SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3100A

Issued JUL 1986
Revised AUG 1994
Reaffirmed AUG 2000

Superseding AMS 3100

Adhesion Promoter
For Polysulfide Sealing Compounds

1. SCOPE:

1.1 Form:

This specification and its supplementary detail specifications cover adhesion promoters in the form of a liquid.

1.2 Application:

This product has been used typically to enhance the adhesion of polysulfide sealing compounds or adhesives to MIL-C-27725 integral fuel tank coating or other substrates such as painted or primed surfaces and bare titanium alloys, but usage is not limited to such applications.

1.3 Precautions:

Precautions: AMS 3100A/2 may contain halogenated solvents and should not be used on titanium alloys which will be subjected to temperatures above 450 °F (232 °C) or on high strength steel because of their tendency for stress-corrosion cracking.

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.

1.5 Classification:

Adhesion promoter shall be classified by color and type of solvent as shown in the detailed specifications.

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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 2473	Chemical Treatment for Aluminum Alloys, General Purpose Coating
AMS 2629	Fluid, Jet Reference
AMS 2820	Aerosol Packaging
AMS 2825	Material Safety Data Sheets
AMS 3819	Cloth, Cleaning, For Aircraft Primary and Secondary Structural Surfaces
AMS 4911	Titanium Alloy Sheet, Strip, and Plate, 6A1 - 4V, Annealed
MAM 4911	Titanium Alloy Sheet, Strip, and Plate, 6A1 - 4V, Annealed (Metric)

2.2 ASTM Publications:

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

ASTM D 1193	Reagent Water

2.3 U.S. Government Publications:

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

QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
CCC-C-419	Cloth, Duck, Unbleached, Plied Yarns, Army and Numbered
PPP-P-1892	Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing, and Marking of
MIL-P-5425	Plastic, Sheet, Acrylic, Heat Resistant
MIL-S-8802	Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
MIL-A-9962	Abrasive Mats, Non-Woven, Non-Metallic
MIL-P-23377	Primer Coating, Epoxy, Chemical and Solvent Resistant
MIL-C-27725	Coating, Corrosion Preventive, for Aircraft Integral Fuel Tanks
MIL-C-38736	Compound, Solvent, for Use in Integral Fuel Tanks
MIL-S-83430	Sealing Compound, Integral Fuel Tanks and Fuel Cell Cavities, Intermittent Use to 360 °F (182 °C)
MIL-P-85582	Primer Coatings: Waterborne

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specification:

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

3.2 Material:

The adhesion promoter shall be a dyed liquid formulated to meet the requirements of 3.3.

3.2.1 Appearance: Adhesion promoter shall be clear and free of particulate matter. Material packaged in aerosol containers may be sprayed into a clear glass container to determine appearance.

3.2.2 Storage Life Updating: At expiration of the storage life, adhesion promoter meeting requirements of the acceptance tests (See 4.2.1) may have its storage life extended two months. Up to two extensions is acceptable.

3.3 Properties:

The adhesion promoter shall conform to requirements specified in the applicable detail specification, determined in accordance with test methods specified in 4.5.

3.4 Quality:

Adhesion promoter, as received by purchaser, shall be uniform in quality and condition, free from sedimentation or turbidity, and free from foreign materials and from other contaminants detrimental to usage of the adhesion promoter.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of adhesion promoter 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 adhesion promoter conforms to the requirements of this specification and the applicable detail specification.

4.2 Classification of Tests:

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

TABLE 1 - Acceptance Tests

Requirement	Paragraph Reference
Appearance	3.2.1
Composition Control	See Detail Specification
Color	See Detail Specification
Peel Strength	See Detail Specification
Solvent Identification	See Detail Specification

4.2.2 Preproduction or Qualification Tests: Tests for all technical requirements are preproduction tests and, for U.S. Military procurement, qualification tests and shall be performed prior to or on the initial shipment of adhesion promotor 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 and for procurement for use on U.S. Military contracts, adhesion promoter shall be a product which has been tested, has passed the qualification tests of 4.2.2 (See 8.2), and has been listed or approved for listing on the applicable U.S. Military qualified products list (QPL).

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient adhesion promoter 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 adhesion promoter produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time. A lot shall not exceed 500 gallons (1873 L).

