

AEROSPACE MATERIAL SPECIFICATION



AMS 3259B

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Superseding AMS 3259A	

Sealing Compound, Polythioether
Nonchromated, Corrosion Inhibiting
for Intermittent Use to 360 °F (182 °C)

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1. SCOPE:

1.1 Form:

This specification covers a polythioether sealing compound with nonchromated corrosion inhibitors supplied as a two-component system which cures at room temperature.

1.2 Application:

The compound has been used typically for faying surface sealing and for wet-installation of fasteners in aircraft structural joints, but usage is not limited to such applications. This compound is also suitable for fillet sealing and overcoating fasteners in nonfuel areas. The sealing compounds are usable from -65 to +320 °F (-54 to +160 °C) with short term (six hour) exposures up to 360 °F (182 °C).

CAUTION: Do not use this material for fillet sealing and overcoating fasteners in fuel areas.

1.3 Classification:

The sealing compound covered by this specification is classified by method of application and application time as follows:

Class A - Suitable brush application, available with the following application times:
(Not Applicable)

Class B - Suitable for application by extrusion gun or spatula, available with the following application times:

B-1/2
B-2

Class C - Suitable for application by extrusion gun, spatula, brush or roller. Used for faying surface sealing only. Available with the following application times:

C-12
C-24
C-48

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 2400	Cadmium Plating
AMS 2471	Anodic Treatment of Aluminum Alloys, Sulfuric Acid Process, Undyed Coating
AMS 2629	Fluid, Jet Reference
AMS 2825	Material Safety Data Sheets
AMS 3020	Oil, Reference, for "L" Stock Rubber Testing
AMS 3021	Fluid, Reference for Testing Diester (Polyol) Resistant Material
AMS 3100	Adhesion Promoter for Polysulfide Sealing Compounds
AMS 3276	Sealing Compound, Integral Fuel Tanks and General Purpose, Intermittent Use to 360 °F (182 °C)
AMS 3819	Cloths, Cleaning for Aircraft Primary and Secondary Structural Surfaces
AMS 4037	Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024-T3 Sheet/-T351 Plate), Solution Heat Treated
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 4049	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
AMS 4901	Titanium, Sheet, Strip and Plate, Annealed, 70,000 psi (485 MPa) Yield Strength
AMS 4911	Titanium Alloy, Sheet, Strip and Plate, 6Al - 4V Annealed
MAM 4911	Titanium Alloy, Sheet, Strip and Plate, 6Al - 4V Annealed
AMS 5516	Steel, Corrosion Resistant, Sheet, Strip, and Plate, 18Cr - 9.0Ni, Solution Heat Treated
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 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117 Salt Spray (Fog) Testing
ASTM D 412 Rubber Properties Vulcanized Rubber and Thermoplastic Rubber and Thermoplastic Elastomers in Tension
ASTM D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 2240 Rubber Property - Durometer Hardness

2.3 U.S. Government Publications:

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

TT-N-97 Naphtha, Aromatic
CCC-C-419 Cloth, Duck, Cotton, Unbleached, Plied Yarns, Army and Numbered
PPP-B-636 Box, Shipping, Fiberboard
PPP-C-96 Can, Metal, 28 Gage and Lighter
PPP-P-704 Pail, Metal (Shipping, Steel, 1 Through 12 Gallons)
PPP-D-729 Drums, Shipping and Storage, Steel, 55 Gallon (208 Liters)
FED-STD-141 Paint, Varnish, Lacquer and Related Materials, Inspection, Sampling and Testing
FED-STD-601 Rubber Sampling and Testing
MIL-S-5002 Surface Treatments and Inorganic Coatings for Metal Surfaces of Weapons Systems
MIL-S-7839 Screw Structural, Aircraft
MIL-C-5541 Chemical Conversion Coatings on Aluminum Alloys
MIL-A-9962 Abrasive Mats, Non-woven, Non-metallic
MIL-P-23377 Primer Coatings: Epoxy, High Solids
MIL-C-27725 Coating, Corrosion Preventive, for Aircraft Integral Fuel Tanks
MIL-C-38334 Corrosion Removing Compound, Prepaint, for Aircraft Aluminum Surfaces
MIL-C-38736 Cleaning Compound, Solvent Mixtures (Metric)
MIL-C-81706 Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-C-85582 Primer Coatings: Epoxy Waterborne
MIL-S-38714 Sealant Cartridge for Two-Component Materials
MIL-L-81352 Lacquer, Acrylic (For Naval Weapons Systems)
MIL-T-9046 Titanium and Titanium Alloy, Sheet, Strip and Plate
MIL-C-85285 Coating, Polyurethane, High Solids
MS24694 Screw, Machine, Flat Countersunk Head, 100 Deg, Cross Recessed, URIC-3A and UNF-3A

2.4 AIA Publications:

Available from National Standards Association, Inc., 1321 14th Street NW, Washington, DC 20005.

