MILITARY 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 ambient temperature, activates solvent, tank type paint remover for use on aircraft wheels and landing gear components.

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 Government Documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specification and Standards (DODISS) and supplement thereto, cited in the solicitation."

Beneficial comments (recommendation, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: WR-ALC/MMIRFW by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC: 8010

SPECIFICATIONS

FEDERAL

QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
QQ-M-44	Magnesium Alloy Plate and Sheet (AZ31B)
PPP-D-729	Drums, Metal, 55 Gallon (For Shipment of Non-Corrosive Materials)

Military

MIL-M-3171	Magnesium Alloy, Processes for Corrosion Protection of
MIL-S-5002	Surfaces Treatments and Inorganic Coatings for Metal Surfaces of Weapon Systems
MIL-S-7952	Steel, Sheet and Strip, Uncoated Carbon (1020 and 1025)
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-C-83286	Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications

STANDARDS

Federal

FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-831	Test Reports, Preparation of
MIL-STD-870	Cadmium Plating, Low Embrittlement Electrodeposition

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Federal Hazardous Substances Labeling Act
(Application for copies should be addressed to the U.S. Department of Health, Education and Welfare, Food and Drug Administration, Washington DC 20203.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede application laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualifications. Removers furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time for opening of bids (see 4.3 and 6.3).

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, homogenius, satisfactory product.

3.3 Composition. The formulation of the paint remover shall be optional with the supplier but shall be restricted by other requirements specified herein, and shall contain no phenols or phenol derivatives. The paint remover shall contain no materials which may be considered corrosive under applicable conditions. The use of a water or oil seal, no more than 15 percent by volume of the remover, is permissible to prevent evaporation of the remover in actual use.

3.4 Biodegradability. All surface active agents incorporated in the paint remover formulation shall be a minimum of 90 percent biodegradable. The supplier shall furnish biodegradability characteristics of the agents.

3.5 Toxicity. The paint remover shall have no adverse effect on the health of personnel when used for its intended purpose. The instructions for use of the paint remover shall include any necessary safety precautions for handling materials containing components hazardous to health such as phenols. The chemical composition/toxicological data on the paint remover shall be supplied to Warner Robins ALC/MMIRFW, Robins AFB GA 31098 to evaluate the occupational and

environmental protection necessary to utilize the paint remover in Air Force activities. The AFLC Surgeon's Office (AFLC/SGP) WPAFB OH 45433 is available to provide consultant assistance in this evaluation.

3.6 Viscosity. When tested as specified in 4.6.1, the viscosity shall be 15 CP or less at 77°±1° F (25°±1° C).

3.7 Flammability. When subjected to the test specified in 4.6.2, the remover shall not continue to burn longer than 3 seconds after removal of the flame.

3.8 Corrosion. When tested as specified in 4.6.3, the remover will not exceed the limits per Table I.

TABLE I

METAL	SPECIFICATION	SURFACE TREATMENT	WT CHANGE
Aluminum	QQ-A-250/4	As Received	±3.0 mg
Aluminum	QQ-A-250/4	MIL-A-8625, Type II Class 1, Dichromate Seal	-4.0 mg
Magnesium	QQ-M-44	MIL-M-3171 Type III	±2.0 mg
Steel	MIL-S-7952	As Received	±4.0 mg
Steel	MIL-S-7952	Cadmium Plated MIL-STD-870-Class 1 Type II	±5.0 mg.In^2

NOTE: All panels shall be cleaned/degreased with MEK, acetone or chloroform, oven dried at 350 for 1 hour, and desiccated for 1/2 hour prior to surface treatment and/or testing. Panels shall be sheared/cut prior to surface treatment.

3.9 Paint Stripping Efficiency. When tested as specified in 4.6.4 the remover shall remove 95 percent of the paint from the exposed surface within two hours (120) minutes at both 70°±5°F (21°±3°C) and 55°±5°F (12°±2°C).

3.10 Hydrogen Embrittlement. When tested as specified in 4.6.5 the remover shall not produce tensile failure.

3.11 Storage Stability. After being stored unopened at a temperature of 75°±5°F (24°±2°C) for six months, the paint remover shall then conform to all the requirements of this specification.

3.12 Type I - One Step. The paint remover qualified as a Type I material shall meet all the requirements of paragraph 3.0.

3.13 Type II - Two Step. Each of the two paint removers qualified as a Type II material shall meet all the requirements of paragraph 3, with the exceptions of paragraph 3.8 and 3.9. The two materials when evaluated in accordance with paragraph 3.8 Corrosion will have their weight change taken in aggregate to determine compliance. The two materials when evaluated in accordance with paragraph 3.9 Paint Stripping Efficiency, shall remove 95 percent of the paint from the exposed surface within a combined total of two hours.

3.14 Service Test. When required by the qualifying activity, the remover shall be tested as specified in 4.6.7 ans shall show satisfactory performance in actual use.

