AEROSPACE MATERIAL SPECIFICATION	AMS-S-4383	REV. B
	Issued 1999-07 Revised 2015-07 Superseding AMS-S-4383A	

Sealing Compound, Topcoat, Fuel Tank Buna-N Type

RATIONALE

AMS-S-4383 Rev B incorporates changes to film thickness, non-volatile content (NVC), viscosity, and color leaching requirements (based on requirement for use of oil-soluble dye). These minor changes are based on input from all qualified product manufacturers and do not change the form, fit, or function of the sealant as currently employed. Widening the NVC envelope was formally approved when the specification was MIL-S-4383 but the change was never incorporated. Allowance for use of alternative dry film thickness measurement equipment has also been included. As one-component material, batch and lot are the same so Acceptance Tests are run only once consistent with other one-component sealant specifications.

1. SCOPE

1.1 Form

This specification covers one type of one-component, air drying protective coating which cures at room temperature. The topcoat compound covered by this specification shall be formulated from butadiene acrylonitrile copolymer and shall be colored red by the use of an oil soluble dye.

1.2 Application

This material is a one part compound designed as topcoat or barrier coating for integral fuel tank sealants and coatings but usage is not limited to such applications. It may also be used for temporary repair of aircraft fuel tanks using a “fill-and-drain” technique. It may also be used as a bonding agent for materials such as synthetic rubber metals, glass, and many plastics.

1.2.1 Notice

The cured coating is resistant to exposure from both jet fuel and aviation gas; it is not suitable for use with motor fuels containing alcohols.

1.3 Safety – Hazardous Materials

Shall be in accordance with AS5502 (1.1).

2. APPLICABLE DOCUMENTS

Shall be in accordance with AS5502 (Section 2).

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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMSS4383B

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS4049 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-S-8802 Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion

AS5127 Aerospace Standard Test Methods for Aerospace Sealants Methods for Preparing Aerospace Sealant Test specimens

AS5127/1 Aerospace Standard Test Methods for Aerospace Sealants, Two-Component Synthetic Rubber Compounds

AS5502 Standard Requirements for Aerospace Sealants and Adhesion Promoters

SAE J1966 Lubricating Oils, Aircraft Piston Engine (Non-Dispersant Mineral Oil)

2.2 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2000 Goverance and Administration of a Managed Product Qualification Program

PD2001 Manufacturer Request for Product Approval and Qualification Process

PD2103 Aerospace Quality Assurance, Product Standards, Qualification Procedure, Sealants

PRI-QPL- AMS-S-4383 Products Qualified Under AMS-S-4383

2.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B36 Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar

ASTM D130 Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

ASTM D381 Standard Test Method for Gum Content in Fuels by Jet Evaporation

ASTM D471 Standards Test Method for Rubber Property – Effect of Liquids

ASTM D1005 Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

ASTM D4976 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials

2.4 U.S. Government Publications

Copies of these documents are available online at http://quicksearch.dla.mil.

CCC-C-432 Cloth, Sheeting, Cotton, (Unbleached, Bleached, and Dyed)

MIL-PRF-23699 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number O-156

3. TECHNICAL REQUIREMENTS

3.1 Materials

The compound covered by this specification shall be formulated from butadiene acrylonitrile copolymer and shall be colored red by the use of an oil soluble dye.

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

Shall be a minimum of 6 months from date of packaging when stored below 80 ºF (27 ºC). Shelf life shall be a minimum of 6 months if calculated from date of shipment in accordance with individual manufacturer policies and warranties. Independent of shelf life policy, every container shall clearly indicate start and/or expiration date of shelf life prior to shipment. Material may be tested for shelf life extension per 4.3.3.

3.6 Properties

The compound 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 Method
3.6.1	Nonvolatile Content, (by weight)	17 to 24%	AS5127/1 (5.1)
3.6.2	Viscosity	250 to 2000 Centipoise (0.25 to 2.0 Pa-S)	AS5127/1 (5.3) Use No.2 spindle at 10 rpm
3.6.3	Tack Free Time, max	4 hours	AMS-S-4383 (4.6.1)
3.6.4	Accelerated Storage Stability	No greater than ±10 percent viscosity change from original viscosity per 3.6.2. Topcoat material shall not separate or gel.	AS5127/1 (9.1)
3.6.5	Working properties		AMS-S-4383 (4.5.4)
3.6.5.1	Film Quality	Brush and dip coats of the topcoat compound, shall be smooth, uniform, and free of sagging, bubbles, pinholes, cracks, and other film irregularities.	
3.6.5.2	Film Thickness	0.0005 to 0.0030 inches (0.013 to 0.076 mm)	ASTM D 1005, Procedure C and AMS-S-4383 (4.6.9)
3.6.5.3	Recoating	A coat of the topcoat compound when applied over a freshly dried film of topcoat compound and over a cured film of polysulfide sealing compound qualified to AMS-S-8802 shall show satisfactory bonding and no lifting, cracking, blistering, or loss of adhesion.	
3.6.6	Peel Strength, min	5 pounds force/inch (875 N/m) on AMS4049 10 pounds force/inch (1750 N/m) on AMS-S-8802	AMS-S-4383, (4.6.8) and AS5127/1 (8.1)
3.6.7	Low Temperature Flexibility	No visual evidence of cracking, checking, or loss of adhesion.	AMS-S-4383 (4.6.2) and AS5127/1 (7.6)
3.6.8	Resistance to Heat	No evidence of hardening, blistering, checking, cracking, shrinkage, loss of adhesion, or loss of flexibility	AMS-S-4383 (4.6.3)
3.6.11	Resistance to Salt Water and Hydrocarbons	No evidence of softening, blistering, leaching, corrosion, or loss of adhesion. Color leaching into hydrocarbon is permitted.	AMS-S-4383 (4.6.4)
3.6.12	Resistance to Hot Oil	No evidence of cracking, flaking, or loss of adhesion.	AMS-S-4383 (4.6.5)
3.6.13	Fuel Contamination	20 milligrams per 100 milliliters, max. No more than slight discoloration shall be present on a freshly polished copper strip.	AMS-S-4383 (4.6.6)
3.6.14	Sealing Compound Protection	No evidence of appreciable leaching, change in hardness, flexibility, or signs of cracking in sealing compound. No evidence of cracking, checking, or loss of adhesion of topcoat compound.	AMS-S-4383 (4.6.7)

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Shall be in accordance with AS5502 (4.1).

4.1.1 Sampling

Shall be in accordance with AS5502 (4.3).

4.2 Classification of Tests

Shall be in accordance with AS5502 (4.2).

4.2.1 Qualification Tests

Shall be in accordance with AS5502 (4.2.1).

4.2.2 Acceptance Tests

Requirements shown in Table 2 are acceptance tests and shall be performed on each lot prior to final packaging.

Table 2 - Acceptance tests

Test	Requirement Paragraph
Nonvolatile Content	3.6.1
Viscosity	3.6.2
Tack Free Time	3.6.3
Film Quality	3.6.5.1
Peel Strength	3.6.6

4.3 Sampling and Testing

Sampling shall be in accordance with AS5502 (4.3).

4.3.1 Qualification Test Samples

Sufficient material shall be supplied to perform all required tests. Samples shall be identified as:

SEALING COMPOUND, TOPCOAT, FUEL TANK, BUNA-N TYPE
AMS-S-4383B
MANUFACTURER'S IDENTIFICATION_____
NAME OF MANUFACTURER_____
LOT NUMBER_____
DATE OF PACKAGING_____
SHELF LIFE EXPIRATION DATE_____
STORE PER MFG INSTRUCTIONS BELOW 80 ºF (27 ºC)

4.3.2 Acceptance Tests

Shall be in accordance with AS5502 (4.3.1).

4.3.2.1 Batch and Lot

A lot shall consist of all the topcoat compound produced by one supplier, at one plant, from the same materials, under essentially the same manufacturing conditions. When the process is considered a batch operation, each batch shall constitute a lot.

4.3.2.2 Lot Acceptance Tests

Each lot shall be subjected to acceptance testing listed in Table 2 prior to final packaging. After successful completion of the acceptance tests, the lot shall be released for final packaging.

4.3.3 Shelf-Life Extensions

4.3.3.1 Sampling

Shall be in accordance with AS5502 (4.3).

4.3.3.2 Shelf-Life Testing

The testing to be conducted for shelf-life extension are listed in Table 3.

Table 3 - Shelf-life testing

Test	Requirement Paragraph
Nonvolatile Content	3.6.1
Viscosity	3.6.2
Tack Free Time	3.6.3
Film Quality	3.6.5.1
Peel Strength	3.6.6

4.3.3.3 Shelf-Life Extension

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 extend the shelf-life of the topcoat compound and all tests are passed the shelf-life will be extended an additional four months. A maximum of three extensions are allowed.

4.4 Approval

Shall be in accordance with AS5502 (4.4).

4.5 Test Methods

4.5.1 Standard Tolerances

Unless otherwise specified herein, standard tolerances of AS5127 (3) “Standard Tolerances” shall apply.

4.5.2 Standard Conditions

Standard laboratory conditions shall be as specified in AS5127 (Section 4).

4.5.3 Preparation and Cleaning of Test Panels

Test panels shall be prepared and cleaned in accordance with AS5127 (Section 6).

