INCH-POUND

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SUPERSEDING
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PERFORMANCE SPECIFICATION

REMOVER, PAINT, EPOXY AND POLYURETHANE SYSTEMS, TANK TYPE, AMBIENT TEMPERATURE, FOR AIRCRAFT WHEELS AND LANDING GEAR COMPONENTS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the requirements for two types of tank type paint removers for use on aircraft wheels and landing gear components at ambient temperature.

1.2 Classification. Paint remover covered by this specification shall be of the following types, as specified (see 6.2):

Type I	-	One Step
Type II	-	Two Step (Paint Remover A and Paint Remover B)

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are cited in sections 3 and 4 of this specification. These lists do not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of these lists, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: WR-ALC/LKJE, 460 2nd St., STE 221, Robins AFB, Georgia 31098-1640, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 8010

2.2 Government Documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issues of these documents are those listed in the specific issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-M-3171	-	Magnesium Alloy, Processes for Corrosion Protection of
MIL-A-8625	-	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-P-23377	-	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-C-85285	-	Coating: Polyurethane, High-Solids

STANDARDS

FEDERAL

FED-STD-313	-	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
FED-STD-595	-	Colors Used in Government Procurement

DEPARTMENT OF DEFENSE

MIL-STD-870	-	Cadmium Plating, Low Embrittlement, Electrodeposition

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, Pennsylvania 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issues of the documents which have been adopted by the DoD are those listed in the specific issue of the DoDISS cited in the

solicitation. Unless otherwise specified, the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

ANSI/ASQC Z1.4-1993	-	Sampling Procedures and Tables For Inspection By Attributes

(Application for copies should be addressed to American Society for Quality Control, 611 East Wisconsin Avenue, P.O. Box 3005, Milwaukee, Wisconsin 53201-3005.)

American Society for Testing and Materials (ASTM) Standards

ASTM B209	-	Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
ASTM F519	-	Standard Test Method for Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals
ASTM D2196	-	Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer (R 1991)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 39103.)

Society of Automotive Engineers (SAE)

SAE AMS 4377	-	Sheet and Plate, Magnesium Alloy 3.0Al -1.0Zn -0.20Mn (AZ31B-H24) Cold Rolled, Partially Annealed
SAE AMS 5046	-	Sheet, Strip, and Plate, Carbon Steel (SAE 1020 and 1025) Annealed

(Application for copies should be addressed to Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Removers furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.3 and 6.3).

3.1.1 Type I - one step. A paint remover qualified as Type I shall meet all the requirements of this section.

3.1.2 Type II - two step. Each of the two paint removers qualified as Type II shall meet all the requirements of this section, with the exception of 3.6 and 3.7. The two materials when evaluated for compliance with the requirements of 3.6 will have their weight change taken in aggregate to determine compliance. The two materials, when evaluated for compliance with the requirements of 3.7, shall meet the requirements within a combined total of two hours.

3.2 Material. The material covered by this specification shall be tank type paint removers consisting of organic solvents, wetting agents and other ingredients to produce a stable, homogeneous, satisfactory product.

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the materials meet or exceed the operational and maintenance requirements, and promote economically advantageous life cycle costs.

3.2.2 Biodegradability. All surfactants incorporated in the paint remover formulation shall be at least 90 percent biodegradable. The supplier shall furnish certification (from the manufacturer of the surfactants) regarding biodegradability characteristics.

3.3 Toxicity. The material shall have no adverse effect on the health of personnel when used for its intended purpose. The material shall not contain any hazardous compound as defined in FED-STD-313, nor shall it contain any chemical listed in the current report of known carcinogens of the National Toxicology Program.

3.4 Viscosity. The viscosity shall be 15 centipoises or less at 77 ±2 °F (25 ±1 °C).

3.5 Flammability. When exposed to an external flame source, the remover shall not continue to burn longer than 3 seconds after removal of the flame.

3.6 Corrosion. The remover shall not cause pitting or etching of the base metal, nor cause weight changes in the base metal that exceed the limits of Table I.

TABLE I

METAL	SPECIFICATION	SURFACE TREATMENT	WEIGHT CHANGE (2 by 4-inch Test Sample)
Aluminum (2024-T3)	ASTM B209	As Received	±3.0 mg
Aluminum (2024-T3)	ASTM B209	MIL-A-8625, Type II Class 1, Dichromate Seal	-4.0 mg
Magnesium	SAE AMS 4377	MIL-M-3171 Type III	±2.0 mg
Steel	SAE AMS 5046	As Received	±4.0 mg
Steel	SAE AMS 5046	Cadmium Plated MIL-STD-870, Type II, Class 1	±5.0 mg/in^2

NOTE: All panels shall be cleaned and degreased with a suitable solvent, oven dried at 350°F for 1 hour, and desiccated for 1/2 hour prior to surface treatment and testing. Panels shall be sheared or cut prior to surface treatment.

