

NOT MEASUREMENT
SENSITIVE

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SUPERSEDING
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PERFORMANCE SPECIFICATION

CLEANING COMPOUND, AIRCRAFT, EXTERIOR

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

1. SCOPE

1.1 Scope. The cleaning compounds covered by this specification are used for cleaning the exterior surface of aircraft.

1.2 Classification. The cleaning compounds covered by this specification are furnished in the following types, as specified (see 6.2):

- Type I - General purpose, aromatic solvent base
- Type Ia - General purpose, aromatic solvent base, aerosol
- Type II - General purpose, non-solvent
- Type IIa - General purpose, non-solvent, aerosol
- Type IV - Rubberized spot cleaner
- Type V - Gel-type wheel well degreaser, low solvent (less than 10%)
- Type Va - Gel-type spot cleaner, low solvent (less than 10%), trigger-spray

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 6850

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

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2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the 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).

SPECIFICATIONS

FEDERAL

- | | | |
|-------------|---|--------------------------------------|
| QQ-A-250/4 | - | Aluminum Alloy 2024, Plate and Sheet |
| QQ-A-250/12 | - | Aluminum Alloy 7075, Plate and Sheet |

DEPARTMENT OF DEFENSE

- | | | |
|----------------|---|---|
| MIL-C-1164 | - | Cloth, Terry, Cotton, Cotton and Polyester |
| MIL-M-3171 | - | Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on |
| MIL-T-9046 | - | Titanium and Titanium Alloy, Sheet, Strip and Plate |
| MIL-G-21164 | - | Grease, Molybdenum Disulfide, for Low and High Temperatures, NATO Code Number G-353 |
| MIL-PRF-23377 | - | Primer Coatings, Epoxy, High Solids |
| MIL-W-81381/11 | - | Wire, Electric, Fluorocarbon/Polyimide Insulated, Medium Weight, Silver Coated Copper Conductor, 600 Volts, Nominal 8, 4 or 15.4 Mil Wall |
| MIL-H-83282 | - | Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, Metric, NATO Code Number H-537 |
| MIL-P-83310 | - | Plastic Sheet, Polycarbonate, Transparent |
| MIL-PRF-85285 | - | Coating, Polyurethane, High-Solids |

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STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data
For Hazardous Materials Furnished To Government Activities

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

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

CODE OF FEDERAL REGULATIONS

29 CFR 1910.1200 - Occupational Safety and Health Standards - Hazard
Communications
40 CFR - Protection of Environment
40 CFR 796.3100 - Aerobic Aquatic Biodegradation

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

NAVAL AIR SYSTEMS COMMAND

NAVAIR 01-1A-509 - Aircraft Weapons Systems Cleaning and Corrosion Control

(This document has limited distribution. Requests for copies by U.S. Government agencies and their contractors shall be made to the Naval Air Systems Command, Code 4.3.4, 1421 Jefferson Davis Highway, Arlington, VA 22234-5034.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are 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).

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | | |
|------------|---|---|
| ASTM-D93 | - | Flash Point by Pensky-Martin Closed Cup Tester, Standard Test Method for (DoD Adopted) |
| ASTM-D95 | - | Water in Petroleum Products and Bituminous Materials by Distillation, Standard Test Method for |
| ASTM-D523 | - | Test Method for Specular Gloss (DoD Adopted) |
| ASTM-D1141 | - | Substitute Ocean Water, Standard Specification for (DoD Adopted) |
| ASTM-D2024 | - | Cloud Point of Nonionic Surfactants, Standard Test Method for (DoD Adopted) |
| ASTM-D3056 | - | Gel Time for Solventless Varnishes, Test Method For (DoD Adopted) |
| ASTM-E70 | - | pH of Aqueous Solutions with the Glass Electrode, Standard Test Method for (DoD Adopted) |
| ASTM-E168 | - | General Techniques of Infrared Quantitative Analysis, Standard Practices For (DoD Adopted) |
| ASTM-F483 | - | Total Immersion Corrosion Test for Aircraft Maintenance Chemicals, Standard Test Method for (DoD Adopted) |
| ASTM-F484 | - | Stress Cracking of Acrylic Plastics in Contact with Liquid or Semi-liquid Compounds, Standard Test Method for (DoD Adopted) |
| ASTM-F485 | - | Effects of Cleaners on Unpainted Aircraft Surfaces, Standard Test Method For |
| ASTM-F502 | - | Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces, Standard Test Method For (DoD Adopted) |
| ASTM-F1110 | - | Sandwich Corrosion Test, Standard Test Method For |
| ASTM-F1111 | - | Corrosion of Low-Embrittling Cadmium Plate by Aircraft Maintenance Chemicals |

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

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

| | | |
|-------------|---|---|
| SAE-AMS4377 | - | Magnesium Alloy, Sheet and Plate -3.0 Al, 1.0 Zn, Cold Rolled, Partially Annealed (DoD Adopted) |
| SAE-AMS5046 | - | Sheet, Strip and Plate, Carbon Steel (SAE 1020 and 1025), Annealed (DoD Adopted) |

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

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

3. REQUIREMENTS

3.1 Qualification. The cleaning compounds furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.4 and 6.3). The control formulations in 4.5 qualify to the requirements of this specification and may be used for comparison purposes. Additionally, the control formulas may be manufactured under a contractor designation and submitted for qualification. Other suitable materials of optional composition can be qualified provided they conform to the requirements in table I. Unless otherwise specified in the test method or table I, testing shall be performed on the neat (as received) compound.

