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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3258

Issued MAY 1998

Submitted for recognition as an American National Standard

Sealing Compound, Polythioether For Aircraft Windshields and Canopies, For Use Up to 300 °F (149 °C)

1. SCOPE:

1.1 Form:

This specification covers a polythioether based sealing compound supplied as a two-component system suitable for application by brush, or by extrusion gun or spatula.

1.2 Application:

This product has been used typically for sealing aircraft windshields and canopies. This includes both sealing between the windshield/canopy and the aircraft structure for pressure sealing, and sealing around the windshield/canopy for weather sealing, but usage is not limited to such applications. The sealing compound cures at room temperature and may have an accelerated cure at higher temperatures. The sealing compounds are usable from -65 to 300 °F (-54 to 149 °C).

1.3 Classification:

Sealing compounds are classified as follows:

Class A - None

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

a. B-1/4
b. B-1/2
c. B-2

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1.4 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification 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.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification 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.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2471	Anodic Treatment of Aluminum Alloys, Sulfuric Acid Process, Undyed Coating
AMS 3803	Wipes, Cotton, Loosely Woven
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 4901	Titanium, Sheet, Strip and Plate, Annealed, 70,000 psi (485 MPa) Yield Strength
AMS 5516	Steel, Corrosion Resistant, Sheet, Strip, and Plate, 18Cr - 9.0Ni, Solution Heat Treated
AS5127	Methods for Testing Aerospace Sealants (May, 1997 - See 4.5.3.1)
AS5127/1	Methods for Testing Aerospace Sealants, Two-Component Synthetic Rubber Compounds (May, 1997 - See 4.5.3.1)
AS7001	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Description
AS7002	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Rules for Implementation
AS7003	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation
AS7200/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit and Inspection Procedures and Checklists for the Sealant Manufacturers Accreditation Program
AS7201	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Accreditation of Pass-Thru Distributors
AS7202	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Accreditation of Value Added Distributors

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-P-5425	Plastic, Sheet, Acrylic, Heat Resistant
MIL-P-8184	Plastic Sheet, Acrylic, Modified
MIL-P-23377	Primer Coatings: Epoxy, High Solids
MIL-G-25667	Glass, Monolithic, Aircraft Glazing
MIL-P-25690	Plastic, Sheets and Formed Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant
MIL-P-38714	Sealant Cartridge for Two-Component Materials
MIL-P-83310	Plastic, Sheet, Polycarbonate, Transparent
MIL-P-85285	Coating, Polyurethane, High Solids
MIL-P-85582	Primer Coatings: Epoxy, Waterborne

3. TECHNICAL REQUIREMENTS:

3.1 Materials:

The basic ingredient shall be polythioether type synthetic rubber. The sealing compound shall cure by the addition of a curing agent to the base compound, and shall not depend on solvent evaporation for curing. The material shall contain no lead, chromium or asbestos 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.

3.2 Properties:

The sealing compound, when mixed in accordance with the manufacturer's instructions and cured in accordance with 4.5.2.5, shall conform to the requirements shown in Table 1, and determined in accordance with specified test methods as defined in Table 1.

3.3 Performance and Application Requirements:

Performance requirements define those properties of the cured sealant related to performance in service. Application requirements define those properties of the uncured sealant which affect the application parameters of the sealant, but have little or no effect on performance properties of the cured sealant. Minor variations in the Application requirements during quality conformance inspection, such as receiving inspection tests, may not be cause for rejection if approved by the purchaser. Application requirements are listed below; all other properties are performance requirements.

3.3 (Continued):

a. Viscosity of Base Compound
b. Flow
c. Application Time
d. Tack-Free Time
e. Cure Time

