SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-S-83318 REV. B

Issued 1999-05
Revised 2011-04

Superseding AMS-S-83318A

Sealing Compound, Polysulfide Type, Low Temperature Curing, Quick Repair, Integral Fuel Tanks and Fuel Cell Cavities

RATIONALE

Fix pkg verbiage (standardize), change 7 day aged peel requirement back to original (10 lbf/in) [this was done as AMS-S-8802 A-1/2 and B-1/2 requirement for this is 10 lbf/in, therefore it should be allowable that the repair material (only A-1/6 and B-1/6) be acceptable at the same strength].

FOREWORD

This document supersedes AMS-S-83318A, which superseded MIL-S-83318A (USAF).

1. SCOPE

1.1 Form

This specification covers two-component polysulfide sealing compounds, temperature resistant, for use from -65 to 250 °F (-54 to 121 °C), low temperature curing to 20 °F (-13 °C) minimum, for quick repair of integral fuel tanks and fuel cell cavities. During application, the sealing compound shall exhibit suitable, fluid consistency.

1.2 Application

This sealing compound has been used typically for quick repair of fuel tank sealing and cabin pressure sealing, but usage is not limited to such applications. It cures at room temperature and below room temperature as low as 20 °F (-13 °C). Lower temperature cures require extended periods of time.

1.2.1 AMS3100 adhesion promoter can be applied prior to application of the sealant.

1.3 Classification

Sealing compounds covered by this specification are classified as follows:

Class A - Suitable for application by brush. Available in the following application times in hours: [1/6 hour = 10 minutes].

A-1/6

Class B - Suitable for application by extrusion gun and spatula. Available in the following application times in hours:

B-1/6

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**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMSS83318B

1.4 Safety - Hazardous Materials

Shall be in accordance with AS5502 (1.1)

2. APPLICABLE DOCUMENTS

Shall be in accordance with AS5502 (2.)

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
AMS3100	Adhesion Promoter, for Polysulfide Sealing Compounds
AMS4045	Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr, 7075: (-T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS4911	Titanium Alloy, Sheet, Strip and Plate, 6Al - 4V, Annealed
AMS-C-27725	Coating, Corrosion Preventative, for Aircraft Integral Fuel Tanks for Use to 250 °F (121 °C)
AMS-S-8802	Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
AS5127	Methods for Testing Aerospace Sealants
AS5127/1	Aerospace Standard Test Methods for Aerospace Sealants, Two-Component Synthetic Rubber Compounds

2.2 U.S. Government Publications

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

MIL-S-38714	Sealant Cartridge for Two Component Materials
MIL-DTL-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys

2.3 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2000	Procedures for an Industry Qualified Product Management Process
PD2001	Manufacturer Request for Product Approval and Qualification Process
PD2103	Aerospace Quality Assurance, Product, Standards, Qualification Procedure, Sealants
PRI-QPL-AMS-S-83318	Products Qualified Under AMS-S-83318

3. TECHNICAL REQUIREMENTS

3.1 Materials

The basic ingredient used in the manufacture of these products shall be synthetic rubber of the polysulfide (T) type. The sealing compound shall cure by the addition of a curing agent to the base compound, and shall not depend on solvent evaporation or curing. The material shall contain no lead compounds or chromate compounds. The curing agent shall possess sufficient color contrast to the base compound to permit easy identification of an unmixed or incompletely mixed sealing compound. Neither the base compound nor the cured sealant shall be red or pink in color.

3.1.1 Qualification

All products sold to this specification shall be listed, or approved for listing, on the qualified product list, PRI-QPL-AMS-S-83318. The qualified products list shall be in accordance with PD 2000.

3.2 Date of Packaging

Shall be in accordance with AS5502 (3.1)

3.3 Toxicological Formulations

Shall be in accordance with AS5502 (3.2)

3.4 Quality

Shall be in accordance with AS5502 (3.3)

3.5 Shelf Life

Shelf life shall be a minimum of 6 months from the date of packaging when stored unopened at 80 °F (27 °C) or lower. Material may be retested for shelf life extension.

3.6 Properties

The base compound and the curing agent shall conform to the requirements shown in Table 1, when determined in accordance with the specified test methods.

