

AEROSPACE MATERIAL SPECIFICATION

AMS 1536
 Issued 1-15-81
 Revised

CLEANER FOR AIRCRAFT SURFACES Cold Tank Type

1. SCOPE:

- 1.1 Form: This specification covers a tank-type cleaner in the form of a liquid.
- 1.2 Application: Primarily for removing, by immersion in cleaner as supplied or as solvent diluted, greasy soils, carbon, rubber, etc from painted and unpainted aircraft components such as wheels and landing gear. This cleaner is not recommended for use on plastic or aircraft windows due to possible crazing.

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

- 2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 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 2475 - Protective Treatments, Magnesium Base 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)
- 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 - 0.26Cr (Alclad 7075; -T6 Sheet, -T651 Plate)
- AMS 4376 - Magnesium Alloy Plate, 3.0Al - 1.0Zn (AZ31B-H26)
- AMS 4911 - Titanium Alloy Sheet, Strip, and Plate (6Al - 4V), Annealed

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 A109 - Steel, Carbon, Cold Rolled Strip
 ASTM D270 - Sampling Petroleum and Petroleum Products
 ASTM D1310 - Flash Point of Liquids by Tag Open-Cup Apparatus
 ASTM F482 - Total Immersion Corrosion Test for Tank-Type Aircraft Maintenance Chemicals
 ASTM F485 - Effects of Cleaners on Unpainted Aircraft Surfaces
 ASTM F502 - Determination of 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 - Hydrogen Embrittlement Testing of Aerospace Materials

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

2.3.1 Federal Specifications:

P-D-680 - Dry Cleaning Solvent

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/or soaps, emulsifiers, and solvents 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 supplied in concentrated form and at use dilution recommended by manufacturer:

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 nor cause a weight change of any single test panel greater than the following, determined in accordance with ASTM F482:

Test Panel	Weight Change (mg/cm ²)/24 hr
AMS 4037 Aluminum Alloy, anodized as in AMS 2470	0.3
AMS 4041 Aluminum Alloy	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
ASTM A109, Temper No. 1, 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)/24 hr, determined in accordance with ARP 1511.

- 3.2.2 Hydrogen Embrittlement: The cleaner shall be non-embrittling, determined in accordance with ASTM F519, Type 1c.
- 3.2.3 Flash Point: Shall be not lower than 60°C (140°F), determined in accordance with ASTM D1310.
- 3.2.4 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 F502.
- 3.2.5 Effect on Unpainted Surfaces: The cleaner, tested in accordance with ASTM F485, shall neither produce streaking nor leave any stains requiring polishing to remove.
- 3.2.6 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 concentration with P-D-680, Type II, solvent, determined in accordance with ASTM F503.
- 3.2.7 Performance: Cleaner shall leave no visible residue on steel test panels, determined as in 3.2.7.1.
- 3.2.7.1 Four test panels, approximately 1/2 x 2 in. (12.5 x 50 mm), fabricated from low-carbon steel conforming to ASTM A109, Temper No. 1, shall be marked approximately 1-1/4 in. (32 mm) from the bottom. The area below the mark shall be coated with 10 mg $\pm$ 1/2 of grease (See 8.1) by means of a spatula. The panels shall be placed horizontally in a circulating-air oven at 88°C $\pm$ 2 (190°F $\pm$ 4) for 2 hr $\pm$ 0.25 with vents open. At the end of 2 hr, remove the panels from the oven, allow to cool to room temperature, and immerse to a point above the line in a 10% room temperature solution of cleaner diluted with P-D-680, Type II, solvent. Test panels shall be suspended above the bottom in separate containers. After 20 min. $\pm$ 1 immersion, remove the panels, rinse at least 10 sec using 85°C $\pm$ 5 (185°F $\pm$ 9) tap water with the panel at approximately 45 deg angle, thoroughly dry, and examine for visible residue.
- 3.2.8 Quality: The cleaner, as received by purchaser, shall be homogeneous, uniform in color, and free from foreign materials detrimental to its usage.
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 such confirmatory testing as he deems 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 effect on painted surfaces (3.2.4) and effect on unpainted surfaces (3.2.5) are classified as acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Tests to determine conformance to requirements for corrosion of metal surfaces (3.2.1), hydrogen embrittlement (3.2.2), flash point (3.2.3), and performance (3.2.7) 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 on the initial shipment of cleaner to a purchaser, when a change in material or processing requires reapproval as in 4.2.2, 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 D270, unless otherwise specified by purchaser; 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. Results of tests on production cleaner shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, and methods of inspection on production cleaner which are essentially the same as those used on the approved sample cleaner. If necessary to make any change in ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material and/or processing and, when requested, sample cleaner. Production cleaner made by the revised procedure shall not be shipped prior to receipt of reapproval.
- 4.5 Reports: Unless waived by purchaser, the vendor of cleaner shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the acceptance test requirements and, when performed, to the periodic test requirements and stating that the cleaner conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 1536, manufacturer's identification, lot number, and quantity.
- 4.5.1 A material safety data sheet conforming to AMS 2825 or equivalent shall be supplied to each purchaser prior to, or concurrent with, the report of preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of cleaner for production use. All requests for modification of formulation shall be accompanied by a similar form for the proposed formulation.
- 4.6 Resampling and Retesting: If any sample used in the above tests fails to meet the specified requirements, disposition of the cleaner may be based on the results of testing three additional samples for each original nonconforming sample. Failure of any retest sample to meet the specified requirements shall be cause for rejection of the cleaner represented and no additional testing shall be permitted. Results of all tests shall be reported.
5. PREPARATION FOR DELIVERY:
- 5.1 Packaging and Identification:
- 5.1.1 Cleaner shall be packaged in suitable containers of a type and size agreed upon by purchaser and vendor.
- 5.1.2 Each container shall be legibly marked to show not less than AMS 1536, purchase order number, manufacturer's identification, lot number, and quantity.
- 5.1.3 Containers of cleaner shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the cleaner to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.
- 5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1.1 and 5.1.3 will be acceptable if it meets the requirements of Level C.