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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 1537A

Issued 1 OCT 1985
Revised 1 OCT 1992

Superseding AMS 1537

Submitted for recognition as an American National Standard

CLEANER, ALKALINE
Hot-Tank Type

1. SCOPE:

1.1 Form:

This specification covers an alkaline cleaner in the form of a liquid for use above 65 °C (154 °F).

1.2 Application.

This cleaner has been used typically for removing soils from aluminum and magnesium alloy parts by immersion in hot cleaner solution prior to surface treatment, 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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

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 2825 Material Safety Data Sheets

2.1 SAE Publications (Continued)

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

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

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 E 70 pH of Aqueous Solutions with the Glass Electrode
ASTM F 483 Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F 1104 Preparing Aircraft Cleaning Compounds, Liquid Type, Water Base, for Storage Stability Testing
ASTM F 1110 Sandwich Corrosion Test

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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 shall produce a 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:

3.2.1 Total Immersion Corrosion: The product shall neither produce evidence of corrosion nor cause weight change of any test panel greater than that shown in Table 1, determined in accordance with ASTM F 483 at highest concentration and temperature recommended for the cleaner by the manufacturer:

TABLE 1 - Maximum Immersion Corrosion Weight Change

Test Panel	Weight Change mg/cm² per 24 hours
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

3.2.2 (R) Sandwich Corrosion: Specimens shall pass the sandwich corrosion test, determined in accordance with ASTM F 1110.

3.2.3 Solubility: The product shall be readily soluble in water at maximum concentration and minimum temperature specified by manufacturer.

3.2.4 pH Value: Shall be between 9.0 and 11.5 on a 5% by volume solution, determined in accordance with ASTM E 70 at room temperature, making no correction for sodium ion.

3.2.5 (R) Flash Point: Shall be not lower than 70 °C (158 °F), determined in accordance with ASTM D 56 or other method acceptable to purchaser.

3.2.6 Cleaning Performance: The prepared cleaning solution shall remove not less than 70% of the soil on panels prepared and tested in accordance with 3.2.6.1 and 3.2.6.2.

3.2.6.1 Soiling Procedure: Four 2 x 4 inch (51 x 102 mm) AMS 4041 aluminum alloy panels shall be coated with test soil (See 8.2). The soiling mixture shall be well mixed and maintained at 25 °C ± 1 (77 °F ± 2) during the soiling procedure. Immerse four panels in the soiling mixture for 60 seconds, remove panels, and permit excess soiling mixture to drain. Allow to dry at room temperature for 24 hours. Weigh the panels to the nearest 0.1 milligram.

3.2.6.2 Soil Removal Test: Prepare a fresh solution of the cleaner at minimum recommended concentration using water conforming to ASTM D 1193. Place 900 mL of the diluted cleaning compound in each of four 1-liter tall form beakers. Maintain the temperature of the cleaning solution at the minimum recommended temperature. Immerse one each of the soiled panels in each of the beakers containing the cleaning compound by suspending them vertically from a suitable hanger mounted on a laboratory ring stand. Suspend the soiled panel in the center of the beaker so that one end of the panel is 1 inch (25 mm) from the bottom of the beaker. Place beaker containing the soiled panel on a magnetic stirring apparatus. Place a 1 inch (25 mm) stirring bar in the beaker. Operate the magnetic stirrer at 300 rpm for 20 minutes. After the 20 minutes cleaning cycle, withdraw the panels from the cleaning solution and immerse them in 900 mL of ASTM D 1193 water contained in a 1-liter tall form beaker. Repeat the above procedure for the cleaning cycle except operate the magnetic stirrer for two minutes. Remove the panels from the water and dry them in a circulating-air type oven maintained at 120 °C ± 1 (248 °F ± 2) for 15 minutes. Remove the panels from the oven and cool them at standard conditions for 15 minutes. Weigh the panels to the nearest 0.1 milligram. The percent soil removal shall be reported as an average value for four panels and calculated using Equation 1.

$$\% \text{ Soil Removed} = \frac{\text{Wgt of soiled panel} - \text{Wgt of cleaned panel}}{\text{Wgt of soiled panel} - \text{Wgt of unsoiled panel}} \times 100 \quad \text{(Eq. 1)}$$

3.2.7 (R) Storage Stability: The product shall be tested in accordance with ASTM F 1104. The stored cleaning compound shall give a cleaning ability value not less than 90% of that obtained with original compound when tested in accordance with 3.2.6.

3.3 Quality:

The cleaner, as received by purchaser, shall be homogeneous and free from foreign materials detrimental to usage of the cleaner.

4. QUALITY ASSURANCE PROVISIONS:

4.1 (R) 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. 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 for pH value (3.2.4) are acceptance tests and shall be performed on each lot.

4.2.2 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.

4.2.2.1 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:
(R)

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.

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 ingredients 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:

The vendor of the cleaner shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the cleaner conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 1537A, manufacturer's identification, 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. Each request for modification of cleaner formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.6 Resampling and Retesting:
(R)

If any specimen 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 specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the cleaner represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification: