

# AEROSPACE MATERIAL SPECIFICATION



AMS 1529C

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Superseding AMS 1529B

## Cleaner for Aircraft Exterior Surfaces Emulsion, Foam-On, Pressure-Spray Type

### 1. SCOPE:

#### 1.1 Form:

This specification covers an emulsion-type, foam-on, pressure-spray cleaner in the form of a liquid.

#### 1.2 Application:

This cleaner has been used typically for removing soils from painted and unpainted exterior surfaces of aircraft using foam-forming equipment, but usage is not limited to such applications.

#### 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

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## 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2470	Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS 2475	Protective Treatments, Magnesium Alloys
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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

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

### 3. TECHNICAL REQUIREMENTS:

#### 3.1 Material:

The composition of the cleaner shall be optional with the 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 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: Cleaner shall produce a rating not worse than 1, determined in accordance with ASTM F 1110.

3.2.1.2 Total Immersion Corrosion: The cleaner shall neither show evidence of corrosion of the panels nor cause a weight change of any test panel greater than that shown in Table 1, determined in accordance with ASTM F 483:

TABLE 1 - Maximum Immersion Weight Change

Test Panel Material	Weight Change mg/cm <sup>2</sup> 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 cadmium plate shall not show a weight change greater than 0.3 mg/cm<sup>2</sup> per 24 hours, determined in accordance with ASTM F 1111.

3.2.2 Hydrogen Embrittlement: The cleaner 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 cleaner 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 exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted to use concentrationn with ASTM D 1193, Type IV, water, determined in accordance with ASTM F 1104.
- 3.2.8 Emulsion Stability: Place 20 mL of undiluted cleaning compound into a 100 mL glass-stoppered graduated cylinder and slowly add 80 mL of ASTM D 1193, Type IV, water. Allow to stand for one minute. Insert stopper, invert the cylinder twice, and place on a level surface; a homogeneous emulsion should be formed. If not, the product is not acceptable. If the water/product emulsion is satisfactory, allow to stand undisturbed for one hour and inspect for separation layer between water phase and solvent phase. If any phase is evident, report this in milliliters. Shake the sample by inverting the cylinder through 20 inversions in less than ten seconds. Allow to remain undisturbed for 48 hours and re-inspect for phase separation. Report phase separation in milliliters. 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 one minute, 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 to 60 psi (276 to 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 ten 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 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 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 for vendor's tests and shall be responsible for the performance of 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: 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: Corrosion of metal surfaces (3.2.1), hydrogen 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: 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.

### 4.3 Sampling and Testing:

Shall be in accordance with ASTM D 1568; a lot shall 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.