

NOT MEASUREMENT
SENSITIVE

TT-R-2918A
March 19, 2001
SUPERSEDING
TT-R-2918
April 30, 1997

FEDERAL SPECIFICATION

REMOVER, PAINT, NO HAZARDOUS AIR POLLUTANTS (HAPS)

INACTIVE FOR NEW DESIGN AFTER 29 DECEMBER 2000

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

1. SCOPE AND CLASSIFICATION

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

1.2 Classification. The paint removers covered by this specification shall be of the following types as specified.

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 coating systems

2. APPLICABLE DOCUMENTS

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

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100 B120-3, Highway 547, Lakehurst, NJ 08733-5100.

FSC 8010

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FEDERAL SPECIFICATIONS

A-A-58054	-	Abrasive Mats, Non-Woven, Non-Metallic
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

FEDERAL STANDARDS

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

(Activities outside the Federal Government may obtain copies of federal specifications, and standards, and commercial item descriptions as specified in the General Information section of the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index is for sale on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Single copies of these specifications and other federal specifications required by activities outside the Federal Government for bidding purposes are available without charge from the General Services Administration, Federal Supply Service, Specification Section, Suite 8100, 470 L'Enfant Plaza, SW, Washington, DC 20407.)

(Federal Government activities may obtain copies of federal standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

MILITARY SPECIFICATIONS

MIL-A-8625	-	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-PRF-23377	-	Primer Coatings: Epoxy, High-Solids
MIL-C-81706	-	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-PRF-81733	-	Sealing and Coating Compound, Corrosion Inhibitive
MIL-PRF-85285	-	Coating: Polyurethane, High-Solids
MIL-PRF-85582	-	Primer Coatings: Epoxy, Waterborne

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MILITARY STANDARDS

MIL-STD-2073-1 - DoD Standard Practice for Military Packaging

(Copies of military specifications and standards required by contractors in connection with specific procurement functions are obtained from the Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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
 40 CFR 796.3100 - Aerobic Aquatic Biodegradation

(The code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the federal agency responsible for issuing them.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQC-Z1.4 - Procedures, Sampling and Tables for Inspection by Attributes.(DoD Adopted)

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Society for Quality, PO Box 3005, 611 East Wisconsin Avenue, Milwaukee, WI 53201-4606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-D92 - Flash and Fire Points by Cleveland Open Cup. (DoD Adopted)
 ASTM-D95 - Water in Petroleum Products and Bituminous Materials by Distillation. (DoD Adopted)
 ASTM-D823 - Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels. (DoD Adopted)

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ASTM-D2196	-	Viscometer, Rotational (Brookfield Type), Rheological Properties of Non-Newtonian Materials by. (DoD Adopted)
ASTM-D3951	-	Packaging Commercial. (DoD Adopted)
ASTM-E70	-	Electrode, pH of Aqueous Solutions with the Glass. (DoD Adopted)
ASTM-F483	-	Total Immersion Corrosion Test For Aircraft Maintenance Chemicals. (DoD Adopted)
ASTM-F519	-	Mechanical Hydrogen Embrittlement Testing of Plating Processes and Aircraft Maintenance Chemicals
ASTM-F1080	-	Determining the Consistency of Viscous Liquids Using a Consistometer
ASTM-F1110	-	Sandwich Corrosion Test

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

NATIONAL TOXICOLOGY PROGRAM

Annual Report on Carcinogens

(Private sector and civil agencies may purchase copies of these voluntary standards from the Annual Report on Carcinogens, National Toxicology Program, PO Box 12233, Research Triangle Park, NC 27709.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE-AMS4375	-	Sheet and Plate, Magnesium Alloy 3.0Al - 1.0Zn - 0.20Mn (AZ31B-0) Annealed and Recrystallized. (DoD Adopted)
SAE-AMS5046	-	Sheet, Strip and Plate, Carbon Steel (SAE 1020 and 1025) Annealed. (DoD Adopted)
SAE-AMS-QQ-A-250/4	-	Aluminum Alloy 2024, Plate and Sheet. (DoD Adopted)
SAE-AMS-QQ-A-250/5	-	Aluminum Alloy Alclad 2024, Plate and Sheet. (DoD Adopted)
SAE-AMS-QQ-A-250/13	-	Aluminum Alloy Alclad 7075, Plate and Sheet. (DoD Adopted)
SAE-AMS-M-3171	-	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion On. (DoD Adopted)
SAE-AMS-T-9046	-	Titanium and Titanium Alloy, Sheet, Strip, and Plate. (DoD Adopted)