TABLE 1 - Properties

Paragraph	Property	Requirement	AMS 5127/1 Standard Test Method (paragraph)
3.2.1	Color	Non-Red	Visual Examination
3.2.2	Specific Gravity, max	1.50	(6.1)
3.2.3	Nonvolatile Content, by weight, min	97%	(5.1)
3.2.4	Viscosity of Base Compound	12000 to 20000 poises (1200 to 2000 Pa·S)	(5.3) Use No. 7 spindle at 2 RPM
3.2.5	Flow	0.1 to 0.75 inches (2.5 to 19.1 mm)	(5.5.1)
3.2.6	Application Time, min from the beginning of mixing, not less than 15 grams per minute shall be extruded		(5.6.2)
	Class B-1/4	15 minutes	
	Class B-1/2	30 minutes	
	Class B-2	2 hours	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	AMS 5127/1 Standard Test Method (paragraph)
3.2.7	Tack-Free Time, max		(5.8)
	Class B-1/4	3 hours	
	Class B-1/2	4 hours	
	Class B-2	20 hours	
3.2.8	Standard Cure Time, max (30 Durometer A, min)		(5.9)
	Class B-1/4	3 hours	
	Class B-1/2	4 hours	
	Class B-2	24 hours	
3.2.9	Peel Strength, Minimum /100% cohesive failure	20 lbf/inch (3580 N/m)	(8.1) and Table 5
3.2.10	Shear Strength, min average with 100% cohesive failure	200 psi (1379 kPa)	(7.8)
3.2.11	Heat Reversion Resistance	The sealant shall not revert to a liquid or paste-like consistency, nor shall it become brittle or lose adhesion.	(6.5), Heat Cycle: 8 h at 300 °F (149 °C)
3.2.12	Corrosion	None	After exposure in 4.5.3.2 and Table 5
3.2.13	Tensile Strength and Elongation, min		(7.7)
	Standard Cure as in 4.5.2.5	250 psi (1724 kPa), 200% elong.	
	8 hours at 250 °F (121 °C)	150 psi (1034 kPa), 100% elong.	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	AMS 5127/1 Standard Test Method (paragraph)
3.2.14	Low-Temperature Flexibility	No visual evidence of cracking, checking, or loss of adhesion	(7.6.2)
3.2.15	Hydrolytic Stability, min	30 Durometer A	(6.6)
3.2.16	Crazing	No evidence of crazing or chemical degradation	(7.11) Use appropriate adhesion promoter.
3.2.17	Storage Stability		
3.2.17.1	Accelerated Storage		(9.1)
	Viscosity of Base Compound	Same as 3.2.4	
	Application Time	Same as 3.2.6	
	Tack-Free Time	Same as 3.2.7	
3.2.17.2	Long-Term Storage		(9.2)
	Viscosity of Base Compound	Same as 3.2.4	
	Application Time	Same as 3.2.6	
	Tack-Free Time	Same as 3.2.7	

3.4 Quality:

The sealing compound, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practical and free from imperfections detrimental to the usage of the compound. There shall be no separation of ingredients that cannot be readily dispersed.

3.5 Qualification:

Material furnished under this specification shall be products which are authorized by the qualifying agency for listing on the applicable qualified products list at the time of contract award.

3.6 Shelf Life:

Packaged material shall have a minimum shelf life of six months from the Date of Packaging when stored unopened at 80 °F (27 °C) or lower. Premix frozen material has a shelf life of 30 days when stored at -100 °F (-73 °C).

3.6.1 Date of Packaging: Date of Packaging is defined as the date finished material is assembled from its components, base compound and curing compound, into a package, labeled kit or unit by the manufacturer or re-packager. Date of Packaging shall be no more than 90 days from the last day of full quality conformance testing in accordance with 4.2.2. Material may be retested by the manufacturer at any time to determine conformance to full quality conformance testing in accordance with 4.2.2.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the sealing compound shall supply all samples and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the sealing compound conforms to the requirements of this specification.

4.1.1 Source Inspection: Material procured by the U.S. Military under this specification shall be third party approved prior to shipment, to ensure that material meets acceptance tests (4.2.1). Third party approval shall be by a third party accreditation process in accordance with AS7001, AS7002, AS7003, and AS7200/1. Sealant shall be from a manufacturer that currently holds a third party accreditation and shall be from a batch of material that has been third party source inspected in accordance with AS7200/1. Distributors supplying sealant shall supply material from an accredited manufacturer and from a batch of material that has been third party source inspected. Distributors shall also be third party accredited in accordance with AS7201 or AS7202, whichever is applicable.

4.1.2 Shelf-Life of Surveillance and Updating:

4.1.2.1 Sampling: The minimum number of samples to be tested during shelf-life surveillance and updating is shown in Table 2.

TABLE 2 - Shelf-Life Surveillance Samples

Items in Stock	Samples to be Tested
Up to 100, excl	3
100 to 500, incl	5
Over 500	7

4.1.2.2 Testing: The following inspections are to be conducted for shelf-life surveillance and updating:

a. Condition of Container
b. Application Time
c. Tack-Free Time
d. Standard Cure Time
e. Peel Strength on MIL-P-25690

4.1.2.2.1 Tests are to be conducted in accordance with test methods outlined in this specification for acceptance tests. If the 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 will be allowed.

