The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-S-4383

Issued JUL 1999

Sealing Compound, Topcoat, Fuel Tank, Buna-N Type

FSC 8030

NOTICE

This document has been taken directly from U.S. Military Specification MIL-S-4383C, Notice 1 and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-S-4383C, Notice 1. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

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1. SCOPE:

1.1 This specification covers one type of air drying protective coating.

2. APPLICABLE DOCUMENTS:

The following publications, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

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

QQ-A-250/13	Aluminum Alloy Alclad 7075 Plate and Sheet
QQ-B-626	Brass, Leaded and Nonleaded: Rod, Shapes, Forgings, and Flat Products with Finished Edges (Bar and Strip)
TT-E-751	Ethyl Acetate, Technical
TT-I-735	Isopropyl Alcohol
TT-M-261	Methyl Ethyl Ketone, Technical
TT-N-97	Naphtha, Aromatic
TT-S-735	Standard Test Fluids: Hydrocarbons
CCC-C-432	Cloth, Sheeting, Cotton, (Unbleached, Bleached, and Dyed)
PPP-B-585	Boxes, Wood, Wirebound
PPP-B-636	Boxes, Shipping, Fiberboard
PPP-C-96	Cans, Metal, 28 Gauge and Lighter
MIL-B-43666	Boxes, Shipping, Consolidation
MIL-L-6082	Lubricating Oil, Aircraft Reciprocating Engine (Piston)
MIL-L-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
FED-STD-313	Materials Safety Data Sheets, Preparation and Submission
FED-STD-791	Lubricants, Liquid Fuels and Related Products; Methods of Testing
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads

2.2 ASTM Publications:

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

ASTM D 130	Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test
ASTM D 381	Existent Gum in Fuels by Jet Evaporation
ASTM D 3951	Commercial Packaging

2.3 Order of precedence:

In the event of a conflict between the text of this specification and the references cited herein, (except for associated detail specifications, specification sheets or MS standards) the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS:

3.1 Qualification:

The topcoat material furnished under this specification shall be a product which is qualified for listing on the applicable qualified products list at the time set for opening of bids.

3.2 Composition:

The topcoat material compound covered by this specification shall be formulated from butadiene acrylonitrile copolymer and such other ingredients as may be necessary to give a product of high quality and one suitable for the purpose intended.

3.3 Appearance:

The topcoat compound shall be a clear uniform compound free of skins, lumps, and jelled or coarse particles.

3.4 Color:

The topcoat materials shall be colored by the use of an oil soluble dye. The topcoat material shall be colored red.

3.5 Toxicity:

The sealing compound shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate medical service who will act as advisor to the contracting agency (see 4.3.2).

3.6 Solids content:

The solids content of the topcoat material shall be not less than 17 percent, nor more than 22 percent when tested as specified in 4.6.2.

3.7 Viscosity:

Viscosity of the topcoat materials shall be in the range of 400 to 2,000 centipoises when tested in accordance with 4.6.3.

3.8 Drying:

A dipcoat of the topcoat material shall air-dry to a tack-free film in 4 hours when tested in accordance with 4.6.4.

3.9 Accelerated stability:

The topcoat material shall not change in viscosity more than ±10 percent from the original viscosity when tested in accordance with 4.6.12. The topcoat material shall not separate or gel.

3.10 Working properties:

Brush and dipcoats of the topcoat material, when prepared and cured in accordance with 4.5.3, shall be smooth, uniform, and free of sagging, bubbles, pinholes, cracks, and other film irregularities.

3.11 Film thickness:

When the solids content of the topcoat materials is within the range of 17 to 22 percent, the film thickness of the single brush and dipcoats shall be not less than 0.5 mils nor more than 1.5 mils when cured to maximum hardness.

3.12 Recoating properties:

A dipcoat of the topcoat material, when the solids content is within the range of 17 to 22 percent, when applied over a freshly dried film of topcoat material and also over a cured film of polysulfide sealing compound shall show satisfactory bonding and no lifting, blistering, or loss of adhesion.

