

[NOT MEASUREMENT SENSITIVE]

TT-R-2918
30 APRIL 1997

FEDERAL SPECIFICATION

REMOVER, PAINT, NO HAZARDOUS AIR POLLUTANTS (HAPs)

The General Services Administration has authorized
the use of this federal specification by all Federal Agencies.

1. SCOPE

1.1 Scope. This specification establishes the requirements for two types of paint remover which contain no hazardous air pollutants (HAPs).

1.2 Classification.

1.2.1 Type.

Type I - For removal of epoxy primer/polyurethane topcoat
and flexible polyurethane primer/polyurethane topcoat coating (paint) systems
Type II - For removal of polysulfide sealant based coat coating systems

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100 B120-3, Highway 547, Lakehurst, NJ 08733-5100, 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

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

TT-R-2918

SPECIFICATIONS

FEDERAL

A-A-58054	-	Abrasive Mats, Non-Woven, Non-Metallic
QQ-A-250/4	-	Aluminum Alloy 2024, Plate and Sheet
QQ-A-250/5	-	Aluminum Alloy Alclad 2024, Plate and Sheet
QQ-A-250/13	-	Aluminum Alloy Alclad 7075, Plate and Sheet
QQ-P-416	-	Plating, Cadmium (Electrodeposited)
TT-P-2756	-	Polyurethane Coating: Self-Priming Topcoat, Low Volatile Organic Compounds (VOC) Content
TT-P-2760	-	Primer Coating: Polyurethane, Elastomeric, High-Solids
CCC-C-440	-	Cloth, Cheesecloth, Cotton, Bleached And Unbleached
PPP-D-729	-	Drums, Shipping and Storage, Steel, 55 Gallon (208 liters)
PPP-P-704	-	Pail, Metal (Shipping , Steel, 1 through 12 gallons)

DEPARTMENT OF DEFENSE

MIL-M-3171	-	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion
MIL-S-7952	-	Steel, Sheet and Strip, Uncoated, Carbon (1020 and 1025) (Aircraft Quality)
MIL-A-8625	-	Anodic Coatings, For Aluminum and Aluminum Alloys
MIL-T-9046	-	Titanium and Titanium Alloy, Sheet, Strip and Plate
MIL-PRF-23377	-	Primer Coating: Epoxy, High Solids
MIL-C-81706	-	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-S-81733	-	Sealing And Coating Compound, Corrosion Inhibitive
MIL-PRF-85285	-	Coating: Polyurethane, High-Solids
MIL-P-85582	-	Primer Coatings: Epoxy, Waterborne

STANDARDS

FEDERAL

FED-STD-141	-	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
FED-STD-313	-	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

DEPARTMENT OF DEFENSE

MIL-STD-129	-	Marking for Shipment and Storage
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(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the DODSSP - Customer Service, Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

TT-R-2918

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

CODE OF FEDERAL REGULATIONS (CFR)

OCCUPATIONAL SAFETY AND HEALTH STANDARDS

29 CFR 1910.1200 - Toxic and Hazardous Substances - Hazard Communications

PROTECTION OF THE ENVIRONMENT

40 CFR 61 - National Emission Standards For Hazardous Air Pollutants

40 CFR 82 - Protection Of Stratospheric Ozone

40 CFR 401 - Effluent Guidelines and Standards - General Provisions

(Application of copies of the Code of Federal Regulations (CFR) should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.)

2.2 Non-Government publications. The following documents forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (DoD) adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-Z129.1 - American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals

(Application for copies of ANSI-Z129.1 should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ASQC-Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Application for copies of ASQC-Z1.4 should be addressed to the American Society for Quality Control, PO Box 3005, 611 East Wisconsin Avenue, Milwaukee, WI 53201-4606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-D95 - Water in Petroleum Products and Bituminous Materials by Distillation, Standard Test Method for (DoD Adopted)

TT-R-2918

ASTM-D823	-	Producing Films of Uniform Thickness of Paint, Varnish, and Related Product on Test Panels, Standard Test Methods for (DoD Adopted)
ASTM-D2196	-	Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer, Standard Test Methods for (DoD Adopted)
ASTM-D3278	-	Flash Point Of Liquids By Small Scale Closed-Cup Apparatus (DoD Adopted)
ASTM-D3951	-	Commercial Packaging, Standard Practice for (DoD Adopted)
ASTM-E70	-	pH of Aqueous Solutions With the Glass Electrode, Standard Test Method for (DoD Adopted)
ASTM-F483	-	Total Immersion Corrosion Test For Aircraft Maintenance Chemicals, Standard Test Method for (DoD Adopted)
ASTM-F519	-	Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals, Standard Test Method for
ASTM-F1080	-	Determining the Consistency of Viscous Liquids Using a Consistometer, Standard Test Method for
ASTM-F1110	-	Sandwich Corrosion Test, Standard Test Method for

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959)

SOCIETY FOR AUTOMOTIVE ENGINEERS (SAE) AEROSPACE MATERIAL SPECIFICATIONS (AMS)

SAE-AMS4375	-	Sheet And Plate, Magnesium Alloy 3.0Al - 1.0Zn - 0.20Mn (AZ31B-0) Annealed And Recrystallized
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(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001)

NATIONAL TOXICOLOGY PROGRAM

Annual Report on Carcinogens

(Application for copies should be addressed to the Annual Report on Carcinogens, National Toxicology Program, PO Box 12233, Research Triangle Park, NC 27709.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 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,

TT-R-2918

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 (QPL) before contract award (see 4.3 and 6.3).

3.2 Toxicity. The compound shall not adversely affect the health of personnel when used for its intended purpose. Prior to listing on the Qualified Products List, the manufacturer shall obtain a satisfactory toxicity review (see 4.3.2.2). The MSDS for the remover shall be prepared in accordance with FED-STD-313 and shall conform to 29 CFR 1910.1200 (see 6.5).

3.3 Compositional limitations. The remover shall be biodegradable and shall not contain Hazardous Air Pollutants (HAPs) (as defined in 40 CFR 61); known or suspected human carcinogens (as defined by the National Toxicology Program's Annual Report on Carcinogens), toxic pollutants (as defined in 40 CFR 401); nor Class I or II Ozone Depleting Substances (as defined in 40 CFR 82). Surface active agents used in the remover shall be a minimum of 90 percent biodegradable, determined in accordance with methods appropriate to surface active agent type.

3.3.1 pH. The remover shall have a pH of no less than 7.0 and no more than 12.5, when tested in accordance with ASTM-E70 (see table I).

3.3.2 Water content and alkalinity. The water content and alkalinity of the remover shall be determined during the qualification inspection in accordance with ASTM-D95 and 4.6.1, respectively (see table I). Conformance inspection results for water content and alkalinity (see 4.4) shall not differ from the manufacturer's certified target values (see 4.3.2) by more than ± 10.0 percent.

3.4 Flashpoint. The flash point of the remover shall be a minimum of 93°C (200°F), when tested in accordance with ASTM-D3278 (see table I).

3.5 Consistency. The remover shall flow 100 to 230 millimeters (mm) from the origin, when tested in accordance with ASTM-F1080 (see table I).

3.6 Viscosity. The viscosity of the remover shall be 6 to 12 Pascal-seconds (Pa-sec) [6,000 to 12,000 centipoise (cP)] at 30 revolutions per minute (rpm), when tested in accordance with ASTM-D2196, method A, and 4.6.2. Additionally, the remover shall remain wet on a vertical surface for no less than 6 hours.

TT-R-2918

3.7 Paint removal.

3.7.1 Type I. The stripping percentage shall be equal to, or better than, the stripping percentage obtained with the control formula, when tested in accordance with 4.6.3.

3.7.2 Type II. The stripping percentage shall be equal to, or greater than, 95 percent, when tested in accordance with 4.6.3.

3.8 Corrosivity.

3.8.1 Immersion corrosion. The remover shall not cause any visible corrosion nor an average weight change of any specimen greater than that shown in table V, when tested in accordance with 4.6.4.

3.8.2 Sandwich corrosion. The remover shall have a sandwich corrosion rating no greater than 1, when tested in accordance with ASTM-F1110 (see table I). Additionally, when viewed under 10x magnification, the test specimen shall exhibit no white aluminum corrosion product.

3.8.3 Hydrogen embrittlement. The remover shall not cause embrittlement of high strength steel when tested on ASTM F519, type 1a (notched round bars) or type 1d (C-rings) specimens, in accordance with 4.6.5.

3.9 Accelerated storage stability. The remover shall be conditioned in accordance with 4.6.6. Upon completion of the conditioning, the remover shall not exhibit any precipitation, layering, separation (not greater than 5 percent by volume separation), nor marked change in color (as compared to its original color); additionally, the remover shall be mixable and shall conform to 3.6 and 3.7.

3.10 Rinseability. There shall be no visible remover residue, when tested in accordance with 4.6.7.

3.11 Storage stability. After a minimum storage for one year in accordance with 4.6.8, the remover shall meet all of the requirements herein, with the exception of 3.11 (storage stability) and 3.13 (service evaluation).

3.12 Workmanship. The remover shall have a uniform and homogeneous appearance and the component ingredients shall be intimately blended and processed.

3.13 Service evaluation. The remover shall be acceptable to an aircraft production stripping facility for removal of the intended primer/topcoat system (see table III) from aircraft exteriors, tested in accordance with 4.6.9.

TT-R-2918

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facility 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall 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 absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- a. Qualification inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.3 Qualification inspection. The qualification inspection shall consist of all the tests specified in table I. Upon successful completion of all laboratory tests, the service evaluation test will be performed as part of the qualification inspection.

TT-R-2918

TABLE I. Test methods.

Characteristic	Requirement Paragraph	Test Paragraph	Test Method
pH	3.3.1	---	ASTM-E70 <u>1/</u>
Water content	3.3.2	---	ASTM-D95
Alkalinity	3.3.2	4.6.1	---
Flashpoint	3.4	---	ASTM-D3278
Consistency	3.5	---	ASTM-F1080
Viscosity	3.6	4.6.2	---
Paint removal	3.7	4.6.3	---
Immersion corrosion	3.8.1	4.6.4	---
Sandwich corrosion	3.8.2	---	ASTM-F1110
Hydrogen embrittlement	3.8.3	4.6.5	---
Accelerated storage stability	3.9	4.6.6	---
Rinseability	3.10	4.6.7	---
Storage stability	3.11	4.6.8	---
Workmanship	3.12	---	---
Service evaluation	3.13	4.6.9	---

1/ Mix 50 ml of remover with 50 ml of distilled water and then test.

TT-R-2918

4.3.1 Qualification samples. Prior to submitting samples for qualification testing, vendors shall request authorization from the qualification activity (see 6.3). Upon receipt of authorization, samples shall be forwarded as directed. The qualification test sample shall be contained in one 3.8 liter (one gallon) glass container and one 3.8 liter (one gallon) metal container conforming to PPP-P-704, type I, class 1. The MSDS (see 3.2 and 6.5) shall accompany each submission. Samples shall be identified as follows:

Qualification test samples

Federal Specification TT-R-2918, "REMOVER, PAINT, NO HAZARDOUS AIR POLLUTANTS"

Manufacturer's name and product number

Batch or lot number

Date compounded

Submitted by (name and date) for qualification testing in accordance with authorization (reference authorizing letter)

4.3.1.1 Field service test samples. Upon successful completion of all laboratory tests, the manufacturer will be authorized to submit samples for a field service evaluation. Samples shall be forwarded in accordance with instructions contained in the authorizing letter and shall consist of 380 to 2840 liters (100 to 750 gallons) of paint remover, as required by the field service activity and stated in the authorizing letter. No overpacking is required.

4.3.2 Qualification data. In addition to the qualification test samples, the manufacturer shall furnish the following to the qualification activity:

- a. One copy of the MSDS (see 3.2);
- b. A certified test report showing that the material conforms to the requirements of this specification. Test(s) not conducted due to lack of special facilities or materials shall be noted in the report.;
- c. Certification of compliance with the requirements for toxicity (see 3.2), compositional limitations (see 3.3), and target values for water content and alkalinity (see 3.3.2);
- d. Certification that the remover is biodegradable, with details concerning the type of tests conducted and their results for each of the surfactants in the product formula.

4.3.2.1 Toxicity review. When requested by the qualifying activity, the manufacturer of the product shall disclose the following information to the Navy Environmental Health Center, Industrial Hygiene Directorate, Norfolk, VA 23513-2617, to determine compliance with 3.2.

- a. Product name (including part number/tradename), formula, CAS number, and percentage by weight of each ingredient in the product;
- b. Product MSDS compliant with OSHA Form 174, or equivalent;
- c. Current MSDS for each ingredient used in the formulation; and

TT-R-2918

- d. The results of any toxicological testing of the product; identification of its pyrolysis products; and any other information as may be needed to permit an accurate appraisal of any toxicity problem or issues associated with the handling, storage, application, use, removal, disposal, or combustion of the material.

Information submitted shall be clearly marked to show it is being provided in connection with qualification under TT-R-2918.

4.3.3 Retention of qualification. In order to retain qualification of products approved for listing on the qualified products list (QPL), the manufacturer shall verify by certification to the qualifying activity that the product complies with the requirements of this specification. The time of periodic verification by certification shall be two year intervals from the date of original qualification and shall be initiated by the Government. The Government reserves the right to reexamine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

4.4 Conformance inspection.

4.4.1 Batch and lot formation. A batch shall consist of all material manufactured during one continuous operation and forming part of one contract or order for delivery. A lot shall consist of all material manufactured at one time from one batch, forming part of one contract, and submitted for acceptance. When requested by the procurer (see 6.2), the manufacturer shall furnish with each batch and/or lot a certified test report showing that the material has passed the conformance inspection and that there has been no formulation or process change from that which resulted in the production of the qualification inspection sample.

4.4.1.1 Rejection and retest. Failure in any conformance test shall result in rejection of that batch and/or lot and shall constitute justification for removal from the qualified products list. Rejected material shall not be resubmitted for acceptance without written approval from the qualification activity (see 6.3). The application for resubmission shall contain full particulars concerning previous rejections and measures taken to correct these deficiencies. Samples for retest shall be randomly selected in accordance with 4.4.2 and forwarded to the testing activity.

4.4.2 Sampling.

4.4.2.1 Sampling for conformance inspection. Conformance test samples shall be selected in accordance with FED-STD-141, method 1022, with the exception that ASQC-Z1.4 shall be used for sampling; the sample shall consist of not less than 4 liters (1 gallon). If required (see 6.2), the manufacturer shall certify that the material has been manufactured in the same manner and using the same base ingredients as the approved qualification sample. The selected samples shall be tested as specified in 4.4.3.1.

TT-R-2918

4.4.2.2 Sampling for inspection of filled containers. A random sample of filled containers shall be selected from each lot in accordance with ANSI-Z1.4, Inspection Level I for the inspection specified in 4.4.3.2. For the purposes of this inspection, the lot size shall be the number of shipping containers.

4.4.3 Inspections.

4.4.3.1 Physical tests. The sample selected in 4.4.2.1 shall be tested for conformance to table II.

TABLE II. Conformance inspection.

Characteristic	Requirement paragraph	Test paragraph	Test method
pH	3.3.1	---	ASTM-E70 1/
Water content	3.3.2 2/	---	ASTM-D95
Alkalinity	3.3.2 2/	4.6.1	---
Consistency	3.5	---	ASTM-F1080
Viscosity	3.6	4.6.2	---
Paint removal	3.7	4.6.3	---
Immersion corrosion	3.8.1	4.6.4	---
Hydrogen embrittlement	3.8.3	4.6.5	---

1/ Mix 50 ml of remover with 50 ml of distilled water and then test.

2/ Conformance inspection results shall not differ from the manufacturer's certified target values (see 3.3.2 and 4.3.2) by more than ± 10.0 percent.

4.4.3.2 Packaging inspection. The sample selected in accordance with 4.4.2.2 shall be visually examined for fill, closure, and marking.

4.5 Inspection conditions. Unless otherwise specified in the test method or paragraph, all tests shall be conducted at standard (room temperature) conditions ($21^{\circ} \pm 3^{\circ}\text{C}$ ($70^{\circ} \pm 5^{\circ}\text{F}$), and relative humidity of 50 ± 10 percent).

4.6 Test methods. The tests of this specification shall be conducted in accordance with the table I and 4.6.1 through 4.6.9.

4.6.1 Alkalinity. Prepare and standardize 1 Normal (N) hydrochloric acid (normality = A) and 1 N sodium hydroxide (normality = B). Solutions at 0.1 N may be used when products do

TT-R-2918

not have a high reserve alkalinity. With a syringe, transfer about 10 grams of paint remover into a 250 ml beaker containing 75 ml of methanol and 50.0 ml of the 1 N hydrochloric acid. Determine the sample weight (S) by difference. Add a stirring bar, then mix and titrate with the 1 N sodium hydroxide to pH 4.0. Determine the volume (in milliliters) of titrant used (V) and calculate alkalinity as follows:

$$\text{Alkalinity (in percent NH}_3 \text{ (28 percent))} = [(50A - VB) \times 6.07 \div S].$$

4.6.2 Viscosity. A Brookfield viscometer (Model LVF or equivalent), shall be used with spindle number LV4. Viscosity shall be determined in accordance with ASTM-D2196, method A, at 30 rpm, but only after the spindle has been operating for at least 3 minutes. Prepare a test panel with the appropriate coating system from table III, in accordance with 4.6.3.1 through 4.6.3.2. Apply remover to the test panels and place them on a rack, such that the surface forms a 90° angle with the horizontal and store for six hours. At the end of this storage period, wipe a gloved finger across the center of the vertical test panel surface; visual inspection shall reveal an obvious streak in the remover.

4.6.3 Paint removal. For type I remover, a minimum of four test panels for each coating system (solventborne primer system, waterborne primer system, and flexible polyurethane primer system) shall be tested, two for the control and two for the remover under test. For type II remover, a minimum of two test panels for the polysulfide sealant system shall be tested.

4.6.3.1 Preparation of test panels. Test panels, measuring approximately 0.5 by 127.0 by 406.4 mm (0.020 by 5.0 by 16.0 inches) and constructed of deburred Alclad aluminum alloy 2024 conforming to QQ-A-250/5, shall be prepared for application of coating as follows:

- a) Abrade the surface of the test panel with a very fine abrasive mat, conforming to A-A-58054, which has been soaked with deionized water, by manually rubbing the mat back and forth parallel to the long dimension of the panel until the entire surface is water break free;
- b) Immediately wipe the test panel clean and dry with cotton cloth conforming to CCC-C-440, Class 1;
- c) Within 4 hours of drying, immerse the panel in chemical conversion coating, conforming to MIL-C-81706, for three minutes. Ensure that panels do not touch each other nor the sides of the tank;
- d) Remove the test panels and rinse thoroughly with deionized water for one minute;
- e) Allow test panels to air dry in an upright position and, within 24 hours, apply the coating system from table III for which the remover is intended.

4.6.3.2 Application of coatings to test panels. Apply the applicable coating system from table III to the test panels. MIL-PRF-23377, MIL-P-85582, TT-P-2760, and MIL-PRF-85285 shall be applied in accordance with ASTM-D823.

TT-R-2918

TABLE III. Test panel finishes.

Remover type (see 1.2.1)	Finish system	Step	Material	Number of coats and total dry film thickness	Drying time between coats	Drying time before baking	Baking time and temperature
I	Solventborne epoxy primer/polyurethane topcoat system	1	MIL-PRF-23377, type I, class C	One coat 0.6 to 0.9 mils (15 to 23 μm)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 μm)	15 minutes	7 days	7 days at 150°F
	Waterborne epoxy primer/polyurethane topcoat system	1	MIL-P-85582, type I, class C2	One coat 0.6 to 0.9 mils (15 to 23 μm)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 μm)	15 minutes	7 days	7 days at 150°F
	Flexible polyurethane primer/polyurethane topcoat system	1	TT-P-2760, type I, class C	Two coats 1.5 - 2.0 mils (38 to 51 μm)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 μm)	15 minutes	7 days	7 days at 150°F
II	Polysulfide sealant system	1	MIL-S-81733, type III	One coat 2.0 mils (51 μm)	15 minutes	---	---
		2	MIL-S-81733, type III	One coat 2.0 mils (51 μm)	15 minutes	---	---
		3	MIL-S-81733, type III	One coat 2.0 mils (51 μm)	15 minutes	---	---
		4	MIL-PRF-23377, type I, Class C	One coat 0.6 to 0.9 mil (15 to 23 μm)	60 minutes	---	---
		5	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 μm)	15 minutes	7 days	7 days at 150°F

4.6.3.3 Scribing. Cut test panels, prepared in accordance with 4.6.3.1 and 4.6.3.2, into pieces measuring approximately 4.0 by 5.0 inches (102 by 127 mm). Using a stylus, scribe an "X" on the coated surface side of each panel piece, connecting opposite corners. Ensure that the scribe cuts through to the substrate.

4.6.3.4 Type I remover.

TT-R-2918

4.6.3.4.1 Preparation of control formulation remover (for type I only). Prepare the control formula remover by mixing the ingredients listed in table IV in the order given. Add the thickener slowly while using a high speed mixer. Complete the formula preparation in less than 5 minutes to avoid excessive loss of ammonia.

NOTE: This formula is not intended to meet any other requirements of this specification.

TABLE IV. Control formula remover.

Ingredient	Weight percent
Benzyl alcohol	56.0
Igepal OD-410 <u>1/</u>	14.0
Ammonia (28 %)	14.0
Methocel F4M <u>2/</u>	1.45
Monoethanolamine	7.0
Deionized water	7.5

1/ GAF Corporation

2/ Dow Chemical

4.6.3.4.2 Procedure. Place four test panels on a rack, coated and scribed surface up, such that the test panel forms a 60° angle with the horizontal. Apply the remover by pouring along the top edge of two test panels. Immediately apply the control formula remover (see 4.6.3.4.1) in a similar manner to the remaining two test panels. Allow the remover to flow down the panels, taking no more than one minute to cover the coated surface. Allow the remover to dwell on the panel for 6 hours. Test panels shall then be scraped with a rubber scraper to remove loosened coatings; apply additional remover to cover any remaining coating and allow it to dwell for an additional 2 hours. Immediately after this exposure, the test panels shall be scraped with a rubber scraper to remove the bulk of the loosened coatings and remover residue. The test panels shall then be rinsed with tap water with gentle brushing using a soft, nylon bristle brush. Paint removal shall be determined for each test panel by estimating the percentage of aluminum substrate revealed by the stripping process. The result shall be reported as the average of the two panels under test and the average of the two panels for the control formula.

4.6.3.5 Type II remover. Place two test panels on a rack, coated and scribed surface up, such that the test panel forms a 60° angle with the horizontal. Apply the remover by pouring along the top edge of each test panel. Allow the remover to flow down the panels, taking no more than one minute to cover the coated surface. Allow the remover to dwell on the panel for 6 hours. Test panels shall then be scraped with a rubber scraper; apply additional remover to cover any remaining coating and allow it to dwell for an additional 2 hours. The test panels shall then be scraped with a rubber scraper to remove loosened coatings; apply additional remover to cover any remaining coating and allow it to dwell for an additional 2 hours. Immediately after this

TT-R-2918

exposure, the test panels shall be scraped with a rubber scraper to remove the bulk of the loosened coatings and remover residue. The test panels shall then be rinsed with tap water with gentle brushing using a soft, nylon bristle brush. Paint removal shall be determined for each test panel by estimating the percentage of aluminum substrate area revealed by the stripping process. The result shall be reported as the average of the two test panels.

4.6.4 Immersion corrosion. Perform the immersion corrosion test as specified in ASTM-F483, except that preparatory solvent cleaning of test panels shall be done with acetone and isopropyl alcohol. The duration of immersion shall be 7 days. Weight change results shall be reported in units of mg/cm²/24 hours. Failure to meet the limitations in table V is cause for rejection.

TABLE V. Immersion corrosion limits.

Test panel	Specification	Surface treatment	Maximum weight change (mg/cm ² /24 hr)
Alclad aluminum alloy 2024 (T3 temper)	QQ-A-250/5	None	0.04
Alclad aluminum alloy 7075 (T6 temper)	QQ-A-250/13	None	0.04
Alclad aluminum alloy 2024 (T3 temper)	QQ-A-250/4	Anodize in accordance with MIL-A-8625, type I or II	0.04
Steel 1020	MIL-S-7952	Polished to 65 rms.	0.04
Steel 1020	MIL-S-7952	Cadmium plated in accordance with QQ-P-416, type I, class 3	0.20
Magnesium AZ31B	AMS 4375	Chrome pickled in accordance with MIL-M-3171, type I	0.20
Titanium 6Al-4V	MIL-T-9046	None	0.04

TT-R-2918

4.6.5 Hydrogen embrittlement. This test shall be conducted using a minimum of three ASTM-F519, type 1a or 1d, specimens. The test shall be conducted in accordance with ASTM-F519, with the following exceptions:

a. Type 1a (notched round bar) specimens

1. Specimens shall be loaded to 75 percent of the notch tensile load.
2. After loading the specimen, the paint remover shall be applied once to the notch of each specimen using a clean, nylon bristle brush to completely cover the notch and surfaces within 0.5 inch of the notch.
3. The test duration shall be a minimum of 200 hours; record the time to failure if failure occurs in less than 200 hours.

b. Type 1d (notched C-ring) specimens

1. Specimens shall be loaded to 65 percent of the notch bend load.
2. After loading the specimens, the stressed C-rings shall be immersed in the remover to a depth of approximately 10.0 mm (0.5 inch) for 60 seconds with the notched side down. The rings shall be removed and allowed to drain; no rinse of any kind shall be used after immersion.
3. The rings shall be hung with the notched side down for a minimum of 100 hours; record the time of failure if failure occurs in less than 100 hours.

If failure occurs in one of the three specimens (for either type), a second set of three specimens shall be evaluated. A minimum of three out of three or five out of six specimens shall meet the 200 hour duration for the type 1a or 100 hours duration for the type 1d to consider the paint remover non-embrittling and meeting the requirement.

4.6.6 Accelerated storage stability. A 150 ml portion of well mixed paint remover shall be poured into each of two clean 16 ounce plastic bottles which shall be approximately 180 mm in height and 70 mm in outside diameter. One bottle shall be sealed with a screw-type cap and stored for at least six days at room temperature for reference purposes. Seal the other bottle in the same manner and shake thoroughly for 10 seconds; place in a bath maintained at $60^{\circ} \pm 2^{\circ}\text{C}$ ($140^{\circ} \pm 4^{\circ}\text{F}$) for 5 hours, then remove and allow to cool to ambient for 19 hours. Repeat this heating cooling cycle 5 times. The last cooling cycle may be shortened to 3 hours to allow the test to be started on Monday and completed on Friday. The test may be allowed to run over a weekend by leaving the sample at room temperature from Friday afternoon to Monday morning. After completion of 5 cycles, both bottles shall be shaken thoroughly for 10 seconds, then allowed to remain undisturbed at room temperature for 1 hour. The bottles shall then be examined for separation, precipitation, layering, and color change.

4.6.7 Rinseability. Approximately 2.0 grams of paint remover shall be added to a 60.0 mm (0.24 inch) diameter disposable aluminum dish. The dish shall be placed in an air-circulating oven

TT-R-2918

at $49^{\circ} \pm 2^{\circ}\text{C}$ ($120^{\circ} \pm 4^{\circ}\text{F}$) for 24 hours, then rinsed for one minute under flowing tap water adjusted to $35^{\circ} \pm 2^{\circ}\text{C}$ ($95^{\circ} \pm 4^{\circ}\text{F}$). A soft horse hair or hog bristle brush with bristles no less than 20.0 mm (0.8 inch) long may be used to assist the rinsing process. The dish shall then be lightly wiped with paper tissue, dried for 10 minutes in the same oven, then examined for evidence of visible residue.

4.6.8 Storage stability. A 3.8 liter (1.0 gallon) metal container conforming to PPP-P-704, type I, class 1, filled with remover furnished for storage stability shall be stored for a minimum of 12 months at $21^{\circ} \pm 3^{\circ}\text{C}$ ($70^{\circ} \pm 5^{\circ}\text{F}$). After the 12 month storage period, the remover shall be tested for all requirements in section 3, except storage stability (3.11) and service test (3.13).