(Private sector and civil agencies may purchase copies of these voluntary standards from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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3. REQUIREMENTS

3.1 Qualification. The paint removers furnished under this specification shall be products qualified for listing on the applicable qualified products list.

3.2 Toxicity. The paint remover shall not 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 4.3.2.1).

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 not less than 90 percent biodegradable in 28 days, as determined in accordance with 40 CFR 796.3100 (see table I).

3.3.1 Paint remover pH level. The paint remover shall have a pH of no less than 7.0 and no more than 12.5, when tested in accordance with ASTM-E70.

3.3.2 Water content and alkalinity (Type I only). The water content and alkalinity of the Type I remover shall be determined during the qualification inspection in accordance with ASTM-D95 and 4.6.1 of this specification, respectively. Quality 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 of the value.

3.4 Flash point. The flash point of the remover shall be not less than 79 °C (175 °F), when tested in accordance with ASTM-D92.

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

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 not less than 6 hours.

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.

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3.8 Corrosivity.

3.8.1 Immersion corrosion. The remover shall not cause any visible corrosion (staining is allowable on cadmium plated specimens) 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 one, or no effect greater than that obtained for reagent water, when tested in accordance with ASTM-F1110. 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 bar), Type 1d (notched C-ring), or Type 1e (notch square bar) 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 storage time of not less than one year (see 4.6.8), the remover shall meet all of the requirements of this specification, with the exception of 3.13 (service evaluation).

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

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

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor 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 ensure supplies and services conform to prescribed requirements.

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4.2 Classification of examinations and tests. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.3).
- b. Quality 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 shall be performed as part of the qualification inspection.

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) unit in the type of container in which the manufacturer intends to supply contract quantities of the remover. (If the manufacturer intends to supply contract quantities of the remover in plastic, the second qualification sample shall be made from the same type plastic and have no greater wall thickness than containers proposed for production packaging.) The MSDS (see 3.2 and 6.4) shall accompany each submission. Samples shall be identified as follows:

Qualification test samples

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AIR POLLUTANTS (HAPS)"

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.

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TABLE I. Qualification test methods.

Characteristic	Requirement Paragraph	Test Method or Paragraph
Biodegradability	3.3	40 CFR 796.3100
pH	3.3.1	ASTM-E70 <u>1/</u>
Water content (Type I only)	3.3.2	ASTM-D95
Alkalinity (Type I only)	3.3.2	4.6.1
Flash point	3.4	ASTM-D92
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	<u>2/</u>
Service evaluation	3.13	4.6.9

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

2/ Workmanship observed throughout qualification inspection.

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); and
- 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.

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4.3.2.1 Toxicity review. The contractor shall furnish the toxicological data and formulations required to evaluate the safety of the material for the proposed use. When requested by the qualifying activity, the manufacturer of the product shall provide the following information:

- 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 (see 6.4);
- c. Current MSDS for each ingredient used in the formulation; and
- 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 marked to show it is being provided in connection with qualification under this specification.

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 Quality 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 acquisition activity (see 6.2), the manufacturer shall furnish with each batch, a certified test report showing that the material has passed the quality conformance inspection and that there has been no formulation or process change from that which resulted in the production of the qualification inspection sample.

4.4.2 Sampling.

4.4.2.1 Sampling for quality conformance inspection. Quality 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 3.8 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.

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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 ASQC-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 quality conformance to table II.