3.13 Adhesion:

The topcoat material when tested as specified in 4.6.11 shall have a minimum peel test value of 5 pounds per inch on the metal surface and 10 pounds per inch on the polysulfide sealant.

3.14 Low temperature flexibility:

The topcoat material shall withstand the low temperature flexibility test described in 4.6.5 without cracking, checking, or loss of adhesion.

3.15 Resistance to heat:

The topcoat material, when tested in accordance with 4.6.6 shall show no hardening, blistering, checking, cracking, shrinkage, loss of adhesion, or loss of flexibility.

3.16 Resistance to salt water and hydrocarbon:

The topcoat material, when tested in accordance with 4.6.7, shall show no softening, blistering, leaching, apparent corrosion of the metal, or loss of adhesion.

3.17 Resistance to hot oil:

The topcoat material, when tested in accordance with 4.6.8, shall show no cracking, flaking, or loss of adhesion.

3.18 Fuel contamination:

When tested in accordance with 4.6.9, the nonvolatile extractable materials contributed by the material in contact with the test fluid, shall not exceed 20 milligrams per 100 milliliters. No more than slight discoloration shall be present on a freshly polished copper strip.

3.19 Shrinkage:

A film of the topcoat material on a polysulfide sealant when applied and cured in accordance with 4.5.3, shall show no tendency to crack or pull away from the surface of the polysulfide sealant, caused by shrinkage.

3.20 Sealing compound protection:

The topcoat material, when applied and tested in accordance with 4.6.10, shall adequately protect the approved sealing compound. The sealing compound shall show no appreciable leaching, change in hardness, flexibility, or signs of cracking. The topcoat materials shall not crack, check, or delaminate.

3.21 Workmanship:

The workmanship shall be in accordance with high-grade manufacturing practice covering this type of material.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for inspection:

Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance: All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections:

The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.3).
b. Quality conformance inspection (see 4.4).

4.3 Qualification inspection:

Qualification inspection shall consist of all tests specified in Table I.

Table I. Qualification Inspection.

Characteristics	Paragraph Requirement	Test
Composition	3.2	-
Appearance	3.3	4.6.1
Color	3.4	4.6.1
Toxicity	3.5	4.3.2
Solids content	3.6	4.6.2
Viscosity	3.7	4.6.3
Drying	3.8	4.6.4
Accelerated stability	3.9	4.6.12
Working properties	3.10	4.5.3
Film thickness	3.11	-
Recoating properties	3.12	-
Adhesion	3.13	4.6.11
Low temperature flexibility	3.14	4.6.5
Resistance to heat	3.15	4.6.6
Resistance to salt water and hydrocarbon	3.16	4.6.7
Resistance to hot oil	3.17	4.6.8
Fuel contamination	3.18	4.6.9
Shrinkage	3.19	4.5.3
Sealing compound protection	3.20	4.6.10
Workmanship	3.21	-

4.3.1 Sampling instructions: The qualification samples shall consist of 3 quarts of the topcoat compound packaged as specified in section 5 upon which qualification is desired. Samples shall be identified as follows and forwarded to the Naval Air Development Center (Code 60621), Warminster, PA 18974 (qualifying activity) as designated in the letter of authorization (see 6.3).

Qualification Test Samples
Sealing Compound, Topcoat, Fuel Tank, Buna-N Type
MIL-S-4383C
Name of manufacturer and product number
Submitted by (name) (date) for Qualification Testing in accordance with authorization (reference authorizing letter).

4.3.2 Manufacturer's data: The manufacturer shall furnish two copies of a certified test report showing that the material submitted for qualification meets the requirements of this specification. Material safety data sheets prepared in accordance with FED-STD-313 shall also be included with the report.

4.3.3 Retention of qualification: In order to retain qualification of a product approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals as specified by the qualifying activity. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

4.4 Quality conformance inspection:

4.4.1 Lot formation: 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 provided the operation does not exceed 24 hours. When the process is considered a batch operation, each batch shall constitute a lot.

4.4.2 Sampling and inspection:

4.4.2.1 Visual inspection: A random sample of filled containers, prior to closure, shall be selected from each lot in accordance with Inspection Level I and Acceptable Quality Level (AQL) of 2.5 defects per hundred units, of MIL-STD-105. The sample unit shall be one filled container. Inspection shall be in accordance with Table II.

Table II. Quality conformance visual inspection.

Examine	Defect
Fill	Average net content per container less than specified in contract or order.
Material	Not as specified.
Appearance	Presence of foreign matter. Not homogeneous. Wrong color.

4.4.2.2 Physical property inspection: Two containers shall be randomly selected from each lot and tested to the requirements specified in Table III. The samples selected shall be thoroughly mixed prior to testing. Failure of the material to conform with any requirement specified in Table III shall be cause to reject the entire inspection lot.

Table III. Quality conformance physical testing.

Characteristics	Paragraph	
	Requirement	Test
Solids content	3.6	4.6.2
Viscosity	3.7	4.6.3
Drying	3.8	4.6.4
Adhesion	3.13	4.6.11

4.4.2.3 Packaging inspection:

4.4.2.3.1 Examination for packaging and marking: An examination shall be made to determine that packaging and marking comply with the requirements of Section 5 of this specification. Defects shall be scored in accordance with Table IV. The sample unit for this examination shall be one shipping container fully prepared for delivery except that it shall not be palletized and need not be sealed. The lot size shall be the number of shipping containers in the end item inspection lot. The samples for this examination shall be selected at random in accordance with MIL-STD-105, inspection level S-2 and an acceptable quality level (AQL) of 4.0 defects per hundred units.

Table IV. Packaging inspection.

Examine	Defect
Packaging	Container not as specified; closures not accomplished by specified or required methods or materials. Leakage or seepage of contents. Non-conforming component, component missing, damaged or otherwise defective. Bulged or distorted container.
Markings	Data omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements.

4.4.2.3.2 Examination for palletization: An examination shall be made to determine that palletization complies with the requirements of Section 5 of this specification. Defects shall be scored in accordance with Table V. The sample unit shall be one palletized unit load fully prepared for delivery. The lot size shall be the number of palletized unit loads in the end item inspection lot. The samples for this examination shall be selected at random in accordance with MIL-STD-105, inspection level S-1 and an acceptable quality level (AQL) of 6.5 defects per hundred units.

Table V. Palletization inspection.

Examine	Defect
Finished dimension	Length, width, or height exceeds specified maximum requirement.
Palletization	Not as specified. Pallet pattern not as specified. Interlocking of loads not as specified. Load not banded with required straps as specified.
Weight	Exceeds maximum load limits.
Marking	Omitted, incorrect, illegible, of improper size, location, sequence or method of application.

4.4.3 Rejection and retest: Failure to meet any quality conformance test shall result in rejection of the batch represented and may constitute sufficient justification for removal of the product from the Qualified Products List. Rejected material shall not be resubmitted for acceptance without prior approval from the Naval Air Development Center Code 6062. The application for resubmission shall contain full particulars concerning previous rejections and measures taken to correct these deficiencies. Samples for retest shall be randomly selected as in 4.4.2 and forwarded to the qualifying activity for evaluation.

4.5 Test conditions:

4.5.1 Standard conditions: Unless otherwise specified, standard conditions shall be 77° ± 2°F (25° ± 1°C) and a relative humidity (RH) of 50 ± 5 percent. Unless otherwise specified, all test specimens shall be prepared and cured under these conditions.

