AN AMERICAN NATIONAL STANDARD

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 1527

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Revised

CLEANER FOR AIRCRAFT EXTERIOR SURFACES
Water-Miscible, Foam-On, Pressure-Spraying

1. SCOPE:

1.1 Form: This specification covers a water-miscible, foam-on, pressure-spraying cleaner in the form of a liquid.

1.2 Application: Primarily for removing soils from painted and unpainted exterior surfaces of aircraft using foam forming equipment.

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) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2470 - Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS 2475 - Protective Treatments, Magnesium Base Alloys
AMS 4037 - Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate)
AMS 4041 - Aluminum Alloy Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (Alclad 2024 and 1-1/2% Alclad 2024-T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate)
AMS 4049 - Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (Alclad 7075; T6 Sheet, -T651 Plate)
AMS 4376 - Magnesium Alloy Plate, 3.0Al - 1.0Zn (AZ31B-H26)
AMS 4911 - Titanium Alloy Sheet, Strip, and Plate (6Al - 4V), Annealed
AMS 5045 - Steel Sheet and Strip, Low Carbon, Hard Temper

2.1.2 Aerospace Recommended Practices:

ARP 1511 - Corrosion of Low-Embrittling Cadmium Plate by Aircraft Maintenance Chemicals
ARP 1512 - Corrosion of Aluminum Alloys by Aircraft Maintenance Chemicals, Sandwich Test
ARP 1525 - Hydrogen Embrittlement Effect on Metals by Aircraft Maintenance Chemicals, Mechanical Test Methods

Printed in U.S.A.

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

ASTM D56 - Flash Point by Tag Closed Tester
ASTM D1568 - Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM D2667 - Biodegradability of Alkylbenzene Sulfonates
ASTM F483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F484 - Stress Craze Test of Acrylic Plastics in Contact with Liquid and Semi-Liquid Compounds
ASTM F485 - Effects of Cleaners on Unpainted Aircraft Surfaces
ASTM F502 - Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces
ASTM F503 - Preparing Aircraft Cleaning Compounds, Liquid Type, for Storage Stability Testing

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.3.3.

2.3.1 Military Specifications:

MIL-P-25690 - Plastic Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant
MIL-C-81762 - Cleaner, Pressure, Cleaning Compound - Water, Foaming

2.3.2 Military Standards:

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

2.3.3 U.S. Department of Labor, Occupational Safety and Health Administration Forms: Available from regional offices of U.S. Department of Labor, Bureau of Labor Standards.

OSHA Form 20 - Material Safety Data Sheet

3. TECHNICAL REQUIREMENTS:

3.1 Material: The composition of the cleaner shall be optional with the manufacturer but should contain water, biodegradable surfactants and/or soap builders, emulsifiers, solvents, and foam stabilizers to produce a foamable product completely miscible in water and meeting the requirements of 3.2.

3.2 Properties: The cleaner shall conform to the following requirements; tests shall be performed in accordance with specified test methods on the product supplied in the concentrated form and at use dilution recommended by the manufacturer:

3.2.1 Effect on Metallic Surfaces:

3.2.1.1 Sandwich Corrosion: Specimens, after test, shall show a rating not worse than 2, determined in accordance with ARP 1512.

3.2.1.2 Total Immersion Corrosion: The product shall neither show evidence of corrosion of the panels nor cause a weight change of any single panel greater than the following, determined in accordance with ASTM F483:

Panel	Weight Change mg/cm^2/24 hr
AMS 4037 Aluminum Alloy, anodized as in AMS 2470	0.3
AMS 4041 Aluminum Alloy (optional)	0.3
AMS 4049 Aluminum Alloy	0.3
AMS 4376 Magnesium Alloy, dichromate treated as in AMS 2475	0.2
AMS 4911 Titanium Alloy	0.1
AMS 5045 Steel	0.[illegible]

3.2.1.3 Low-Embrittling Cadmium Plate: Panels coated with low-embrittling cadmium plate shall not show a weight change greater than 0.3 mg/cm^2/24 hr, determined in accordance with ARP 1511.

