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SUPERSEDING
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27 December 1984

MILITARY SPECIFICATION

CLEANING COMPOUND, TURBINE ENGINE GAS PATH

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

1. SCOPE

1.1 Scope. This specification establishes the requirements for a turbine engine gas path cleaning compound to be used in installed aircraft turbine engines during a starter crank operation.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

| | |
|-------------|---|
| QQ-A-250/4 | Aluminum Alloy 2024, Plate and Sheet |
| QQ-A-250/5 | Aluminum Alloy Alclad 2024, Plate and Sheet |
| QQ-A-250/11 | Aluminum Alloy 6061, Plate and Sheet |
| QQ-A-250/12 | Aluminum Alloy 7075, Plate and Sheet |
| QQ-A-250/13 | Aluminum Alloy Alclad 7075, Plate and Sheet |

| |
|---|
| Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter. |
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AMSC N/A

FSC 6850

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

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SPECIFICATIONS (continued)

FEDERAL (continued)

| | |
|-----------|--|
| QQ-M-44 | Magnesium Alloy, Plate and Sheet (AZ31B) |
| QQ-P-416 | Plating, Cadmium (Electrodeposited) |
| QQ-S-766 | Steel Plates, Sheet and Strip - Corrosion Resisting |
| TT-L-32 | Lacquer, Cellulose Nitrate, Gloss, For Aircraft Use |
| PPP-D-705 | Drum, Shipping and Storage, Steel, 16 and 30 Gallon Capacity |
| PPP-D-729 | Drums, Shipping and Storage, Steel, 55 Gallon (208 liters) |
| PPP-P-704 | Pail, Metal (Shipping, Steel, 1 thru 12 Gallon) |

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| | |
|-------------|---|
| 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-G-9954 | Glass Beads, For Cleaning and Peening |
| MIL-C-22750 | Coating, Epoxy, Polyamide |
| MIL-L-23699 | Lubricating Oil, Aircraft Turbine Engines, Synthetic Base |
| MIL-C-81751 | Coating, Metallic, Ceramic |
| MIL-C-83286 | Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications |

STANDARDS

FEDERAL

| | |
|-------------|--|
| FED-STD-313 | Material Safety Data Sheets, Preparation and Submission of |
|-------------|--|

MILITARY

| | |
|-------------|---|
| MIL-STD-105 | Sampling Procedures and Tables for Inspection by Attributes |
| MIL-STD-129 | Marking for Shipment and Storage |
| MIL-STD-147 | Palletized Unit Loads |

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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.

CODE OF FEDERAL REGULATIONS

49 CFR 100-199 - Regulations for the Transportation of Explosive and Other Dangerous Articles.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20370.)

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

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

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight Traffic Association, Tariff Order Section, 1616 P Street, N.W. Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification Rules

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | |
|-------------|--|
| ASTM D 93 | Flash Point by Pensky-Martens Closed Tester |
| ASTM D 95 | Water in Petroleum Products and Bituminous Materials by Distillation |
| ASTM D 445 | Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity) |
| ASTM D 1141 | Substitute Ocean Water |
| ASTM D 2240 | Rubber Property - Durometer Hardness |
| ASTM D 2834 | Non Volatile Matter (Total Solids) in Water Emulsion Floor Polishes, Solvent-Based Floor Polishes, and Polymer Emulsion Floor Polishes |

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| | |
|------------|---|
| ASTM E 70 | pH of Aqueous Solutions with the Glass Electrode |
| ASTM E 203 | Water Using Karl Fischer Reagent |
| ASTM F 483 | Total Immersion Corrosion Test for Aircraft Maintenance Chemicals |
| ASTM F 484 | Stress Cracking of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds |
| ASTM F 502 | Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces |

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

SOCIETY FOR AUTOMOTIVE ENGINEERS

Aerospace Material Specifications

| | |
|----------|--|
| AMS 2416 | Plating, Nickel-Cadmium, Diffused |
| AMS 5510 | Sheet, Strip and Plate, 18Cr 10.5Ni 0.40Ti, Solution Heat Treated |
| AMS 5536 | Sheet, Strip and Plate, 47.5Ni(eye) 22Cr 1.5 Co 9.0Mo 0.60W 18.5Fe |

Aerospace Recommended Practices

| | |
|----------|---|
| ARP 1795 | Stress Corrosion of Titanium Alloys, Effect of Cleaning Agents on Aircraft Engine Materials |
|----------|---|

(Application for copies should be addressed to the Customer Service Department, Publications Group, SAE, 400 Commonwealth Drive, Warrendale, PA 15096.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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

3. REQUIREMENTS

3.1 Qualification. Cleaning compounds furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3).

3.2 Toxicity. The cleaning compound shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to

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this effect shall be referred by the contracting activity to the appropriate medical service who will act as advisor to the contracting agency (see 4.3.2).

