



# AEROSPACE STANDARD

**AS5127™****REV. D**Issued 1997-05  
Revised 2024-06

Superseding AS5127C

## Aerospace Standard Test Methods for Aerospace Sealants Methods for Preparing Aerospace Sealant Test Specimens

### RATIONALE

Five-Year Review. Added multiple reference fluids and alternatives to reflect actual testing practices and protect against supply chain and testing variability: AMS3020 (alternative: MIL-PRF-5606), AMS3021 (alternative: MIL-PRF-7808), AMS3023 (alternative: MIL-PRF-23699), and AMS3400 (alternative: MIL-PRF-83282).

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## 1. SCOPE

### 1.1 Form

This standard describes the accepted methods used for preparing aerospace sealant test specimens for qualification and quality conformance or acceptance testing. AS5127/1 and AS5127/2 are to be used in conjunction with this document and the applicable AMS specifications.

### 1.2 Application

This standard is intended to be used with AMS specifications or other materials specifications which govern the procurement of aerospace sealants.

All test procedures and associated test materials designated in this standard were adopted from current military and consensus material specifications for sealing compounds. Cross-references for equivalent test materials may be obtained using documents such as the SAE AMS Index or the ASTM Metals and Alloys in the Unified Numbering Systems reference manuals.

### 1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this standard may involve the use of hazardous materials, this standard does not address the hazards that 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. Refer to the specific product Materials Safety Data Sheets (MSDS) or Safety Data Sheet (SDS) for health and safety information.

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

|         |                                                                                                         |
|---------|---------------------------------------------------------------------------------------------------------|
| AMS2471 | Anodic Treatment of Aluminum Alloys Sulfuric Acid Process, Undyed Coating                               |
| AMS2629 | Fluid, Jet Reference                                                                                    |
| AMS3020 | Oil, Reference, for "L" Stock Rubber Testing                                                            |
| AMS3021 | Fluid, Reference for Testing Di-Ester (Polyol) Resistant Material                                       |
| AMS3023 | Fluid, Reference for Testing Polyol Ester (and Diester) Resistant Material                              |
| AMS3100 | Adhesion Promoter for Polysulfide Sealing Compounds                                                     |
| AMS3167 | Solvents, Wipe for Cleaning Prior to Application of Primer and Top Coat Materials, or Sealing Compounds |
| AMS3400 | Fluid, Reference for Testing Polyalphaolefin (PAO) Resistant Material                                   |
| AMS3819 | Cloths, Cleaning For Aircraft Primary and Secondary Structural Surfaces                                 |

|             |                                                                                                                                                      |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| AMS4037     | Aluminum Alloy, Sheet and Plate 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate) Solution Heat Treated                                     |
| AMS4045     | Aluminum Alloy Sheet and Plate 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr 7075: (-T6 Sheet, -T651 Plate) Solution and Precipitation Heat Treated                 |
| 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 |
| AMS4377     | Magnesium Alloy, Sheet and Plate 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H24) Cold Rolled, Partially Annealed                                                  |
| AMS4901     | Titanium Sheet, Strip, and Plate, Commercially Pure Annealed, 70.0 ksi (485 MPa)                                                                     |
| AMS4911     | Titanium Alloy, Sheet, Strip, and Plate 6Al - 4V Annealed                                                                                            |
| AMS5516     | Steel, Corrosion-Resistant, Sheet, Strip, and Plate 18Cr - 9.0Ni (302) Solution Heat Treated                                                         |
| AMS-C-27725 | Coating, Corrosion Preventative, for Aircraft Integral Fuel Tanks for Use to 250 °F (121 °C)                                                         |
| AMS-G-25667 | Glass, Monolithic, Aircraft Glazing                                                                                                                  |
| AMS-M-3171  | Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on                                                                           |
| AMS-P-83310 | Plastic Sheet, Polycarbonate, Transparent                                                                                                            |
| AS5127/1    | Aerospace Standard Test Methods for Aerospace Sealants Two-Component Synthetic Rubber Compounds                                                      |
| AS5127/2    | Test Method for Aerospace Firewall Sealant Flame Penetration                                                                                         |
| AS5502      | Standard Requirements for Aerospace Sealants and Adhesion Promoters                                                                                  |