3.2 Product identification and instructions for use. All containers of cleaning compound shall be clearly labeled with the manufacturer's name and product designation, date of manufacture, and pH of the cleaning compound. Instructions for use labels for each container shall be as follows:

3.2.1 Type I.

EXTERIOR AIRCRAFT CLEANER, GENERAL USE, AROMATIC SOLVENT;
MIL-PRF-85570, TYPE I

Directions for use:

Light soils: Mix 1 part cleaner in 14 parts water
Moderate soil: Mix 1 part cleaner in 9 parts water
Heavy soils: Mix 1 part cleaner in 4 parts water

Apply with foam generator (see NAVAIR 01-1A-509, Section 2), spray, sponge, brush or cloth. Scrub, then rinse with fresh water.

3.2.2 Type Ia.

EXTERIOR AIRCRAFT CLEANER, GENERAL USE, AROMATIC SOLVENT,
AEROSOL; MIL-PRF-85570, TYPE Ia

Directions for use: Spray cleaner onto surface to be cleaned.
 Allow up to 3 minutes dwell time.
 Scrub with a brush or rub with a clean cloth.
 Rinse thoroughly with fresh water or wipe dry.

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TABLE I. Performance requirements.

| PROPERTY | REQUIREMENT | TEST METHOD |
|---|--|---|
| Abrasiveness (type IV) | 0.5 increase in gloss, maximum | 4.5.1 |
| Accelerated storage stability | No separation or effect on steel strip, 90 percent original cleaning efficiency, minimum | 4.5.2 |
| Aerosol packaging (types Ia and IIa) Flammability Leakage Net weight of usable product Pressure | No flame extension None 13 oz, minimum 60 psi, maximum | ASTM-D3056 4.5.3.1 4.5.3.2 Suitable gage |
| Appearance | Homogeneous, no foreign matter | Visual |
| Biodegradability (types II, IIa, V, and Va) | 85 percent in 28 days, minimum | 40CFR 796.3100 |
| Cadmium corrosion | No visible corrosion. 0.20 mg/sq. cm/day wt loss, maximum | ASTM-F1111 |
| Cleaning efficiency (types I, Ia, II, IIa, and IV) | 97 percent of control cleaning efficiency, minimum, on hydraulic fluid, grease, and wire rope lubricating oil, with 95 percent confidence | 4.5.4 |
| Cleaning of vertical surfaces (type V) | Complete removal of wire rope lubricating oil, or visually comparable to control | 4.5.5 |
| Cloud point all types (neat) type II (use dilution) | 49 °C (120 °F), minimum 27 °C (80 °F), minimum | ASTM-D2024 |
| Composition | No carcinogens <u>1</u> /, toxic pollutants <u>2</u> /, or ozone depleting substances <u>3</u> / | Manufacturer Certification |
| Consistency type IV type V and Va | 10 to 20 centimeter (cm) flow in 10 seconds 13 to 23 cm flow in 10 seconds | 4.5.6 |
| Flash point, closed cup | 140°F (60°C), minimum | ASTM-D93 |
| Foaming properties (types I and II) | 80 milliliters (ml) of liquid after 6 minutes, maximum | 4.5.7 |
| Infrared spectrogram | Record spectrogram | ASTM-E168 |
| Low temperature stability | No separation | 4.5.8 |
| Material Safety Data Sheet | Properly prepared and complete | FED-STD-313 |
| Non-volatile content | Record value | 4.5.9 |
| pH | 7.0 to 10.0 | ASTM-E70 |

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TABLE I. Performance requirements - Continued.

| PROPERTY | REQUIREMENT | TEST METHOD |
|---|--|---|
| Plastics, effect on Acrylic, type A (types I, Ia, II, IIa, IV) Acrylic, type A (types V, Va) Acrylic, type C Polycarbonate, MIL-P-83310 | No crazing after 8 hours No crazing after 4 hours No crazing after 8 hours No crazing after 2 hours at 2000 psi | ASTM-F484 and 4.5.10 |
| Polyimide insulated wire, effect on | No dielectric leakage, no visual effect greater than that of distilled water | 4.5.11 |
| Rubber content (Type IV) | 10.0 to 15.0 percent by weight | Manufacturer certification |
| Salt-coated surfaces, effect on (use <u>4/</u>) | No non-rinseable film (use dil) | ASTM-F502 and 4.5.12 |
| Sandwich corrosion, Al (neat/use) <u>5/</u> | Rating 1 maximum, or no effect greater than distilled water | ASTM-F1110 |
| Service evaluation (when required) | Satisfactory | 4.5.13 |
| Solvent content, weight percent, maximum types I, Ia, and IV types II and IIa types V and Va | 10.0 % aromatic, 32.0% total solvent 0.0% total solvent 0.0% aromatic, 10.0% total solvent | Calculate from non-volatile and water content |
| Sprayability types Ia and IIa types V and Va | Uniform spray, foam clings to vertical panel for minimum of 60 seconds Uniform spray, clings to vertical panel | Visual |
| Storage stability | No separation or effect on steel strip, 90 percent original cleaning efficiency, min. | 4.5.14 |
| Total immersion corrosion Al <u>6/</u> , Ti <u>7/</u> , Steel <u>8/</u> Mg <u>9/</u> | No visible corrosion, meet wt. Loss 0.04 mg/sq. cm/day wt. loss, max. 0.20 mg/sq. cm/day wt. loss, max. | ASTM-F483 |
| Unit of issue types I, II, IV, and V types Ia and IIa types Va | 5, 15, or 55 gallon container 16 oz pressurized can 16 oz pump spray container | Visual |
| Unpainted surfaces, effect on | No streaks or stains (use dil) | ASTM-F485 |
| Water content | Record value | ASTM-D95 |

1/ as defined by the National Toxicology Program's Annual Report on Carcinogens2/ as defined in 40 CFR 4013/ as defined in 40 CFR 824/ Use dilution shall be as defined in 4.6.35/ Aluminum alloy: QQ-A-250/46/ Aluminum Alloy: QQ-A-250/127/ Titanium: MIL-T-90468/ Steel: alloy 1020, SAE-AMS 50469/ Magnesium alloy: SAE-AMS , Chrome Pickled: MIL-M-3171, Type VI

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3.2.3 Type II.