4.3.1.2 When a statistical sampling plan has 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: As agreed upon by purchaser and vendor.

4.3.3 For Qualification Tests: Samples shall consist of three aerosol containers or three brown glass small-mouth bottles (See 5.1.1), each containing 16 ounces (454 g) or more of adhesion promoter. Samples shall be identified as specified herein and forwarded to the activity responsible for qualification as designated in the letter of authorization from that activity (See 8.2). Samples for qualification shall be identified as follows:

ADHESION PROMOTER FOR POLYSULFIDE SEALING COMPOUND

Specification AMS 3100A/[1]
Manufacturer's Number
Name of Manufacturer
Submitted by (Name) (Date) for qualification tests in accordance with AMS 3100A under authorization (reference authorizing letter)

4.4 Approval:

4.4.1 Adhesion promoter shall be approved by the procuring activity before adhesion promotor for production use is supplied, unless such approval be waived by the procuring activity. Results of tests on production adhesion promotor shall be essentially equivalent to those on the approved (qualified) sample.

4.4.1.1 For direct U.S. Military procurement and for procurement for use on U.S. Military contracts, the adhesion promotor shall be listed, or approved for listing, on the applicable U.S. Military qualified products list.

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

4.5 Test Methods:

4.5.1 Standard Conditions:

4.5.1.1 Test Conditions: Standard laboratory test conditions shall be 77 °F (25 °C) and 50% ± 5 relative humidity. Except as otherwise specified herein, all test specimens shall be prepared, cured, and tested under these conditions. Peel strength testing may be conducted at 77 °F (25 °C) with no control on humidity necessary.

1. Insert applicable detail specification number.

4.5.1.2 Standard Tolerances: Unless otherwise specified herein, the following are standard tolerances:

Temperature:	±2 °F (±1 °C)
Days:	±2 hours
Hours:	±5 minutes
Minutes:	±1
Inches (mm):	±0.01 inch (±0.25 mm)

4.5.2 Test Panel Preparation:

4.5.2.1 Panel Material, Size, and Coating: Shall be as follows:

4.5.2.1.1 Aluminum Alloy: QQ-A-250/4 aluminum alloy sheet, -T81 or -T3 temper, nominally 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm) with chemical film applied in accordance with AMS 2473.

4.5.2.1.2 Titanium Alloy: AMS 4911 or MAM 4911 titanium alloy sheet or strip, nominally 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm).

4.5.2.1.3 Acrylic: MIL-P-5425 acrylic plastic sheet, nominally 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm).

4.5.2.1.4 MIL-C-27725 Coating: Aluminum alloy panels as in 4.5.2.1.1 shall be coated with MIL-C-27725 corrosion preventive coating, in accordance with manufacturer's instructions, to produce a dry film thickness of 0.0008 to 0.0015 inch (20 to 38 µm) and cured for not less than 14 days at standard test conditions.

4.5.2.1.5 Aged MIL-C-27725 Coating: Panels prepared as in 4.5.2.1.4 shall be aged, immediately after curing, by immersion in AMS 2629, Type I, jet reference fluid for 12 days at 140 °F (60 °C), followed immediately by 60 hours at 160 °F (71 °C), followed immediately by 6 hours at 180 °F (82 °C), followed immediately by air drying in a circulating-air oven for 66 hours at 200 °F (93 °C), followed by air drying for 5 hours at 255 °F (124 °C), followed by air drying for 4 hours at 280 °F (138 °C), and finally air drying for 72 minutes at 300 °F (149 °C).

4.5.2.1.6 MIL-P-23377 Primer: Aluminum alloy panels as in 4.5.2.1.1 shall be coated with MIL-P-23377 epoxy primer, in accordance with manufacturer's instructions, to produce a dry film thickness of 0.0006 to 0.0009 inch (15 to 23 µm) and cured for not less than 14 days at standard test conditions.

4.5.2.1.7 MIL-P-85582 Primer: Aluminum alloy panels as in 4.5.2.1.1 shall be coated with MIL-P-85582 epoxy primer, in accordance with manufacturer's instructions, to produce a dry film thickness of 0.0006 to 0.0009 inch (15 to 23 µm) and cured for not less than 14 days at standard test conditions.

