

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 which cures at room temperature.
- 1.2 Application: Primarily for use in sealing aircraft access doors and accessories where gaskets are required. The sealing compounds are resistant to both jet fuels and high aromatic aviation gasolines and are useable from -55°C to 120°C (-65°F to +250°F).
- 1.3 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.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 3180 - Thinner, Toluene
AMS 4049 - Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 1.5Mg - 1.6Cu
- 0.23Cr, (Alclad 7075; - T6 Sheet, - T651 Plate)

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- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D792 - Specific Gravity and Density of Plastics by Displacement

ASTM D2240 - Rubber Property - Durometer Hardness

ASTM D3227 - Mercaptan Sulfur in Gasoline, Kerosine, Aviation Turbine and Distillate Fuels (Potentiometric Method)

- 2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

- 2.3.1 Federal Specifications:

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

- 2.3.2 Federal Standards:

FED-STD-791 - Lubricants, Liquid Fuels and Related Products; Methods of Testing

- 2.3.3 Military Specifications:

MIL-P-38714 - Packaging and Packing of Two Component Materials in Semkits

MIL-C-38736 - Compound, Solvent; For Use in Integral Fuel Tanks

- 2.3.4 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging of

3. TECHNICAL REQUIREMENTS:

- 3.1 Detail Specifications: The requirements for a specific material shall consist of all the requirements specified herein in addition to the requirements specified in the applicable detail specification. In case of conflict between the requirements of this basic specification and an applicable detail specification, the 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 the addition of a separate 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 the requirements specified in the applicable detail specification, determined in accordance with methods specified in 4.8.
- 3.4 Quality: Compound, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practicable, and from imperfections detrimental to usage of the compound.

4. QUALITY ASSURANCE PROVISIONS:

- 4.1 Responsibility for Inspection: The vendor of the sealing compound shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. 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 to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each lot:

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 specimens acceptance testing.

- 4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification and the applicable detail specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of sealing compound to a purchaser, when a change in material or processing, or both, 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, the contracting officer, or the request for procurement.

4.3 Sampling:

- 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 lb (900 kg) of compound and may be packaged in smaller quantities 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 and acceptance quality level (AQL) have been agreed upon by purchaser and 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: Shall be 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 material or processing, or both, 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 the following:

Requirement	Test Procedure
Color	Visual
Specific gravity of cured sealant	ASTM D792, Method A-1
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 D2240
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 $25^{\circ}\text{C} \pm 1$ ($77^{\circ}\text{F} \pm 2$) and $50\% \pm 5$ relative humidity. Except as otherwise specified, 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 wiped dry immediately 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 $25^{\circ}\text{C} \pm 1$ ($77^{\circ}\text{F} \pm 2$) and $50\% \pm 5$ relative humidity. For acceptance testing, the sealing compound shall be given an accelerated cure of 48 hr at $25^{\circ}\text{C} \pm 1$ ($77^{\circ}\text{F} \pm 2$) and $50\% \pm 5$ relative humidity plus 24 hr at $60^{\circ}\text{C} \pm 1$ ($140^{\circ}\text{F} \pm 2$).

- 4.5.3 Formulation of Jet Reference Test Fluid: The jet reference fluid required for conducting fluid immersion tests shall be formulated as follows:

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% $\pm$ 0.0015 by weight of other four components

- 4.5.3.1 When tested for mercaptan and total sulfur in accordance with ASTM D3327 and FED-STD-791, Method 5201, respectively, the reference fluid shall have the following properties:

Total sulfur content 0.400% $\pm$ 0.005 by weight
Mercaptan sulfur content 0.0050% $\pm$ 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 and total sulfur content.

4.5.4 Test Methods:

- 4.5.4.1 Nonvolatile Content: From 5 to 10 g of the mixed sealing compound shall be transferred as rapidly as possible to a cup approximately 3 in. (75 mm) in diameter and 3/4 in. (19 mm) in depth. A fitted cover shall immediately be placed over the cup and the weight determined accurately 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 hr at 70°C $\pm$ 1 (158°F $\pm$ 2). It shall then be cooled, the cover replaced, and the weight determined accurately. The percentage of total solids shall be calculated as follows:

$$\text{Percentage of solids} = \frac{\text{Final weight of sample}}{\text{Initial weight of sample}} \times 100$$

