AEROSPACE MATERIAL SPECIFICATION

AMS1454™	REV. A

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Superseding AMS1454

Cleaning/Scale Removing Compound
Aircraft Vacuum Toilet Systems

RATIONALE

The specification is not currently being called out by any suppliers or customers and there do not appear to be any updates needed at this time.

STABILIZED NOTICE

AMS1454A has been declared “STABILIZED” by SAE AMS Committee J, Aircraft Maintenance Chemicals and Materials Committee, and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
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SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS1454A/

1. SCOPE

1.1 Form

This specification covers a cleaning/scale removing compound in the form of a liquid concentrate or gel.

1.2 Application

This cleaner/scale remover has been used typically as an additive in aircraft toilet systems to control the formation of scale and/or remove previous build-up of scale.

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

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2825	Material Safety Data Sheets
AMS4049	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-P-83310	Plastic Sheet, Polycarbonate, Transparent

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 56 Flash Point by Tag Closed Tester

ASTM D 471 Rubber Property - Effect of Liquids

ASTM D 1193 Reagent Water

ASTM D 1568 Sampling and Chemical Analysis of Alkylbenzene Sulfonates

ASTM D 2667 Biodegradability of Alkylbenzene Sulfonates

ASTM F 483 Total Immersion Corrosion Test for Aircraft Maintenance Chemicals

ASTM F 484 Stress Crazing of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds

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 1110 Sandwich Corrosion Test

2.3 APHA Publications

Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001, Tel: 202-777-2742, www.apha.org.

Standard Methods for Examination of Water and Waste Water

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall consist of a biodegradable material with suitable additives, such as cleaner/scale removers necessary to provide a cleaner/scale remover meeting the requirements of 3.2.

3.1.1 The cleaner/scale remover shall dilute readily with water with minimum agitation.

3.2 Properties

The cleaner/scale remover shall conform to the following requirements; tests shall be performed in accordance with specified test methods.

3.2.1 Cleaner/Scale Removers as Received in Concentrate Form

Shall be tested as the liquid concentrate, except that if the scale remover is received in the form of a gel, it shall be dissolved at the ratio of 1 part mover to 5 parts ASTM D 1193, Type IV, water. If a residue (undissolved) is present, filter through a #40 filter paper prior to using for tests. However, such solids should be soluble at intended use dilution.

3.2.1.1 Flash Point

Shall be not lower than 93 °C (199 °F), determined in accordance with ASTM D 56.

3.2.1.2 Storage Stability

The scale remover shall be stable after storage at room temperature for not less than 12 months. The scale remover shall, if supplied as a liquid concentrate, show no evidence of layering or separation and shall contain no lumps or show evidence of skin formation after being subject to five freeze-thaw cycles as in 3.2.1.2.1.

3.2.1.2.1 Two 6 ounce (175 mL) samples of scale remover shall be placed in two 8 ounce (250 mL) clear glass bottles or in ziplock-type plastic bags, sealed, and exposed for 8 hours ± 0.25 to -23 °C (-9 °F), or lower if necessary to completely freeze the cleaner/scale remover samples. At the end of the freezing period, the samples shall be removed to a room temperature environment and allowed to thaw for 16 hours ± 0.5. This shall constitute one complete freeze-thaw cycle. The samples shall be subjected to five complete freeze-thaw cycles. At the end of the fifth cycle, the samples shall be examined for conformity to 3.2.1.2.

3.2.1.3 Environmental Properties

Standards vary from area to area and, therefore, acceptance standards for the following environmental properties shall be as agreed upon by purchaser and vendor.

3.2.1.3.1 Biodegradability

The deodorant shall show not less than 90% surfactant reduction to be adequately biodegradable, determined in accordance with ASTM D 2667.

3.2.1.3.2 Total Alkalinity or Acidity

Shall be determined as ppm $CaCO_3$ in accordance with APHA Method 201.

3.2.1.3.3 Total Inorganic Phosphate

Shall be determined in accordance with APHA Method 223E, stannous chloride procedure.

3.2.1.3.4 Phenols

Shall be determined by distilling 500 mL of the scale remover in accordance with APHA Method 222B, followed by chloroform extraction in accordance with APHA Method 222C.

3.2.1.3.5 Heavy Metals

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

3.2.2 Scale Remover in Diluted Form

Cleaner/Scale remover can be diluted as recommended by manufacturer.

3.2.3 Scale remover tested both as concentrate as defined in 3.2.1 and in concentration as recommended by manufacturer as defined in 3.2.2.

