



AEROSPACE MATERIAL SPECIFICATION	AMS1540	REV. C
	Issued 1981-07 Revised 2008-03 Reaffirmed 2015-04 Superseding AMS1540B	
Cleaner, Thrust Reverser Water-Base		

RATIONALE

AMS1540C has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

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

1.2 Application

This cleaner has been used typically for removing thrust reverser stains and deposits from corrosion and heat resistant steel and aluminum alloy exterior surfaces of aircraft, 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.

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), Solution Heat Treated

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AMS 4041	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
AMS 4045	Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr, 7075: (-T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
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 4911	Titanium Alloy, Sheet, Strip, and Plate, 6Al - 4V, Annealed
AMS 5045	Steel, Sheet and Strip, 0.25 Carbon, Maximum, Hard Temper
AMS-P-83310	Plastic Sheet, Polycarbonate, Transparent

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 56	Flash Point by Tag Closed Tester
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 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-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, 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 shall pass the sandwich corrosion test, determined in accordance with ASTM F 1110.

3.2.1.2 Total Immersion Corrosion

The product shall neither produce evidence of corrosion of the panels nor cause a weight change of any test panel greater than shown in Table 1, determined in accordance with ASTM F 483:

TABLE 1 - MAXIMUM IMMERSION CORROSION WEIGHT CHANGE

Test Panel	Weight Change mg/cm ² per 24 hours
AMS4037 Aluminum Alloy, anodized as in AMS2470	0.3
AMS4041 Aluminum Alloy	0.3
AMS4045 Aluminum Alloy	0.3
AMS4049 Aluminum Alloy	0.3
AMS4911 Titanium Alloy	0.1
AMS5045 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/cm² 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, utilizing Types 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 between 68 to 86 °F (20 to 30 °C).

3.2.3 Effect on Plastics

The product shall not craze, stain, or discolor Type C acrylic plastic, determined in accordance with ASTM F 484. 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 F 484 on specimens stressed for 30 minutes \pm 2 to an outer fiber stress of 3000 psi (20.7 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 F 485.

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 F 502.

3.2.6 Flash Point

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

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 F 1104.

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 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

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 acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

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 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 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 has 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.