4.5.2.2 Cleaning of Panels: All test panels, except titanium, shall be cleaned by scrubbing and rinsing with MIL-C-38736 solvent using AMS 3819, Grade A, cleaning cloths. After cleaning with solvent, surfaces of panels shall be wiped dry with AMS 3819, Grade A, cleaning cloths. If adhesion promoter is not required, allow the panels to dry in air at standard test conditions for not less than 30 minutes nor more than 24 hours before applying sealant. If more than 24 hours elapse, reclean the test panel.

4.5.2.2.1 Cleaning Titanium Panels: Titanium panels shall be cleaned by scrubbing with MIL-A-9962, Type III, Class 1, Grade A, abrasive mats and MIL-C-38736 solvent. After scrubbing, rinse panels with MIL-C-38736 solvent and wipe dry with AMS 3819, Grade A, cleaning cloths. Immediately apply adhesion promoter in accordance with 4.5.2.3.

4.5.2.3 Application of Adhesion Promoter: When specified, adhesion promoter shall be applied to the cleaned surfaces immediately after cleaning in accordance with manufacturer's instructions. The adhesion promoter shall be allowed to dry in air at standard test conditions for not less than 30 minutes nor more than 24 hours before applying sealant. If more than 24 hours elapse, reclean the test panel and reapply the adhesion promoter.

4.5.3 Sealant: Sealants used for preparing peel test specimens shall be either manganese-dioxide-curing sealing compounds conforming to MIL-S-83430 or to MIL-S-8802, Class B-2. Sealants shall be within their specified shelf life when used.

4.5.4 Color: Adhesion promoter shall be applied, in accordance with manufacturer's instructions, to test panels as in 4.5.2.1.1, allowed to air dry at standard test conditions for not less than 30 minutes, and visually inspected for color.

4.5.5 Peel Strength: Shall be determined on panels specified in the applicable detail specification, using specimens prepared and tested as follows:

4.5.5.1 The center 4 inches (102 mm) of the panels shall be coated on one face with a 0.125 inch (3.18 mm) thickness of sealing compound. An optional configuration consists of coating the bottom approximate 5 inches (127 mm) of the panel with sealant (Figure 1). A 2.75 x 12 inch (69.8 x 305 mm) strip of aluminum woven wire fabric, 15 to 20 mesh with wire diameter of 0.010 to 0.011 inch (0.25 to 0.28 mm) or CCC-C-419, Type III, cotton duck shall be impregnated with sealant so that approximately 4 inches (102 mm) [5 inches (127 mm) for the optional configuration] at one end is completely covered on both faces. The sealant shall be worked well into the screen or fabric. The sealant impregnated end of the screen or 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 screen or fabric.

4.5.5.2 An additional approximate 0.031 inch (0.79 mm) thick coating of sealant shall be applied over the screen or fabric. Peel strength specimen configuration shall be as shown in Figure 1.

4.5.5.3 Cure the sealant for 14 days at standard test conditions.

4.5.5.3.1 A cure of 48 hours at standard test conditions followed by 24 hours at 140 °F (60 °C) may be used for acceptance tests.

4.5.5.4 Following cure, the panels shall be completely immersed in the fluid in covered glass vessels and under the conditions specified in the applicable detail specification. Specimen-to-fluid ratio shall be approximately one panel per pint (0.5 L) of fluid. Immersion in wide-mouth quart (liter) glass jars with two panels in each jar has been found suitable. After specified exposure at 140 °F (60 °C), panels shall be cooled in the fluid for 24 hours at 77 °F (25 °C).

4.5.5.5 The peel strength of conditioned panels shall be measured within 30 minutes after removal from the test fluid. Two 1-inch (25-mm) wide sections shall be prepared by cutting completely through the sealant and fabric to the panel, lengthwise, along the panel and continuing completely along the free end of the fabric. The specimens shall be stripped back at an angle of 180 degrees to the panel in a suitable tensile test machine. Jaw separation rate shall be 2 inches per minute (0.8 mm/s). During peel strength testing, three cuts shall be made through the sealant to the panel in an attempt to promote adhesive failure. The cuts shall be made at approximately 1-inch (25-mm) intervals.

4.5.5.6 The peel strength for each specimen shall be the numerical average of the peak loads required to separate the strips of sealant from the panel or to cause cohesive failure of the sealant. Failure of the sealant to screen or fabric shall not be included in the peel strength values.

