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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-1529 REV B

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Superseding AMS-1529A

Submitted for recognition as an American National Standard

CLEANER FOR AIRCRAFT EXTERIOR SURFACES
Emulsion, Foam-On, Pressure-Spraying Type

1. SCOPE:

1.1 Form: This specification covers an emulsion-type, 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.

1.3 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.

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.

2.1.1 Aerospace Material Specifications:

AMS-2470 - Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS-2475 - Protective Treatments, Magnesium Alloys
AMS-2825 - Material Safety Data Sheets
AMS-4037 - Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated
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 - 0.23Cr (Alclad 7075; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS-4376 - Magnesium Alloy Plate, 3.0Al - 1.0Zn (AZ31B-H26), Cold Rolled and Partially Annealed
AMS-4911 - Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS-5045 - Steel Sheet and Strip, 0.25 max Carbon, Hard Temper

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

ASTM D 56 - Flash Point by Tag Closed Tester
ASTM D 1193 - Reagent Water
ASTM D 1568 - Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM F 483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F 484 - Stress Crazing of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds
ASTM F 485 - Effects of Cleaners on Unpainted Aircraft Surfaces
ASTM F 502 - Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces
ASTM F 519 - Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals
ASTM F 1104 - Preparing Aircraft Cleaning Compounds, Liquid Type, Water Base, for Storage Stability Testing
ASTM F 1110 - Sandwich Corrosion Test
ASTM F 1111 - Corrosion of Low Embrittling Cadmium Plate by Aircraft Maintenance Chemicals

2.3 U.S. Government Publications: Available from Naval Publications and Forms Center, Attn: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: The composition of the cleaner shall be optional with the Ø manufacturer but should contain water, biodegradable surfactants, emulsifiers, solvents, and foam stabilizers to produce a foamable product completely soluble in ASTM D 1193, Type IV, water and meeting the requirements of 3.2.

3.2 Properties: The cleaner shall conform to the following requirements; tests Ø shall be performed in accordance with specified test methods on the product supplied in concentrated form and at use dilution recommended by the manufacturer; diluent shall be ASTM D 1193, Type IV, water.

3.2.1 Corrosion of Metal Surfaces:

3.2.1.1 Sandwich Corrosion: Specimens, after test, shall show a rating not Ø worse than 1, determined in accordance with ASTM F 1110.

3.2.1.2 Total Immersion Corrosion: The product shall neither show evidence of Ø corrosion of the panels nor cause a weight change of any test panel greater than the following, determined in accordance with ASTM F 483:

Panel	Weight Change mg/cm^2 per 24 hours
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 Carbon Steel	0.8

3.2.1.3 Low-Embrittlement Cadmium Plate: Panels coated with low-embrittling Ø cadmium plate shall not show a weight change greater than 0.3 mg/cm^2 per 24 hours, determined in accordance with ASTM F 1111.

3.2.2 Hydrogen Embrittlement: The product shall be non-embrittling, determined in accordance with ASTM F 519, Type 1a, 1c, or 2a.

3.2.3 Flash Point: Shall be not lower than 60°C (140°F), determined in accordance with ASTM D 56.

3.2.4 Effect on Plastics: There shall be no crazing or staining of stretched MIL-P-25690 plastic, determined in accordance with ASTM F 484.

3.2.5 Effect on Painted Surfaces: The product shall neither decrease the hardness of the paint film by more than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with ASTM F 502.

3.2.6 Effect on Unpainted Surfaces: The product, tested in accordance with ASTM F 485, shall neither produce streaking nor leave any stains requiring polishing to remove.

3.2.7 Storage Stability: The product shall neither show separation from Ø exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted to use concentration with ASTM D 1193, Type IV, water, determined accordance with ASTM F 1104.

3.2.8 Emulsion Stability: Place 20 mL of undiluted cleaning compound into a Ø 100 mL glass-stoppered measuring cylinder and slowly add 80 mL of ASTM D 1193, Type IV, water. Allow to stand for 1 minute. Insert stopper, invert the cylinder twice, and place on a level surface; a homogenous emulsion should be formed. If not, the product is not acceptable. If the water/product emulsion is satisfactory, allow to stand undisturbed for 1 hour and inspect for separation layer between water phase and solvent phase. If any phase is evident, report this in millilitres. Shake the sample by inverting the cylinder through 20 inversions in less than 10 seconds. Allow to remain undisturbed for 48 hours and re-inspect for phase separation. Report phase separation in millilitres. Any separation beyond 5 mL is not acceptable.

3.2.9 Foaming Properties: The product shall remain on unpainted aluminum alloy surfaces not less than 1 munute, determined in accordance with 3.2.9.1.

3.2.9.1 Using equipment conforming to MIL-C-81762, the cleaner shall be applied to an unpainted panel of AMS-4049 aluminum alloy, 36 inches (914 mm) square, which has a line scribed 3 inches (76 mm) from the bottom. With the panel held in a horizontal position, the cleaner shall be applied from a 6 foot (1.8 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 seconds after application of cleaner, the panel shall be held at an angle approximately 60 degrees 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.

3.2.10 Performance: The product, used in accordance with manufacturer's Ø recommendations, shall remove normally accumulated soils from exterior surfaces of aircraft. No visible residue shall remain on any surface tested. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.3 Quality: The cleaner, as received by purchaser, shall be homogenous, 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 Ø 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 cleaner conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for effect on plastics (3.2.4), effect on unpainted surfaces (3.2.6), and quality (3.3) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for corrosion of metal surfaces (3.2.1), hydrogen Ø embrittlement (3.2.2), flash point (3.2.3), effect on painted surfaces (3.2.5), storage stability (3.2.7), emulsion stability (3.2.8), foaming properties (3.2.9), and performance (3.2.10) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of cleaner 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.

4.2.3.1 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, contracting officer, or request for procurement.

4.3 Sampling and Testing: Shall be in accordance with ASTM D 1568; a lot shall Ø be all cleaner 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.

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 by purchaser. Results of tests on production cleaner shall be essentially equivalent to those on the approved sample.