The weight of the cup and cover shall be determined accurately 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 in. (1.00 x 70 x 150 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 in. $\pm$ 1/64 (3 mm $\pm$ 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 in. (25 x 175 mm) pieces of polyethylene 0.004 in. $\pm$ 0.002 (0.10 mm $\pm$ 0.05) thick shall be applied to the sealing compound and held in place at a pressure of approximately 1/32 psi (200 Pa) for 2 minutes. 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 in. (1.00 x 70 x 150 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.1. Sealing compound shall cover 5 in. (150 mm) of one side of the panel to a depth of 1/8 in. $\pm$ 1/64 (3 mm $\pm$ 0.4). A 2-3/4 x 12 in. (70 x 300 mm) strip of cotton duck conforming to CCC-C-419, Type III shall be impregnated with sealant, so that approximately 5 in. (130 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 in. (1 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 hr at 25°C $\pm$ 1 (77°F $\pm$ 2) in jet reference fluid (See 4.5.3). A 1 in. (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 angle of 180 deg to the metal panel in a suitable tensile testing machine having a jaw separation rate of 2 in. (50 mm) per minute.
- 4.5.4.4 Resistance to Heat: A 0.040 x 2-3/4 x 6 in. (1.00 x 70 x 150 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 in. $\pm$ 1/64 (3 mm $\pm$ 0.4). At the end of sealant cure (See 4.5.2.4), the panel shall be immersed vertically for 48 hr at 60°C $\pm$ 2 (140°F $\pm$ 5) in jet reference fluid (See 4.5.3) 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 $\pm$ 1 (77°F $\pm$ 2) for 24 hr, and baked at 120°C $\pm$ 2 (250°F $\pm$ 5) for 72 hours.

- 4.5.4.5 Resistance to Salt Water and Hydrocarbons: A 0.040 x 2-3/4 x 6 in. (1.00 x 70 x 150 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 in. $\pm$ 1/64 (3 $\pm$ 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 1/3 of the sealant is exposed to an aqueous solution containing sodium chloride, 1/3 is exposed to jet reference fluid (See 4.5.3) and 1/3 is exposed to vapor. Immersion shall be for 7 days at 60°C $\pm$ 1 (140°F $\pm$ 2).
- 4.5.4.6 Weight Loss and Flexibility: Four 1/8 x 1 x 5 in. (3 x 25 x 125 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 $\pm$ 1 (140°F $\pm$ 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 hr at 50°C $\pm$ 1 (120°F $\pm$ 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 deg over a 1/8 in. (3 mm) mandrel and examined for evidence of cracking.
- 4.5.4.7 Low Temperature Flexibility: Four 0.040 x 2-3/4 x 6 in. (1.00 x 70 x 150 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 in. (40 x 100 mm) coating is centered on the panels to a depth of 1/8 in. $\pm$ 1/64 (3 mm $\pm$ 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 $\pm$ 1 (250°F $\pm$ 2) for an additional 7 days. The panels and test jig (See Fig. 1) shall be stabilized at -55°C $\pm$ 1 (-67°F $\pm$ 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 qt (945 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 $\pm$ 1 (120°F $\pm$ 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 g 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 the 0.25% silver nitrate solution (2.5 g silver nitrate in 1000 mL of distilled water). Then cautiously add 1.5 g of ammonium persulfate. Boil gently for an additional 10 minutes. Allow to cool, add 5 mL 1:1 H_2SO_4 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:

$$\frac{A \times B \times C \times D \times 100}{E} = \% \text{ MgCrO}_4 \cdot 5H_2O$$

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 $MgCrO_4 \cdot 5H_2O$)

E = weight of sample in grams

4.6 Reports:

4.6.1 The vendor of the 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 of this specification. This report shall include the purchase order number, AMS 3267 and the applicable detail specification number, vendor's compound number, lot number, date of manufacture, and quantity.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3267 and the applicable detail specification number, contractor or other direct supplier of compound, supplier's compound number, part number, and quantity. When compound for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of compound to determine conformance to the requirements of this specification and shall include in the report either a statement that the compound conforms or copies of laboratory reports showing the results of tests to determine conformance.

- 4.7 Resampling and Retesting: 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 and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

- 5.1 Packaging: Unless otherwise specified, 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 pt (235 mL), 1 pt (475 mL), 1 qt (945 mL), or 1 gal (3.75 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 follows:

Size of Container	Amount of Base Compound
1/2 pt (235 mL)	6 fluid oz $\pm$ 1/8 (175 mL $\pm$ 4)
1 pt (475 mL)	12 fluid oz $\pm$ 1/4 (355 mL $\pm$ 7)
1 qt (945 mL)	24 fluid oz $\pm$ 1/2 (710 mL $\pm$ 15)
1 gal (3.75 L)	96 fluid oz $\pm$ 2 (2840 mL $\pm$ 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 in. (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 compounds 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.