4.2 Classification of Tests:

4.2.1 Qualification Tests: All technical requirements are qualification tests and shall be performed prior to or on the initial shipment of sealing compound to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1.1 Qualification: For direct U.S. Military procurement, and for procurement on U.S. Military contracts, the sealant shall be a product that has been tested, has passed the qualification tests of 4.2.1, and has been listed or approved for listing on the applicable U.S. Military qualified products list.

4.2.2 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each batch:

Nonvolatile content
Viscosity of the base compound
Flow
Application time
Tack-free time
Standard Cure Time (Hardness)
Peel strength on MIL-P-25690

4.3 Sampling and Testing:

4.3.1 For Acceptance Tests: Sufficient sealing compound shall be taken at random from each batch to perform all the required tests. The number of determinations for each required test shall be as specified in the applicable test procedure or, if not specified herein, not less than three. Multiple testing is not required for viscosity, application time, flow, and tack-free time.

4.3.1.1 A batch is defined as a quantity of formulated material mixed as one production entity.

4.3.1.2 Materials for testing shall be mixed, as much as possible, in the same containers in which the sealing compounds were procured.

4.3.1.3 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1.

4.3.2 For Qualification Tests: Samples shall consist of six 1 quart (1-L) containers of sealing compound. Samples shall be identified as specified below and forwarded to the activity responsible for qualification testing as designated in the letter of authorization from that activity (See 8.2).

SEALING COMPOUND, POLYTHIOETHER, FOR AIRCRAFT WINDSHIELDS AND CANOPIES, FOR USE UP TO 300 °F (149 °C)
AMS 3258 CLASS XX
Manufacturer's Identification
Batch Number
Date of Manufacture
Submitted by (name) (date) for qualification tests in accordance with AMS 3258 under authorization (reference authorizing letter).

4.4 Approval:

4.4.1 Sealing compound shall be approved by purchaser before sealing compound for production use is supplied, unless such approval be waived by purchaser. For direct U.S. Military procurement and for procurement for use on U.S. Military contracts, the sealing compound shall be listed, or approved on the applicable U.S. Military qualified products list. Results of tests on production sealing compound shall be essentially equivalent to those on the approved (qualified) sample.

4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production product which are essentially the same as those used on the approval sample. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Standard Conditions: Standard laboratory conditions shall be 77 °F ± 2 (25 °C ± 1) and 50% ± 5 relative humidity. Except as otherwise specified herein, all test specimens shall be cured under these conditions. Test specimens shall be prepared at 77 °F ± 5 (25 °C ± 3) and immediately upon completion of preparation, shall be placed into standard conditions for cure. Except as otherwise specified herein, tests shall be performed at 77 °F ± 5 (25 °C ± 3).

4.5.1.1 Standard Tolerances: Unless otherwise specified herein, standard tolerances of AS5127 under (3.1) "Standard Tolerances" shall apply.

4.5.2 Preparation of Test Specimens: Test panel configuration shall be as defined in AS5127/1 under (8.1.1) “Peel Strength Properties, Classes B, D, and E” and (Figure 22) for “Five-Inch Peel Specimen Configuration”.

4.5.2.1 Cleaning of Test Panels: Test panels shall be cleaned in accordance with Table 3 and methods in accordance with AS5127.

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.

TABLE 3 - Cleaning of Test Panels

Panel Material	Cleaning Method, AS5127 (paragraph)
Aluminum alloy, MIL-P-23377 test surface	(6.2.2.1) “Cleaning of MIL-P-23377 Surface for Sealing”
Aluminum alloy, MIL-C-85285 test surface	(6.2.3.1) “Cleaning of MIL-C-83286 Surface for Sealing”
Aluminum alloy, MIL-P-85582 test surface	(6.2.4.1) “Cleaning of MIL-P-85582 Surface for Sealing”
AMS 5516 Stainless steel	(6.3) “Preparation of AMS 5516 Stainless Steel Panel Test Surfaces”
AMS 4901 Titanium alloy	(6.4) “Preparation of AMS 4901 Titanium Panel Test Surfaces”
Transparent surfaces: (prior to applying adhesion promoter) MIL-P-5425 MIL-P-25690 MIL-P-83310 MIL-G-25667 MIL-P-8184	(6.6) “Preparation of Aircraft Transparent Surfaces”

4.5.2.2 Application of Adhesion Promoter: When specified, the panel surface shall be treated with craze resistant adhesion promoter as recommended by the manufacturer. This shall be done immediately after the panel is cleaned and by wetting a clean AMS 3803 cloth and wiping the surface. Allow adhesion promoter to air dry at least 30 minutes but no more than two hours before applying the sealant. If more than two hours has elapsed, reclean and reapply the adhesion promoter before applying the sealant.

