

(R) Aerospace Standard Test Methods for Aerospace Sealants
Methods for Preparing Aerospace Sealant Test Specimens

RATIONALE

Five-year update. Added AS5127/1 and AS5127/2 in Scope. Eliminated humidity requirement for preparing and testing specimens. Added clad aluminum and sulfuric acid anodizing preparations. Added optional abrasion of coatings and clarified cleaning process of surfaces.

TABLE OF CONTENTS

1.	SCOPE.....	3
1.1	Form.....	3
1.2	Application.....	3
1.3	Safety - Hazardous Materials.....	3
2.	APPLICABLE DOCUMENTS.....	3
2.1	SAE Publications.....	3
2.2	U.S. Government Publications.....	4
3.	STANDARD TOLERANCES.....	5
4.	STANDARD CONDITIONS.....	5
5.	STANDARD HEAT CYCLES.....	5
6.	PREPARATION OF TEST SPECIMENS.....	5
6.1	Preparation of Bare and Clad Aluminum for Sealing.....	5
6.2	Preparation of Aluminum for Chemical Conversion Coating Application (MIL-DTL-5541).....	5
6.2.1	Preparation of Aluminum Panel Test Surfaces.....	5
6.2.2	Chemical Conversion Coating Application.....	6
6.3	Preparation of Aluminum for Sulfuric Acid Anodize (AMS2471).....	6
6.3.1	Preparation of Aluminum Panel Test Surfaces.....	6
6.3.2	Sulfuric Acid Anodize Application.....	6
6.4	Organic Coating Application.....	6
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
6.5	Preparation of AMS5516 Stainless Steel Surfaces.....	7
6.6	Preparation of AMS4901 and AMS4911 Titanium Surfaces.....	7
6.7	Organic Composite Application.....	7
6.7.1	Preparation of Organic Composite Test Surfaces.....	7
6.7.2	Cleaning of AS4/3501-6, IM7/5250-4 and Other Composite Surfaces.....	7
6.8	Preparation of Aircraft Transparent Surfaces.....	7
6.9	Application of Adhesion Promoter.....	7

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6.10	Application of Sealing Compounds	8
6.11	Curing of Sealing Compounds	8
7.	STANDARD TEST FLUIDS	8
7.1	Jet Reference Test Fluid	8
7.2	Petroleum Base Hydraulic Fluid.....	8
7.3	Engine Oil.....	8
8.	TEST METHODS	8
9.	NOTES	8
TABLE 1	STANDARD TOLERANCES	5

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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 & 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 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 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 724-776-4970 (outside USA), 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
AMS3100	Adhesion Promoter for Polysulfide Sealing Compounds
AMS3167	Solvents, Wipe for Cleaning Prior to Application of Primer and Top Coat Materials, or Sealing Compounds
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
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 (SAE 30302), 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-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

2.2 U.S. Government Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: (215) 697-6396, <http://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-23377	Primer Coatings: Epoxy, High-Solids
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number O-156
MIL-PRF-25690	Plastic, Sheets and 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	Coating: Polyurethane, High Solids, Aircraft and Support Equipment
MIL-PRF-85582	Primer Coatings: Epoxy, Waterbase
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	$\pm 2^{\circ}\text{F}$ ($\pm 1^{\circ}\text{C}$)
Day	± 2 hours
Hour	± 5 minutes
Minute	± 10 seconds
Inches (mm)	± 0.010 inch (± 0.25 mm)

4. STANDARD CONDITIONS

Standard laboratory test conditions for preparation and testing of specimens shall be $77^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($25^{\circ}\text{C} \pm 3^{\circ}\text{C}$). Unless otherwise specified by the AS5127/1 or AS5127/2 test method, sealant specimens shall be cured at $77^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($25^{\circ}\text{C} \pm 1^{\circ}\text{C}$) and $50\% \pm 5\%$ 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 (AMS4037 and AMS4045) and Alclad (AMS4049) shall be prepared just prior to application of sealing compound. The use of abrasion in preparing the coating is optional. If performed, lightly abrade the coating with a Scotch-Brite 7447 aluminum oxide or non-metallic equivalent pad prior to application of sealant. Use of abrasion shall be documented in the test report. Aluminum panel test surfaces shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily dampened, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface. Alclad specimens shall not be reused.

6.2 Preparation of Aluminum for Chemical Conversion Coating Application (MIL-DTL-5541)

6.2.1 Preparation of Aluminum Panel Test Surfaces

When aluminum panel test surfaces require chemical conversion coating aluminum panel test surfaces, both bare (AMS4037 and AMS4045) and Alclad (AMS4049) shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth wipe with solvent conforming to AMS3167. Repeat cleaning panel surface by scrubbing the surface with a clean AMS3819 Grade A cloth heavily dampened, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 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

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, time to sealant application shall be performed within 168 hours of conversion coating application (conversion coat only) and 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 (AMS2471)

6.3.1 Preparation of Aluminum Panel Test Surfaces

When aluminum panel test surfaces require sulfuric acid anodize panel test surfaces, the bare AMS4045 aluminum shall be cleaned by scrubbing the surface with a clean AMS3819 Grade A cloth heavily dampened, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 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 failure, time to sealant application shall be performed within 168 hours of anodizing (anodize only) and 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 six 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 (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 coating in accordance with the applicable coating specification. The 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 non-metallic 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 dampened, but not dripping, with solvent conforming to AMS3167. Immediately wipe the surface dry with clean AMS3819 Grade A cloth prior to solvent evaporation. Repeat this cleaning procedure until the dry AMS3819 cloth used for wiping off the solvent displays no visible contamination. Do not allow the solvent to evaporate from the surface.