4.6.9 Service evaluation test. The service evaluation shall be performed at an aircraft paint stripping site designated by the qualifying activity. The remover shall be spray applied to the clean, dry exterior surface of an aircraft which has been in service for at least one year. The finish system on the aircraft to be stripped by type I remover shall be either MIL-PRF-23377 topcoated with MIL-PRF-85285 or MIL-P-85582 topcoated with MIL-PRF-85285. The finish system on the aircraft to be stripped by type II remover shall be MIL-S-81733, topcoated with MIL-PRF-23377 and MIL-PRF-85285. The remover shall be applied and allowed to act for a minimum of 6 hours at a minimum of 21°C (70°F). If the remover under test fails to strip effectively, it shall be compared against a product qualified to the specification and designated by the qualification laboratory. The paint remover under test and the comparison product shall be applied to alternating areas on each side of the same aircraft or another similar aircraft. The areas completely stripped by the remover under test shall be no less than 90 percent of the area stripped by the comparison product or the product under test shall require no more than 20 percent more time to achieve the same degree of stripping.

5. PACKAGING

5.1 Packaging. Packaging shall be Level A or Commercial, as specified in 6.2.

5.1.1 Level A. Unless otherwise specified in the contract or order, the remover shall be packaged in 19 or 208 liter (5 or 55 gallon) containers conforming to PPP-P-704, type I, class 3 and PPP-D-729, type II, respectively. The internal surfaces of all containers shall be protected with a material that shall not adversely affect nor be adversely affected by the remover.

5.1.2 Commercial. The remover shall be packaged in accordance with ASTM-D3951.

5.2 Marking. In addition to any special marking required by the contract or order, shipping containers and palletized unit loads, when applicable, shall be marked in accordance with MIL-STD-129.

TT-R-2918

6. NOTES

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

6.1 Intended use. The paint remover covered by this specification is intended for stripping paint from metal surfaces of aircraft exteriors. Type I removers are used to strip epoxy primer coating/polyurethane topcoat systems and flexible polyurethane primer/polyurethane topcoat systems (see table III) and may be useful for removing self-priming polyurethane coating (TT-P-2756) systems. Type II removers are used to strip polysulfide-based (see table III) systems by digestion of the polysulfide polymer.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification, including any amendments.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2)
- c. Quantity of remover desired.
- d. Level of packaging, including type and capacity of containers required (see 5.1)..
- e. Special marking, if required (see 5.2)
- f. Test/inspection reports and certifications required (4.4.1 and 4.4.2.1).
- g. Address(es) where MSDSs should be sent.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-TT-R-2918, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, 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 purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Commander, Naval Air Systems Command (AIR-4.3.4), Arlington, VA 22243. However, information pertaining to qualification of products may be obtained from the Commander, Naval Air Warfare Center Aircraft Division, Attn.: Code 4.3.4.1, Building 2188, 22347 Cedar Point Road, Unit 5, Patuxent River, MD 20670-1161

6.4 Subject term (key word) listing.

Aircraft exterior coating removal
Methyl ethyl ketone (MEK)
Stripper

TT-R-2918

6.5 Material Safety Data Sheet (MSDS). 29 CFR 1910.1200 requires that the MSDS for each hazardous chemical used in an operation must be readily available to personnel using the material. Contracting officers will identify the activities requiring copies of the MSDS.

6.6 Part or identifying number (PIN). Part numbers may be coded as follows:

<u>TTR2918</u>	-	<u>X</u>	-	<u>XXXX</u>
____ ____		____ ____		____ ____
Specification		1 = Type I		Container size *
identifier		2 = Type II		005G = 5 gallons
				055G = 55 gallons

* The container size and designator may be modified for ease of procurement and is not otherwise limited (1 pint would be coded as 001P, 1 gallon would be coded as 001G, etc.).

CONCLUDING MATERIAL

Custodians:

Navy - AS

Air Force - 11

Review:

Navy - CG

Air Force - 84, 99

Civil coordinating agency:

GSA - FSS

Preparing activity:

Navy - AS

Project No. 8010-0948

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

TT-R-2918

2. DOCUMENT DATE
(YYMMDD)

970430

3. DOCUMENT TITLE

REMOVER, PAINT, NO HAZARDOUS AIR POLLUTANTS (HAPs)

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

COMMANDER
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION

b. TELEPHONE NUMBER (Include Area Code)

(1) Commercial
(908) 323-2947(2) DSN
624-2947

c. ADDRESS (Include Zip Code)

CODE 414100B120-3
HIGHWAY 547
LAKEHURST, NJ 08733-5100IF 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

COMMANDER
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
CODE 414100B120-3
HIGHWAY 547
LAKEHURST, NJ 08733-5100