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INTERNATIONAL®
400 Commonwealth Drive, Warrendale. PA 15096-0001

# AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3267A

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Superseding AMS 3267

Submitted for recognition as an American National Standard

## SEALING COMPOUND, LOW ADHESION, CORROSION INHIBITING For Removable Panels and Fuel Tank Inspection Plates

1. SCOPE:

1.1 Form:

This specification and its supplementary detail specifications cover accelerated curing synthetic rubber compounds with corrosion inhibitors and low adhesive strength, supplied as a two-component system, curing at room temperature.

1.2 Application:

This product has been used typically for sealing aircraft access doors and accessories where gaskets are required, but usage is not limited to such applications. The sealing compounds are resistant to both jet fuels and high aromatic aviation gasolines and are usable from -55 to +120 °C (-67 to +248 °F).

1.3 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.

1.4 Classification:

The requirements specified herein and in the applicable detail specification define each sealing compound on the basis of property characteristics and application time, as shown in the title of each detail specification.





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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 2825 Material Safety Data Sheets
AMS 3180 Toluene, Industrial Grade
AMS 4049 Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr, (Alcad 7075; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 2240 Rubber Property - Durometer Hardness
ASTM D 3227 Mercaptan Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

TT-S-735 Standard Test Fluids, Hydrocarbon
CCC-C-419 Cloth, Duck, Cotton, Unbleached
PPP-B-636 Boxes, Shipping, Fiberboard
PPP-C-96 Cans, Metal, 28 Gage and Lighter
FED-STD-791 Lubricants. Liquid Fuels and Related Products; Methods of Testing
MIL-P-38714 Packaging and Packing of Two Component Materials in Semkits
MIL-C-38736 Compound, Solvent, For Use in Integral Fuel Tanks
MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specifications:

The requirements for a specific material shall consist of all the requirements specified herein in addition to requirements specified in the applicable detail specification. In case of conflict between requirements of this basic specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Materials:

The basic ingredient used in the manufacture of these products shall be synthetic rubber of the polysulfide type with added available chromate for corrosion inhibition. The sealants shall cure by addition of a curing compound to the base compound, and shall not depend on solvent evaporation for curing. The materials shall contain no lead compounds.

3.3 Properties:

Shall conform to requirements specified in the applicable detail specification, determined in accordance with test methods specified in 4.5.

3.4 Quality:

Compound, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practicable, and free from imperfections detrimental to usage of the compound.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:
(R)

The vendor of sealing compound 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 sealing compound conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for requirements specified in Table 1 are acceptance tests and shall be performed on each lot.

TABLE 1 - Acceptance Tests

| Requirement | Reference |
|---|---|
| Color | See detail specification |
| Nonvolatile content | See detail specification |
| Viscosity of base compound | See detail specification |
| Flow, as applicable | See detail specification |
| Application time | See detail specification |
| Tack-free time | See detail specification |
| Hardness | See detail specification |
| Weight loss and flexibility | See detail specification |

4.2.1.1 The accelerated cure of 4.5.2.4 shall be used for acceptance testing.

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction 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 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:
(R)
Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient compound shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all sealing compound of the same class and composition manufactured as one batch and presented for vendor's inspection at one time. An inspection lot shall not exceed 2000 pounds (907 kg) of compound and may be packaged in smaller quantities and delivered under the basic lot approval provided lot identification is maintained.

4.3.1.2 Materials for testing shall, as much as is practicable, be mixed in the same containers in which the products were procured.

4.3.1.3 When a statistical sampling plan has been agreed upon by purchaser and
(R) vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample compound shall be approved by purchaser before compound for production use is supplied, unless such approval be waived by purchaser. Results of tests on production compound shall be essentially equivalent to those on the approved sample compound.

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

4.5 Test Methods:

Shall be in accordance with test methods shown in Table 2.