3.2.2 Hydrogen Embrittlement: The product shall be non-embrittling, determined in accordance with ARP 1525.

3.2.3 Flash Point: Shall be not lower than 60°C (140°F), determined in accordance with ASTM D56.

3.2.4 Effect on Transparent Acrylic Plastics: There shall be no crazing or staining of stretched, MIL-P-25690 plastic, determined in accordance with ASTM F484.

3.2.5 Effect on Painted Surfaces: The product shall neither produce a decrease in film hardness greater than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with ASTM F502.

3.2.6 Effect on Unpainted Surfaces: The product, tested in accordance with ASTM F485, shall neither produce streaking nor leave any stains requiring polishing to remove.

3.2.7 Storage Stability: The product shall neither show separation from exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted to use concentration with deionized water, determined in accordance with ASTM F503.

3.2.8 Foaming Properties: The product shall remain on unpainted aluminum alloy surfaces not less than 1 min., determined in accordance with 3.2.8.1.

3.2.8.1 Using equipment conforming to MIL-C-81762, the cleaner shall be applied to an unpainted panel of AMS 4049 aluminum alloy, 36 in. (900 mm) square, which has a line scribed 3 in. (75 mm) from the bottom. With the panel held in a horizontal position the cleaner shall be applied from a 6 ft (2 m) foam wand assembly and the foam generator regulated to ensure a minimum live water pressure of 30 psi (207 kPa), air at 40 - 60 psi (276 - 414 kPa), and a cleaner/water ratio at use dilution recommended by the manufacturer. Cover panel completely with foam except for the area below the scribed line. Within 10 sec after application of cleaner, the panel shall be held at an angle approximately 60 deg to the horizontal. When the foam crosses the scribed line, start timing and measure the time required for the first signs of foam dropping off the panel. Also, measure the time required for the foam to completely drop off the panel. Repeat the test twice with a clean dry panel and report the average time.

3.2.9 Biodegradability: Surfactants used shall be not less than 90% biodegradable, determined in accordance with ASTM D2667. The vendor of the cleaner shall furnish certification from the surfactant manufacturer of the percent biodegradability of the surfactants.

3.2.10 Performance: The product, when used in accordance with manufacturer's recommendations, shall remove normally accumulated soils from exterior surfaces of aircraft. No visible residue shall remain on any surface tested.

3.3 Quality: The cleaner, as received by purchaser, shall be homogeneous, uniform in color, and free from skins and lumps and from foreign materials detrimental to usage of the cleaner.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the cleaner shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the cleaner conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to effect on transparent acrylic plastics (3.2.4) and effect on unpainted surfaces (3.2.6) requirements are classified as acceptance tests.

4.2.2 Periodic Tests and Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as periodic tests and as preproduction tests.

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 the contracting officer, or the request for procurement.

4.3 Sampling: Sampling shall be in accordance with ASTM D1568, unless otherwise specified by purchaser.

4.4 Approval:

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

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

4.5 Reports: Unless waived by purchaser, the vendor of the cleaner shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the cleaner conforms to the other technical requirements of this specification. This report shall include the purchase order number, material specification number, manufacturers identification, batch number, and quantity.

4.5.1 Reports of preproduction test results shall include a completed copy of OSHA Form 20 Material Safety Data Sheet, or equivalent, covering product formulation. All requests for modification of formulation shall be accompanied by a similar form for the proposed formulation.

4.5.2 The vendor of the cleaner shall supply a certificate of compliance to biodegradability requirements (3.2.9).

4.6 Resampling and Retesting: If any sample used in the above tests fails to meet the specified requirements, disposition of the cleaner may be based on the results of testing three additional samples for each original nonconforming sample. Failure of any retest sample to meet the specified requirements shall be cause for rejection of the cleaner represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 The product shall be packaged in suitable containers of a size agreed upon by purchaser and vendor.

5.1.2 Each container shall be legibly marked to show AMS 1527, purchase order number, manufacturer's identification, batch number, and quantity.

5.1.3 Containers of the product 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 this product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1.1 and 5.1.3 will be acceptable if it meets the requirements of Level C.