TABLE 1 - PROPERTIES

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.6.1	Nonvolatile Content, by weight, min		AS5217/1 (5.1)
	Class A	87%	
	Class B	92%	
3.6.2	Air Content, (Class B only), max	4%	AS5217/1 (5.2)
3.6.3	Viscosity of Base Compound		AS5217/1 (5.3)
	Class A (Use No. 7 spindle at 10 rpm)	1000 to 4000 poises (100 to 400 PaS)	
	Class B (Use No. 7 spindle at 2 rpm)	8000 to 14 000 poises (800 to 1400 PaS)	
3.6.4	Flow Class B (only)	0.1 to 0.75 inches (2.5 to 19.1 mm)	AS5217/1 (5.5.1)
3.6.5	Application Time		
	Class A From beginning of mixing, not less than 100 grams per minute shall be extruded. A-1/6	1/6 hour (10 minutes)	AS5217/1 (5.6.2) (Use Class B test method.)
	Class B From beginning of mixing, not less than 15 grams per minute shall be extruded. B-1/6	1/6 hour (10 minutes)	AS5217/1 (5.6.2)
3.6.6	Tack-Free Time (Measured from beginning of mixing), max		AS5217/1 (5.8)
	at 77 °F (25 °C)	3 hours	
	at 40 °F (4 °C)	12 hours	
	at 20 °F (-7 °C)	48 hours	
3.6.7	Standard Cure Time, max, (30 Durometer A, min)		AS5217/1 (5.9)
	at 77 °F (25 °C)	8 hours	
	at 40 °F (4 °C)	24 hours	
	at 20 °F (-7 °C)	96 hours	
3.6.8	Fluid Immersion Cure Time, min		AS5217/1 (5.11)
	After 6 hours	25 Durometer A	
	After 24 hours	35 Durometer A	
3.6.9	Specific Gravity, max average	1.65	AS5127/1 (6.1)

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.6.10	Hydrolytic Stability, min	30 Durometer A	AS5127/1 (6.6)
3.6.11	Chalking, max Use AMS2629 Type II	Slight chalking	AS5127/1 (7.1)
3.6.12	Fluid Rupture Resistance	No rupture	AS5127/1 (7.3)
3.6.13	Weight Loss and Flexibility		AS5127/1 (7.4)
	Weight Loss, max Flexibility	8% No cracking or checking	
3.6.14	Low Temperature Flexibility	No visual evidence of cracking or checking. No loss of adhesion.	AS5127/1 (7.6)
3.6.15	Tensile Strength and Elongation, min		AS5127/1 (7.7)
3.6.15.1	Standard Cure	200 psi (1380 kPa), 150% elongation	
3.6.15.2	14 days at 140 °F (60 °C) in AMS2629, Type I	180 psi (1240 kPa), 100% elongation	
3.6.15.3	7 days at 250 °F ± 5 (121 °C ± 3) in air	300 psi (2070 kPa), 50% elongation	
3.6.16	Corrosion Resistance	No corrosion under sealant or signs of deterioration	AS5127/1 (7.9)
3.6.17	Peel Strength, min	100% cohesive failure:	AS5127/1 (8.1) and AMS-S-83318 Table 5
	After 7 day exposure After 70 day exposure	10 lbf/inch (3580 N/m) 10 lbf/inch (1750 N/m)	
3.6.18	Repairability, min	10 lbf/inch (1750 N/m) / 100% cohesive failure	AS5127/1 (8.2) on itself and on AMS-S-8802
3.6.19	Appearance	No skinning, hardening or separation that cannot be restored by normal agitation	
3.6.20	Storage Stability		
3.6.20.1	Accelerated Storage		AS5127/1 (9.1)
3.6.20.1.1	Appearance	No skinning, hardening or separation that cannot be restored by normal agitation	
3.6.20.1.2	Application Time	Same as 3.6.5	

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.6.20.1.3	Tack-Free Time	Same as 3.6.6	
3.6.20.1.4	Standard Cure Time	Same as 3.6.7	
3.6.20.1.5	Peel Strength	Same as 3.6.17	
3.6.20.2	Long Term Storage (6 months)		AS5127/1 (9.2)
3.6.20.2.1	Appearance	No skinning, hardening or separation that cannot be restored by normal agitation	
3.6.20.2.2	Application Time	Same as 3.6.5	
3.6.20.2.3	Tack-Free Time	Same as 3.6.6	
3.6.20.2.4	Standard Cure Time	Same as 3.6.7	
3.6.20.2.5	Peel Strength	Same as 3.6.17	

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Shall be in accordance with AS5502 (4.1)

4.1.1 Source Inspection

Shall be in accordance with AS5502 (4.1.1)

4.1.2 Sampling

Shall be in accordance with AS5502 (4.1.2)

4.2 Classification of Tests

Shall be in accordance with AS5502 (4.2)

4.2.1 Qualification Tests

All technical requirements listed in Table 1 are qualification tests (See 8.2) and shall be performed on the initial production of the sealing compound prior to shipment to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4, and when purchaser deems confirmatory testing to be required.