## 2.2 U.S. Government Publications

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

|               |                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------|
| MIL-DTL-5541  | Chemical Conversion Coatings on Aluminum and Aluminum Alloys                                                |
| MIL-DTL-81706 | Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys                                      |
| MIL-PRF-5425  | Plastic, Sheet, Acrylic, Heat Resistant                                                                     |
| MIL-PRF-5606  | Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance                                            |
| MIL-PRF-7808  | Lubricating Oil, Aircraft Turbine Engine, Synthetic Base                                                    |
| MIL-PRF-23377 | Primer Coatings: Epoxy, High-Solids                                                                         |
| MIL-PRF-23699 | Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Numbers: O-152, O-154, O-156, and O-167 |
| MIL-PRF-25690 | Plastic, Sheet and Formed Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant             |
| MIL-PRF-83282 | Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537                 |
| MIL-PRF-85285 | Topcoat, Aircraft and Support Equipment                                                                     |
| MIL-PRF-85582 | Primer Coatings: Epoxy, Waterborne                                                                          |
| TT-I-735      | Isopropyl Alcohol                                                                                           |

### 3. STANDARD TOLERANCES

Unless otherwise specified, standard tolerances shown in Table 1 shall apply.

**Table 1 - Standard tolerances**

| Measurement Units | Tolerance              |
|-------------------|------------------------|
| Temperature       | ±2 °F (±1 °C)          |
| Day               | ±2 hours               |
| Hour              | ±5 minutes             |
| Minute            | ±10 seconds            |
| Inch (mm)         | ±0.010 inch (±0.25 mm) |

### 4. STANDARD CONDITIONS

Standard laboratory test conditions for preparation and testing of specimens shall be 77 °F ± 5 °F (25 °C ± 3 °C). Unless otherwise specified by the AS5127/1 or AS5127/2 test method, sealant specimens shall be cured at 77 °F ± 2 °F (25 °C ± 1 °C) and 50% ± 5% relative humidity.

### 5. STANDARD HEAT CYCLES

Heat cycles to which sealants shall be environmentally exposed prior to testing shall be identified in each material specification.

### 6. PREPARATION OF TEST SPECIMENS

#### 6.1 Preparation of Bare and Clad Aluminum for Sealing

Aluminum panel test surfaces, both bare (refer to AMS4037 and AMS4045) and Alclad (refer to AMS4049), shall be prepared just prior to application of sealing compound. Reuse of Alclad test specimens for more than one test shall not be permitted. Aluminum panel test surfaces shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with AMS3819 Grade A cloth prior to solvent evaporation. Lightly scuff the test surface using 240 grit aluminum oxide sandpaper or with Scotch-Brite™ 7447 aluminum oxide (or an equivalent nonmetallic equivalent pad) prior to application of sealant. Be careful not to sand through the AMS4049 cladding. The test surfaces shall be cleaned again to remove the debris by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

#### 6.2 Preparation of Aluminum or Magnesium for Corrosion Protection

##### 6.2.1 Preparation of Aluminum or Magnesium Panel Test Surfaces

When aluminum or magnesium panel test surfaces require corrosion protection, bare aluminum (refer to AMS4037 and AMS4045), Alclad aluminum (refer to AMS4049), or magnesium (refer to AMS4377) shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

### 6.2.2 Chemical Conversion Coating Application for Aluminum (Refer to MIL-DTL-5541)

When aluminum panel test surfaces require chemical conversion coating, MIL-DTL-81706, Class 1A, Form II, Method C shall be used as the conversion coating material and application method. The chemical conversion coating shall be prepared according to the manufacturer's instructions to meet the requirements of MIL-DTL-5541. No time restrictions are imposed on application of primers/coatings or sealant after conversion coating; however, in the event of a failure specified in a material specification, time to sealant application shall be performed within 168 hours of conversion coating application without subsequent coating, and the time shall be documented in the report. The application of all organic coatings to conversion coated surfaces shall be performed in accordance with applicable specifications. Panels must be kept clean and dry prior to sealant application. Retest results may be used in lieu of the initial results.

### 6.2.3 Corrosion Protection Application for Magnesium (Refer to AMS-M-3171)

When magnesium panel test surfaces require corrosion protection, the following process in AMS-M-3171 shall be used as the material and application method. The magnesium panels shall be immersed in an alkaline cleaner per AMS-M-3171, 3.3.1. The panels shall then be acetic-nitrate pickle per AMS-M-3171, 3.4.7. The panels shall then be treated per AMS-M-3171 Type VI. No time restrictions are imposed on application of primers/coatings or sealant after acid pickling; however, in the event of a failure specified in a material specification, time to sealant application shall be performed within 168 hours of acid pickling application without subsequent coating, and the time shall be documented in the report. The application of all organic coatings to conversion coated surfaces shall be performed in accordance with applicable specifications. Panels must be kept clean and dry prior to sealant application. Retest results may be used in lieu of the initial results.

