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INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 1475C

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Superseding AMS 1475B

Deodorant, Aircraft Toilet Formaldehyde Base

CANCELLATION NOTICE

This specification has been "CANCELLED" by the Aerospace Materials Division, SAE, as of August 2001. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications.

Cancelled specifications are available from SAE.

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1. SCOPE:

1.1 Form:

This specification covers a biodegradable, formaldehyde-base material, containing additives, in the form of a concentrated liquid.

1.2 Application:

Primarily as an additive to be used in aircraft toilet systems to control corrosion, bacteria, color, and odor.

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 Aerospace Material Specifications and Aerospace Recommended Practices shall apply. The applicable issue of other documents shall be as specified in AMS 2350 except that the issue of APHA publications in effect on date of invitation to bid or request for proposal shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350	Standards and Test Methods
AMS 2825	Material Safety Data Sheets
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

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 D445	Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D471	Rubber Property - Effect of Liquids
ASTM D891	Specific Gravity of Liquid Industrial Chemicals
ASTM D1193	Reagent Water
ASTM D1331	Surface and Interfacial Tension of Solutions of Surface-Active Agents
ASTM D1568	Sampling and Chemical Analysis of Alkylbenzene Sulfonates
ASTM D2194	Concentration of Formaldehyde Solutions
ASTM D2667	Biodegradability of Alkylbenzene Sulfonates
ASTM E70	pH of Aqueous Solutions with the Glass Electrode
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 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Specifications:

MIL-C-83286 Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications

2.3.2 Military Standards:

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

2.4 APHA Publications:

Available from American Public Health Association, 1015 Eighteenth Street, N.W., Washington, DC, 20036.

Standard Methods for the Examination of Water and Wastewater

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall consist of a biodegradable, formaldehyde-base material with suitable additives such as aromatic oils, buffers, etc, as necessary to provide a product meeting the requirements of 3.2.

3.1.1 The product shall be free of soaps; non-ionic and amphoteric detergents are acceptable provided the product contains adequate foam depressors to comply with 3.2.2.3.

3.1.2 The product, as received or diluted for use, shall not be deleterious to aircraft toilet systems or aircraft structural aluminum alloys.

3.1.3 The product shall dilute readily with water with minimum agitation.

3.2 Properties:

The product shall conform to the following requirements; tests shall be performed in accordance with specified test methods:

3.2.1 Product As-Received:

3.2.1.1 Specific Gravity: Shall be 1.00 - 1.05, determined in accordance with ASTM D891.

3.2.1.2 Flash Point: Shall be not lower than 93°C (200°F), determined in accordance with ASTM D56.

3.2.1.3 Color: The product shall exhibit a deep blue color to mask organic waste and indicate a chemically-charged toilet. Dye shall be pH-resistant and shall not break down when tested for 72 hr ± 1 in a water solution having a pH of 3 - 11. Formic acid and sodium hydroxide solutions shall be used for adjusting pH of the water solution.

3.2.1.4 Formaldehyde Content: Shall be 4.0% ± 0.1 by weight, determined in accordance with ASTM D2194; for colored solution, titrate electrometrically using a pH meter.

3.2.1.5 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 ASTM F502.

3.2.1.6 Biodegradability: The product shall show not less than 90% surfactant reduction to be adequately biodegradable, determined in accordance with ASTM D2667.

3.2.1.7 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 3.2.1.7.1 shall show no evidence of layering, separation, settling, or crystallization after being subjected to five freeze-thaw cycles as in 3.2.1.7.2. The product shall also be tested in accordance with ASTM F503 and the results reported.

3.2.1.7.1 Two 6-oz (175-mL) samples of the product shall be placed in two 8-oz (235-mL) clear glass bottles, sealed, and, from that time until test is completed, handled so as to minimize movement of the sample.

3.2.1.7.2 Samples shall be exposed for not less than 12 hr at -23°C (-9°F) or lower as necessary to completely freeze the sample. At the end of the 12 hr, samples shall be removed to a room-temperature environment and allowed to thaw completely. This shall be considered as one complete freeze-thaw cycle.

3.2.1.8 Environmental Properties: Environmental standards vary from area to area and, therefore, acceptance standards for the following properties shall be as agreed upon by purchaser and vendor:

3.2.1.8.1 Total Alkalinity or Acidity: Shall be determined as ppm $CaCo_3$ in accordance with APHA Method 201.

3.2.1.8.2 Chemical Oxygen Demand: Shall be determined in accordance with APHA Method 220, using the dichromate reflux procedure.

3.2.1.8.3 Biological Oxygen Demand: The 5-day biological oxygen demand at 20°C (68°F) shall be determined in accordance with APHA Method 219, using filtered raw sewage seed.

3.2.1.8.4 Total Inorganic Phosphate: Shall be determined in accordance with APHA Method 223E, stannous chloride procedure.

3.2.1.8.5 Phenols: Shall be determined by distilling 500 mL of the product in accordance with APHA Method 222B, followed by chloroform extraction in accordance with APHA Method 222C.

3.2.1.8.6 Heavy Metals: Chromium, copper, cadmium, mercury, nickel, silver, and zinc contents shall be determined in accordance with APHA Method 211.

3.2.1.9 Miscibility: The product shall be miscible in all proportions with ethylene glycol and a 50% mixture shall have complete product stability after 7 days at 24°C ± 3 (75°F ± 5).

3.2.2 Product in Diluted Form: Shall be as follows, determined on product diluted with ASTM D1193, Type IV, water to the midpoint of the use dilution concentration range recommended by the manufacturer:

3.2.2.1 Viscosity: Shall not exceed by more than 10% the viscosity of ASTM D1193, Type IV, water at 10°C (50°F) and 30°C (86°F), determined in accordance with ASTM D445.