4.4.3.2 Filled container 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 conditions (room temperature of 21 ± 3 °C [70 ± 5 °F], and relative humidity of 50 ± 10 percent).

4.6 Test methods. The tests of this specification shall be conducted in accordance with 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 not have a high reserve alkalinity. With a syringe, transfer 10 grams of Type I 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:

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

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TABLE II. Quality conformance inspections.

Characteristic	Requirement Paragraph	Test Method or Paragraph
pH	3.3.1	ASTM-E70 <u>1/</u>
Water content (Type I only)	3.3.2	ASTM-D95
Alkalinity (Type I only)	3.3.2	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.

4.6.2 Viscosity. A Brookfield viscometer (Model LVF or similar) 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. In addition, prepare a test panel with the coating system specified in 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, not less than four test panels for each coating system (solvent-borne primer system, water-borne 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, not less than 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 x 127.0 x 406.4 mm (0.020 x 5.0 x 16.0 in.) and constructed of deburred Alclad aluminum alloy 2024 conforming to SAE-AMS-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;

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- 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 or the sides of the tank;
- d. Remove the test panels and rinse thoroughly with deionized water for one minute; and
- 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-PRF-85582, TT-P-2760, and MIL-PRF-85285 shall be applied in accordance with ASTM-D823.

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 102 x 127 mm (4 x 5 in.). For evaluation of Type I removers, scribe an "X" one inch in length in the middle of the panel on the coated surface side of each panel piece using a stylus. Ensure that the scribe cuts through to the substrate. No scribe shall be made on polysulfide sealant system panels for Type II removers.

4.6.3.4 Type I remover.

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 as follows in a high-speed blender.
NOTE: This formula is not intended to meet any other requirements of this specification.

Mixing instructions for 500 or 1000 gram batch:

- a. Weigh out Anisole.
- b. Weigh out Methocel on filter paper and slowly add to the Anisole while stirring with an impeller type mixer. There shall be no lumps.
- c. Weigh benzyl alcohol into the above mix and stir at full speed until homogeneous.
- d. Weigh out water into a separate container.
- e. Weigh 28 percent ammonia into the water and stir for a few seconds with a spatula.
- f. Add 50 gram increments of the mixture from (e) to the mixture from (c) while blending at high speed. Blend after each addition to achieve a smooth milkshake consistency. Complete the formula preparation in less than 5 minutes to avoid excessive loss of ammonia.

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TABLE III. Test panel finishes.

Remover type (see 1.2.1)	Coating 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 .m)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 .m)	15 minutes	7 days	7 days at 150 °F
	Waterborne epoxy primer/polyurethane topcoat system	1	MIL-PRF-85582, Type I, class C2	One coat 0.6 to 0.9 mils (15 to 23 .m)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 .m)	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 .m)	60 minutes	---	---
		2	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 .m)	15 minutes	7 days	7 days at 150 °F
II	Polysulfide sealant system	1	MIL-PRF-81733, Type III	One coat 2.0 mils (51 .m)	15 minutes	---	---
		2	MIL-PRF-81733, Type III	One coat 2.0 mils (51 .m)	15 minutes	---	---
		3	MIL-PRF-81733, Type III	One coat 2.0 mils (51 .m)	15 minutes	---	---
		4	MIL-PRF-23377, Type I, Class C	One coat 0.6 to 0.9 mil (15 to 23 .m)	60 minutes	---	---
		5	MIL-PRF-85285 (Color 36375)	Two coats 1.7 to 2.3 mils (43 to 58 .m)	15 minutes	7 days	7 days at 150 °F

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TABLE IV. Control formula remover.

Ingredient	Weight percent
Anisole	19.0
Methocel, grade F4M <u>1/</u>	1.32
Benzyl alcohol	41.7
Water	33.2
Ammonia (28 percent)	4.78

1/ Dow Chemical

4.6.3.4.2 Procedure. Seal edges of prepared test panels with beeswax by dipping in melted wax to a depth not to exceed 6 mm (0.25 in.) from all edges.