EXTERIOR AIRCRAFT CLEANER, GENERAL USE, NON-SOLVENT;
MIL-PRF-85570, TYPE II

Directions for use:

Light soils: Mix 1 part cleaner in 14 parts water

Moderate Soil: Mix 1 part cleaner in 9 parts water

Heavy soils: Mix 1 part cleaner in 4 parts water

Apply with foam generator (see NAVAIR 01-1A-509, Section 2), spray, sponge, brush or cloth. Scrub, then rinse with fresh water.

3.2.4 Type IIa.

EXTERIOR AIRCRAFT CLEANER, GENERAL USE, NON-SOLVENT, AEROSOL;
MIL-PRF-85570, TYPE IIa

Directions for use: Spray cleaner onto surface to be cleaned.
 Allow up to 3 minutes dwell time.
 Scrub with a brush or rub with a clean cloth.
 Rinse thoroughly with fresh water or wipe dry.

3.2.5 Type IV.

EXTERIOR AIRCRAFT CLEANER, RUBBERIZED SPOT CLEANER;
MIL-PRF-85570, TYPE IV

Directions for use: Apply full strength with a non-abrasive cleaning pad.
 Allow 1 to 3 minutes dwell time.
 Rub with a circular motion.
 Rinse thoroughly, then dry with a clean cloth.
 Do not allow cleaner to dry on surface.

3.2.6 Type V.

EXTERIOR AIRCRAFT CLEANER, GEL TYPE WHEEL WELL DEGREASER,
NON-SOLVENT; MIL-PRF-85570, TYPE V

Directions for use: Apply full strength with brush or pump spray device.
 Allow 5 minutes dwell time.
 Brush if necessary, then spray with fresh water to rinse.

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3.2.7 Type Va.

EXTERIOR AIRCRAFT CLEANER, GEL TYPE SPOT CLEANER MIL-PRF-85570, TYPE Va

Directions for use: Apply full strength.
 Allow up to 5 minutes dwell time.
 Brush or rub with a cloth, then rinse with fresh water.

4. VERIFICATION

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

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

4.2 Inspection conditions. Standard conditions shall be a temperature of 22 ± 2 °C (72 ± 4 °F) and a relative humidity of 50 ± 20 percent. All tests shall be conducted at standard conditions unless otherwise specified herein.

4.3 Qualification inspection. The qualification inspection shall consist of testing the performance requirements for conformance to table I.

4.3.1 Qualification samples.

4.3.1.1 Laboratory test samples. Each laboratory qualification sample shall consist of two 1-gallon containers of cleaning compound. One gallon of each sample shall be used for the storage stability test. Samples submitted under types Ia, IIa, and Va shall consist of six individual units of issue (see table I). The samples shall be plainly identified by securely attached durable tags or labels marked with the following information:

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Sample for qualification inspection

CLEANING COMPOUND, AIRCRAFT, EXTERIOR

Type

Name of manufacturer

Product code number

Batch or lot number

Date of manufacture

Submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-PRF-85570C.

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4.3.1.2 Service test samples. When the service test is required by the qualifying activity, test samples shall consist of a 5-gallon pail for types I, II, IV, and V, and one case of twelve individual units for types Ia, IIa, and Va. The cleaning compound shall be packaged in containers that afford adequate protection during shipment. Samples shall be forwarded in accordance with instructions contained in the letter authorizing the service test.

4.3.1.3 Other information. The contractor will be required to submit other information pertaining to the qualification sample as required by the qualifying activity (see 6.3.1).

4.4 Conformance inspection. The conformance inspection of the cleaning compound shall consist of all the examinations and tests specified in table II.

4.4.1 Lot formation. A lot shall consist of all the cleaning compound produced by one manufacturer, at one plant, from the same materials, and under essentially the same conditions during a continuous operation not exceeding 24 hours. In the event the process is a batch (see 6.4.1) operation, each batch shall constitute a lot.

TABLE II. Conformance inspection.

| Inspection | Paragraph | |
|--|-----------------------------------|-------------|
| | Requirement | Test method |
| Appearance | Homogeneous | Visual |
| Cadmium corrosion <u>1/</u> | see table I | ASTM-F1111 |
| Cloud point | $\pm 5^{\circ}\text{F}$ <u>2/</u> | ASTM-D2024 |
| Flash point | Table I | ASTM-D93 |
| Non-volatile content | ± 2 percent <u>2/</u> | 4.5.9 |
| pH | ± 0.5 <u>2/</u> | ASTM-E70 |
| Plastics, effect on | see table I | ASTM-F484 |
| Total immersion corrosion ¹ | see table I | ASTM-F483 |
| Water content | ± 2 percent <u>2/</u> | ASTM-D95 |

1/ 24-hour test duration for quality conformance testing

2/ Permitted variance from recorded qualification value

4.4.2 Conformance test samples. Conformance test samples shall be selected in accordance with table III. Unless otherwise specified (see 6.2), two 1-gallon composite samples shall be subjected to the tests specified in table II. The contractor shall submit with each lot a certified test report showing that the lot conforms to the specification.

4.4.2.1 Inspection of materials and components. The contractor is responsible for ensuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified, or if none, in accordance with this specification.

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TABLE III. Conformance samples.

| Lot size (Units) | Sample size (Units) |
|------------------|---------------------|
| Up to 50 | 5 |
| 51 to 500 | 7 |
| 501 to 35,000 | 8 |
| over 35,000 | 11 |

4.4.2.2 Net content. The sample unit for this examination shall be one filled container. The sample size shall be as specified in table III. The lot shall be unacceptable if the average net content per container for all units examined is less than specified.

4.5 Test methods. Tests shall be conducted in accordance with the conditions specified in 4.2. Control formulations for comparison purposes shall be as specified in tables IV through VII.

TABLE IV. Type I control formulation.

| Component | Parts by weight | Supplier (see 6.6) |
|---------------------------------|-----------------|--------------------|
| Igepal CO-630 | 10.0 | Rhone Poulenc |
| Igepal CO-730 | 10.0 | Rhone Poulenc |
| Monamid 150-CW | 5.0 | Mona |
| Dipropylene Glycol Methyl Ether | 10.0 | Fisher |
| Hexylene Glycol | 8.0 | Fisher |
| Solvent G | 10.0 | Union Oil |
| Deionized Water | 43.5 | --- |
| Benzotriazole | 0.5 | Fisher |
| Hostacor 2098 | 2.0 | Hoechst Celanese |
| Morpholine | 1.0 | Fisher |
| Total | 100.0 | |

Directions: Blend first eight components in the order given. Reduce pH to 8.0 with glacial acetic acid. Add Hostacor 2098 and Morpholine. Blend until homogeneous.

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TABLE V. Type II control formulation.

| Component | Parts by weight | Supplier (see 6.6) |
|-----------------|-----------------|--------------------|
| Neodol 91-2.5 | 8.5 | Shell |
| Neodol 91-6 | 18.4 | Shell |
| Monamid 150-CW | 15.0 | Mona |
| Monateric 1000 | 1.0 | Mona |
| Sandocorin 8160 | 0.7 | Clariant |
| Benzotriazole | 0.7 | Fisher |
| Hostacor 2098 | 0.7 | Hoechst Celanese |
| Deionized water | 55.0 | --- |
| Total | 100.0 | |

Directions: Blend components in the order given until homogeneous. Final pH should be in the range of 9.5 to 10.0. Cloud point should be approximately 105 °F when diluted 1:14. Cloud point may be increased by increasing the ratio of Neodol 91-6 to Neodol 2.5.

TABLE VI. Type IV control formulation.

| Component | Parts by weight | Supplier (see 6.6) |
|-----------------------------------|-----------------|--------------------|
| Part A: | | |
| Monamulse 653-C | 7.10 | Mona |
| Monamine 1-76 | 2.70 | Mona |
| Aromatic 150 | 7.50 | Exxon |
| Isopar M | 7.50 | Exxon |
| Diethylene Glycol Butyl Ether | 3.55 | Fisher |
| Decanol | 1.55 | Fisher |
| Part B: | | |
| Trisodium Phosphate Dodecahydrate | 2.7 | Fisher |
| Deionized water | 55.0 | N/A |
| Pluronic F98 | 1.8 | BASF |
| Hycar 1422 | 10.6 | BF Goodrich |
| Total | 100.0 | |

Directions: Blend Part A and Part B separately in the order given. Combine the two and blend until homogeneous. After 48 hours, reduce pH to 9.5 with glacial acetic acid and blend until homogeneous. Consistency may be adjusted to comply with the requirements of table I by adding single drops of decanol to increase viscosity or diethylene glycol butyl ether to decrease viscosity.

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TABLE VII. Type V control formulation.

| Component | Parts by weight | Supplier (see 6.6) |
|-----------------------|-----------------|--------------------|
| Part A: | | |
| Neodol 23-1 | 5.0 | Shell |
| Neodol 91-2.5 | 5.7 | Shell |
| Neodol 91-6 | 10.6 | Shell |
| Neodol 91-8 | 10.7 | Shell |
| Monateric 1000 | 4.9 | Mona |
| Prep-solve <u>1</u> / | 6.7 | Glidco |
| Isopar M | 2.9 | Exxon |
| Dipropylene Glycol | 9.0 | Fisher |
| Benzotriazole | 0.5 | Fisher |
| Part B: | | |
| Sodium Bicarbonate | 1.0 | Fisher |
| Deionized water | 43.0 | --- |
| Total | 100.0 | |

1/ D-limonene with proprietary stabilizer.

Directions: Blend part A and part B separately until homogeneous. Gradually add part B to part A, while blending, until homogeneous. Product may thin slightly in the first 24 hours following preparation. Consistency may be adjusted to conform to the requirements of table I by adding single drops of Neodol 91-2.5 to increase viscosity or dipropylene glycol to decrease viscosity.

4.5.1 Abrasiveness (Type IV only). A heavy duty wear tester (see 6.6, table IX) shall be used for this test. A block fitted with a white cotton terry cloth conforming to MIL-C-1164 shall be inserted in the instrument holder. The combined weight of the block, cloth and holder shall be $1,360 \pm 20$ grams (g). The area of contact with the specimen shall be 1.5 square inches. The cleaner shall be tested using panels conforming to panel B in table VIII. Test panel gloss shall be measured using a 60° calibrated glossmeter (ASTM-D523). The panel shall then be placed on the wear tester. Pour 10 ml of the concentrate onto the last panel and 15 ml onto the terry cloth attached to the cleaning block in the instrument holder. After three minutes, place the terry cloth on the cleaning block in contact with the panel and start the tester. The cleaning block shall travel completely across the panel and return (one cycle) at a speed of 15 to 18 inches per second. After 50 cycles, the test panel shall be removed and rinsed under cold, running tap water and blotted dry with terry cloth. Repeat this procedure four times using the same panel. Each time the procedure is repeated, a new terry cloth and additional cleaning compound shall be used. At the completion of the fifth run, the gloss shall again be measured for conformance to table I. When rinsing the test panel, the paint surface shall be observed for the presence of a water break.

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4.5.2 Accelerated storage stability.

4.5.2.1 Preparation of test sample. A 5 ounce (oz) (41.9 ml) portion of a well-shaken cleaning compound shall be poured into a clean 12 oz (254.9 ml) pressure resistant clear glass bottle approximately 9.5 in. (24.1 cm) in height and 2.5 in. (6.4 cm) in outside diameter (Example: returnable soda bottle). A strip of steel 6 x 0.5 x 0.02 in. (5.2 x 1.27 x 0.05 cm) conforming to SAE-AMS5046 shall be polished with 280-grit silicon carbide paper to remove surface contamination and then cleaned by boiling for one minute in mineral spirits and one minute in isopropyl alcohol. The steel strip shall be placed in the test bottle and the bottle capped. The bottle shall then be inverted to completely coat the steel strip.

4.5.2.2 Procedure. The capped bottle containing the steel strip shall be placed in a hot water bath held at $140 \pm 4^{\circ}\text{F}$ ($60 \pm 2^{\circ}\text{C}$) for 8 hours. The bath and the bottle shall then be allowed to cool for 16 hours and the 24 hour cycle repeated each day for a total of seven days. On the eighth day, the bottle shall be removed from the bath, uncapped, examined for separation, and the steel strip withdrawn and examined for corrosion. The aged sample shall be tested for cleaning efficiency in accordance with 4.5.4 or 4.5.5 as applicable.

4.5.3 Aerosol container (Types Ia and IIa).

4.5.3.1 Leakage. A pressurized container containing the cleaning compound shall be immersed completely for five minutes in water maintained at $140 \pm 4^{\circ}\text{F}$ ($60 \pm 2^{\circ}\text{C}$). The container shall be observed for emission of bubbles or distortion during the test period.

4.5.3.2 Net weight. A pressurized container shall be weighed. The cleaning compound shall be sprayed until the usable product is exhausted. Any remaining propellant shall be permitted to remain in the container. The container shall then be re-weighed and the weight of the usable product calculated.

4.5.4 Cleaning efficiency (Types I, Ia, II, IIa, IV).

4.5.4.1 Panel preparation. Aluminum alloy panels measuring 6 x 2.5 x 0.02 in. (15.2 x 6.4 x 0.05 cm) shall be prepared in accordance with panel B of table VIII. At least three panels shall be used for each product tested and the control formulation. Only those panels having a 60° gloss in the range of 2.0 to 4.0 shall be used. Additionally, all panels used in one run (test vs. control) shall have the same gloss reading measured to within ± 0.1 gloss units by both 60° and 85° gloss. The lightness value (L value in a L-a-b color system) shall be measured using a Colorimeter (illuminant C) or equivalent. Record the initial lightness value as L_i .

4.5.4.2 Soil preparation. Hydraulic fluid soil shall be prepared by blending 50 grams of carbon black (see 6.6.3) and 500 grams of hydraulic fluid conforming to MIL-H-83282 with a high speed Cowles type dispersator for 15 minutes. Molybdenum disulfide grease soil shall be prepared by blending 50 grams of carbon black and 500 grams of grease conforming to MIL-G-21164 with a mechanical grease worker for 15 minutes.

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4.5.4.3 Application of hydraulic fluid and grease soils. Using a soft bristle brush, gently paint the coated surface of a test panel with the test soil. Remove excess hydraulic fluid soil by covering the test panel with folded absorbent tissue and exerting pressure by rolling over the tissue with a five pound rubber cylinder. Repeat this blotting procedure twice. Remove excess grease soil by stroking the test panel with a non-metallic aircraft cleaning and polishing pad five times. Brush each test panel using ten strokes of a hog bristle brush (see 6.6, table IX). Each freshly soiled panel shall be baked at $221 \pm 2^\circ\text{F}$ ($105 \pm 1^\circ\text{C}$) for 60 minutes then cooled to room temperature and used within four hours. Record the soiled lightness value as L_s . The soiled lightness values shall be 20.0 to 25.0.

TABLE VIII. Test panel preparation.

| Panel letter | Step | Material | Number of coats | Thickness per coat, mil | Drying time between coats | Drying time after final coat |
|--------------|------|--|-----------------|-------------------------|---------------------------------|---|
| A | 1 | Primer, coating conforming to MIL-PRF-23377 | | 0.6 - 0.9 | 1-2 hours at room temperature | --- |
| | 2 | MIL-PRF-85285 (Color No. 17875) | mist coat | --- | 15 minutes at room temperature | --- |
| | 3 | MIL-PRF-85285 (Color No. 17875) | wet coat | 1.5 - 2.5 | --- | Air dry one week at room temperature plus one week at 150°F . |
| B | 1 | MIL-PRF-23377 | 1 | 0.6 - 0.9 | 1 - 2 hours at room temperature | --- |
| | 2 | MIL-PRF-85285 (Color No. 36440 or No. 36495) | mist coat | --- | 15 minutes at room temperature | --- |
| | 3 | MIL-PRF-85285 (Color No. 36440 or No. 36495) | wet coat | 1.5 - 2.5 | --- | Air dry one week at room temperature plus one week at 150°F . |

4.5.4.4 Application of wire rope lubricant. Spray wire rope lubricant onto a test panel and immediately wipe back and forth using a piece of 3/8 inch (1 cm) thick MIL-C-83957 cleaning pad to achieve a uniform soil in the center of the panel. Bake the soiled test panels at $221 \pm 2^\circ\text{F}$ ($105 \pm 1^\circ\text{C}$) for 60 minutes then cool to room temperature.

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4.5.4.5 Preparation of stock solution. A 10-grain hard water stock solution shall be prepared by dissolving 0.20 ± 0.005 grams of analytical reagent grade calcium acetate monohydrate and 0.14 ± 0.005 gram of analytical reagent grade magnesium sulfate heptahydrate in one liter of distilled water.

4.5.4.6 Cleaning. The test panel shall be cleaned using a heavy duty wear tester (see 6.6, table IX), fitted with a cellulose sponge (see 6.6). The sponge shall be cut such that the dimension parallel to the cleaning stroke is 3.5 inches (9 cm) and the width is 2.75 inches (7 cm). The cleaning head with the dry sponge attached shall be weighed to a mass of 600 ± 10 grams. Type I cleaning compound shall be prepared by diluting 1 part cleaner with 9 parts 10-grain hard water (4.5.4.5). Type II cleaning compound shall be prepared by diluting 1 part cleaner with 14 parts 10-grain water (4.5.4.5). Types Ia, IIa, and IV cleaning compounds shall be tested as received. After placing a soiled test panel in the template at +45 degrees (see figure 1), the cleaning solution shall be applied to the sponge then applied to the soiled test panel so that it is completely covered. After allowing a 30-second dwell time, the test panel shall be cleaned using 5 cycles of the wear tester, then turned 90 degrees and cleaned for an additional 5 cycles. The panel shall then be rinsed under cold running tap water and allowed to dry. Record the cleaned gloss value as L_c .

4.5.4.7 Evaluation. The percent cleaning efficiency for each panel shall be determined as follows:

$$CE = \frac{L_c - L_s}{L_i - L_s}$$

where: CE = Cleaning Efficiency
 L_i = Initial lightness
 L_c = Cleaned lightness
 L_s = Soiled lightness

The average of the three panels tested shall be reported.

4.5.5 Cleaning efficiency on vertical surfaces (types V and Va only)

4.5.5.1 Panel preparation. Panel shall be at least 5 by 16 inches (12 by 40 cm) in size and prepared as in panel A, table VIII. Spray wire rope lubricant (Sprayon No. 201, or equivalent) onto an aluminum test panel. Immediately wipe back and forth using a 3/8-inch nonmetallic aircraft cleaning and polishing pad to achieve a uniform soil. Allow the soil to dry at room temperature for a minimum of 15 minutes.

4.5.5.2 Cleaning. Position the soiled test panel such that the short dimension is vertical and the long dimension is horizontal. Apply the product to the panel using a pump spray applicator,

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(Type Va, use existing packaging as supplied). After 5 minutes, rinse the test panel by spraying with distilled water using the same pump spray device.

4.5.6 Consistency (types IV, V, and Va). A consistometer (see 6.6, table IX) shall be used as follows: Shake the container of cleaning compound by hand for 10 seconds. Fill the well of the consistometer completely with the material. Release the gate and determine the extent of flow in 10 seconds.

4.5.7 Foaming properties (Types I and II). For type I, mix one part of undiluted compound with 9 parts 10 grain hard water (see 4.5.4.5); for type II, mix one part of undiluted compound with 14 parts hard water. Place 100 ml of this mixture mixed in a blender (500 ml capacity with a 3.15 inch (95 millimeters (mm)) maximum outside diameter) for 2 minutes at $8,000 \pm 1,000$ revolutions per minute (rpm). After completion of the 2 minute mix, turn the blender off and allow the mixture to stand undisturbed for 6 minutes. The compound shall be observed for conformance to table I.

4.5.8 Low temperature stability. Approximately 50 ml of the cleaning compound shall be poured into a test tube of suitable size and cooled to $0 \pm 9^{\circ}\text{F}$ ($-18 \pm 5^{\circ}\text{C}$) in a cold box. The sample shall be held at this temperature for one hour. The sample shall then be removed from the cold box and the temperature allowed to rise to room temperature. Invert the test tube five times and examine the content for homogeneity.

4.5.9 Nonvolatile content. Place approximately 0.5 grams of product into each of three weighing dishes and record the weight of each to within ± 0.1 milligram (mg). Place the dishes in a forced draft oven for 1 hour at $38 \pm 2^{\circ}\text{C}$ ($100 \pm 4^{\circ}\text{F}$). Cool the dishes to room temperature in a dessicator and reweigh to determine the percent nonvolatiles.

4.5.10 Plastics, effect on. Cleaning compound shall be tested in accordance with ASTM-F484 as follows:

types I, II, IV, V, and Va- Diluted 1:1 with distilled water
types Ia and IIa - As received

4.5.11 Polyimide insulated wire, effect on. Approximately 24 in. (61 cm) of wire conforming to MIL-W-81381/11 shall be formed into a coil. Place the coil in a 4 ounce (118 ml) wide mouth jar. Add to the jar sufficient concentrated cleaning compound to completely cover the coil of wire. Cap the jar and store it at room temperature for 14 days. Repeat this procedure using distilled water as the test medium. At the end of the storage period, remove the coil and rinse thoroughly with tap water at room temperature. Suspend the coil and allow it to drain until completely dry. Each wire shall be wrapped tightly around a 0.125 inch (3 cm) mandrel and unwrapped slowly, noting the appearance and number of any cracks in the insulation. If the wire is acceptable, it shall be immersed in a 5percent by weight sodium chloride solution and subjected to a one minute dielectric test of 2,500 volts root mean square (rms).

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4.5.12 Salt-coated surfaces, effect on. Test shall be conducted in accordance with ASTM-F502, with the addition that panels shall be sprayed with ASTM-D1141 synthetic ocean water and dried in a $70 \pm 4^{\circ}\text{F}$ ($38 \pm 2^{\circ}\text{C}$) convection oven prior to testing.

4.5.13 Service evaluation. The service evaluation tests, performed by an activity designated by the qualifying activity, shall consist of cleaning of two or more aircraft under actual service conditions. Test results shall be compared to the results obtained with the control formula.

4.5.14 Storage stability. A steel strip conforming to SAE-AMS5046 shall be added to the one gallon container of cleaning compound furnished for storage stability. The total surface area of the steel strip shall be $6 \pm 0.5 \text{ inch}^2$ (30.7 cm^2). The sample shall be stored for 6 months at $70 \pm 5^{\circ}\text{F}$ ($21 \pm 3^{\circ}\text{C}$). After the 6 month storage period, the sample shall be tested for cleaning efficiency and examined for evidence of separation, crystallization, deterioration, corrosion of the steel strip, container incompatibility, distortion, leakage, or container corrosion.

5. PACKAGING

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

6. NOTES

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

6.1 Intended use. The cleaning compound is intended for use in cleaning painted and unpainted aircraft surfaces. Type I may be used in general cleaning of aircraft, provided that local regulations do not limit the use of aromatic solvents or volatile organic compounds. Type II may be used in general cleaning of aircraft, for both high gloss and camouflage paint systems. Types Ia and IIa are the use-diluted forms of types I and II, respectively, packaged in an aerosol container for use in spot cleaning. Type IV is for use on low gloss tactical paint scheme coatings to clean stubborn areas such as boot marks and smudges as well as gun blast and exhaust track soil. Type V can be used in wheel wells, wing butts, and other areas where complete rinsing with water can be tolerated. Type Va is the Type V cleaner packaged in a pump-spray bottle, intended for use in spot cleaning to clean stubborn areas on the aircraft.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type of cleaning compound required (see 1.2)
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- d. Quantity of cleaning compound desired.
- e. Unit of issue required (see 3.19).
- f. Packaging requirements (see 5.1).
- g. Conformance test sample size, if different from 4.4.2.

6.2.1 Unit of purchase. The unit of purchase for the cleaning compound is the U.S. gallon. A U.S. gallon of liquid occupies 231 cubic inches (3.785 liters) at 15.6 °C (60 °F).

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-85570) 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 Naval Air Warfare Center Aircraft Division, Attn.: Code 4.3.4.1 Building 2188, 22347 Cedar Point Road, Unit 6, Patuxent River MD 20670-1161.

6.3.1 Inspection report and other data. When authorizing the forwarding of qualification samples, the qualifying activity will request the contractor to submit along with the qualification sample a satisfactory Material Safety Data Sheet in accordance with FED-STD-313 and 29 CFR 1910.1200 and a report that includes the following information:

- a. The results of tests performed by the manufacturer.
- b. Toxicological data necessary to evaluate the safety of the compound.
- c. Weight percent of aromatic solvents, total organic solvents, water, and rubber (for type IV).
- d. Aerosol container construction and packaging company where applicable.

6.4 Definitions.

6.4.1 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process and subjected to some physical mixing operation intended to make the final product substantially uniform.

6.4.2 Solvent. A solvent is defined as an organic liquid having a vapor pressure of greater than 0.1 mm Hg at 25 °C.

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6.4.3 Use dilution. Use dilution is defined as the product diluted with distilled water 1:9 for Type I, 1:14 for Type II, and the product as received (neat) for all other types.

6.5 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent government mailing addresses for submission of data are listed in Appendix B of FED-STD-313.

6.6 Supplier information.

TABLE IX. Item supplier information.

| Item | Identification | Supplier | Location |
|-------------------|----------------|--------------------|-------------------|
| Hog bristle brush | Cat No. WG0006 | Pacific Scientific | Bethesda, MS |
| Optical Sensor | D25A | Hunter | Reston, VA |
| Cellulose sponge | Cat No. 63 | 3M | Minneapolis, MN |
| Consistometer | Cat. No. 24925 | Central Scientific | Chicago, IL |
| Glossmeter | Novo-Gloss | Paul M. Gardner | Pompano Beach, FL |

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TABLE X. Chemical supplier information.

| Component | Supplier | Address |
|--|--------------------------------------|--|
| Igepal | GAF/International Specialty Products | 1361 Alps Road Wayne, NJ 07470 201-628-4000 |
| Monamid Monateric Monamine Monamulse | Mona Industries | 76 E. 24th Street, P.O. Box 425 Paterson, NJ 07544 201-345-8220 |
| Dipropylene glycol methyl ether Diethylene glycol butyl ether Trisodium phosphate dodecahydrate Hexylene glycol Benzotriazole Morpholine Sodium Bicarbonate | Fisher Scientific | 711 Forbes Avenue Pittsburgh, PA 15219-4785 800-766-7000 |
| Solvent G | Unocal | 1201 West 5th Street Los Angeles, CA 92799-5376 213-666-7179 |
| Neodol | Shell Chemical Co. | P.O. Box 2463, 1 Shell Plaza Houston, TX 77252 713-241-0981 |
| Sandocorin 8160 | Clariant | 400 Monroe Road Charlotte, NC 28205 704-331-7000 |
| Aromatic 150 Isopar M | Exxon Chemical Co. | PO Box 4321 Houston, TX 77210-4321 713-460-6800 |
| Pluronic F98 | BASF | 100 Cherry Hill Road Parsippany, NJ 07054 201-316-3000 |
| Pylam LX-6545 | Pylam Products | 1001 Stewart Avenue Garden City, NY 11530 516-222-1750 |
| Hycar 1422 | BF Goodrich | 9911 Brecksville Road Brecksville, OH 44141 800-337-1144 |
| Prep-solve | Glidco Organics | PO Box 389 Jacksonville, FL 32201 800-231-3728 |
| Hostacor 2098 | Hoechst-Celanese | 5200-77 Center Drive, Suite 220 Charlotte, NC 28217 800-255-6189 |

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6.7 Cross reference.

