

Lubricant Application, Solid Film, Heat Cured, Corrosion Inhibiting

RATIONALE

To Clarify paragraph 1 SCOPE to add application exception for threaded product, add cadmium NOTICE, and general document cleanup.

NOTICE

This document references a part which contains cadmium as a plating material. Consult local officials if you have questions concerning cadmium's use.

1. SCOPE

This SAE Aerospace Standard (AS) establishes the surface pretreatment, temperature, and baking time required to cure AS5272 lubricant when it is applied over the surfaces of manufactured parts of various metals. This requirement is not mandatory for threaded product applications unless otherwise specified.

2. REFERENCES

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 the 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 724-776-4970 (outside USA) www.sae.org.

AMS2488	Anodic Treatment - Titanium and Titanium Alloys Solution pH 13 or Higher
AS5272	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)
AS8879	Screw Threads - UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter

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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 D1125 Standard Test Methods for Electrical Conductivity and Resistivity of Water

ASTM D2510 Standard Test Method for Adhesion of Solid Film Lubricants

ASTM D3735 Standard Specification for VMP Naphthas

ASTM F22 Standard Test Method for Hydrophobic Surface Films by the Water-Break Test

ASTM D1732 Standard Practices for Preparation of Magnesium Alloy Surfaces for Painting

2.3 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

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

MIL-DTL-16232 Phosphate Coatings, Heavy, Manganese or Zinc Base

MIL-C-81302 Cleaning, Compound, Solvent, Trichlorotrifluoroethane

MIL-T-81533 Trichloroethane 1,1,1, (Methyl Chloroform) Inhibited, Vapor Degreasing

3. REQUIREMENTS

3.1 General Application Instructions for all Metals

Do not touch the pretreated surfaces with bare hands. Stir the lubricant until thoroughly mixed, using a low shear mixing blade. A mechanical paint shaker may be used for Types I and II, but is not recommended for Type III as excessive foaming with waterborne products may occur. Minor viscosity adjustments to Type III may be made by adding deionized water. Any deionized water used shall have a resistivity not less than 1 megohm centimeter ($M\Omega \cdot cm$), when tested in accordance with ASTM D1125. Ordinary tap water shall not be used. The grit blast machine and media shall be restricted to a single material application. Cross contamination between metal, machine and media shall not be allowed. Apply the lubricant by brushing, dipping, or spraying.

3.2 Application pretreatment and cure requirements, unless otherwise specified on the drawing:

3.2.1 Application on Aluminum and Aluminum Alloys

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not harm the metal surface (i.e., pitting, etching, etc.). Anodize and seal the surface in accordance with MIL-A-8625, Types I, II, or III, Class 1.

3.2.2 Application on Copper and Copper Alloys

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not harm the surface (i.e., hydrogen embrittlement, etc.). Abrasive-blast the surfaces with 180 to 220 grit clean, dry sand. Form a black oxide finish on the surfaces.

3.2.3 Application on Magnesium and Magnesium Alloys

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not harm the surface (i.e., hydrogen embrittlement, etc.). Anodize the surface in accordance with ASTM D1732 Class II, Type II.

3.2.4 Application on Steel

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not damage the surface (i.e., hydrogen embrittlement, etc.). Abrasive-blast the surface with 180 to 220 grit aluminum oxide. Phosphate coat in accordance with MIL-DTL-16232, Type M, Class 3 or Type Z, Class 3. Coating weight shall be $16 \text{ g/m}^2 \pm 5 \text{ g/m}^2$.

3.2.5 Application on Stainless Steels

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not harm the surface (i.e., hydrogen embrittlement, etc.). Abrasive-blast the surfaces with 180 to 220 grit aluminum oxide. Surface to be cleaned.

3.2.6 Application on Titanium and Titanium Alloys

Preclean the surfaces to be coated with Aliphatic Naphtha conforming to ASTM D3735 or any environmentally safe cleaner that sufficiently cleans surfaces to pass ASTM F22, but does not harm the surface (i.e., hydrogen embrittlement, etc.). Abrasive-blast the surface with 180 to 220 grit aluminum oxide and alkaline anodize per AMS2488, Type 2.