4.6.3.4.2.1 Type I remover. 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 4 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 4 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 and brushed with 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.

4.6.3.4.2.2 Type II remover. Place two test panels on a rack, coated 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 4 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 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.

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4.6.4 Immersion corrosion. The immersion corrosion test shall be performed as specified in ASTM-F483, except that preparatory solvent cleaning of test panels shall be done with acetone followed by 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)	SAE-AMS-QQ-A-250/5	None	0.04
Alclad aluminum alloy 7075 (T6 temper)	SAE-AMS-QQ-A-250/13	None	0.04
Alclad aluminum alloy 2024 (T3 temper)	SAE-AMS-QQ-A-250/4	Anodize in accordance with MIL-A-8625, Type I or II	0.04
Steel 1020	SAE-AMS5046	Polished to 65 root mean square (rms).	0.04
Steel 1020	SAE-AMS5046	Cadmium plated in accordance with QQ-P-416, Type I, Class 3	0.20
Magnesium AZ31B	SAE-AMS4375	Chrome pickled in accordance with SAE-AMS-M-3171, Type I	0.20
Titanium 6Al-4V	SAE-AMS-T-9046	None	0.04

4.6.5 Hydrogen embrittlement. This test shall be conducted in accordance with ASTM-F519, except as noted below, using specimens conforming to Types 1a, 1d, or 1e. Specimens shall be cadmium plated in accordance with ASTM-F519, table 2, treatment B at 645 amps per square meter (60 amps per square foot). Plating shall cover the notch and surfaces within 12 mm (0.5 in.) of the notch; threaded surfaces or ends of the specimens shall not be plated. Plated specimens shall be baked for 100 hours at 190 ±13 °C (375 ±25 °F). The test shall be conducted using either the sustained or incremental load method.

a. Sustained load protocol. Not less than three specimens shall be used. If failure occurs in one of the three specimens (for either type), a second set of three specimens shall be evaluated. Not less than three out of three, or five out of six specimens, shall meet the 200 hour duration for Type 1a, or 100 hour duration for Type 1d, to meet the requirement and consider the paint remover non-embrittling.

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(1) Type 1a (notch round bar) specimens

- (a) Specimens shall be loaded to 75 percent of the tensile notched fracture strength (NFS).
- (b) 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 12 mm (0.5 in.) of the notch.
- (c) The test shall be run for not less than 200 hours; the time to failure shall be recorded if failure occurs in less than 200 hours.

(1) Type 1d (notch C-ring) specimens

- (a) Specimens shall be loaded to 65 percent of the bend NFS.
- (b) After loading the specimens, the stressed C-rings shall be immersed in the remover to a depth of approximately 10 mm (0.4 in.) 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.
- (c) The ring shall be hung with the notched side down for not less than 100 hours; the time of failure shall be recorded if failure occurs in less than 100 hours.

b. Incremental load protocol. Not less than four specimens shall be used. The notch shall be immersed for the duration of the test. If failure occurs in one of the four specimens at less than 80 percent NFS for Type 1a or less than 70 percent NFS for Type 1e, a second set of four specimens shall be evaluated. Not less than four out of four, or seven out of eight specimens shall meet the 80 percent NFS requirement for Type 1a or 70 percent NFS for Type 1e to meet the requirement and consider the paint remover non-embrittling.

(1) Type 1a (notch round bar) specimens

- (a) Specimens shall be loaded to 45 percent of the NFS for 24 hours.
- (b) After 24 hours, the load shall be increased in incremental steps of 5 percent NFS per hour until failure occurs.
- (c) The percent FS at failure shall be recorded.

(1) Type 1e (notch square bar) specimens

- (a) Specimens shall be loaded in bending to 45 percent of the NFS for 24 hours.

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- (b) After 24 hours, the load shall be increased in incremental steps of 5 percent NFS per hour to failure.
- (c) The percent FS at failure shall be recorded.