4.5.6 Storage Stability:

4.5.6.1 Long-Term Stability: After 120 days storage at 80 °C (27 °F) in the original unopened container, a sample of adhesion promoter shall be withdrawn and used for conducting the peel test of Table 2, Tests 1 and 2, of the applicable detail specification, using substrates in accordance with 4.5.2.1.3 and 4.5.2.1.5.

4.5.6.2 Short-Term Stability: Place 24 mL of adhesion promoter (less than 4 months old from date of manufacture) into a 2-ounce (59-mL) glass container with an approximate 1.20-inch (30-mm) mouth diameter. Allow the container to stand open for 60 minutes under standard laboratory test conditions. Cap tightly and let stand for the time specified in the applicable detail specification. Use conditioned adhesion promoter to conduct peel tests in accordance with Table 1, Tests 1 and 2, of the applicable detail specification, using substrates in accordance with 4.5.2.1.3 and 4.5.2.1.5.

4.5.7 Aging After Application: Apply adhesion promoter to the panels of 4.5.2.1.3 and 4.5.2.1.5. Protect the panels from atmospheric fallout and store at standard test conditions for 5 days. After storage, peel specimens shall be prepared as in 4.5.5 and tested in accordance with Table 1, Tests 1 and 2, of the applicable detail specification.

4.5.8 Composition Control: Prepare standard infrared spectrographic analysis master charts of each preproduction (qualification) test sample for comparison to production material.

4.5.9 Solvent Identification: Manufacturer shall certify whether or not the solvent component contains halogenated compounds.

4.6 Reports:

The vendor of adhesion promoter shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the adhesion promoter conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3100A and applicable detail specification number and revision letters, vendor's adhesion promoter designation, and quantity.

4.6.1 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 (qualification) test results or, if preproduction (qualification) testing be waived by purchaser, concurrent with first shipment of adhesion promoter for production use. Each request for modification of product formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.7 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the adhesion promoter 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 requirement shall be cause for rejection of the adhesion promoter represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 For Other Than Direct U.S. Military Procurement:

5.1.1.1 Unless otherwise specified by purchaser, packaging shall be in either 2 ounce (59 mL) or 1 pint (0.5 L) brown glass small-mouth bottles with caps which are sealed from air and which will not react with the adhesion promoter, or in aerosol containers conforming to AMS 2820 equipped with a spray nozzle which will provide a fine, steady spray and deposit the adhesion promoter evenly on a flat horizontal or flat vertical surface. The size of aerosol containers shall be as specified by purchaser.

5.1.1.2 A lot of adhesion promoter may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.

5.1.1.3 Each container shall be legibly identified with durable labels containing not less than the following information applied using characters which will not be obliterated by normal handling:

ADHESION PROMOTER FOR POLYSULFIDE SEALING COMPOUNDS
AMS 3100A/[1]
NAME OF MANUFACTURER _____
MANUFACTURER'S PRODUCT DESIGNATION _____
DATE OF MANUFACTURE _____
MUST BE USED BEFORE _____
LOT NUMBER _____
QUANTITY _____
APPROPRIATE WARNINGS AND PRECAUTIONARY NOTICES
Store below 90 °F (32 °C) _____

5.1.1.3.1 DATE OF MANUFACTURE SHALL BE THE DATE AT WHICH THE LAST ACCEPTANCE TEST WAS COMPLETED BY THE MANUFACTURER.

5.1.1.4 Individual containers shall be packed in an exterior shipping container capable of protecting the adhesion promoter, during shipment and storage, against damage from exposure to weather or any other normal hazard.

5.1.1.5 Each shipping container shall be legibly marked with not less than the information specified in 5.1.3 and, in addition, with the applicable purchase order number so that the marking will not smear or be obliterated during normal handling.

5.1.1.6 Containers of adhesion promoter shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the adhesion promoter to ensure carrier acceptance and safe delivery.

5.2 For Direct U.S. Military Procurement:

Packaging, packing, and marking shall be in accordance with PPP-P-1892, Level C, unless Level A is specified in the request for procurement.

6. ACKNOWLEDGMENT:

A vendor shall mention this specification number and the applicable detail specification number and their revision letters, if any, in all quotations and when acknowledging purchase orders.

1. Insert applicable detail specification number.