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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 1540A

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Superseding AMS 1540

CLEANER, THRUST REVERSER
Water-Base

1. SCOPE:

1.1 Form: This specification covers a water-base cleaner in the form of a liquid.

1.2 Application: Primarily for removing thrust reverser stains and deposits from corrosion and heat resistant steel and aluminum alloy exterior surfaces of aircraft.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications and Aerospace Recommended Practices shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 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 2825 - Material Safety Data Sheets
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 4045 - Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075; -T6 Sheet, -T651 Plate)
AMS 4049 - Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (Alclad 7075; -T6 Sheet, -T651 Plate)
AMS 4911 - Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS 5045 - Steel Sheet and Strip, 0.25 Max 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

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 D2196 - Viscosity Measurements and Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer
ASTM F483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F484 - Stress Crazing of Acrylic Plastics in Contact with Liquid or 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
ASTM F519 - Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals

2.3 U.S. Government Publications: Available from Comanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Specifications:

MIL-P-83310 - Plastic Sheet, Polycarbonate, Transparent

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 manufacturer but should contain water, biodegradable surfactants, and other additives as required to produce a homogeneous product 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 in concentrated form except as otherwise specified in 3.2.5 and 3.2.7:

3.2.1 Corrosion of Metal 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 test panel greater than the following, determined in accordance with ASTM F483:

Test Panel		Weight Change mg/cm^2 per 24 hr
AMS 4037	Aluminum Alloy, anodized as in AMS 2470	0.3
AMS 4041	Aluminum Alloy	0.3
AMS 4045	Aluminum Alloy	0.3
AMS 4049	Aluminum Alloy	0.3
AMS 4911	Titanium Alloy	0.1
AMS 5045	Carbon Steel	0.8

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

3.2.2 Hydrogen Embrittlement: The cleaner shall be non-embrittling, determined Ø in accordance with ASTM F519, Types 1a, 1c, or 2a.

3.2.3 Effect on Plastics: The product shall not craze, stain, or discolor Ø Type C acrylic plastic, determined in accordance with ASTM F484. The product shall not craze, stain, or discolor MIL-P-83310 polycarbonate plastic or polysulfone plastic, determined in accordance with test procedures specified in ASTM F484 on specimens stressed for 30 min. ± 2 to an outer fiber stress of 3,000 psi (20 MPa).

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

3.2.5 Effect on Painted Surfaces: The product, tested at manufacturer's recommended dilution, 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 F502.

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

3.2.7 Solubility: The concentrate shall be completely soluble in water to make a uniform solution free of gelatinous lumps, layering of ingredients, or sediment. There shall be no violent or dangerous reactions when the concentrate is diluted according to manufacturer's recommendations.

3.2.8 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, determined in accordance with ASTM F503.

3.2.9 Performance: The product, when used in accordance with manufacturer's recommendations, shall remove carbon deposits and thrust reverser stains normally found on exterior surfaces of aircraft.

3.3 Quality: Cleaner, as received by purchaser, shall be a homogeneous liquid, free from sediment, abrasives, skins, lumps, and 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. 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 to determine conformance to requirements for total immersion corrosion (3.2.1.2), effect on plastics (3.2.3), effect on unpainted surfaces (3.2.4), and flash point (3.2.6) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for sandwich corrosion (3.2.1.1), low-embrittling cadmium plate (3.2.1.3), hydrogen embrittlement (3.2.2), effect on painted surfaces (3.2.5), solubility (3.2.7), and performance (3.2.9) are classified as 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 to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of cleaner to a purchaser, when a change in material, processing, or both 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, the contracting officer, or the request for procurement.

4.3 Sampling: Sampling shall be in accordance with ASTM D1568; 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.

4.3.1 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3 and the report of 4.5 shall state that such plan was used.