with the safe and proper handling of hazardous materials used and take necessary precautionary measures to ensure the health and safety of all personnel involved.

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Table 1 - Classes of solid film lubricants

Class	Temperature Limits Min	Temperature Limits Max	Usage	Primary Lubricant	Binder	Cure	Thermal Stability ±15 °F (±8 °C)	Corrosion Resistance
Class I	-65 °F (-54 °C)	+450 °F (+232 °C)	General Purpose: Titanium, Aluminum, Low/High Alloy Steels	MoS ₂	Organic	Heat Cure	450 °F (232 °C)	Pass
Class II	-65 °F (-54 °C)	+450 °F (+232 °C)	General Purpose: Titanium, Aluminum, Low/High Alloy Steels	MoS ₂	Organic	Air Dry	450 °F (232 °C)	Pass
Class III	-65 °F (-54 °C)	+750 °F (+399 °C)	Corrosion Resistant Steels, Heat-Corrosion Resistant Steels, Titanium Alloys	MoS ₂	Organic	Heat Cure	750 °F (399 °C)	Pass
Class IV	-65 °F (-54 °C)	+1400 °F (+760 °C)	Corrosion Resistant Steels, Heat-Corrosion Resistant Steels, Waspalloy	Inorganic Pigments /1	Inorganic /1	Heat Cure	1400 °F (760 °C)	Pass
Class V	-65 °F (-54 °C)	+850 °F (+454 °C)	Corrosion Resistant Steels, Heat-Corrosion Resistant Steels	MoS ₂	Inorganic	Air Dry or Heat Cure	850 °F (454 °C)	Pass
Class VI	-365 °F (-221 °C)	+850 °F (+454 °C)	Corrosion-Resistant Steels, Heat-Corrosion Resistant Steels, Nickel Based Alloys, Titanium Alloys for Use with Fuels. Oxidizers such as Hydrazine, LOX, Nitrogen Tetroxide UDM11	MoS ₂	Inorganic	Heat Cure	850 °F (454 °C)	Pass

/1 See 3.1 for restriction on sulfur bearing compounds.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document 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. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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 Deicing/Anti-Icing Fluid, Aircraft SAE Type 1

AMS2488 Anodic Treatment - Titanium and Titanium Alloys Solution pH 13 or Higher

AMS2700 Passivation of Corrosion Resistant Steels

2.2 ANSI Accredited 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

2.3 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 Test Method for Salt Spray (Fog) Testing

ASTM E595 Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment

ASTM D1141 Substitute Ocean Water

ASTM D1193 Reagent Water

ASTM D2510 Test Method for Adhesion of Solid Film Lubricants

ASTM D2512 Test Method for Compatibility of Materials with Liquid Oxygen (Impact Sensitivity Threshold and Pass-Fail Techniques)

ASTM D2625 Test Method for Endurance (Wear) Life and Load-Carrying Capacity of Solid Film Lubricants (Falex Pin and Vee Method)

ASTM D2714 Test Method for Calibration and Operation of the Falex Block-On-Ring Friction and Wear Testing Machine

ASTM D3359 Test Method for Measuring Adhesion by Tape Test

ASTM D7091 Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applies to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

2.4 U.S. Government Publications

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

MIL-DTL-16232 Phosphate Coatings, Heavy, Manganese or Zinc Base (For Ferrous Metals)

MIL-DTL-5541 Chemical Conversion Coatings on Aluminum and Aluminum Alloys

MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, Nato Code Number 0-148

MIL-A-8625 Anodic Coatings for Aluminum and Aluminum Alloys

MIL-PRF-23699 Lubricating Oil, Aircraft Turbine Engine, Nato Code Number 0-156

MIL-PRF-83282 Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, Metric, Nato Code Number H-537

O-M-232 Methanol (Methyl Alcohol)

VV-D-1078 Damping Fluid, Silicone Base (Dimethyl Polysiloxane)