NAS 679 Nut, Self Locking, Hexagon Head, Titanium, .190 to .500

3. TECHNICAL REQUIREMENTS:

3.1 Materials:

The basic ingredient shall be polythioether type synthetic rubber with additive(s) for corrosion inhibition. 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 or chromium 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. The base compound and the curing agent shall be of uniform blend and shall be free of skins, lumps, and gelled or coarse particles.

3.2 Properties:

The sealing compound, when mixed in accordance with the manufacturer's instructions and cured as specified in 4.5.2.7, shall conform to the following requirements, determined in accordance with specified test methods in Table 1.

TABLE 1 - Properties

	Paragraph	Property	Requirement	Test Method
3.2.1		Specific Gravity of Base Compound, max	1.50	ASTM D 792, Method A-1
3.2.2		Nonvolatile Content, min		4.5.3
		Class B	96%	
		Class C	94%	
3.2.3		Viscosity of Base Compound		4.5.4
		Class B	9000 to 18000 poises (900 to 1800 Pa·S)	
		Class C	1500 to 4000 poises (150 to 400 Pa·S)	
3.2.4		Viscosity of Accelerator	700 to 1600 poises (70 to 160 Pa·S)	4.5.5
3.2.5		Flow (Class B only)	0.1 to 0.75 inch (2.5 to 19.1 mm)	4.5.6
3.2.6		Application Time, min		4.5.7

TABLE 1 - Properties (Continued)

	Paragraph	Property	Requirement	Test Method
3.2.6.1		Class B - From the beginning of mixing, not less than 15 grams per minute shall be extruded		
		B-1/2	1/2 hour	
		B-2	2 hours	
3.2.6.2		Class C - From the beginning of mixing, not less than 30 grams per minute shall be extruded		
		C-12	12 hours	
		C-24	24 hours	
		C-48	48 hours	
3.2.7		Assembly Time, min		
		Class C-12	24 hours	4.5.8
		Class C-24	80 hours	
		Class C-48	168 hours	
3.2.8		Tack-free Time (Measured from the beginning of mixing) Max		4.5.9
		Class B-1/2	3 hours	
		Class B-2	14 hours	
		Class C-12	7 days	
		Class C-24	10 days	
		Class C-48	14 days	
3.2.9		Standard Cure Time, Max (30 Shore A, Min)		4.5.10
		Class B-1/2	4 hours	
		Class B-2	24 hours	
		Class C-12	8 days	
		Class C-24	21 days	
		Class C-48	35 days	

TABLE 1 - Properties (Continued)

	Paragraph	Property	Requirement	Test Method
3.2.10	Peel Adhesion, min (All Classes)		20 pounds force/inch (3502 N/m) 100% cohesive failure	4.5.11
3.2.11	Tensile Strength/Elongation (Class B and C), min Standard Cure		200 psi (1.4 MPa) 200%	4.5.12
	12 days at 140 (F) (60 (C)) In AMS 2629, Type I		150 psi (1.03 MPa) 150%	
	12 days at 140 (F) (60 (C)) in AMS 2629 Type I, plus 24 hours at 120 (F) (49 (C)) plus standard heat cycle as in 4.5.1.3		150 psi (1.03 MPa) 100%	
	Standard Heat Cycle as in 4.5.1.3		200 psi (1.4 MPa) 100%	
	72 hours in AMS 3021 at Room Temperature		200 psi (1.4 MPa) 200%	
	72 hours in AMS 3020 at Room Temperature		200 psi (1.4 MPa) 200%	
3.2.12	Shear Strength (Class C), min		150 psi (1034 kPa) 100% cohesive failure	4.5.13
3.2.13	Low-Temperature Flexibility		No visual evidence of cracking, checking, or loss of adhesion	4.5.14
3.2.14	Long Term Storage			4.5.15
3.2.14.1	Application Time		Same as 3.2.6	
3.2.14.2	Tack Free Time		Same as 3.2.8	
3.2.14.3	Cure Time		Same as 3.2.9	
3.2.15	Repairability		10 pounds force/inch (1751 N/m) 100% cohesive failure	4.5.16

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Method
3.2.16	Paintability	No separation from sealant	4.5.17
3.2.17	Shaving and Sanding	No rolling or tearing of the sealant smooth finish	4.5.18
3.2.18	Corrosion Test		4.5.19
	Galvanic Cell	No visible evidence of corrosion	
	Aluminum/Titanium Couple	No visible evidence of corrosion	
	Aluminum-Cadmium Plated Steel Couple	No visible evidence of corrosion	
	Aluminum/Epoxy Graphite (AS4/3501-6) Composite Couple	No visible evidence of corrosion	
3.2.19	Weight Loss Flexibility and Swell		4.5.20
3.2.19.1	Weight loss, max	10%	
3.2.19.2	Flexibility	No cracking or checking	
3.2.19.3	Swell	5 to 25%	
3.2.20	Thermal Rupture, max	0.15 inch (3.8 mm) No blistering or sponging	4.5.21
3.2.21	Air Content, max (Class B only)	4%	4.5.22

3.3 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.

