Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 1525

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Revised

CLEANER FOR AIRCRAFT EXTERIOR METALLIC SURFACES
Wipe Solvent, Cold Operations

1. SCOPE:

1.1 Form: This specification covers a wipe-solvent cleaner in the form of a liquid.

1.2 Application: Primarily for use at ambient temperature as a cleaner for exterior metallic surfaces of aircraft. This product shall not be used on plastics or aircraft windows due to crazing properties.

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 4049 - Aluminum Alloy Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (Alclad 7075; - T6 Sheet, -T651 Plate)

2.1.2 Aerospace Recommended Practices:

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 D891 - Specific Gravity of Industrial Aromatic Hydrocarbons and Related Materials
ASTM D1078 - Distillation Range of Volatile Organic Liquids
ASTM D1353 - Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products
ASTM D1568 - Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM F483 - Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
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

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.3.4.

2.3.1 Federal Specifications:

TT-M-261 - Methyl Ethyl Ketone, Technical
TT-E-776 - Ethylene Glycol Monobutyl Ether (For Use in Organic Coatings)

Printed in U.S.A.

2.3.2 Military Specifications:

MIL-D-6998 - Dichloromethane, Technical
MIL-C-83286 - Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications

2.3.3 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

2.3.4 U.S. Department of Labor, Occupational Safety and Health Administration Forms: Available from regional offices of U. S. Department of Labor, Bureau of Labor Standards.

OSHA Form 20 - Material Safety Data Sheet

3. TECHNICAL REQUIREMENTS:

3.1 Composition: The product shall be a uniform mixture of the following materials in the percentages shown:

Dichloromethane (MIL-D-6998, Grade B)	69 ± 1
Methyl Ethyl Ketone (TT-M-261)	29 ± 1
Ethylene Glycol Monobutyl Ether (TT-E-776)	2 ± 0.5

3.1.1 Product shall not be deleterious to aircraft structural alloys.

3.2 Properties: The product shall conform to the following requirements; tests shall be performed in accordance with specified test methods on the cleaner supplied in concentrated form:

3.2.1 Flash Point: Shall be not lower than 43° C (110° F), determined in accordance with ASTM D56.

3.2.2 Residue: There shall be no visible residue or stains on test panels of AMS 4049 aluminum alloy after the final water rinse, determined in accordance with 3.2.2.1.

3.2.2.1 Two 2 x 6 in. (50 x 150 mm) panels of AMS 4049 aluminum alloy shall be cleaned with acetone. The specimen shall be immersed in a sufficient quantity of the cleaner to cover approximately one-half of the panel. After the cleaner has been applied, the panels shall be placed at approximately 45 deg from the horizontal in an oven maintained at 38° C ± 1 (100° F ± 2) for 30 min. ± 1. At the end of the 30-min., the panels shall be removed from the oven, rinsed with room-temperature distilled water, and allowed to dry. The treated and untreated areas of the panel shall be visually examined and compared for the presence of residue and stains.

3.2.3 Effect on Metallic Surfaces:

3.2.3.1 Sandwich Corrosion: Specimens of AMS 4049 aluminum alloy, after test, shall show a rating not worse than 1, determined in accordance with ARP 1512.

3.2.3.2 Total Immersion Corrosion: The product shall neither show evidence of corrosion of the panels nor cause a weight change greater than 0.3 mg/cm^2/24 hr for any single panel of AMS 4049 aluminum alloy, determined in accordance with ASTM F483.

3.2.4 Temperature Stability: The product shall not show chemical or physical deterioration, including evidence of discoloration, layering, or other change denoting loss of stability after exposure to 2° C ± 3 (35° F ± 5) for 120 hr ± 1.

3.2.5 Color: The product shall be water white.

3.2.6 Effect on Painted Surfaces: The product shall neither produce a decrease in film hardness greater than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with either ASTM F502 or 3.2.6.1.

3.2.6.1 Two test panels prepared in accordance with MIL-C-83286 shall be placed in a horizontal position. The cleaner shall be applied to approximately one-half the painted area of each panel and shall be allowed to remain on the panels for not less than 30 minutes. The panels shall then be rinsed with distilled water and allowed to dry for 24 hr ± 1 at room temperature. Hardness of exposed and unexposed painted surfaces shall be tested in accordance with MIL-C-83286. Exposed and unexposed panel areas shall be examined visually and compared for evidence of streaking, discoloration, and blistering.

3.2.7 Effect on Unpainted Surfaces: The product, tested in accordance with ASTM F485, shall neither produce streaking of unpainted AMS 4049 aluminum alloy test panels nor leave any stains requiring polishing to remove.

3.2.8 Storage Stability: The product shall be stable in storage for not less than 12 months at room temperature. Product shall remain free of lumps and skin formation and shall remain homogeneous. Samples prepared as in 3.2.8.1 shall show no evidence of layering, separation, settling, or crystallization after being subjected to five freeze-thaw cycles in accordance with 3.2.8.2. The product shall not deliquesce or otherwise deteriorate when stored in shipping container or use package for not less than 12 months, determined in accordance with ASTM F503.

3.2.8.1 Two 6-oz (177 - mL) samples of the product shall be placed in 8-oz (237 - mL) clear glass bottles, sealed, and, from that time until test is completed, shall be handled so as to minimize movement of the sample.

3.2.8.2 Samples shall be exposed for not less than 12 hr at -23° C ± 1 (-10° F ± 2). At the end of the 12 hr, sample shall be removed to a room-temperature environment and allowed to thaw completely.

3.2.9 Specific Gravity: Shall be 1.1204 - 1.2376 at 23° C (73° F), determined in accordance with ASTM D891.

3.2.10 Distillation Range: Shall be as follows, determined in accordance with ASTM D1078:

Initial Boiling Point -	40° C (104° F) min
10% -	47° C (117° F) min
20% -	48° C (118° F) min
30% -	50° C (122° F) min
40% -	52° C (126° F) min
50% -	55° C (131° F) min
60% -	59° C (138° F) min
70% -	65° C (149° F) min
80% -	71° C (160° F) min
90% -	81° C (178° F) min
Dry Point -	166° C (331° F) max

3.2.11 Nonvolatile Matter: Shall not exceed 0.002%, determined in accordance with ASTM D1353.

3.2.12 Performance: The product, when used in accordance with manufacturer's recommendations, shall remove normally accumulated soils from exterior metallic surfaces of aircraft. No visible residue shall remain on any surface tested.

3.3 Quality: The cleaner, as received by purchaser, shall be clear, homogeneous, and free from solid particles and separation and from 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 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 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 flash point (3.2.1), residue (3.2.2), color (3.2.5), specific gravity (3.2.9), distillation range (3.2.10), nonvolatile matter (3.2.11), and quality (3.3) requirements are classified as acceptance tests.

4.2.2 Periodic Tests and Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as periodic tests and as preproduction tests.

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, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with ASTM D1568, unless otherwise specified by purchaser.

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 routine inspection on production cleaner which are essentially the same as those used on the approved sample cleaner. If any change is necessary in ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material and 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 the 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 stating that the cleaner conforms to the other technical requirements of this specification. This report shall include the purchase order number, material specification number, manufacturer's identification, lot number, and quantity.

4.5.1 Reports of preproduction test results shall include a completed copy of OSHA Form 20 Material Safety Data Sheet, or equivalent, covering product formulation. 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 product 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 product represented and no additional testing shall be permitted. Results of all tests shall be reported.