4.2.1.1 Qualification

All products sold to this specification shall be listed, or approved for listing, on the Qualified Products List, PRI-QPL-AMS-S-83318. The qualified products list shall be in accordance with PD2000: See AS5502 (2.1). Class B-1/6 shall be the first material to be qualified for each supplier of sealing compound in accordance with 8.2. Once qualification for Class B-1/6 has been obtained, Class A-1/6 of the sealing compound may be qualified. The formulation for Class A-1/6 shall be the same as Class B-1/6, except for minor variations necessary for conformance to viscosity and application time requirements. All compounds shall meet all technical requirements of this specification. Other classes of the sealing compound need only to be tested to the initial acceptance tests listed in Table 2, plus all peel strength tests listed in Table 5, or as defined by the G-9 QPG (PD2000, PD2001, and PD2103 (See AS5502 Para. 2.1)).

4.2.2 Initial Acceptance Tests

Requirements shown in Table 2 are initial acceptance tests and shall be performed on each batch.

TABLE 2 - INITIAL ACCEPTANCE TESTS

Test	Requirement Paragraph
Nonvolatile Content	3.6.1
Air Content (Class B only)	3.6.2
Flow (Class B only)	3.6.4
Application Time	3.6.5
Tack-Free Time	3.6.6
Standard Cure Time	3.6.7
Fluid Immersion Cure Time	3.6.9
Chalking *	3.6.11
Peel Strength: 4 aluminum panels, AMS4045, sulfuric acid anodized in accordance with AMS2471 and coated with AMS-C-27725 Type II Class B only (See 8.6) (7 day immersion only). Do not use AMS3100 adhesion promoter. 1/	3.6.17

* In lieu of 14-day cure specified, specimens shall be subjected to an accelerated cure of 48 hours at standard conditions followed by 24 hours at 140 °F (60 °C).

4.2.3 Final Acceptance Tests

Requirements shown in Table 3 are final acceptance tests and shall be performed on each lot. Acceptance tests of the final packaged product shall consist of the following:

TABLE 3 - FINAL ACCEPTANCE TESTS

Test	Requirement Paragraph
Air Content	3.6.2
Application Time	3.6.5
Tack-Free Time	3.6.6
Standard Cure Time	3.6.7

4.3 Sampling and Testing

Shall be in accordance with AS5502 (4.3)

4.3.1 Acceptance Tests

Shall be in accordance with AS5502 (4.3.1)

4.3.1.1 Batch and Lot

A batch shall be defined as the quantity of material run through a mill or mixer at one time. A lot shall be defined as material from one batch of each component assembled (packaged) as finished product in one size and/or type of container at the same time. The lot, when used, shall be traceable to the batches of base compound and curing agent.

4.3.1.2 Initial and Final Acceptance Tests

Each batch shall be subjected to both initial and final acceptance testing as described in 4.2.2 and 4.2.3 respectively.

4.3.2 Shelf Life Surveillance and Updating

4.3.2.1 Sampling

Shall be in accordance with AS5502 (4.1.2).

4.3.2.2 Shelf-Life Testing

The inspections to be conducted for shelf-life surveillance and updating are listed in Table 4.

TABLE 4 - SHELF-LIFE TESTING

Test	Requirement Paragraph
Application Time	3.6.5
Tack-Free Time	3.6.6
Standard Cure Time	3.6.7
Peel Strength: 2 aluminum panels, sulfuric acid anodized per AMS2471, coated with AMS-C-27725 Type II Class B corrosion preventive coating (See 8.6), and aged in AMS2629, Type I for 7 days at 140 °F (60 °C).	3.6.17
Appearance	3.6.19

4.3.2.3 Shelf Life Extension

If tests are being performed at the end of the stated shelf life to update the shelf-life of the sealing compound, and all tests are passed, the shelf-life will be extended an additional three months. Shelf-life shall not be extended more than three times.

4.4 Approval

Shall be in accordance with AS5502 (4.4)

4.5 Test Methods

4.5.1 Standard Tolerances

Unless otherwise specified herein, standard tolerances of AS5127 (3.1) “Standard Tolerances” shall apply.

4.5.2 Standard Test Conditions

Standard laboratory conditions shall be as specified in AS5127 (4). Test specimens shall be prepared and immediately after completion of preparation, shall be placed under 77 °F (25 °C) and 50% ± 5 relative humidity to cure according to 4.5.4.1. Except as otherwise directed herein, tests shall be performed at conditions in accordance with AS5127 (4).

4.5.3 Preparation of Test Specimens

Test specimens shall be prepared in accordance with AS5127 (6).

4.5.3.1 Cleaning of Test Panels

Test panels shall be cleaned in with AS5127 (6).