3.2.2.2 Foam Volume: Shall not exceed 5 mL when 100 mL of diluted product is shaken in a 200 mL-graduate for 15 sec ± 1 and allowed to stand for 60 sec ± 1.

3.2.2.3 Surface Tension: The product shall have wetting characteristics such that it reduces the surface tension of water to below 45 dynes/cm^2 (4.5 Pa), determined in accordance with ASTM D1331 at 25°C ± 3 (77°F ± 5).

3.2.2.4 Waste Material Reactivity: The product shall mask color and odor of human waste materials. A green-to-blue color and an odor which remains slightly perfumed, never offensive nor overpowering, shall be retained during the test of 3.2.2.4.1.

3.2.2.4.1 Tests shall be conducted on the diluted product or as a solution of 0.25 fl oz (7.4 mL) of concentrate in 1 qt (945 mL) of ASTM D1193, Type IV, water; 25 g of fecal matter and 25 mL of urine shall be added to the diluted solution and mixed vigorously to ensure dispersion of the waste material. Color and odor of the mixture shall be observed at intervals up to 24 hr while temperature of the solution is maintained at 25°C ± 5 (77°F ± 10).

3.2.3 Product Tested Both as a Concentrate and Diluted as in 3.2.2:

3.2.3.1 pH: Shall be 7.5 - 9.5, determined in accordance with ASTM E70.

3.2.3.2 Effect on Unpainted Surfaces: There shall be no visible stains or residue on test panels tested in accordance with ASTM F485.

3.2.3.3 Effect on Metallic Surfaces:

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

3.2.3.3.2 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 per 24 hr for any panel of AMS 4049 aluminum alloy, determined in accordance with ASTM F483.

3.2.3.4 Temperature Stability: The product shall show no chemical or physical deterioration, including evidence of discoloration, layering, or other change denoting loss of stability after being exposed for 120 hr ± 1 to 2°C ± 3 (35°F ± 5) and to 49°C ± 6 (120°F ± 10).

3.2.3.5 Fabric Stain Test: The product shall not appreciably stain 2 x 2 in. (50 x 50 mm) samples of white 100% cotton, light-colored nylon, and light-colored wool when spotted with the product. The spotted fabric samples shall be allowed to dry at 60°C ± 3 (140°F ± 5) and washed with a commercial detergent. Presence of any stain remaining on any of the three types of fabrics shall be reported.

3.2.3.6 Effect on Rubber and Plastic Materials: The product shall neither cause swelling greater than 10%, determined in accordance with ASTM D471, nor cause staining, discoloration, or evidence of degradation of rubber or plastic materials normally incorporated in aircraft lavatory fixtures, using the materials listed in 3.2.3.6.1 and tested as in 3.2.3.6.2. When specified by purchaser, tensile strength and elongation of exposed test specimens, determined in accordance with ASTM D471, shall be not lower than 75% of tensile strength and elongation values determined on unexposed test specimens.

3.2.3.6.1 Test specimens shall be of ethylene propylene (EPT), fluorosilicone (FVMQ), silicone (PMQ), chloroprene (CR), acrylonitrile butadiene (NBR), and fluorocarbon (FKM) rubbers; of acetal, polysulfone, nylon and polycarbonate plastics; of epoxy-glass fabric laminates; and of glass fabric.

3.2.3.6.2 Duplicate strips of each material shall be placed in test tubes containing the product. Strips for determination of volume change and, when specified, change in tensile strength and elongation shall be completely immersed in the solution. Strips for determination of staining, discoloration, and visual evidence of degradation shall be immersed so that the bottom-half of each strip is in the solution and the top-half is in air. The test tubes shall be capped and stored at ambient temperature for 30 days. After this exposure, the immersed and unimmersed areas of each partially-immersed specimen shall be compared visually for evidence of deleterious effects. Volume change and, when specified, tensile strength and elongation shall be determined on the totally-immersed specimens and the values compared with those of unimmersed specimens.

3.2.3.7 Solubility: The product shall be fully soluble in both hard and soft water and shall produce no detectable precipitate, determined in accordance with 3.2.3.7.1.

3.2.3.7.1 One set of two samples of the product shall be prepared using 0.5 fl oz (14.8 mL) of concentrate in 1 gal (3.8 L) of ASTM D1193, Type IV, water or diluted to the midpoint of the vendor's recommended concentration range and a second set using the same amount of product in 1 gal (3.8 L) of hard water containing at least 180 ppm $CaC0_3$ hardness. After stirring vigorously for not less than 1 min., samples shall be allowed to stand for 15 min. ± 1, and examined for evidence of precipitation.

3.3 Quality:

The product, as received by purchaser, shall be homogeneous, free from skins and lumps, and uniformly blue in color, with a faint, pleasant, perfume odor.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product 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 any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for specific gravity (3.2.1.1), flash point (3.2.1.2), color (3.2.1.3), foam volume (3.2.2.2), and pH (3.2.3.1) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of deodorant to a purchaser, when a change in material, processing, or both 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:

Shall be in accordance with ASTM D1568.

4.4 Approval:

4.4.1 Sample deodorant shall be approved by purchaser before deodorant for production use is supplied, unless such approval be waived by purchaser. Results of tests on production deodorant 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 deodorant which are essentially the same as those used on the approved sample deodorant. 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, processing, or both and, when requested by purchaser, sample deodorant. Production deodorant 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 deodorant shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the deodorant conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 1475C, 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 deodorant for production use. Each request for modification of deodorant formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.5.2 The vendor of the deodorant shall supply a certificate of compliance to biodegradability requirements (3.2.1.6).