AEROSPACE STANDARD	AS5528™	REV. E
	Issued 2005-07 Revised 2020-08 Superseding AS5528D	

Lubricant Application, Solid Film, Heat Cured, Corrosion Inhibiting

RATIONALE

Paragraph 3.2.1 changed to add abrasive blast requirements.

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.

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.

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

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 D1193	Standard Specification for Reagent Water
ASTM D1732	Standard Practices for Preparation of Magnesium Alloy Surfaces for Painting
ASTM D2510	Standard Test Method for Adhesion of Solid Film Lubricants

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AS5528E/

ASTMD3330/D3330M Standard Test Method for Peel Adhesion of Pressure Sensitive Tape

ASTM D3735 Standard Specification for VMP Naphthas

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

2.3 U.S. Government Publications

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

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

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

3. REQUIREMENTS

3.1 General Metal Preparation Instructions

Do not touch the pretreated surfaces with bare hands. Stir the lubricant until thoroughly mixed in accordance with manufacturer's recommendation. Any deionized water used shall have a resistivity not less than 1 MΩ·cm, when tested in accordance with ASTM D1125 or ASTM D1193. Ordinary tap water shall not be used. The grit blast machine and media shall be restricted to a single material application. 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 meet the requirements of ASTM F22, and does not harm the surface. Abrasive blast the surfaces with180 to 220 grit clean aluminium oxide for copper, steel, and stainless steel materials.

3.2.2 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 meet the requirements of ASTM F22 and does not harm the surface. Chlorinated solvents are not permitted. Unless otherwise specified, abrasive-blast the surface with 180 to 220 grit aluminum oxide or alkaline anodize per AMS2488, Type II.

3.2.3 Application on Cadmium Plated Substrate Metal

Film adhesion, (see 3.5) is dependent on the active surface. Application of AS5272 should take place as soon as possible after plating.

3.2.4 Cure

Permit the coated parts to air dry for at least 30 minutes (or flash cure at 149 to 174 °F (65 to 79 °C) for 10 to 30 minutes) Bake the part so that the coated surface remains at 400 °F ± 27 °F (204 °C ± 15 °C) for at least 1 hour at temperature for AS5272 Types II and III, or 302 °F ± 27 °F (150 °C ± 15 °C) for at least 1 hour at temperature for AS5272 Type I, or 2 hours at temperature for AS5272 Type III, unless otherwise specified by the manufacturer in writing, but not to exceed 350 °F for types requiring the lower temperature cure. Alternate cure cycles cannot be used on temperature sensitive substrates that would be annealed or otherwise adversely affected by a higher temperature cure. The curing time shall be counted from the time the part reaches the cure temperature, not when the part is first subjected to heat.

3.3 Film Appearance

The bonded solid film lubricant, when examined as specified in 4.4, shall be uniform in color, smooth, free from any cracks, scratches, pinholes, blisters, bubbles, runs, sags, foreign matter, grit, or rough particles.

3.4 Film Thickness

The average film thickness, based on six readings minimum, of the cured film for all types shall be between 0.0003 inch and 0.0005 inch, with no single reading less than 0.0002 inch or greater than 0.0007 inch, except as noted in 3.4.1 and 3.4.2.

3.4.1 Internally Threaded Components

For internally threaded fasteners (e.g., nuts, inserts), the cured film for all types shall show complete coverage in the threaded area with no requirement for thickness verification other than visual. The coated internal threads shall permit a minimum free rotation of three-quarters turn on a corresponding mating bolt.

3.4.2 Externally Threaded Components

For externally threaded fasteners (e.g., bolts, studs), the cured film for all types shall show complete coverage with no requirement for thickness verification other than visual in the threaded area. The coated external threads shall permit a minimum free rotation of three-quarters turn on a corresponding mating nut or ring gage (GO).

3.5 Film Adhesion

The bonded solid film lubricant, when tested as specified in and 4.6, shall not be lifted to expose any bare metal surface. For parts, the coating shall be continuously bonded to the part and shall not display loss of adhesion or separation from the part fastener when examined at a magnification of 4X. The film adhesion test shall be waived for internally threaded fasteners without sufficient surface area to tape test.

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 4.4, 4.5, and 4.6. Inspections shall be performed on manufactured parts. Except coupons may be used for testing when configuration prohibits testing of 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 °F ± 5 °F (25 °C ± 3 °C) and at a relative humidity between 30% and 70%.

4.4 Film Appearance

The bonded solid film lubricated parts shall be examined visually and microscopically at magnification of 12 to 15X and meet the requirements of 3.3.

4.5 Film Thickness

Film thickness is determined after the parts have been completely cured. The thickness of the film shall meet the requirements of 3.4 except as noted in 3.4.1 and 3.4.2.

4.6 Film Adhesion

The lubricated parts shall meet the adhesion requirements of 3.5 when tested per 4.6.1 or 4.6.2. Testing per 4.6.2 is to be performed only when tape testing of the coated part is not possible due to insufficient area for tape testing.

4.6.1 Parts

Apply a length of 1 inch wide tape per 4.6.3 to the part. Remove the tape with a quick motion and examine tape and part for lifting of the coating. A uniform deposit of powdery material may cling to the tape, but the lifting of any flakes or particles of the lubricant, which exposes a base metal surface on the part shall be cause for rejection. For externally threaded fasteners apply a length of tape to the bolt shank, or for fully threaded screw or bolts apply a length of tape to the top of head or bolt end. For Internally Threaded Fasteners Apply a length of tape to the nut bearing surface.

4.6.2 Test Panels

Perform film adhesion testing in accordance with ASTM D2510 Procedure B

Tape for film adhesion test shall be 3M Company No. 250 tape or equivalent (i.e., 1 inch wide, paper backed, pressure sensitive masking tape, with an adhesive strength greater than or equal to 25 oz/in when tested in accordance with ASTM D3330/D3330M procedure A). The tape shall be no older than 6 months from the date of manufacturing if stored in an uncontrolled environment. The tape shall be no older than 1 year from the date of manufacture if maintained indoors in a controlled environment of 40 to 90 °F and 10 to 70% relative humidity.

4.6.3 Tape

Tape for film adhesion test shall be 3M Company No. 250 tape or equivalent (i.e., 1 inch wide, paper backed, pressure sensitive masking tape, with an adhesive strength greater than or equal to 25 oz/in when tested in accordance with ASTM D3330/D3330M procedure A). The tape shall be no older than 6 months from the date of manufacturing if stored in an uncontrolled environment. The tape shall be no older than 1 year from the date of manufacture if maintained indoors in a controlled environment of 40 to 90 °F and 10 to 70% relative humidity.

5. USE LIMITATIONS

5.1 Engineering Tolerances

The operating thickness of this lubricant averages from 0.0003 to 0.0005 inch per lubricated surface. This thickness seldom requires alteration of established clearances between moving parts. There is one exception. The lubricant coating thickness must be considered in the case of small parts that normally operate with very little clearance. The cured lubricant film is relatively soft, and any interference produced by the thickness of the lubricant will cause rapid wear of the lubricant film to the point where interference is eliminated.

5.2 Application

AS5272 lubricant shall be applied in accordance with this specification and manufacturer's recommended practices over surfaces that have been pretreated in accordance with this specification, unless otherwise specified in the contract or purchase order.

6. ACKNOWLEDGMENT

An applicator shall mention this specification number in all quotations when acknowledging contract or purchase orders.

7. REJECTIONS

Coated parts not conforming to this specification shall be subject to rejection.