3.3 Composition. The composition of the cleaning compound shall be optional with the supplier but shall conform to the requirements specified herein.

3.3.1 Compositional assurance. The cleaning compound shall be tested for water content and non-volatile content as specified in 4.5. The values shall be recorded, along with an infrared spectrogram of the non-volatile material for use in quality conformance inspection. Quality conformance inspection results shall not differ from the recorded values by more than ± 1.5 percentage points for water content or by ± 1.0 percentage points for non-volatile matter. There shall be no significant difference in spectrograms when run by the qualifying laboratory. Infrared spectrograms shall be recorded by the qualifying laboratory at the request of inspecting official (see 4.4.3).

3.3.2 Elemental content. The elemental content of the cleaning compound shall not exceed the concentrations specified in Table I, when tested as specified in 4.5.1.

3.3.3 Phenolic content. The cleaning compound shall contain no phenol or cresol.

3.3.4 Insoluble matter. The insoluble matter content of the cleaning compound shall be less than 0.1 percent by weight, as determined in 4.5.2.

3.3.5 Ash content. The ash content of the cleaning compound shall be less than 0.05 percent by weight as determined in 4.5.3.

3.4 pH. When diluted to 20 volume percent with distilled water, the pH of the cleaner solution shall be greater than 7.5 and less than 9.5, as determined in 4.5.

3.5 Flashpoint. The Pensky-Martens flash point of the cleaning compound shall be greater than 60°C (140°F), when tested as specified in 4.5.

3.6 Viscosity. The kinematic viscosity of the cleaning compound shall be greater than 15 and less than 25 centistokes at 26.7°C (80°F), when tested with a Cannon-Fenske viscometer as specified in 4.5.

3.7 Cleaning efficiency. The cleaning compound shall remove at least 85 percent of the soil when tested as specified in 4.5.4.

3.8 Corrosivity.

3.8.1 Total immersion corrosion. The diluted cleaning compound shall not cause any visual corrosion nor an average weight change of any specimen greater than that shown in Table II, when tested in accordance with 4.5 and 4.5.5.

3.8.2 Hot corrosion. The diluted cleaning compound shall produce no visual corrosion and no significant localized microscopic corrosion (maximum permissible depth of attack is 0.0076mm (0.0003 inches) when examined at 250x magnification, after the exposure specified in 4.5.6.

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3.8.3 Titanium stress corrosion. The diluted cleaning compound shall not produce any microscopic cracking when tested and examined at 250x magnification, as specified in 4.5.

3.8.4 Sandwich corrosion. The diluted cleaning compound shall not cause a corrosion rating greater than 1, when tested as specified in 4.5.7.

3.9 Effect on polymeric materials.

3.9.1 Effect on painted surfaces. The diluted cleaning compound shall not decrease the hardness of paint finishes by more than 2 pencil hardness values, when tested as specified in 4.5 and 4.5.8.

3.9.2 Effect on silicone elastomers. The diluted cleaning compound shall not change the durometer hardness of the elastomers by more than the amount shown in Table III after testing as specified in 4.5.9.

3.9.3 Effect on epoxy adhesives. The diluted cleaning compound shall not decrease the pencil hardness of adhesive films by more than the amount shown in Table IV when tested as specified in 4.5.10.

3.9.4 Stress crazing of acrylics. The diluted cleaning compound shall cause no crazing or cracking of stressed acrylic plastic, when tested as specified in 4.5.

3.10 Emulsibility. The cleaning compound, when mixed with water, shall form a homogeneous emulsion and shall not separate, when tested as specified in 4.5.11.

3.11 Rinsability. When applied to a salt-coated surface, the cleaning compound shall rinse clean leaving no visible non-rinsable film, when tested as specified in 4.5.12.

3.12 Hard water stability. When diluted with synthetic hard water, the cleaning compound solution shall exhibit no separation, when tested as specified in 4.5.13.