3.15 Workmanship. 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 the best commercial practice for a high quality material.

3.16 Materials. Recycled and recovered raw materials should be used to the maximum extent possible in lieu of virgin raw materials as long as these materials do not jeopardize the intended use and fully comply with all contract requirements. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. None of the above shall be interpreted to mean that the use of used or rebuilt products will be allowed.

4. *QUALITY ASSURANCE PROVISIONS*

4.1 Responsibility for Inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to presented requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absense of any inspection requirements in the specification shall not relieve the contractor of the responsilility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the

contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material."

4.2 Classification of Inspections. The inspection requirements specified herein are classified as follows:

a. Qualification Inspection (see 4.3)

b. Quality Conformance Inspection (see 4.4)

c. Quality Assurance Inspection (see 4.5)

4.3 Qualification Inspection. Qualification tests shall consist of all of the tests specified in paragraph 4.6.

4.3.1 Qualification Samples. Unless otherwise specified, 2 one-gallon containers of paint remover shall be submitted for test by the supplier. The samples shall be plainly identified and forwarded to the qualifying activity or as directed in the letter of authorization from the qualifying activity (see paragraph 6.3). The identification shall include the supplier's production code or compound number, and date of compounding or manufacture.

4.3.2 Test Report. Qualification samples shall be accompanied by a certified test report showing results of all tests required by this specification except the test for inspection of filled containers, and the 6-month storage stability test and service test. Test report shall follow MIL-STD-831 format.

4.3.2.1 Instruction Sheet. The supplier shall forward 3 copies of the instruction sheet detailing required mixing techniques and application procedures with all qualification samples submitted for approval. Qualification approval of the supplier's paint remover shall also constitute approval of the applicable instruction sheets. The instruction sheets shall not be changed in any way without specific approval of the qualifying activity.

4.4 Quality Conformance Inspection. Quality conformance inspection for acceptance of individual lots shall consist of sampling and tests in accordance with paragraph 4.6.1 and 4.6.4.

4.4.1 Sampling.

4.4.1.1 Lot. A lot shall consist of paint remover produced by one supplier, with no change in process or materials, provided the operation is continuous. In the event the process is a batch process, each batch shall constitute a lot.

4.4.1.2 Sampling for Inspection of Filled Containers. A random sample of filled containers shall be selected from each lot in accordance with MIL-STD-105 at Inspection Level I and Acceptance Quality Level (AQL) = 2.5 percent defective to verify compliance with this specification regarding fill, closure marking and other requirements not involving tests.

4.4.1.3 Sampling for Tests. Two containers (Four Type II - 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 sampling. Each sample shall be tested to determine compliance with this specification.

4.5 Quality Assurance Inspection.

4.5.1 Inspection of Filled Containers. Each sample filled container selected in accordance with 4.4.1.2 shall be examined for defects of the container and the closure 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 MIL-STD-105, the lot represented by the sample shall be rejected.

4.5.2 Lot Acceptance Tests. The samples selected in accordance with 4.4.1.3 shall be subjected separately to the tests in accordance with paragraph 4.6.1 through 4.6.4. If either sample fails one or more of these tests, the lot shall be rejected.

4.6 Test Procedures.

4.6.1 Viscosity. Viscosity of the active phase of the paint remover shall be determined at 77°±2°F (25°±1°C), using a Model LFV Brookfield Viscosimeter, or its equivalent. Readings shall be taken after the spindle has been operating for a maximum of three minutes and reported.

4.6.2 Flammability. A 1 by 6 inch (2.54cm X 15.24cm) panel shall be prepared from aluminum alloy conforming to Specification QQ-A-250/4. A hole shall be drilled near one end 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 (4.76mm) 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.

4.6.3 Corrosion. Two specimens, 2 X 4 inches (5.08cm X 10.16cm) 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 loosley capped with screw type cap having an aluminum foil liner in addition to the usual pulp liners and placed in a suitable condition chamber at 10°F (38°C) for a total exposure period of 24 hours. At the end of the period, the specimen shall be thoroughly rinsed with acetone, MEK, or chloroform, oven dried at 375°F for one hour, desiccated for one half hour and reweighed to the nearest 0.1 Mg. Pitting, etching, or weight changes exceeding the limits of Table I shall be cause for rejection. Results shall be reported.

4.6.4 Paint Stripping Efficiency.

4.6.4.1 Preparation of Test Panels. After the test panels have been prepared as specified in Table II, four panels of each metal shall be painted with the coating system as specified. All paint topcoats shall be color #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-83286)	0.8 - 1.1 mils each	4 hour between coats, 48 hours after last coat

After coating system has been applied to both sides of 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.

4.6.4.3 Paint Removal Procedure (Type I). Two test panels of each metal specified in Table II, and painted as required by 4.6.4.2, shall be immersed in a container of the paint remover maintained at 70°±5°F (21°±3°C) for a period of two hours. Two test panels of each metal specified in Table II, and painted as required by 4.6.4.2, shall be immersed in a container of the paint remover maintained at 55°±3°F (12°±2°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 100psi. The test panels shall be air dried and examined for compliance with the requirements of 3.9. Percentage of paint system removed should be reported.

TABLE II

METAL	SPECIFICATION	SURFACE TREATMENT
Aluminum	QQ-A-250/4	MIL-A-8625, Type II, Class 1, Dichromate Seal
Magnesium	QQ-M-44 (AZ31B-H24)	MIL-M-3171, Type III
Steel	MIL-S-7952	MIL-STD-870, Class 1, Type II

NOTE: All panels shall be sheared/cut prior to surface treatment. All panels shall be cleaned/degreased with MEK, acetone or chloroform prior to surface treatment and painting.

4.6.4.4 Paint Removal Procedure Type II. Two test panels of each metal specified in Table II, and painted as required by 4.6.4.2, shall be immersed in a container of paint remover A maintained at 70°±5°F (21°±3°C) for a period of one hour. Remove the two panels and rinse (manufacturer's option), immerse in a container of paint remover B maintained at 70°±5°F (21°±3°C) for a period of one hour. Two test panels of each material specified in Table II, and painted as required by 4.6.4.2 shall be immersed in a container of paint remover A maintained at 55°±5°F (12°±2°C) for a period of one hour. Remove the two panels and rinse (manufacturer's option), immerse in a container of paint remover B maintained at 55°±5°F (12°±2°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 3.9. Percentage of paint system removed shall be reported.

4.6.5 Hydrogen Embrittlement. Test specimens shall be prepared as specified in MIL-S-5002, Section 4, with the exception that the cadmium plating is in accordance with MIL-STD-870. The plated test specimens will then be immersed in the active phase of the paint remover maintained at 70°±4°F (21°±3°C) for a period of four hours, then rinsed and dried. The test specimens will then be subjected to test procedures as specified in MIL-S-5002, Section 4 for a period of 200 hours. Any tensile failure of the test specimen during the 200 hour test period will be cause for rejection due to hydrogen embrittlement.

4.6.6 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.

4.6.7 Service Test. The service test will be performed at OO-ALC. The service test shall consist of field evaluation of the paint remover under service conditions conducted in accordance with standard operating procedures on as many aircraft wheels as needed to determine suitability of the product for military use. The service test shall be performed when paint removers have met all the requirements of Section 3 including storage stability.

5. PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Level A. Unless otherwise specified, the paint remover shall be furnished in 55-gallon (208 liter) drums conforming to PPP-D-729 Type II. The size of the containers shall be specified by the procuring activity.

5.1.2 Level C. Unless otherwise specified, packaging shall be in accordance with the supplier's commercial practice.

5.2 Packing

5.2.1 Level A. Paint remover packaged in accordance with 5.1.1 will require no overpacking.

5.2.2 Level C. Paint remover packaged in accordance with 5.1.2 shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Containers shall comply with Consolidated Freight Classification rules or other common carrier regulations applicable to the mode of transportation.

5.3 Marking. Containers shall be marked in accordance with MIL-STD-129. The shipment marking nomenclature shall be: Paint Remover, Activated Solvent Type.

5.3.1 Additional Marking. Each container shall be durably and legibly marked with the following information:

Warning: Avoid contact with skin. Open container slowly to relieve pressure. Use at ambient operating temperature.

Caution: Use only under conditions of adequate ventilation. Empty this container as soon as possible after opening.

NOTE: This remover shall be used by (**).

** Date shall be six months from date of manufacture and shall be indicated by month and year.

5.3.2 Type II paint remover will be further marked Remover A and Remover B.

6. NOTES

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 Ordering Data. Paint remover conforming to this specification tends to have a slower removal rate and becomes more corrosive after aging in the container. Therefore, it should be used within 180 days from the date of manufacture. Procuring activities are cautioned to order only those quantities of paint remover for use within a six month period or to stagger procurement to maintain minimum surplus quantities. Procurement documents shall specify the following:

a. Title, number and date of this specification.

b. Quantity of paint remover desired. For Type II quantity of Remover A and Remover B.

c. Type and size of container.

d. Selection of applicable levels of preservation, packaging and packing (see section 5).

e. Unit of purchase and sale shall be U.S. Gallon of 231 cubic inches at 77 ±2 F (25 ±1 C).

6.3 Qualification. With respect to products requiring qualification awards will be made only for products which are of the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the contractor is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for products covered by this specification. The activity responsible for the Qualified Products List is the Warner Robins ALC. ATTN: MMIRFW Robins AFB GA 31098, and information pertaining to qualification of products may be obtained from that activity.

6.4 Subject Term (Key Word) Listing.

Epoxy
Gear, Landing
Paint
Polyurethane
Temperature, Ambient
Wheels, Aircraft

Custodian: Air Force - 99

Preparing Activity: Air Force - 84

Reviewer: Navy - SH

Project Number: 8010-1157

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-R-87978	

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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