3.2.3.1 Effect on Unpainted Surfaces

There shall be no visible stains or residue on test panels, tested in accordance with ASTM F 485.

3.2.3.2 Effect on Painted Surfaces

The product 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.

3.2.3.3 Effect on Metallic Surfaces

3.2.3.3.1 Sandwich Corrosion

Specimens of AMS4049 aluminum alloy, Titanium and AMS5501 or AMS 5595 stainless steel after testing in accordance with ASTM F 1110, shall show no evidence of corrosion worse than specimen panels tested in ASTM D 1193, Type IV, water.

3.2.3.3.2 Total Immersion Corrosion

The scale remover shall neither cause corrosion of the panels nor cause a weight change greater than 0.3 mg/cm^2 per 24 hours for any panel of AMS4049 aluminum alloy, Titanium, and stainless steel determined in accordance with ASTM F 483.

3.2.3.4 Temperature Stability

The scale remover shall show no chemical or physical deterioration, including evidence of discoloration, layering, skinning, or other change denoting loss of stability, after being exposed for 120 hours ± 1 to 2 °C ± 2 (36 °F ± 4) and to 50 °C ± 5 (122 °F ± 9).

3.2.3.5 Solubility

The scale remover shall be fully soluble in both hard and soft water and shall produce no detectable precipitate, determined in accordance with 3.2.3.5.1.

3.2.3.5.1 One set of two samples of the scale remover shall be diluted in accordance with 3.2.2; the other sample shall be diluted using 20 grain hard water solution made by dissolving 0.40 gram ± 0.005 of analytical reagent calcium acetate ($Ca(C_2H_3O_2)_2{\cdot}H_20$) and 0.28 gram ± 0.005 of analytical reagent magnesium sulfate ($MgSO_4{\cdot}7H_20$) in 1 liter of boiling ASTM D 1193, Type IV, water. After stirring vigorously for not less than 1 minute, both samples shall be allowed to stand undisturbed for 15 minutes ± 1, and examined for evidence of precipitation.

3.2.3.6 Effect on Rubber and Plastic Materials

The scale remover shall neither cause swelling greater than 10%, determined in accordance with ASTM D 471, nor cause staining, discoloration, or evidence of degradation of rubber or plastic materials normally incorporated in aircraft lavatory systems. Materials listed on 3.2.3.6.1 shall be tested in accordance with 3.2.3.6.2. When specified by purchaser, tests to determine changes in tensile strength and elongation shall be performed in accordance with ASTM D 471 and the results obtained on exposed specimens shall be not lower than 75% of the tensile strength and elongation values determined on unexposed specimens.

3.2.3.6.1 Test specimens shall be composed of ethylene propylene (EPM), fluorosilicone (FVMQ), methyl-phenyl-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 listed in 3.2.3.6.1 shall be placed in test tubes containing the scale remover. Strips for determining volume change shall be totally immersed. Strips for determination of staining, discoloration, and evidence of degradation shall be partially immersed so that the bottom-half is in the scale remover 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 non-immersed area of each of the partially immersed specimens shall be compared visually for evidence of staining, discoloration, or degradation and the results noted. Volume change shall be determined on the totally-immersed specimens and the values compared with those of untreated samples from the same source. Any change in volume shall be reported.

3.2.3.7 Effect on Polycarbonate Plastics

Scale remover shall not craze, stain, or discolor AMS-P-83310 polycarbonate plastic, determined in accordance with the test procedures specified in ASTM F 484 on specimens stressed for 30 minutes ± 2 to an outer fiber stress of 2000 psi (13.8 MPa).

3.2.3.8 Miscibility

The scale remover shall be miscible in mixtures of water and either ethylene glycol or propylene glycol. A solution made up in accordance with 3.2.2, except that 50% of the diluent water shall be replaced with either ethylene glycol or propylene glycol shall show complete stability after storage for 7 days at 24 °C + 3 (75 °F ± 5).

3.3 Quality

The product, as received by purchaser, shall be homogeneous, free from skins and lumps.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the scale remover 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 scale remover conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Test

Flash point (3.2.1.1) of the scale remover concentrated form be performed on each lot.

4.2.2 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of scale remover 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

Shall be in accordance with ASTM D 1568.

4.4 Approval

4.4.1 Sample scale remover shall be approved by purchaser before scale remover production use is supplied, unless such approval be waived by purchaser. Results of tests on production scale remover 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 scale remover which are essentially the same as those used on the approved sample. 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 by purchaser, sample deodorant. Production scale remover made by the revised procedure shall not be shipped prior to receipt of reapproval.