3.13 Salt water stability. The diluted cleaning compound shall exhibit no separation, when tested as specified in 4.5.14.

3.14 Acid stability. The diluted cleaning compound shall exhibit no separation, when tested as specified in 4.5.15.

3.15 Accelerated storage stability. The cleaning compound shall show no marked color change, shall not separate, and shall not corrode or stain the steel specimen, when tested as specified in 4.5.16.

3.16 Low temperature stability. The cleaning compound shall not solidify or crystallize at -12°C ($+10^{\circ}\text{F}$) nor shall it separate upon warming to room temperature from -26°C (-15°F) when tested as specified in 4.5.17.

3.17 Storage stability. The cleaning compound shall perform satisfactorily when subjected to the evaluations specified in 4.5.18.

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3.18 Service test. The service test shall be initiated upon completion of all laboratory tests (see 4.3.1.1). The cleaning compound shall improve the performance of dirty aircraft gas turbine engines when subjected to field evaluation, as specified in 4.5.19.

3.19 Workmanship. When examined visually at room temperature, the cleaning compound shall be a homogeneous liquid free of foreign matter. A faint turbidity shall not be cause for rejection.

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 as specified herein. Except as otherwise specified in the contract or purchase order, 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 assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in the quality conformance does not authorized submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

- a. Qualification inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.2.1 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the test method document or the applicable paragraph of this specification.

4.3 Qualification inspection. The qualification inspection shall consist of all tests specified in Table V.

4.3.1 Qualification sample.

4.3.1.1 Laboratory test sample. The laboratory test samples shall consist of three-four liter (one-gallon) glass containers of cleaning compound. Samples shall be identified as follows and forwarded to the Naval Air Development Center

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(Code 60622), Warminster, PA 18974 (qualifying activity) as designated in the letter of authorization (see 6.3):

Cleaning Compound, Turbine Engine Gas Path
 Qualification test samples
 Specification MIL-C-85704A
 Manufacturer's name and product number
 Submitted by (name and date) for qualification
 testing in accordance with authorization
 (reference authorizing letter)

4.3.1.2 Service test samples. Service test samples shall be packaged in steel drums conforming to PPP-D-705. Samples shall be forwarded in accordance with instructions contained in the authorizing letter granting service test, which will be sent to the manufacturer on satisfactory completion of all laboratory tests. In addition to the identification in 4.3.1.1, each drum shall be labeled in 2-inch bold lettering with the manufacturer's name and the words: QUALIFICATION SAMPLE: CLEANING COMPOUND, TURBINE ENGINE GAS PATH

4.3.2 Manufacturer's data. The manufacturer shall furnish two copies of the qualification inspection report. Included with the report shall be:

- a. Certification showing the material conforms to 3.3.2 (elemental content) and 3.3.3 (phenolic content) in lieu of actual test data.
- b. Material safety data sheets prepared in accordance with FED-STD-313.

4.3.3 Retention of qualification. In order to retain qualification of a product approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The Government reserves the right to re-examine 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 Lot formation. A lot shall consist of all the cleaning compound produced by one supplier, at one plant, from the same materials, under essentially the same manufacturing conditions provided the operation does not exceed 24 hours. When the process is considered a batch operation, each batch shall constitute a lot.

4.4.2 Sampling and inspection.

4.4.2.1 Visual inspection. A random sample of filled containers, prior to closure, shall be selected from each lot in accordance with Inspection Level I and Acceptable Quality Level (AQL) of 2.5 defects per hundred units, of MIL-STD-105. The sample unit shall be one filled container. Inspection shall be in accordance with Table VI.

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4.4.2.2 Physical property inspection. Two containers shall be randomly selected from each lot and tested to the requirements specified in Table VII. The samples selected shall be thoroughly mixed prior to testing. Failure of the material to conform with any requirement specified in Table VII shall be cause to reject the entire inspection lot.

4.4.2.3 Packaging inspection.

4.4.2.3.1 Examination for packaging and marking. An examination shall be made to determine that packaging and marking comply with the requirements of Section 5 of this specification. Defects shall be scored in accordance with Table VIII. The sample unit for this examination shall be one shipping container fully prepared for delivery except that it shall not be palletized and need not be sealed. Shipping containers fully prepared for delivery that have not been palletized shall be examined for closure defects. The lot size shall be the number of shipping containers in the end item inspection lot. The samples for this examination shall be selected at random in accordance with MIL-STD-105, inspection level S-2 and an acceptable quality level (AQL) of 4.0 defects per hundred units.

