

 AEROSPACE MATERIAL SPECIFICATION	SAE AMS-C-83873		REV. A
	Issued	1999-06	
	Cancelled	2010-12	
Superseding AMS-C-83873			
Cleaning Compound, Precoating Surface, Aircraft and Aerospace Ground Equipment (AGE)			

RATIONALE

AMS-C-83873 is being cancelled for the following reasons:

1. MIL-C-83873 was cancelled in 1996 but it was superseded by MIL-C-87937 Type II, and MIL-C-87937 was superseded by MIL-PRF-87937 in 1997.
2. Drawings and specifications that call out MIL-C-83873 should be using MIL-PRF-87937 Type II, not AMS-C-83873.
3. AMS-C-83873 is not recognized as an acceptable alternative for MIL-C-83873.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of December 2010. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index.

Cancelled specifications are available from SAE.

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NOTICE

This document has been taken directly from U.S. Military Specification MIL-C-83873A, Notice 1, and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-C-83873A, Notice 1. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

1. SCOPE:

1.1 Scope:

This specification establishes the requirements for biodegradable, enzyme based, precoating surface cleaners.

2. APPLICABLE DOCUMENTS:

The following publications, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

O-A-51	Acetone, Technical
P-D-680	Dry Cleaning Solvent
QQ-A-250/4	Aluminum Alloy, 2024, Plate and Sheet
QQ-A-250/5	Aluminum Alloy, Alclad 2024 Plate and Sheet
QQ-A-250/12	Aluminum Alloy, 7075, Plate and Sheet
QQ-M-44	Magnesium Alloy, Plate and Sheet (AZ31B)
TT-C-2756	Coating: Self-priming Topcoat, Low VOC
TT-E-529	Enamel, Alkyd Semi-gloss Low VOC
TT-I-735	Isopropyl Alcohol
TT-P-2760	Primer: Flexible, Polyurethane
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-636	Boxes, Shipping, Fiberboard
PPP-D-729	Drums, Shipping and Storage, Steel, 55 Gallons
PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade) and Cut Shapes
PPP-P-704	Pails, Metal: (Shipping, Steel, 1 through 12 gallons)
MIL-M-3171	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on
MIL-P-5425	Plastic Sheet, Acrylic, Heat Resistant
MIL-C-5541	Chemical Conversion Coating of Aluminum and Aluminum Alloys
MIL-S-7952	Steel, Sheet and Strip, Uncoated, Carbon (1020 and 1025) (Aircraft Quality) (ASG)
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-T-9046	Titanium and Titanium Alloy, Sheet, Strip and (For Aircraft Use)
MIL-A-9962	Abrasive Mats, Nonwoven, Nonmetallic
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-P-25690	Plastic, Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant

2.1 (Continued):

MIL-C-38334	Corrosion Removing Compound, Prepaint, for Aircraft Aluminum Surfaces
MIL-H-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, NATO Code No. H-537
MIL-C-83286	Coating Urethane, Aliphatic Isocyanate, for Aerospace Application
MIL-P-83310	Plastic Sheet, Polycarbonate, Transparent
MIL-P-85582	Type I, Class II Primer Coatings: Epoxy, Waterborne
FED-STD-141	Paint, Varnish, Lacquer and Related Materials Methods of Inspection, Sampling and Testing
FED-STD-313	Material Safety Data Sheets, Preparation and the Submission of
FED-STD-595	Color
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads
40 CFR	Protection of Environment
29 CFR	OSHA Safety and Health Standards (1910)

2.2 Federal Environmental Protection Agency (EPA) Standards:

USEPA, Environmental Monitoring and Support Laboratory, 26 West Martin Luther King Drive, Cincinnati, OH 45268.