## 6.3 Preparation of Aluminum for Sulfuric Acid Anodize (Refer to AMS2471)

### 6.3.1 Preparation of Aluminum Panel Test Surfaces

When aluminum panel test surfaces require sulfuric acid anodize, the bare AMS4045 aluminum shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

### 6.3.2 Sulfuric Acid Anodize Application

The aluminum shall be sulfuric acid anodized per AMS2471 using a dichromate seal. No time restrictions are imposed on application of primers/coatings or sealant after anodizing; however, in the event of a material failure, time to sealant application shall be performed within 168 hours of anodizing with seal only, and the time shall be documented in the report. Refer to the individual material's specification for more details on material failure. The application of all organic coatings to anodized surfaces shall be performed in accordance with applicable specifications. Panels must be kept clean and dry prior to sealant application. Retest results may be used in lieu of the initial results.

## 6.4 Organic Coating Application

When organic coatings are specified for panel test surfaces, the coatings shall be fully cured as defined by the applicable coating specification. The applied coatings shall not be more than 6 months old when stored at standard conditions prior to sealant application.

### 6.4.1 AMS-C-27725 Fuel Tank, MIL-PRF-23377 Epoxy Primer, MIL-PRF-85582 Epoxy Primer, and MIL-PRF-85285 Polyurethane Topcoat Coatings

#### 6.4.1.1 Panel Surface Preparation and Coating Application

Bare aluminum (refer to AMS4045) test panels shall be sulfuric acid anodized in accordance with AMS2471. One surface of the anodized aluminum panels shall then be coated with the specified organic coating in accordance with the applicable organic coating specification. The organic coatings shall be fully cured as defined by the applicable specification before cleaning prior to sealant application.

#### 6.4.1.2 Cleaning of Coated Surface for Sealing

The use of abrasion in preparing the coating is optional. If performed, lightly abrade the coating with a Scotch-Brite™ 7447 aluminum oxide or nonmetallic equivalent pad prior to application of sealant. Use of abrasion shall be documented in the test report. Panel cleaning shall be accomplished immediately prior to application of sealing compound. The coated test surface shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

#### 6.5 Preparation of AMS5516 Stainless Steel Surfaces

Use AMS5516 stainless steel sheet with a No. 2B finish. Panel cleaning shall be accomplished just prior to application of sealing compound. AMS5516 stainless steel test surfaces shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. The test surface shall be abraded using 240 grit aluminum oxide sandpaper. After scrubbing, the panel surface shall be wiped clean with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

#### 6.6 Preparation of AMS4901 and AMS4911 Titanium Surfaces

Panel cleaning shall be accomplished just prior to application of sealing compound. AMS4901 and AMS4911 titanium test surfaces shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. The test surface shall be abraded using 240 grit aluminum oxide sandpaper. After scrubbing, the panel surface shall be wiped clean with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.

#### 6.7 Organic Composite Application

##### 6.7.1 Preparation of Composite Surfaces

Composite materials, including Graphite/Epoxy (AS4/3501-6 or IM7/977-3) and Graphite/Bismaleimide (IM7/5250-4), shall have a quasi-isotropic laminated construction. Eight plies of unidirectional tape shall be prepared in a (0 degrees, 45 degrees, 90 degrees, 135 degrees) symmetrical layup. Thickness of 8-ply composite is variable based on the materials used. A peel ply (nylon is acceptable) can be applied to the bag side for the composite curing process. The composite shall be cured per the manufacturer's recommendations. If used during curing, the peel ply shall be removed prior to cleaning.

##### 6.7.2 Cleaning of Composite Surfaces

Panel cleaning shall be accomplished just prior to application of sealing compound. Composite panel test surfaces (bag/peel ply side or tool side) shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. The test surface shall be abraded using 240 grit aluminum oxide sandpaper. Stop abrasion process if black dust is observed to avoid damage to fiber reinforcement. After abrading, remove sanding dust with a dry, clean AMS3819 Grade A cloth. The test surface shall then be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily wetted, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with a clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 Grade A cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.