4.4.2.3.2 Examination for palletization. An examination shall be made to determine that palletization complies with the requirements of Section 5 of this specification. Defects shall be scored in accordance with Table IX. The sample unit shall be one palletized unit load fully prepared for delivery. The lot size shall be the number of palletized unit loads in the end item inspection lot. The samples for this examination shall be selected at random in accordance with MIL-STD-105, inspection level S-1 and an acceptable quality level (AQL) of 6.5 defects per hundred units.

4.4.3 Rejection and retest. Failure to meet any quality conformance test shall result in rejection of the batch represented and may constitute sufficient justification for removal of the product from the Qualified Products List. Rejected material shall not be resubmitted for acceptance without prior approval from the Naval Air Development Center Code 6062. 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 as in 4.4.2 and forwarded to the qualifying activity for evaluation to include an IR spectrogram of non-volatile matter.

4.5 Test methods. The tests of this specification shall be conducted in accordance with the Test Methods in Table X and paragraphs 4.5.1 through 4.5.19.

4.5.1 Elemental content. Elemental content shall be determined using the following methods:

| <u>Element</u> | <u>Method</u> |
|--------------------|--|
| Sulfur, Phosphorus | Inductively Coupled Plasma Spectroscopy - Atomic Emission Spectroscopy (ICP-AES) |
| Chlorine | Microcoulometric filtration |
| Sodium, Potassium | Atomic Absorption (AA) |
| Other metals | ICP-AES or AA |

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Solution for analysis by inductively-coupled plasma and atomic absorption shall be a 10% by weight dilution of cleaning compound in distilled water. Solution for analysis by microcoulometry shall be a 10% by weight dilution of cleaning compound in reagent grade ethanol. Procedures shall be in accordance with recognized analytical practice. Results shall be calculated in parts per million of undiluted cleaning compound and shall conform to 3.3.2.

4.5.2 Insoluble matter. The undiluted test sample, after having been stored undisturbed for at least one week, shall be thoroughly agitated and two 100 gram (g) samples withdrawn and weighed to the nearest gram. The insoluble matter shall be collected with the aid of a vacuum filtering apparatus capable of producing 200 - 250 mm of vacuum (water tap filter pump), a 250 ml filter flask, a 4.25 cm Buchner funnel and two pieces of filter paper (Whatman no. 1 or equivalent). Two filter papers for each determination shall be dried at $60^{\circ} \pm 2^{\circ}\text{C}$ ($140^{\circ} \pm 4^{\circ}\text{F}$) for 30 minutes and cooled in a desiccator and then weighed to the nearest milligram (mg). Two filter papers shall be placed in the Buchner funnel, the vacuum started and the test sample filtered. The sides of the sample container shall be rinsed with 25 ml of the filtrate and the rinse mixture transferred to the funnel. The sides of the funnel shall be rinsed with an additional 25 ml of the filtrate and liquid filtered. The vacuum shall be maintained for an additional five minutes. The filter papers shall then be dried for one hour at $60^{\circ} \pm 2^{\circ}\text{C}$ ($140^{\circ} \pm 4^{\circ}\text{F}$) and cooled in a desiccator and weighed to the nearest 1 mg. The percent insolubles shall be calculated as follows:

$$\text{Percent insolubles} = \frac{A_2 - (B_2/B_1)A_1}{\text{Weight of sample}} \times 100$$

where:

A_1 = initial weight of top filter paper.

B_1 = initial weight of bottom filter paper.

A_2 = final weight of top filter paper.

B_2 = final weight of bottom filter paper.

4.5.3 Ash content. Approximately 10 g of cleaning compound shall be weighed to the nearest 0.1 mg in a tared porcelain crucible. The crucible shall be heated at $105^{\circ} \pm 1^{\circ}\text{C}$ ($221^{\circ} \pm 2^{\circ}\text{F}$) for 24 hours, then heated at $240^{\circ} \pm 2^{\circ}\text{C}$ ($464^{\circ} \pm 4^{\circ}\text{F}$) for the next 24 hours. Following this, the crucible and its contents shall be carefully ignited over a bunsen type gas burner. The crucible shall then be placed in a muffle furnace at 1040°C (1900°F) for 2 hours. The crucible shall be transferred to a desiccator, cooled, and weighed until constant weight. The ash content shall be calculated as the percentage of the initial weight of cleaning compound.