TABLE 2 - Test Methods

| Requirement | Test Procedure |
|---|---|
| Color | Visual |
| Specific gravity of cured sealant | ASTM D 792, Method A-l |
| Nonvolatile content | 4.5.4.1 |
| Viscosity of base compound | See detail specification |
| Flow, as applicable | See detail specification |
| Application time | See detail specification |
| Tack-free time | 4.5.4.2 |
| Hardness | ASTM D 2240 |
| Peel adhesion | 4.5.4.3 |
| Resistance to heat | 4.5.4.4 |
| Resistance to salt water and hydrocarbons | 4.5.4.5 |
| Weight loss and flexibility | 4.5.4.6 |
| Low-temperature flexibility | 4.5.4.7 |
| Accelerated storage stability | 4.5.4.8 |
| Soluble chromate stability | 4.5.4.9 |



4.5.1 Test Conditions: Standard laboratory testing conditions shall be 25 °C ± 1 (77 °F ± 2) and 50% ± 5 relative humidity. Except as otherwise specified herein, all test specimens shall be prepared, cured, and tested under these conditions.

4.5.2 Preparation of Test Specimens:

4.5.2.1 Cleaning of Test Panels: All test panels shall be cleaned by scrubbing and rinsing using MIL-C-38736 solvent and clean gauze which is free of sizing or any other contaminant. The panels shall then be immediately wiped dry with gauze.

4.5.2.2 Preparation of Sealing Compound: The quantity of sealing compound required for the test shall be hand mixed, either from a can or in a MIL-P-38714 package, as thoroughly as possible according to manufacturer's instructions.-

4.5.2.3 Application of Sealing Compound: See applicable detail specification.

4.5.2.4 Cure of Sealing Compound: For preproduction testing, the sealing compound shall be cured for 14 days at 25 °C ± 1 (77 °F ± 2) and 50% ± 5 relative humidity. For acceptance testing, the sealing compound shall be given an accelerated cure of 48 hours at 25 °C ± 1(77 °F ± 2) and 50% ± 5 relative humidity plus 24 hours at 60 °C ± 1 (140 °F ± 2).

4.5.3 Formulation of Jet Reference Test Fluid: The jet reference fluid required for conducting fluid immersion tests shall be formulated as shown in Table 3.

TABLE 3 - Jet Reference Fluid Formulation

| Jet Reference Fluid | Formulation |
|---|---|
| Toluene (AMS 3180) | 30 Parts by Volume |
| Cyclohexane (technical grade) | 60 Parts by Volume |
| Iso-octane (TT-S-735, Type 1) | 10 Parts by Volume |
| Tertiary dibutyl disulfide (doctor sweet) | 1 Part by Volume |
| Tertiary butyl mercaptan | 0.015% ±0.0015 by weight of other four components |

4.5.3.1 When tested for mercaptan sulfur in accordance with ASTM D 2327 and total sulfur in accordance with FED-STD-791, Method 5201, the reference fluid shall have the following properties:

Total sulfur content 0.400% ± 0.005 by weight
Mercaptan sulfur content 0.0050% ± 0.0050 by weight

4.5.3.2 The fluid shall be stored out of contact with light in containers which are inert to the fluid ingredients; welded aluminum, non-galvanized welded steel, or glass containers are suitable. If not used within 90 days after blending, the fluid should be retested for mercaptan sulfur and total sulfur content.

4.5.4 Test Methods:

4.5.4.1 Nonvolatile Content: From 5 to 10 grams of the mixed sealing compound shall be transferred as rapidly as possible to a cup approximately 3 inches (76 mm) in diameter and 3/4 inch (19 mm) in depth. A fitted cover shall immediately be placed over the cup and the weight accurately determined by using an enclosed balance which will weigh accurately to the nearest milligram. The cover shall then be removed and the sealing compound heated for 24 hours at 70 °C ± 1 (158 °F ± 2). It shall then be cooled, the cover replaced; and the weight determined. The percentage of total solids shall be calculated as shown in Equation 1.

$$\text{Percentage of solids} = \frac{\text{Final weight of sample}}{\text{Initial weight of sample}} \times 100 \qquad \text{(Eq. 1)}$$

4.5.4.1.1 The weight of the cup and cover shall be determined before using and subtracted from the initial and final weights.

4.5.4.2 Tack-free Time: A 0.040 x 2-3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.1. Sealing compound, mixed and applied in accordance with the applicable detail specification, shall cover one side of the panel to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4). The panel shall then be set to cure at standard conditions (See 4.5.1). At the end of the tack-free time (See applicable detail specification), two 1 x 7 inch (25 x 178 mm) pieces of polyethylene 0.004 inch ± 0.002 (0.10 mm ± 0.05) thick shall be applied to the sealing compound and held in place for two minutes at a pressure of approximately 1/32 psi (200 Pa). The strips shall then be slowly and evenly peeled back at right angles to the sealing compound surface. The polyethylene shall come away clean and free of sealing compound.