4.5.2 Cleaning of test panels: The metal test panels shall be thoroughly cleaned of all contaminants using the formulation as specified below, and wiped dry with clean, nonoily wiping cloths or tissues:

	Percent by volume
Aromatic petroleum naphtha (TT-N-97, type I, grade B)	50
Ethyl acetate (TT-E-751)	20
Methyl ethyl ketone (TT-M-261)	20
Isopropyl alcohol (TT-I-735)	10

4.5.3 Application of coating: Unless otherwise specified, the test panels shall be given a single dipcoat of the topcoat materials to produce a film having a thickness of not less than 0.5 nor more than 1.5 mils when cured. The solids content of the the topcoat materials used shall be within the range of 17 to 22 percent. The coated panels shall be cured by suspending or placing vertically for a period of 48 hours in a draft-free enclosure such as a ventilated laboratory oven to reduce the tendency of blister formation.

4.6 Test methods:

4.6.1 Visual inspection: The sealing compound shall be visually examined for color and appearance requirements specified in 3.3 and 3.4.

4.6.2 Solids content: Approximately 10 grams of the topcoat materials shall be transferred as rapidly as possible to a cup approximately 3 inches in diameter and 3/4 inch deep. A fitted cover shall immediately be placed over the cup and the weight determined accurately. The cup and cover shall be weighed accurately prior to use and subtracted from the gross weights in order to calculate the net sample weights. The cover shall then be removed and the material heated at 71° ± 1°C (160° ± 2°F) for 24 hours. It shall then be cooled, the cover replaced, and the weight determined accurately. The percentage of total solids shall be calculated as follows:

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

4.6.3 Viscosity: The viscosity shall be determined after the sample has been stored at room conditions for 24 hours using the Brookfield Viscosimeter with a No. 2 spindle at 10 rpm. The instrument shall be run for 1 minute prior to first reading. The reading shall be converted to centipoises.

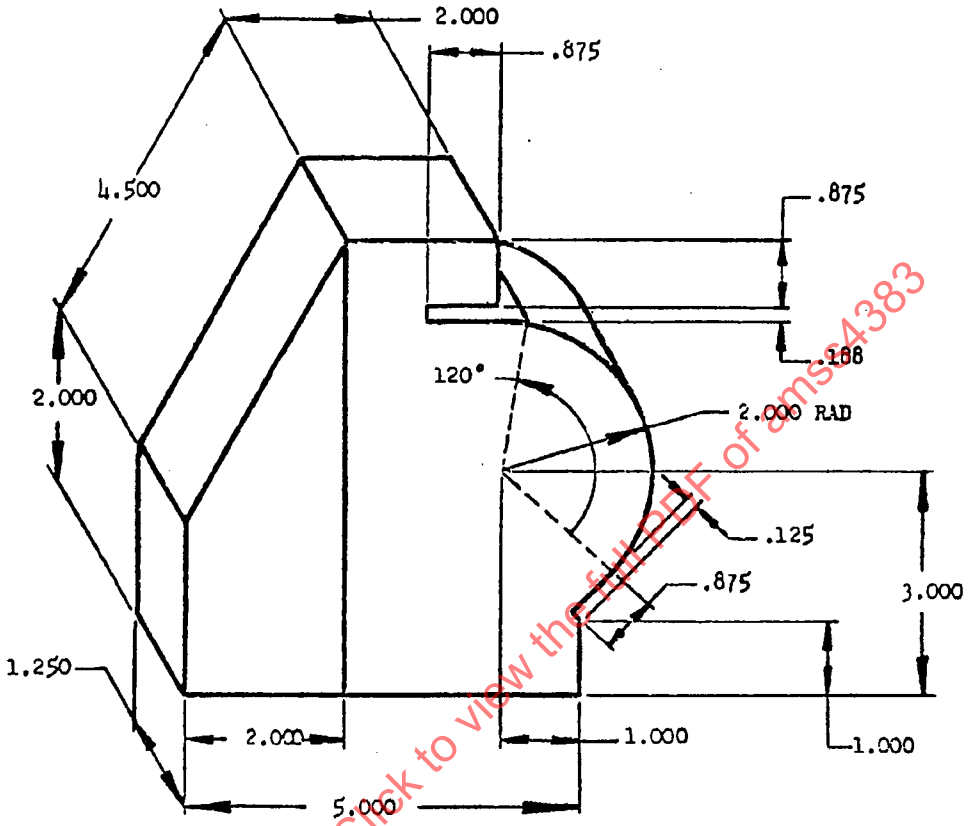
4.6.4 Drying: A dipcoat of the topcoat material shall be applied to a 1- by 6- by .032-inch bare metal panel conforming to QQ-A-250/13, and to panels which have been coated and cured with a polysulfide sealing compound. The coated panels shall then be suspended from a suitable rack at room conditions for 4 hours. A small sheet of smooth polyethylene film 0.004 ± 0.002 inch thick shall then be pressed with the thumb onto a 1-square-inch area of the topcoated panels and withdrawn. The film shall not adhere to the polysulfide coating.