EPA 420.1	Phenolics, Total Recoverable, Spectrophotometric Manual 4-AAP with Distillation
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2.3 ASTM Publications:

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

ASTM D 93	Test for Flash Point by Pensky-Martens Closed Tester
ASTM A 153	Zinc Coating (Hot Dip) on iron and steel Hardware
ASTM D 460	Chemical Analysis of Soaps
ASTM D 846	Xylene
ASTM D 891	Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals,
ASTM D 3951	Commercial Packaging, Practice for
ASTM E 70	pH of Aqueous Solutions with the Glass Electrode
ASTM F 483	Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM F 484	Stress Craze Test of Acrylic Plastics in Contact with Liquid and 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 503	Preparing Aircraft Cleaning Compounds, Liquid Type, for Storage Stability Testing

2.3 (Continued):

ASTM F 519 Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals

ASTM F 1110 Test Method for Sandwich Corrosion Test

ASTM F 1111 Corrosion of Low Embrittling Cadmium Plate by Aircraft Maintenance Chemicals

2.4 Uniform Freight Classification Publications:

Available from the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.

Uniform Freight Classification Rules (Current Issue)

2.5 AISI Publications:

Available from the American Iron and Steel Institute, 1133 15th Street N.W., Suite 300, Washington, DC 20005. Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.

AISI 4340 High Strength, Low Alloy Steel

3. REQUIREMENTS:

3.1 Qualification:

3.1.1 Qualification (Initial): The cleaning compound furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein and has been listed or approved for listing on the applicable Qualified Products List (QPL).

3.1.2 Qualification (Periodic): The cleaning compound furnished under this specification must be retested or recertified by the qualifying activity at least every three years for the product to remain listed on the QPL. Qualification retesting shall be accomplished on any qualified cleaning compound for which a using activity issues a valid deficiency report. The cleaning compound shall also be subject to qualification retesting for any change in chemical formulation, material, process, or procedure in manufacturing the cleaning compound. Any cleaning compound which does not conform to all the qualification tests specified herein on periodic requalification testing shall be removed from the QPL.

3.2 Materials:

The composition and formulation of the cleaning compound shall be optional with the manufacturer within the restrictions specified herein.

- 3.2.1 Unacceptable Materials: The cleaning compounds shall not contain any chlorinated compounds, phosphates, abrasives, chromates, phenols, cresols, terpenes, amines, petroleum hydrocarbons, lead, mercury, cadmium, or chromium. The following materials are unacceptable unless they are being used as an essential active ingredient in the cleaner: sodium chloride, urea, sodium sulfate, nitrates, or nitrites. It also shall not contain any chemical listed by the current report of known carcinogens of the National Toxicology Program (NTP), or any hazardous compounds as defined in 40 CFR 261. (See paragraph 4.8).
- 3.2.2 Acceptable Materials: The cleaning compound shall consist of a stable, homogeneous product, composed of one or more of the materials listed below. Certification from the manufacturer as to the composition of the cleaning compound is required.

Bioenzyme mixture and nutrients
Surfactants
Corrosion Inhibitors
Buffers

3.3 Toxicity:

The cleaning compound shall have no adverse effect on the health of personnel when used for its intended purpose and with proper personal protective equipment (when required). The cleaner must be evaluated and approved for toxicity in accordance with EPA 600/4-89/001 procedure prior to listing on the QPL (see paragraph 4.7)

- 3.3.1 Formulation: The manufacturer must submit to the qualifying activity, SA-ALC-SFTT, 1014 Andrews Rd Suite 1, Kelly AFB TX 78241-5603, each of the following:
- a. Written certification that the cleaning compound contains no substance known to be toxic as defined in 29 CFR and 40 CFR as of the date of qualification or requalification of the product.
 - b. A complete formulation including the chemical name and weight percent of each ingredient. Trade names alone are not satisfactory. All proprietary information shall be protected as such.
- 3.3.2 Material Safety Data Sheet: The manufacturer shall submit a material safety data sheet (MSDS) for each component of the product and for the finished product to the qualifying and procuring activities. The MSDS shall be prepared in accordance with the latest revision of FED-STD-313.
- 3.3.3 Toxicological Data: The manufacturer shall submit a copy of pertinent toxicological data/information on their product to the qualifying activity. (See paragraph 4.7).
- 3.3.4 Biodegradability: The supplier of the cleaning compound shall furnish certification from the surfactant manufacturer(s) that the surfactants are readily biodegradable in accordance with 40 CFR, Part 796, Subpart D. Biodegradability testing shall be accomplished as specified in paragraph 4.7.1 on the finished product. Biodegradability on the finished product shall be determined over 28 days by the Shake Flask Method monitored by analysis of Total Organic Carbon (TOC). The product shall conform to a minimum of 85% biodegradable at the end of the 28 day period.