3.7 Paint stripping efficiency. The remover shall remove at least 95 percent of the paint from the painted surface of a 2 inch by 4 inch panel within two hours at 55 ±5 °F (13 ±3 °C).

3.8 Hydrogen Embrittlement. The remover shall not induce tensile failure as defined in ASTM F519.

3.9 Storage stability. After being stored unopened at a temperature of 75 ±5 °F (24 ±3 °C) for six months, the paint remover shall then conform to all the requirements of this specification.

3.10 Appearance. The remover shall be a liquid having a uniform and homogeneous appearance. The component ingredients shall be intimately blended and processed as required in accordance with commonly accepted industrial workmanship standards.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification Inspection (see 4.2)

b. Conformance Inspection (see 4.3)

4.2 Qualification inspection. Qualification tests shall consist of all of the tests specified in 4.5.

4.2.1 Qualification procedures. Upon successful completion of all testing requirements as specified herein, the contractor shall provide a certified qualification test report showing that the material conforms to all requirements of this document. The report shall be forwarded to WR-ALC/LKJE, 460 2ND ST, STE 221, ROBINS AFB, GA 31098-1640. Upon review and acceptance of the test report, the government will add the product to the Qualified Products List.

4.2.2 Qualification test report. The qualification test report shall include complete data, in the contractor's format, describing the method of performance of each test and definitive results to verify that the material conforms to all requirements of this specification. The report shall also include complete formulation data identifying each ingredient of the remover by chemical or proprietary name.

4.3 Conformance inspection. Conformance inspection for acceptance of individual lots shall consist of sampling and inspection in accordance with 4.3.1 and tests in accordance with 4.5.1 and 4.5.4.

4.3.1 Sampling and Inspection.

4.3.1.1 Sampling for inspection of filled containers. A random sample of filled containers shall be selected from each lot in accordance with ANSI/ASQC Z1.4-1993.

4.3.1.2 Inspection of filled containers. Each filled container selected in accordance with 4.3.1.1 shall be examined for defects of the container and the seal for evidence of leakage, and for unsatisfactory marking. Each sample filled container shall also be weighed to determine the amount of contents. Any container in the sample, having one or more defects, or under required fill, shall be rejected and if the number of defective containers in any sample exceeds the acceptance number for the applicable sample plan of ANSI/ASQC Z1.4-1993, the lot represented by the sample shall be rejected.

4.3.1.3 Sampling for tests. Two containers of Type I paint remover shall be selected at random from each inspection lot. Four containers of Type II paint remover (two paint remover A and two paint remover B) shall be selected at random from each inspection lot. If more than one lot is represented in the shipment, each lot represented shall be treated as a separate shipment for sampling purposes. The contents of each container having been selected at random for sampling shall be thoroughly mixed immediately prior to testing. Each sample shall be tested to determine compliance with this specification.

4.4 Requirements cross-reference matrix. Table II provides a cross-reference matrix of the Section 3 requirements tested or verified in the paragraphs below.

Table II: Requirements Cross-Reference Matrix

REQUIREMENT	VERIFICATION
3.4	4.5.1
3.5	4.5.2
3.6	4.5.3
3.7	4.5.4
3.8	4.5.5
3.9	4.5.6

4.5 Test Procedures.

4.5.1 Viscosity. Viscosity of the paint remover shall be 15 centipoises or less at 77 ±2°F (25 ±1°C), and shall be determined using a Model LVF Brookfield Viscometer, or its equivalent in accordance with ASTM D2196. Readings shall be taken after the spindle has been operating for a minimum of three minutes.

4.5.2 Flammability. A 1 inch by 6 inch (2.54 cm by 15.24 cm) panel shall be prepared from any aluminum alloy conforming to Standard ASTM B209. A hole shall be drilled near one end of the panel to facilitate hanging. The panel shall be dipped into a container of the paint remover and immediately suspended on a ring stand. A microburner flame, not exceeding 3/16 inch (5 mm) in length shall be passed back and forth along the lower edge of the panel within a 2 second period. This operation shall be repeated three times at 3 second intervals. If the paint remover ignites, the burner shall be removed and observation made to determine whether the paint remover continues to burn. Burning duration in excess of 3 seconds after removal of the flame shall be cause for rejection.

4.5.3 Corrosion. Two specimens, 2 inches by 4 inches (5.08 cm by 10.16 cm) of each of the metals and treatment specified in Table I shall be prepared. Each specimen shall be weighed to the nearest 0.1 mg, placed singly in suitable glass jars at approximately a 45° angle, and completely covered with the paint remover. The jars shall be placed in a chamber at 100°F (38°C) for a total exposure period of 24 hours. At the end of the period, the specimen shall be thoroughly rinsed with a suitable solvent, oven dried at 375 °F for one hour, desiccated for one-half hour and reweighed to the nearest 0.1 mg. Pitting, etching of the base metal, or weight changes exceeding the limits of Table I shall be cause for rejection.