3.2.7 Application on Cadmium Plated Substrate Metal

Cadmium plate in accordance with AMS-QQ-P-416, Type III, Class 2. NOTE: Film adhesion, 3.5.1, is dependent on the active surface, application of AS5272 should take place as soon as possible following the application of the cadmium plate.

3.2.8 Cure

Permit the coated parts to air dry for at least 30 minutes (or flash cure at $(149 \text{ to } 174 \text{ } ^\circ\text{F} (65 \text{ to } 79 \text{ } ^\circ\text{C}))$ for 10 to 30 minutes) to assure complete removal of solvent or water. Bake the part so that the coated surface remains at $400 \text{ } ^\circ\text{F} \pm 27 \text{ } ^\circ\text{F} (204 \text{ } ^\circ\text{C} \pm 15 \text{ } ^\circ\text{C})$ for at least 1 hour for Types II and III, or $302 \text{ } ^\circ\text{F} \pm 27 \text{ } ^\circ\text{F} (150 \text{ } ^\circ\text{C} \pm 15 \text{ } ^\circ\text{C})$ for at least 1 hour for Type I, or 2 hours for Type III. The curing time shall be counted from the time the part reaches the cure temperature, not when the part is first subjected to heat. This will require that the coated piece remain in the oven for a period longer than that specified to assure compliance with this requirement. The use of a thermocouple attached to the coated surface to indicate the temperature of the coating has been found to be satisfactory for determining the beginning of the timed baking period.

3.3 Film Appearance

The bonded solid film lubricant, when examined as specified in 4.5, shall be uniform in color, smooth, free from any cracks, scratches, pinholes, blisters, bubbles, runs, sags, foreign matter, grit, rough particles, or separation of ingredients.

3.4 Thickness

The average film thickness, based on 6 readings minimum, of the cured film for all Types shall be between 0.0003 in and 0.0005 in, with no single reading less than 0.0002 in or greater than 0.0007 in, except as noted in 4.6.1 and 4.6.2.

3.5 Performance Characteristics

3.5.1 Film Adhesion

The bonded solid film lubricant, when tested as specified in Table 1, shall not be lifted to expose any bare metal surface. A uniform deposit of powdery material clinging to the tape is acceptable. The tests shall be carried out on each of the material requirements, 3.2.1 through 3.2.7.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The applicator is responsible for performing all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, and unless disapproved by the purchaser, the applicator's own or any other facilities suitable for the performance of the inspection requirements specified herein, may be used. The purchaser reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

4.1.1 Responsibility for Compliance

All items shall meet all requirements of Section 3. The inspection set forth in this specification shall become part of the manufacturer's overall inspection system or quality program. The absence of any inspection requirements in this specification shall not relieve the manufacturer of the responsibility of assuring that all products or supplies submitted to the purchaser for acceptance comply with all requirements of the contract or purchase order. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the procuring activity to acceptance of defective material.

4.2 Quality Conformance Inspection

The quality conformance inspection shall consist of all the tests specified in Table 1. Inspections shall be performed on manufactured parts.

4.3 Inspection Conditions

4.3.1 Atmospheric Conditions

Unless otherwise specified, all examinations and tests shall be performed at a temperature of $77^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($25^{\circ}\text{C} \pm 3^{\circ}\text{C}$) and at a relative humidity between 30% and 70%.

4.4 Methods of Inspection

Methods of inspection shall be in accordance with Table 1 and 4.5 through 4.7.

TABLE 1 - QUALITY INSPECTION TESTS

Characteristic	Test Methods ASTM	Requirement Paragraph
Film Appearance	D2510 ¹ Procedure A	3.3
Film Thickness		3.4
Film Adhesion		3.5.1
¹ When performing ASTM D2510 test method, use Aliphatic Naphtha conforming to ASTM D3735 followed by acetone or any environmental safe cleaner that sufficiently cleans surfaces to pass ASTM F22 (MIL-C-81302, Trichlorotrifluoroethane, or MIL-T-81533, 1,1,1-Trichloroethane are not acceptable cleaners for testing or production).		