4.5.4.3 Peel Adhesion: A 0.040 x 2-3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.1. Sealing compound shall cover 5 inches (127 mm) of one side of the panel to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4). A 2-3/4 x 12 inch (69.8 x 305 mm) strip of CCC-C-419, Type III, cotton duck shall be impregnated with sealant, so that approximately 5 inches (127 mm) at one end is completely covered on both sides. The sealant shall be worked well into the fabric. The sealant-impregnated end of the fabric shall be placed on the sealant coated panel, and smoothed down on the layer of sealant, taking care not to trap air beneath the fabric. An additional 1/32 inch (0.8 mm) thick coating of sealing compound shall be applied over the fabric. At the end of sealant cure (See 4.5.2.4), the panel shall be immersed for 48 hours at 25 °C ± 1 (77 °F ± 2) in jet reference fluid (See 4.5.3). A 1-inch (25-mm) wide strip shall be cut through the sealant and fabric to the metal and extended the full length of the fabric. The specimens shall be stripped back at an angle of 180 degrees to the metal panel in a suitable tensile testing machine having a jaw separation rate of 2 inches (51 mm) per minute.

4.5.4.4 Resistance to Heat: A 0.040 x 2-3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.1. Sealing compound shall cover one side of the panel to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4). At the end of sealant cure (See 4.5.2.4), the panel shall be immersed vertically in jet reference fluid (See 4.5.3) for 48 hours at 60 °C ± 2 (140 °F ± 4) in a closed container with one-half of the sealant above the liquid level. The panel shall then be removed, air dried at 25 °C ± 1 (77 °F ± 2) for 24 hours, and baked at 120 °C ± 2 (248 °F ± 5) for 72 hours.

4.5.4.5 Resistance to Salt Water and Hydrocarbons: A 0.040 x 2-3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.1. Sealing compound shall cover one side of the panel to a depth of 1/8 inch ± 1/64 (3.2 ± 0.4 mm). At the end of sealant cure (See 4.5.2.4), the panel shall be immersed vertically in a covered glass vessel so that one-third of the sealant is exposed to an aqueous solution containing sodium chloride, one-third is exposed to jet reference fluid (See 4.5.3) and one-third is exposed to vapor. Immersion shall be for seven days at 60 °C ± 1 (140 °F ± 2).

4.5.4.6 Weight Loss and Flexibility: Four 1/8 x 1 x 5 inch (3.2 x 25 x 127 mm) specimens shall be cut from a sheet of the sealing compound that has been cured (See 4.5.2.4). The specimens shall be weighed and immersed in 900 mL of jet reference fluid at 60 °C ± 1 (140 °F ± 2) in a closed container for seven days. At the end of the exposure period, the specimens shall be removed from the fluid and air dried for 72 hours at 50 °C ± 1 (122 °F ± 2). The specimens shall then be cooled to a standard test temperature in a desiccator and weighed. After weighing, the specimens shall be bent 180 degrees over a 1/8 inch (3.2 mm) mandrel and examined for evidence of cracking.

4.5.4.7 Low-Temperature Flexibility: Four 0.040 x 2-3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panels shall be cleaned in accordance with 4.5.2.1. Sealing compound shall cover one side of the panels so that a 1-1/2 x 4 inch (38 x 102 mm) coating Is centered on the panels to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4). At the end of a 14 day cure, as specified in 4.5.2.4, two of the panels shall be conditioned at 120 °C ± 1 (248 °F ± 2) for an additional seven days. The panels and test jig (See Figure 1) shall be stabilized at -55 °C ± 1 (-67 °F ±2) for 2 hours. While at this temperature, each panel shall be tested by putting the panel in the slot (with the sealant coated side facing up) and rapidly bending it once around the curved portion of the jig. Each panel shall then be examined for evidence of cracking or checking.

4.5.4.8 Accelerated Storage Stability: A full, tightly closed 1 quart (946 mL) container of the base compound and a full, tightly closed container with the appropriate amount of curing compound shall be exposed to 14 days at 50 °C t 1 (122 °F ± 2). The viscosity of the base compound shall be determined. The sealing compound shall then be mixed as specified in the applicable detail specification and both the application time and tack-free time (See 4.5.4.2) determined.

