

Cleaner for Exterior Aircraft Surfaces
Gel-Type, Solvent-Base

RATIONALE

This specification was revised to meet current verbiage required by SAE standards with no technical changes.

1. SCOPE

1.1 Form

This specification covers a solvent-base cleaner in the form of a gel.

1.2 Application

This product has been used typically for removing soils from exterior surfaces of aircraft, such as landing gears, wheel wells, and flap cavities, 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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2470	Anodic Treatment of Aluminum Alloys, Chromic Acid Process
AMS2475	Protective Treatments, Magnesium Alloys
AMS2825	Material Safety Data Sheets

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AMS4037	Aluminum Alloy, Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated
AMS4041	Aluminum Alloy, Alclad Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn, Alclad 2024 and 1-1/2% Alclad 2024, -T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate
AMS4049	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
AMS4376	Plate, Magnesium Alloy, 3.0Al - 1.0Zn - 0.20Mn (AZ31B-H26), Cold Rolled and Partially Annealed
AMS4911	Titanium Alloy, Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS5045	Steel, Sheet and Strip, 0.25 Carbon, Maximum, Hard Temper
AMS5046	Carbon Steel, Sheet, Strip, and Plate, (SAE 1020 and 1025), Annealed

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 93	Flash Point by Pensky-Martens Closed Tester
ASTM D 471	Rubber Property - Effects of Liquids
ASTM D 1568	Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM D 2667	Biodegradability 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 1080	Determining the Consistency of Viscous Liquids Using a Consistometer
ASTM F 1105	Preparing Aircraft Cleaning Compounds, Liquid Type, Solvent Based 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 the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

MIL-PRF-25690	Plastic, Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant
MIL-STD-870	Cadmium Plating, Low Embrittlement, Electrodeposition
MIL-STD-2073-1	DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS

3.1 Material

The composition of the cleaner shall be optional with the manufacturer but should contain water, biodegradable surfactants, emulsifiers, thickeners, and solvents to produce a gel-type product meeting the requirements of 3.2.

3.2 Properties

Cleaner shall conform to the following requirements; tests shall be performed in accordance with specified test methods on the product supplied in concentrated form:

3.2.1 Viscosity

Flow rate shall be between 13 and 23 centimeters in 10 seconds, determined in accordance with ASTM F 1080.

3.2.2 Corrosion of Metal Surfaces

3.2.2.1 Sandwich Corrosion

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

3.2.2.2 Total Immersion Corrosion

Cleaner shall neither show evidence of corrosion nor cause a weight change of any test panel greater than shown in Table 1, determined in accordance with ASTM F 483:

TABLE 1 - TOTAL IMMERSION CORROSION WEIGHT CHANGE

Panel	Weight Change mg/cm ² per 24 hours
AMS4037 Aluminum Alloy, anodized as in AMS2470	0.3
AMS4041 Aluminum Alloy (optional)	0.3
AMS4049 Aluminum Alloy	0.3
AMS4376 Magnesium Alloy, dichromate treated as in AMS2475	0.2
AMS4911 Titanium Alloy	0.1
AMS5045 Carbon Steel	0.8

3.2.2.3 Low-Embrittling Cadmium Plate

Panels, coated with low-embrittling cadmium plate, shall not show a weight change greater than 0.3 mg/cm² per 24 hours, determined in accordance with ASTM F 1111.

3.2.3 Hydrogen Embrittlement

Cleaner shall be non-embrittling, determined in accordance with ASTM F 519, utilizing Type 1a, 1c, or 2a specimens, cadmium plated in accordance with MIL-STD-870, Class 1, Type I. Type 1a and 1c specimens shall be loaded to 45% of the predetermined notch fracture strength, and Type 2a specimens loaded to 80% of the yield strength. The entire 2a stressed specimen, or just the notched area of the 1a and 1c stressed specimen, shall be immersed continuously in the solution under test for 150 hours at a temperature of 68 to 86 °F (20 to 30 °C).

3.2.4 Flash Point

Shall not be lower than 140 °F (60 °C), determined in accordance with ASTM D 93.

3.2.5 Effect on Plastics

There shall be no crazing or staining of MIL-PRF-25690 stretched acrylic plastic, determined in accordance with ASTM F 484.

3.2.6 Effect on Painted Surfaces

Cleaner 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 F 502.

3.2.7 Effect on Unpainted Surfaces

Cleaner, tested in accordance with ASTM F 485, shall neither produce streaking nor leave any stains requiring polishing to remove.

3.2.8 Effect on Natural Rubber

Cleaner shall produce no swell of natural rubber in excess of 3% after 8 hours immersion, determined in accordance with ASTM D 471.

3.2.9 Stability

3.2.9.1 Heat Stability

Cleaner shall show no separation or stratification at $122\text{ }^{\circ}\text{F} \pm 18$ ($50\text{ }^{\circ}\text{C} \pm 10$), determined in accordance with ASTM F 1105.

3.2.9.2 Cold Stability

Cleaner shall show no precipitation, stratification, layering, or separation at $18\text{ }^{\circ}\text{F} \pm 4$ ($-8\text{ }^{\circ}\text{C} \pm 2$), determined in accordance with ASTM F 1105. If product freezes, it shall, on thawing, return to its original state without agitation.

3.2.9.3 Accelerated Storage Stability

The cleaner shall exhibit no change in appearance, shall not separate, and shall not cause any visual corrosion of the steel strip, when tested as follows: Polish a MIL-S-7952 steel strip, nominally 0.04 x 0.50 x 6.0 inches (1.0 x 12.7 x 152 mm), using 240 grit silicon carbide paper. Clean the specimen using absorbent paper tissue, wiping first with methyl ethyl ketone and then with isopropanol. Dry the specimen, place it in a clean glass pressure bottle, add enough cleaner to cover half of the strip, cap the bottle, roll the bottle on its side to cover the strip, and immerse bottle in a water or oil bath. Program the temperature of the bath for $140\text{ }^{\circ}\text{F} \pm 2$ ($60\text{ }^{\circ}\text{C} \pm 1$) for 8 hours ± 0.25 and no input for 16 hours ± 0.5 . After the 24 hour cycle and without agitation, examine the cleaner and the steel strip.

3.2.10 Biodegradability

Surfactants used shall be not less than 90% biodegradable, determined in accordance with ASTM D 2667. The vendor of the cleaner shall furnish certification from the surfactant manufacturer of the percent biodegradability of the surfactants.

3.2.11 Performance

The product, when used in accordance with manufacturer's recommendations, shall remove normally accumulated soils from aircraft landing gears, wheel wells, and flap cavities. 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, lumps, and foreign materials detrimental to usage of the cleaner.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of 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 specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Effect on plastics (3.2.5) and effect on unpainted surfaces (3.2.7) are acceptance tests and shall be performed on each lot.