3.4 Qualification:

The sealing compounds furnished under this specification for U.S. Government procurement shall be products which are authorized by the qualifying agency for listing on the applicable qualified products list at the time set for opening of bids (See 4.2.2 and 8.2).

3.5 Shelf Life:

Packaged material shall have a minimum shelf life of nine months from Date of Packaging when stored unopened at 80 °F (27 °C) or lower.

- 3.5.1 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 repackager. Date of Packaging shall be no more than 90 days from the last day of full quality acceptance testing in accordance with 4.2.1. Material may be retested by the manufacturer at any time to determine conformance to full quality acceptance testing in accordance with 4.2.1. A sample of the material may be sent back to the manufacturer at any time for testing to determine conformance to full qualification testing in accordance with 4.2.2.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the product shall supply all samples for vendor's tests 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 product 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.

4.2 Classification of Tests:

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

Hardness

Nonvolatile content

Viscosity of the base compound

Viscosity of the curing agent

Application time (3.2.6)

Assembly time (3.2.7)

Tack-free time (3.2.8)

Standard curing rate (3.2.9)

Peel strength two aluminum panels coated with material conforming to MIL-C-27725 aged in equal parts AMS 2629 jet reference fluid (JRF) and 3% sodium chloride solution for seven days at 140 °F (60 °C) (3.2.11)

Shear strength (Class C only)

Corrosion test-Galvanic cell test only

4.2.1.1 Testing viscosity of base compound or curing agent shall be performed in quart cans (1 L) on compound packaged in sectionalized containers or small size containers of less than eight ounces (235 mL).

4.2.2 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.

4.2.2.1 The first compound that a manufacturer must qualify is Class B-2. That compound shall meet all applicable requirements of this specification. Once qualification for Class B-2 is obtained, other classes may be qualified. The formulation for the other classes and application times shall be the same as that for the Class B-2, except for minor variations necessary for viscosity and application life. It will not always be necessary for the qualifying agency to conduct all tests on the other classes. In general, the acceptance tests will be sufficient, although additional tests can be required. The manufacturer shall show proof that all requirements are met prior to requesting qualification approval for any class. This includes assurance that the compound will cure at standard conditions. After the compound has been accepted for qualification, approval will be granted and the compound will be identified by reference to the manufacturer's code or formula number.

4.2.2.2 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient sealing compound shall be taken at random from each batch to perform all the required tests. A batch shall be the quantity of material run through a mill or mixer at one time. 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, except that multiple testing is not required for viscosity, application time, flow, and tack-free time.

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

4.3.1.2 If the compound is being procured in plastic injection kits, such as those conforming to MIL-S-38714, all tests shall be conducted on compound that has been packaged and mixed in the initial sample injection kits except for viscosity of base compound and viscosity of the curing agent. During filling of the initial sample injection kits, base compound and curing agent shall be placed in 1-quart (1 L) cans for the viscosity tests. If more than one size of injection kits are to be packaged from a particular batch, it is necessary to test compound from only one size kit.

4.3.1.3 If the compound is being procured in cans, pails, or drums, the batch shall be tested on the compound placed in 1-quart (1 L) cans.

4.3.1.4 If the compound is being procured in both type containers, the quality conformance tests shall be conducted on the compound packaged in plastic injection kits (See 4.3.1.2).

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

4.3.1.6 For U.S. Government Procurement: Each batch shall be subjected to both initial and final acceptance testing. Sufficient compound for initial acceptance testing shall be packaged in the same type containers that are being procured. Initial acceptance tests are those listed in 4.2.1. After successful completion of the initial quality conformance tests, the batch shall be released for final packaging. During packaging, test kits shall be picked at random to perform the following final acceptance tests:

Application time (3.2.6)

Tack-free time (3.2.8)

Standard cure time (3.2.9)

Air content (3.2.21)

4.3.1.6.1 If the batch is being packaged in different type and/or different size containers, the final acceptance tests shall be conducted on each type and/or each size containers. If the compound is being procured under different purchase orders, but the purchase orders call for the same type and size containers, it is only necessary to conduct the final acceptance tests once.