4.5.4.9 Soluble Chromate Level:

4.5.4.9.1 Extraction: Weigh 1 gram of base compound into a centrifuge tube and add a 50/50 blend of dry methyl ethyl ketone and benzene solution. Mix thoroughly with a microspatula. Centrifuge, decant, and repeat twice using new dry solvent each time. After the third extraction, transfer the dry residue to a 500 mL beaker, add 300 mL of distilled water to the material in the beaker, and boil for 30 minutes. Repeat to be sure that the last extraction is colorless. Make up to 500 mL of total volume.

4.5.4.9.2 Titration: Transfer 200 mL of the extracted solution to a 600 mL beaker, cover with a watch glass, and gently boil for 10 minutes. Add 10 mL of a 0.25% silver nitrate solution (2.5 grams silver nitrate in 1000 mL of distilled water). Then cautiously add 1.5 grams of ammonium persulfate. Boil gently for an additional 10 minutes. Allow to cool, add 5 mL 1:1 sulfuric acid for each 100 mL solution, and titrate with 0.1 N ferrous ammonium sulfate solution. Use a platinum and Ag/AgCl electrode combination in a potentiometric titration to maximum deflection.

4.5.4.9.3 Calculation:

$$\frac{A \times B \times C \times D \times 100}{E} = \% \ MgCrO_4 \ . \ 5H_2O \qquad \text{(Eq. 2)}$$

A = mL ferrous ammonium sulfate
B = dilution factor (2 if 200 mL of a 400 mL extract was used in the titration)
C = normality of ferrous ammonium sulfate
D = 0.0768 (milliequivalent weight of MgCrO4.5H2O)
E = weight of sample in grams

4.6 Reports:

The vendor of sealing compound shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3267A and the applicable detail specification number and their revision letters if any, vendor's compound number, date of manufacture, and quantity.

4.6.1 (R) A material safety data sheet conforming to AMS 2825, or equivalent, shall be supplied to each purchaser prior to, or concurrent with, the report of preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of sealing compound for production use. Each request for modification of sealing compound formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.7 Resampling and Retesting:

(R) If any specimen used in the above tests fails to meet the specified requirements, disposition of the compound may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the compound represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging:

Compound shall be furnished in individual containers (for base compound and curing compound) or sectional-type containers. The ratio of the quantity contained in base container to the quantity contained in the curing agent container shall be the same as the recommended mixing ratio of the base compound and curing agent.

5.1.1 Individual Containers: The base compound shall be furnished in 1/2 pint (237 mL), 1 pint (473 mL), 1 quart (946 mL), or 1 gallon (3.79 L) metal cans, or as specified in the purchase order. Metal cans shall conform to PPP-C-96, Type V, Class 2. Tinplate cans with paper labels may be used, unless specifically prohibited by purchaser. The base compound contained in each size container shall be as shown in Table 4.

TABLE 4 - Containers

| Size of Container | Amount of Base Compound |
|---|---|
| 1/2 pint (237 mL) | 6 fluid ounces ± 1/8 (177 mL ± 4) |
| 1 pint (473 mL) | 12 fluid ounces ± 1/4 (355 mL ± 7) |
| 1 quart (946 mL) | 24 fluid ounces ± 1/2 (710 mL ± 15) |
| 1 gallon (3.79 L) | 96 fluid ounces ± 2 (2839 mL ± 60) |



5.1.1.1 The air in the top of the base compound containers shall be replaced with nitrogen gas immediately prior to closing the containers. The curing agent shall be furnished in glass jars or in suitable containers approved by purchaser. The jars or plastic containers, as applicable, shall have vertical, smooth inside walls and no internal projections or internal lips exceeding 1/16 inch (1.6 mm). The glass jars shall be closed with enameled metal or plastic continuous thread screw caps having a nonabsorbent lining material. Caps shall be tightened adequately and further sealed with cellulose bands or equivalent. One container each of the base compound and curing agent, individually packaged in accordance with the foregoing, shall be enclosed in PPP-B-636, Grade W5C, container and shall constitute a complete kit.

5.1.2 Sectional-Type Containers: The base compound and curing agent shall be furnished in high density polyethylene sectional-type 2-1/2 ounces (74 mL) or 6 ounce (177 mL) cartridges, conforming to MIL-P-38714, as specified in the purchase order. The total content of the base compound and curing agent contained in each sectional-type container shall be as shown in Table 5.