

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 1536B

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Reaffirmed JAN 2008

Superseding AMS 1536A

Cleaner for Aircraft Components Cold Tank Type, Solvent-Base

1. SCOPE:

1.1 Form:

This specification covers a tank-type cleaner in the form of a liquid.

1.2 Application:

This cleaner has been used typically for removing greasy soils, carbon, or rubber from painted and unpainted aircraft components, such as wheels and landing gear, by immersion in cleaner as supplied or as solvent diluted, but usage is not limited to such applications. This cleaner is not recommended for use on plastic or aircraft windows due to possible crazing.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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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 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 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 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 |
| AMS 4911 | Titanium Alloy Sheet, Strip, and Plate, 6Al - 4V, Annealed |
| AMS 5045 | Steel Sheet and Strip, 0.25 max Carbon, Hard Temper |

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

| | |
|-------------|---|
| ASTM D 13 | Spirits of Turpentine |
| ASTM D 93 | Flash Point by Pensky-Martens Closed Tester |
| ASTM D 4057 | Manual Sampling of Petroleum and Petroleum Products |
| ASTM F 482 | Total Immersion Corrosion Test for Tank-Type Aircraft Maintenance Chemicals |
| 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 Evaluation of Plating Processes and Service Environments |
| ASTM F 1105 | Preparing Aircraft Cleaning Compounds, Liquid Type, Solvent 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 DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

| | |
|------------|---|
| MIL-C-306 | Carbon, Black, Powdered, Dry |
| MIL-A-356 | Asphaltum (Gilsonite) |
| MIL-L-6082 | Lubricating Oil, Aircraft Reciprocating Engine (Piston) |
| P-D-680 | Dry Cleaning Solvent |

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 cleaner supplied in concentrated form and at a use dilution recommended by the manufacturer.

3.2.1 Corrosion of Metal Surfaces:

3.2.1.1 Sandwich Corrosion: Cleaner shall produce a rating not worse than 1, determined in accordance with ASTM F 1110.

3.2.1.2 Total Immersion Corrosion: The cleaner shall neither cause evidence of corrosion nor a weight change of any test panel greater than shown in Table 1, determined in accordance with ASTM F 482:

TABLE 1 - Allowable Weight Change

| Test Panel | Weight Change mg/cm ² 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 |
| 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/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, Type 1A, 1C, or 2a.

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

- 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 F 502.
- 3.2.5 Effect on Unpainted Surfaces: The cleaner, tested in accordance with ASTM F 485, shall neither produce streaking nor leave any stains requiring polishing to remove.
- 3.2.6 Storage Stability: The cleaner 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 F 1105.
- 3.2.7 Performance: Cleaner shall leave no visible residue on steel panels, determined as in 3.2.7.2.
- 3.2.7.1 Standard Soil: Shall be as specified in Table 2. The asphaltum shall be melted by use of an oil bath. The lubricating oil and the lanolin shall be added, with stirring until a smooth mixture results. The mixture shall be cooled to $25\text{ }^{\circ}\text{C} \pm 1$ ($77\text{ }^{\circ}\text{F} \pm 2$). The turpentine and carbon shall be added in that order, with stirring.

TABLE 2 - Standard Soil

| Ingredient | Parts by Weight |
|--|--------------------|
| MIL-A-356 Asphaltum (Gilsonite) | 5.0 |
| Lanolin (Anhydrous) USP | 15.0 |
| MIL-L-6082 Lubricating Oil, Grade 1100 | 20.0 |
| ASTM D 13 Turpentine | 25.0 |
| MIL-C-306 Carbon, Activated, Powdered | 20.0 |

- 3.2.7.2 Procedure: Four AMS 5045 steel panels, approximately 1/2 x 2 inches (13 x 51 mm), shall be marked approximately 1-1/4 inches (31.8 mm) from the bottom. The area below the mark shall be coated with $10\text{ mg} \pm 0.5$ of standard soil by means of a spatula. The panels shall be placed horizontally in a circulating-air oven at $88\text{ }^{\circ}\text{C} \pm 2$ ($190\text{ }^{\circ}\text{F} \pm 4$) for two hours ± 0.25 with vents open. At the end of two hours, remove the panels from the oven, allow to cool to room temperature, and immerse to a point above the line in a 10% solution of cleaner diluted with P-D-680, Type II, solvent. Test panels shall be suspended above the bottom in separate containers. After 20 minutes ± 1 immersion, remove the panels, rinse at least ten seconds using $85\text{ }^{\circ}\text{C} \pm 5$ ($185\text{ }^{\circ}\text{F} \pm 9$) tap water with the panel at an angle of approximately 45 degrees, 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 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 the requirements of this specification.

4.2 Classification of Tests:

- 4.2.1 Acceptance Tests: Effect on painted surfaces (3.2.4) and effect on unpainted surfaces (3.2.5) are acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Corrosion of metal surfaces (3.2.1), hydrogen embrittlement (3.2.2), flash point (3.2.3), and performance (3.2.7) 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: 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.

4.3 Sampling and Testing:

Shall be in accordance with ASTM D.4057; 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.