4.6.5 Low temperature flexibility: Six panels of aluminum, 1 by 6 by 0.020 inches, conforming to QQ-A-250/13, shall be used for this test. Four of these panels shall be coated with a suitable polysulfide sealant and cured. The cured thickness of the polysulfide sealing compound shall be 0.125 inch ± 0.016 inch. Two of these coated panels and the two bare panels shall be coated with the topcoat material in accordance with 4.5.3. All six panels shall then be immersed for 48 hours at 49° ± 1°C (120° ± 2°F) in test fluid conforming to TT-S-735, type III. At the completion of the immersion period, the panels and the flexibility test fixture (see Figure 1) shall be subjected to a temperature of -54° ± 1°C (-65° ± 2°F) for 2 hours. While at this temperature, one end of the test panel shall be held in the slotted position and the other end bent rapidly around the curved position of the fixture with the side coated with sealing compound on the exterior of the radius. The panels shall then be removed and examined. 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 sealing compound.

4.6.6 Resistance to heat: Six panels of aluminum, 3 by 6 by 0.032 inches, conforming to QQ-A-250/13, shall be used for this test. Four parallel fillets of polysulfide sealant shall be applied to four of the panels. The fillets shall be approximately 0.19 inch thick by 0.5 inch wide by 2 inches long. Two of these panels and the two bare panels shall be coated with the topcoat material as given in 4.5.3. All six panels shall then be immersed for 48 hours at 49° ± 1°C (120° ± 2°F) in test fluid conforming to TT-S-735, type III, in such a manner that one-half of the material is above the liquid level. The panels shall then be removed and air-dried at room conditions for 72 hours, then heated at 82° ± 1°C (180° ± 2°F) for 72 ± 1 hours. The panels shall then 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 sealing compound.

4.6.7 Resistance to salt water and hydrocarbon: Two panels of aluminum, 3 by 6 by 0.032 inches, conforming to QQ-A-250/13, shall be coated with the topcoat material and cured in accordance with 4.5.3. They shall then be immersed vertically for 20 days in a covered glass vessel containing a 2-layer liquid, consisting of a 3 percent aqueous solution of sodium chloride and test fluid conforming to TT-S-735, type III, in such a manner that 2 inches of the panels are exposed to the salt solution, 2 inches of the panels exposed to the test fluid, and the rest of the panels exposed to the air-vapor mixture. The temperature during the test shall be maintained at 49° ± 1°C (120° ± 2°F). Immediately upon removal from the liquid, panels shall be examined.

4.6.8 Resistance to hot oil: Two panels of aluminum 1 by 6 by 0.032 inches conforming to QQ-A-250/13 shall be dipcoated with the topcoat material. After drying 1 hour at room conditions, a second dipcoat of the topcoat material shall be applied and cured in accordance with 4.5.3. They shall then be immersed for 14 days in oil conforming to MIL-L-6082, grade 1065, at a temperature of 121° ± 2°C (250° ± 5°F). Likewise, another two panels of aluminum 1 by 6 by 0.032 inches conforming to QQ-A-250/13 shall similarly be prepared and immersed in oil conforming to MIL-L-23699. 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 mandrel and examined.



MATERIAL: MAPLE WOOD

DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED,
TOLERANCES: DECIMALS ±.016.

Figure 1. Low temperature flexibility test fixture.