SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-S-83318A

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Superseding AMS-S-83318

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

FOREWORD

This document supersedes AMS-S-83318, which superseded MIL-S-83318A (USAF).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 AMS 3100 adhesion promoter can be applied prior to application of the sealant.

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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

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, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2471	Anodic Treatment of Aluminum Alloys, Sulfuric Acid Process, Undyed Coating
AMS 2629	Fluid, Jet Reference
AMS 3100	Adhesion Promoter, for Polysulfide Sealing Compounds
AMS 4045	Aluminum Alloy, Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr, (7075; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS 4911	Titanium Sheet, Strip and Plate, 6Al 4V, Annealed
AMS-C-27725	Coating, Corrosion Preventive, for Aircraft Integral Fuel Tanks
AMS-S-8802	Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
AS5127	Methods For Testing Aerospace Sealants
AS5127/1	Methods For Testing Aerospace Sealants, Two-Component Synthetic Rubber Compounds

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 or www.dsp.dia.mil.

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

2.3 PRI Publications:

Available from PRI, 161 Thornhill Road, Warrendale, PA 15086-7527 or www.pri.sae.org

PD 2000	Procedures for an Industry Qualified Product Management Process
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 sealing 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 Pa•S)	
	Class B (Use No. 7 spindle at 2 rpm)	8000 to 14000 poises (800 to 1400 Pa•S)	
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. Class 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. Class B-1/6	1/6 hour (10 minutes)	AS5217/1 (5.6.2)

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Procedures (Paragraph)
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)
3.6.10	Hydrolytic Stability, min	30 Durometer A	AS5127/1 (6.6)
3.6.11	Chalking, max Use AMS 2629 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	8%	
	Flexibility	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)

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.6.15.1	Standard Cure	200 psi (1380 kPa), 150% elong.	
3.6.15.2	14 days at 140 °F (60 °C) in AMS 2629, Type I	180 psi (1240 kPa), 100% elong.	
3.6.15.3	7 days at 250 °F ± 5 (121 °C ± 3) in air	300 psi (2070 kPa), 50% elong.	
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	20 lbf/inch (3580 N/m)	
	After 70 day exposure	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	Storage Stability		
3.6.19.1	Accelerated Storage		AS5127/1 (9.1)
	Appearance	No skinning, hardening or separation that cannot be restored by normal agitation	
	Application Time	Same as 3.6.5	
	Tack-Free Time	Same as 3.6.6	
	Standard Cure Time	Same as 3.6.7	
	Peel Strength	Same as 3.6.17	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.6.19.2	Long Term Storage (6 months)		AS5127/1 (9.2)
	Appearance	No skinning, hardening or separation that cannot be restored by normal agitation	
	Application Time	Same as 3.6.5	
	Tack-Free Time	Same as 3.6.6	
	Standard Cure Time	Same as 3.6.7	
	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 PD 2000: See AS5502 (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 1/	3.6.11
Peel Strength: 4 aluminum panels, AMS 4045, sulfuric acid anodized in accordance with AMS 2471 and coated with AMS-C-27725 Type II Class B only (See 8.6) (7 day immersion only). Do not use AMS 3100 adhesion promoter. 1/	3.6.17

1/ 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	3.6.7
Standard Cure Time	3.6.8

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. Sufficient material for initial acceptance testing shall be packaged in the same type containers that are being procured. Initial acceptance tests are those listed in Table 2. After successful completion of the initial acceptance tests, the batch shall be released for final packaging. During packaging, test kits shall be selected at random for final acceptance testing. Final acceptance testing is to be conducted on the final packaged product and consist of those tests outlined in Table 3.

4.3.2 Sampling for Acceptance Tests: Each lot shall be tested as specified in Table 2. Samples shall be selected from the materials which are packaged in sectional-type containers conforming to MIL-S-38714. A sufficient number of containers shall be selected from each lot in order to conduct all the tests specified.

4.3.3 Shelf Life Surveillance and Updating:

4.3.3.1 Sampling: Shall be in accordance with AS5502 (4.1.2).

4.3.3.2 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
Condition of the container	
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 AMS 2471, coated with AMS-C-27725 Type II Class B corrosion preventive coating (see 8.6), and aged in AMS 2629, Type I for 7 days at 140 °F (60 °C).	3.6.17

4.3.3.3 Tests are to be conducted in accordance with test methods outlined herein for acceptance tests. 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. Up to three updatings is permissible.

4.4 Approval:

Shall be in accordance with AS5502 (4.4)

4.5 Test Methods:

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).

4.5.3.2 Preparation of Peel Strength Test Panels: Test panel configuration shall be in accordance with AS5127/1 (8.) "Peel Strength Properties" and (8.1) "Peel Strength Testing" and as in Figure 22 "Five-Inch Peel Specimen Configuration".

4.5.4 Preparation of Sealing Compound: Sealing compound shall be prepared in accordance with AS5127/1 (4.) "Preparation of Sealing Compound" and subparagraphs (4.1) "Qualification Testing", (4.2) "Acceptance Testing", (4.3) "Quick-Freezing of Sealing Compound", and (4.4) "Thawing of Quick-Frozen Sealing Compound".

NOTE: When organic coatings are specified for the test panels, the coatings shall be fully cured as defined by the applicable coating specification before cleaning. The applied coatings shall be at least 14 days old and a maximum of 6 months old stored at ambient indoor temperatures.

4.5.2.2 Curing of the Sealing Compound: Shall be tested in accordance with AS5127 under (6.9) "Curing of the Sealing Compounds". For Qualification testing, the sealing compound shall be cured at for 14 days at Standard Conditions. For Acceptance testing, the sealing compound shall be given an accelerated cure for 48 hours minimum at Standard Conditions followed by 48 hours at 140 °F (60 °C).