4.5.4 Application and Curing of Topcoat Compound

Unless otherwise specified, the test panels shall be given a single dipcoat of the topcoat compound to produce a film having a thickness of 0.0005 to 0.0030 inches (0.013 to 0.076 mm) when cured. The solids content of the topcoat compound shall be within the range of 17 to 24 percent. The coated panels shall be cured by suspending or placing vertically for a period of 48 hours at standard conditions (4.5.2) in a draft-free enclosure such as a ventilated unheated laboratory oven to reduce the tendency of blister formation.

4.6 Test Procedures

Standard Test methods are in accordance with AS5127 and 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.

4.6.1 Tack Free Time

A coat of the topcoat compound shall be applied to a 0.032 x 1 x 6 inch (0.8 x 25 x 152 mm) bare metal panel conforming to AMS4049 and to a panel which has been coated with a polysulfide sealing compound qualified to AMS-S-8802 and cured in accordance with manufacturer's instructions. The coated panels shall then be suspended from a suitable rack at standard conditions for 4 hours. A 1 x 7 inch (25 x 178 mm) strip of low density polyethylene film (ASTM D4976 or equivalent) 0.005 inch ± 0.002 (0.13 mm ± 0.05) thick shall be applied to the topcoat compound and held in place at a pressure of approximately 0.5 ounce per square inch (0.0002 N/mm^2) for 2 minutes ± 10 seconds. The strips shall then be slowly and evenly peeled back at right angles to the topcoat compound surface. The polyethylene film shall come away clean and free of topcoat compound.

4.6.2 Low Temperature Flexibility

Six AMS4049 aluminum panels, measuring 0.020 x 1 x 6 inch (0.51 x 25 x 152 mm), shall be used for this test. Four of the panels shall be coated with a polysulfide sealant compound qualified to AMS-S-8802 and cured in accordance with manufacturer's instructions. The cured thickness of the polysulfide sealing compound shall be 0.125 inch (3.17 mm). Two of these coated panels and the two bare panels shall be coated with the topcoat compound and cured in accordance with 4.5.4. All six panels shall then be immersed for 48 hours at 120 °F (49 °C) in test fluid conforming to ASTM D471, Reference Fuel B. After conditioning, the panels shall be tested in accordance with AS5127/1 (7.6). The two panels coated with polysulfide sealant, which were not topcoated, shall be considered as control panels to insure that any failure is not due to failure in the polysulfide sealing compound.

4.6.3 Resistance to Heat

Six AMS4049 aluminum panels, measuring 0.032 x 1 x 6 inch (0.8 x 25 x 152 mm), shall be used for this test. Four parallel fillets, measuring 0.19 x 0.5 x 2 inch (4.8 x 13 x 51 mm), of polysulfide sealant compound qualified to AMS-S-8802 and cured in accordance with manufacturer's instructions shall be applied to each panel. Two of these panels and the two bare panels shall be coated with the topcoat compound and cured in acccordance with 4.5.4. All six panels shall then be immersed for 48 hours at 120 °F (49 °C) in test fluid conforming to ASTM D471, Reference Fuel B, such that one-half of all materials on the panels (sealant and topcoat) are above the liquid level. The panels shall be removed and air-dried at standard conditions for 72 hours followed by heating at 180 °F (82 °C) for 72 hours. The panels shall be examined for changes in film properties. The two panels coated with polysulfide which were not topcoated shall be considered as control panels to insure that any failure is not due to failure in the polysulfide sealing compound.

4.6.4 Resistance to Salt Water and Hydrocarbons

Two AMS4049 aluminum panels, measuring 0.032 x 3 x 6 inch (0.8 x 76 x 152 mm), shall be coated with the topcoat compound and cured in accordance with 4.5.4. The panels shall be immersed vertically for 20 days in a covered glass vessel containing a 2-layer liquid, consisting of a 3 percent by weight aqueous solution of sodium chloride and test fluid conforming to ASTM D471, Reference Fuel B, such that 2 inches (51 mm) of the panels are exposed to the salt solution, 2 inches (51 mm) of the panels exposed to the test fluid, and the balance of the panels exposed to the air-vapor mixture. The temperature during the test shall be maintained at 120 °F (49 °C). Immediately upon removal from the liquid, panels shall be examined. Due to the requirement for use of an oil-soluble dye, some color leaching into the fuel is permitted.

4.6.5 Resistance to Hot Oil

Four AMS4049 aluminum panels, measuring 0.032 x 1 x 6 inch (0.8 x 25 x 152 mm), shall be dipcoated with the topcoat compound. After drying 1 hour at standard conditions (4.5.2), a second dipcoat of the topcoat material shall be applied and cured in accordance with 4.5.4. Two of the panels shall be immersed for 14 days in oil conforming to SAE J1966 and two shall be immersed in oil conforming to MIL-PRF-23699 at a temperature of 250 °F (121 °C). The four panels shall then be removed from the oils, cleaned, cooled to room temperature, and bent swiftly 180 degrees around a 0.125 inch (3.2 mm) mandrel and examined.