4.5.4 Paint Stripping Efficiency.

4.5.4.1 Preparation of test panels. After the test panels have been prepared as specified in Table III, four panels of each metal shall be painted with the coating system as specified. All paint topcoats shall be color number 17875 in accordance with Federal Standard 595. The coating system shall consist of the following:

Coating System	Dry Film Thickness	Drying Time
Epoxy Primer, one coat (MIL-P-23377)	0.5 - 0.8 mils	1 hour
Urethane Topcoat, two coats (MIL-C-85285)	0.8 - 1.1 mils each	4 hours between coats, 48 hours after last coat

After the coating system has been applied to both sides of each panel and cured as above, all panels shall be baked for 96 hours at 210 ±10°F (99 ±6°C), cooled to ambient temperature and stored in a desiccator (or equivalent) until used for test.

4.5.4.2 Paint removal procedure (Type I). Two test panels of each metal specified in Table III, and painted as required by 4.5.4.1, shall be immersed in a container of the paint remover maintained at 55 ±5°F (13 ±3°C) for a period of two hours. At the conclusion of the test period the test panels shall be rinsed with a water spray (hot or cold) not exceeding 100 psi. The test panels shall be air dried and examined for compliance with the requirements of 3.7. (Visual assessment)

TABLE III

METAL	SPECIFICATION	SURFACE TREATMENT
Aluminum (2024-T3)	ASTM B209	MIL-A-8625, Type II, Class 1, Dichromate Seal
Magnesium	SAE AMS 4377(AZ31B-H24)	MIL-M-3171, Type III
Steel	SAE AMS 5046	MIL-STD-870, Type II, Cl 1

NOTE: All panels shall be sheared or cut prior to surface treatment. All panels shall be cleaned and degreased with a suitable solvent prior to surface treatment and painting.

4.5.4.3 Paint removal procedure (Type II). Two test panels of each material specified in Table III, and painted as required by 4.5.4.1 shall be immersed in a container of paint remover A maintained at 55 ±5°F (13 ±3°C) for a period of one hour. Remove the two panels and rinse with tap water (manufacturer's option). Immerse in a container of paint remover B maintained at 55 ±5°F (13 ±3°C) for a period of one hour. At the conclusion of the test period the test panels shall be rinsed with a water spray (hot or cold) not exceeding 100 psi. The test panels shall be air dried and examined for compliance with 3.7. (Visual assessment)

4.5.5 Hydrogen embrittlement. Test specimens shall be prepared and tested in accordance with ASTM F519, Type 1a, for maintenance chemicals. Accept or reject criteria shall be accordance with ASTM F519, paragraph 9.

4.5.6 Six month storage stability. A one gallon (3.8 liter) container of the paint remover shall be stored unopened at a temperature of 75 ±5 °F (24 ±3 °C) for a period of six months. At the end of the storage period, the container shall be examined for visual signs of paint remover deterioration. Any bulging of the container due to pressure build-up or signs of deterioration of the container lining or material separation shall be cause for rejection. The paint remover shall then conform to all the requirements of this specification.

5. PACKAGING

5.1 General. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's Acquisition Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. The paint remover covered by this specification is intended to be used for removing difficult paint finishes from aircraft wheels, landing gears, and other components.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification.

b. Issue of the DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).

c. Type of paint remover required (see 1.2).

d. Selection of applicable levels of preservation, packaging and packing (see 5.1).

e. Material Safety Data Sheets, if required (see 6.4).

6.4 Material Safety Data Sheets. When specified, Material Safety Data Sheets will be provided in accordance with FED-STD-313 (see 6.2).

6.5 Subject term (key word) listing.

Biodegradable	Cadmium
Dichromate	Hydrogen embrittlement
Solvent	Surfactant
Viscosity	

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodian:
Air Force - 99

Preparing Activity:
Air Force - 84

Agent:
Air Force - 99

(Project 8010-0971)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-87978A	**2. DOCUMENT DATE (YYMMDD)**

3. DOCUMENT TITLE

REMOVER, PAINT, EPOXY AND POLYURETHANE SYSTEMS, TANK TYPE, AMBIENT TEMPERATURE, FOR AIRCRAFT WHEELS AND LANDING GEAR COMPONENTS

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. Organization	
c. ADDRESS *(Include zip code)*	**d. TELEPHONE** *(Include Area Code)* (1) Commercial (2) DSN *(if applicable)*	**7. DATE SUBMITTED (YYMMDD)**

8. PREPARING ACTIVITY

a. NAME WR-ALC/LKJE	**b. TELEPHONE** *(Include Area Code)* (1) Commercial 912-926-6630 (2) DSN 468-6630
c. ADDRESS ***(Include Zip Code)*** 460 2ND ST STE 221 ROBINS AFB GA 31098-1640	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** **Defense Quality and Standardization Office** **5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466** **Telephone (703) 756-2340 DSN 289-2340**