6.7.1..Additions to MIL-PRF-85570C.

Type IIa - An aerosol mixture of type II cleaning compound has been added to this revision.

Type Va - A pump spray mixture of type V cleaning compound has been added to this revision.

6.7.2 Deletions from MIL-PRF-85570C.

Type III - An abrasive cleaning compound for high gloss paint surfaces is no longer included in this specification

6.8 Subject term (key word) listing.

Aerosol
Degreaser
Gel
Hazardous air pollutant
Pump dispenser
Solvent
Volatile organic compound

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

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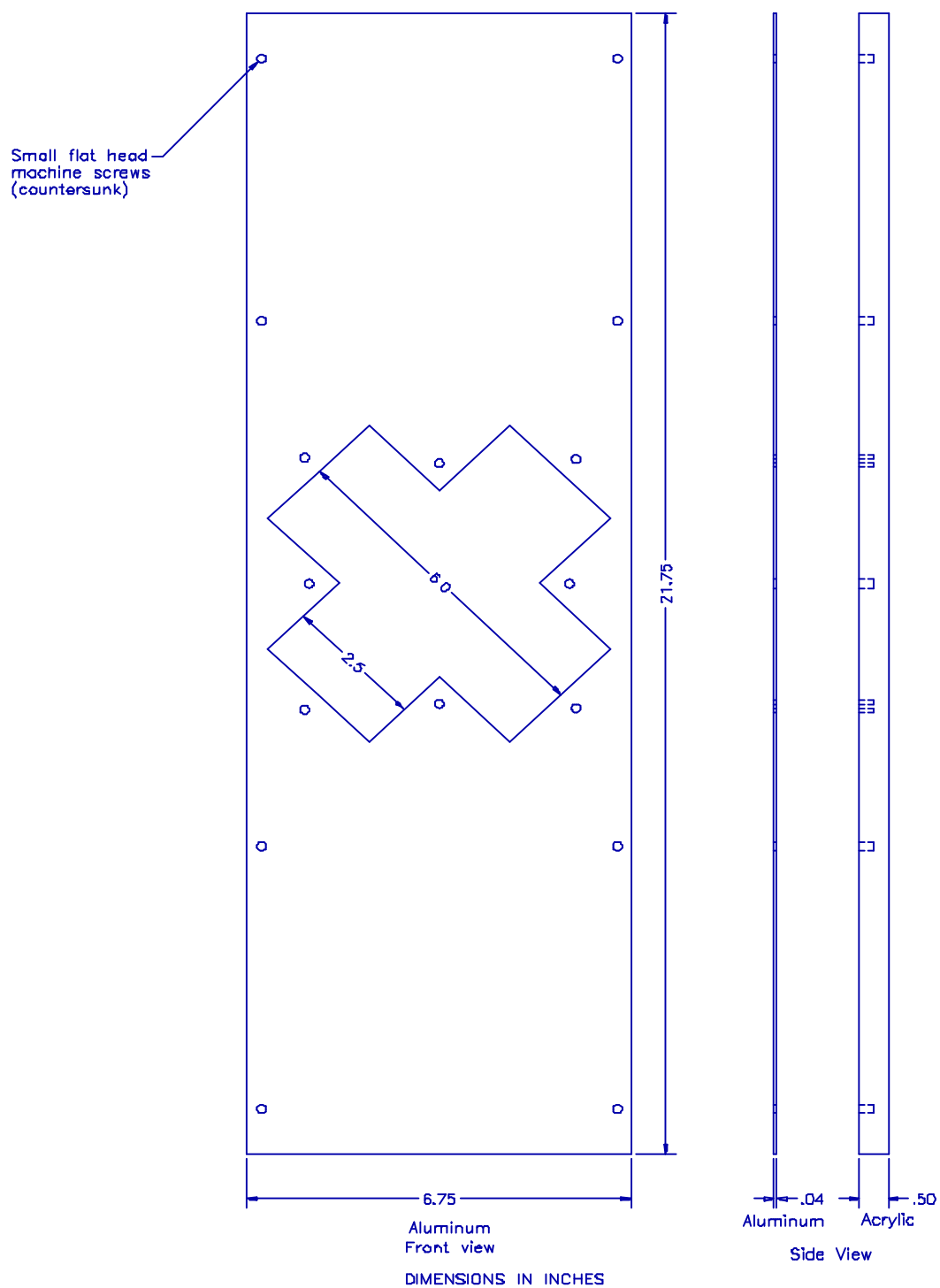


FIGURE 1. Template.

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CONCLUDING MATERIAL:

Custodians:

Navy - AS

Air Force - 68

Preparing activity:

Navy - AS

(Project 6850-1186)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.
NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-85570C

2. DOCUMENT DATE (YYMMDD)
970611

3. DOCUMENT TITLE

CLEANING COMPOUND, AIRCRAFT, EXTERIOR

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) 323-1281 (2) DSN 624-1281

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 Quality and Standardization Office, 5203 Leesburg Pike,
Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 DSN 289-2340

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