4.6.6 Accelerated storage stability. A 150 ml portion of well mixed paint remover shall be poured into each of two clean 473 ml plastic bottles which shall be approximately 180 mm (7 in.) in height and 70 mm (2.8 in.) 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. The other bottle shall be sealed in the same manner and thoroughly shaken for 10 seconds; place in a bath maintained at 60 ± 2 °C (140 ± 4 °F) for 5 hours, then remove and allow to cool to ambient for 19 hours. This heating-cooling cycle shall be repeated 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 thoroughly shaken for 10 seconds, then allowed to remain undisturbed at room temperature for one hour. The bottles shall 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 (2.5 in.) diameter disposable aluminum dish. The dish shall be placed in an air-circulating oven at 49 ± 2 °C (120 ± 4 °F) for 24 hours, then rinsed for one minute under flowing tap water adjusted to 35 ± 2 °C (95 ± 4 °F). A soft horse hair or hog bristle brush with bristles no less than 20.0 mm (0.8 in.) long can 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) container filled with remover furnished for storage stability shall be stored for not less than 12 months at 21 ± 3 °C (70 ± 5 °F). The container shall be constructed of the same material in which the manufacturer intends to supply contract quantities of the remover and have no greater wall thickness than containers proposed for production packaging. After the 12-month storage period, the remover shall be tested for all requirements in section 3, except storage stability (see 3.11) and service test (see 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 with Type I remover shall be either MIL-PRF-23377 topcoated with MIL-PRF-85285, or MIL-PRF-85582 topcoated with MIL-PRF-85285. The finish system on the aircraft to be stripped with Type II remover shall be MIL-PRF-81733, topcoated with MIL-PRF-23377 and MIL-PRF-85285. The remover shall be applied and allowed to act for not less than 6 hours at not less than 21 °C (70 °F). If the remover under test fails to strip effectively, it shall be compared to a product qualified to this 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. The areas completely stripped by the remover under test shall be not less than 90 percent of the area stripped by the comparison

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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. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). In the absence of detailed packaging guidance, military packaging shall be accomplished in accordance with MIL-STD-2073-1. Commercial packaging as described in ASTM-D3951 shall be used when military packaging is not available.

6. NOTES

INFORMATION FOR GUIDANCE ONLY. (This section contains information of a general or explanatory nature that is 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 must 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. Test/inspection reports and certifications required (4.4.1 and 4.4.2.1).
- e. Packaging requirements (see 5.1).
- f. 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 supplier 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 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), and 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.

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6.4 Material Safety Data Sheet (MSDS). The Material Safety Data Sheet (MSDS) for the remover will be prepared in accordance with FED-STD-313 and will conform to 29 CFR 1910.1200. The 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.

6.5 Part identification number (PIN). Part numbers may be coded as follows:

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

^{1/} 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.).

6.6 Subject term (key word) listing.

Aircraft exterior coating removal
Methyl ethyl ketone (MEK)
Stripper

6.7 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensive changes.

Custodians:

Navy - AS

Air Force - 11

Review activities:

Navy - CG

Air Force - 84, 99

CIVIL AGENCY COORDINATING ACTIVITY

GSA - FSS

Preparing activity:

Navy - AS

(Project 8010-0166)

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, and send to preparing activity.
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-2918A

2. DOCUMENT DATE (YYYYMMDD)
20010319

3. DOCUMENT TITLE

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

7. DATE SUBMITTED
(YYYYMMDD)

(2) DSN
(If applicable)

8. PREPARING ACTIVITY

a. NAME
COMMANDER
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION

b. TELEPHONE (Include Area Code)
(1) Commercial (732) 323-2947 (2) DSN 624-2947

c. ADDRESS (Include ZIP Code)
CODE 414100B120-3
HIGHWAY 547
LAKEHURST, NJ 08733-5100

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
Defense Standardization Program Office (DLSC-LM)
8725 John J. Kingman Road, Suite 2533
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Telephone (703) 767-6888 DSN 427-6888