4.5.2.3 Preparation of Sealing Compound: The quantity of sealing compound required for testing shall be thoroughly mixed as thoroughly as possible according to the manufacturer's instructions.

4.5.2.4 Application of Sealing Compound: Unless otherwise specified herein, test panels shall be given an application of sealing compound to produce a coating having a total thickness of 0.125 inch ± 0.016 (3.0 mm ± 0.4) when cured.

4.5.2.5 Standard Cure: For qualification testing the sealing compound shall be cured for 14 days at 77 °F (25 °C) and 50% ± 5 relative humidity. For acceptance testing, the sealing compound shall be given an accelerated cure for 48 hours at 77 °F (25 °C) and 50% ± 5 relative humidity plus 24 hours at 140 °F (60 °C). Tests on the cured sealing compound shall commence not more than two days after the completion of the specified cure.

4.5.3 Standard Test Methods: Standard test methods as shown in Table 4 shall be used. Standard test methods are in accordance with AS5127/1. In the event of a conflict between the text of this document and AS5127 and/or AS5127/1, the text of this document takes precedence.

4.5.3.1 Future Revisions of AS5127 and AS5127/1: Use of a specific issue of AS5127 and of AS5127/1 is for clarity. Future revisions of AS5127 and AS5127/1, when published, may be used providing test methods correspond in kind to those of the issues listed in 2.1.

TABLE 4 - Standard Test Methods

Test Method	AS5127/1
Specific Gravity	(6.1) "Specific Gravity"
Hardness	(6.2) "14-Day Hardness"
Nonvolatile content	(5.1) "Nonvolatile Content"
Viscosity of Base Compound	(5.3) "Viscosity of Base Compound"
Flow (class B only)	(5.5.1) "Flow, Classes B and D"
Application Time (Class B)	(5.6.2) "Application Time, Class B and C Material"
Tack-Free Time	(5.8) "Tack-Free Time"
Standard Cure Time	(5.9) "Standard Curing"
Peel Strength (See Table 5)	(8.1) "Peel Strength Testing"
Shear Strength	(7.8) "Shear Strength (Class C only)"
Heat Reversion Resistance	(6.5) "Heat Reversion Resistance (Classes B and C only)"
Tensile Strength and Elongation	(7.7) "Tensile Strength and Elongation"
Low Temperature Flexibility	(7.6.2) "Low Temperature Flexibility (Windshield Sealant)"
Hydrolytic Stability	(6.6) "Hydrolytic Stability"
Crazing	(7.11) "Crazing"
Accelerated Storage Stability	(9.1) "Accelerated Storage Stability"
Long-Term Storage	(9.2) "Long-Term Storage"

4.5.3.2 Peel Strength: The panels listed in Table 5 shall be used for evaluation of peel strength. The thickness of the panels shall be as specified in Table 5. At the end of the sealing compound cure in accordance with 4.5.2.5, two panels from each substrate shall be placed into 95 percent relative humidity and at 140 °F (60 °C).

TABLE 5 - Peel Strength Panels

Quantity Required	Panel Thickness, Inch (mm)	Panel Material	Exposure
2	0.040 (1.02)	Al alloy AMS 4045 sulfuric acid anodized per AMS 2471, 0.001 inch (0.025 mm) overcoat of MIL-P-23377 primer. Apply the manufacturer's adhesion promoter.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	Al alloy AMS 4045 sulfuric acid anodized per AMS 2471, 0.001 inch (0.025 mm) overcoat of MIL-P-23377 primer. Apply the manufacturer's adhesion promoter.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	Al alloy AMS 4045 sulfuric acid anodized per AMS 2471, 0.001 inch (0.025 mm) overcoat of MIL-P-85582 water based primer. Apply the manufacturer's adhesion promoter.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	AMS 5516 Stainless steel. Apply the manufacturer's adhesion promoter.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	AMS 4901 Titanium alloy. Apply the manufacturer's adhesion promoter.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	MIL-P-5425 Acrylic. Apply the manufacturer's adhesion promoter, if required.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	MIL-P-25690 Acrylic. Apply the manufacturer's adhesion promoter, if required.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	MIL-P-83310 Polycarbonate. Apply the manufacturer's adhesion promoter, if required.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	MIL-P-25667 Glass, Type I. Apply the manufacturer's adhesion promoter, if required.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.
2	0.040 (1.02)	MIL-P-8184 Craze Resistant Acrylic. Apply the manufacturer's adhesion promoter, if required.	2 panels in 95% RH at 140 °F (60 °C) for 7 days.