3.4 Compositional Assurance:

The cleaning compound shall be tested for nonvolatile matter as specified in paragraph 4.6.1. Results of this test as well as an infrared spectrogram of the nonvolatile matter (see 4.9) shall be recorded by the qualifying activity for use in quality conformance inspections (see 4.4). Quality conformance inspection results for nonvolatile matter shall not differ by more than 2 percent absolute from this recorded value. Quality conformance inspection infrared spectrograms shall show no significant difference when compared to the original qualifying spectrogram.

3.5 Chemical Properties:

3.5.1 Chemical Requirements: The cleaning compound shall meet the requirements listed in Table I.

3.5.2 Volatility: The volatility of a 6 percent solution of the cleaning compound (mixed with distilled water) shall be less than or equal to the volatility of distilled water when tested in accordance with 4.6.4.

3.5.3 Residue Rinsibility: When a freshly prepared solution of the cleaning compound is tested in accordance with 4.6.5, it shall not leave any residue or stains. (A freshly prepared solution is defined as one being prepared no longer than 30 minutes prior to testing.) Weight change shall be no greater than that obtained with standard hard water (plus or minus 0.2 mg) tested under the same conditions.

3.5.4 Solvent Content: The cleaning compound shall not contain more than 3.0 weight percent of organic solvents when tested in accordance with 4.6.16.

3.6 Physical Properties:

TABLE I. Quantitative requirements

REQUIREMENT	MIN	MAX	TEST METHOD
Insoluble Matter (wt%)	---	0.05	4.6.2
pH			
6% Solution	7.0	8.5	4.6.3
Conc. Solution	7.5	9.0	
Flash Point, °C	None ^{1/}	---	4.6.7
Emulsion Characteristics	---	0.5 ml	4.6.8
Hard Water Stability (ppm silica)	---	20.0	4.6.9

^{1/} No flash point should be observed up to the boiling point of the compound.

3.6.1 Cold Stability: The concentrated cleaning compound shall return to its original homogeneous condition when tested in accordance with 4.6.6.

3.7 Effect on Metals:

3.7.1 Total Immersion Corrosion: When tested in accordance with 4.6.10, the concentrated cleaning compound and a six (6) percent solution of the cleaning compound in distilled water shall not cause pitting corrosion or cause a weight change of an average of three (3) test panels greater than that shown in Table II.

3.7.1.1 Hot Dip Galvanized Total Immersion Corrosion: Steel panels conforming to MIL-S-7952, Grade 1020, Hot Dip Galvanized per ASTM A 153, immersed in the concentrated cleaning compound and a six (6) percent solution of the cleaning compound in distilled water shall not cause pitting corrosion or cause weight change of an average of three (3) test panels greater than $0.30 \text{ mg/cm}^2/24$ hours when tested in accordance with 4.6.10.1.

3.7.2 Low-Embrittling Cadmium Plate Corrosion: Steel panels coated with low-embrittling cadmium plate immersed in the concentrated cleaning compound and a six (6) percent solution of the cleaning compound in distilled water shall not show a weight change greater than 0.14 mg/cm^2 for 24 hours when tested in accordance with 4.6.11.

TABLE II. Total Immersion Corrosion Requirements

Alloy	Average of 3 Panels Weight Loss, Max ($\text{mg/cm}^2/168\text{hrs}$)
Magnesium (AZ 31B-H24) QQ-M-44 surface treated in accordance with Type III of MIL-M-3171	0.21
Aluminum, QQ-A-250/4, T3 surface treated in accordance with Type II, Class I of MIL-A-8625	0.49
Aluminum, QQ-A-250/4, Bare T3 Alloy	0.49
Aluminum, QQ-A-250/12, Bare T6 Alloy	0.49
Titanium, MIL-T-9046, 6AL-4V Class III, Composition C	0.35
Steel, MIL-S-7952, Grade 1020,	0.50