4.5.4 Cleaning efficiency.

4.5.4.1 Test panels and apparatus. Test panels shall be 150 mm (6-inch) diameter 2024-T3 (QQ-A-250/4) bare aluminum alloy disks of 0.51 mm (0.020 inch) thickness scribed with a 95 mm (3.75 inch) circle centered on the panel. The cleaning apparatus shall be capable of rotating these panels vertically at 220 rpm in front of a nozzle perpendicular to the panel which travels back and forth

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across the scribed area nine times per minute. The nozzle tip shall remain 83.8 ± 2.5 mm (3.3 ± 0.1 inches) from the test panel through the cleaning and rinsing cycles (see figure 1).

4.5.4.2 Soil. 500 g of MIL-L-23699 lubricating oils shall be mixed with 50 grams of Raven 1040 carbon black (Columbia Carbon Company or equal) in a one liter (quart), wide-mouth jar. The jar shall be placed in an oven at $240^\circ \pm 5^\circ\text{C}$ ($464^\circ \pm 10^\circ\text{F}$). A 6.35 mm (0.25 inch) I.D. glass tube connected to a metered air supply shall be inserted into the mixture with an air flow of 8.5 ± 0.5 cubic centimeters per second. The mixture, shall be heated at $240^\circ \pm 5^\circ\text{C}$ ($464^\circ \pm 10^\circ\text{F}$), with aeration for 120 hours, then cooled to room temperature and mixed until homogeneous.

4.5.4.3 Panel preparation. The test panels shall be abraded with a Scotchbrite fine abrasive mat (3M Company), or equivalent, wiped with clean tissue soaked in reagent grade toluene followed with isopropanol, then dried to constant weight. Record the weight to the nearest 0.1 mg. Apply approximately 240 mg of soil by brush to cover the scribed area uniformly and bake at $232^\circ \pm 3^\circ\text{C}$ ($455^\circ \pm 7^\circ\text{F}$) for 20 ± 0.2 minutes. Cool the panels and weigh to the nearest 0.1 milligram. Use only panels with more than 135 mg and less than 165 mg of soil.

4.5.4.4 Test procedure. Prepare 1000 ml of a 20 volume percent cleaning solution and aspirate it through the nozzle (with an air pressure of 10.0 ± 0.3 psig) onto the rotating soiled panel. Adjust the flow of cleaning solution to 100 ± 10 ml per minute. Rinse the test panel with 100 milliliters of distilled water applied in the same manner. The rinsed panel shall be heated to $105^\circ \pm 5^\circ\text{C}$ ($221^\circ \pm 10^\circ\text{F}$) for 10 minutes, cooled to room temperature, then weighed to the nearest 0.1 mg. Calculate the cleaning efficiency as follows:

$$\%C.E. = \frac{A - B}{A - C} \times 100$$

where:

A = weight of the soiled panel before cleaning

B = weight of the soiled panel after cleaning

C = weight of the unsoiled panel

Report the cleaning efficiency as the average of four tests.

4.5.5 Total immersion corrosion. Corrosion specimens shall be fabricated from the following substrates as specified by the dimensional requirements of ASTM F483: aluminum (QQ-A-250/11 -0 and QQ-A-250/4 -T3), steel (MIL-S-7952), and stainless steel (QQ-S-766, class 410), chrome pickled magnesium (QQ-M-44) and titanium (MIL-T-9046, Type III, Composition C). Cadmium plated steel specimens shall be prepared in accordance with QQ-P-416, Type I and nickel-cadmium plated steel specimens shall be prepared in accordance with AMS 2416. Sermetal W coated steel specimens shall be prepared in accordance with MIL-C-81751, Type I, Class 4. Immediately prior to testing, untreated specimens (not plated or coated) shall be abrasive blasted using MIL-G-9954, Size 13 glass beads. Specimens shall be tested in diluted cleaning compound (20 percent by volume in distilled water)

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as required by ASTM F 433, except that the cleaning solution shall be conditioned at 57°C (135°F) for one and one-half hours prior to immersion and the immersion shall be carried out at 57°C (135°F) for one-half hour. Weight changes shall be calculated in units of milligrams per square centimeter per 24 hours and shall conform to 3.8.1.

4.5.6 Hot corrosion. Corrosion specimens, 25 by 50 by 1.5 mm (one-inch by two-inches by 0.060 inches), shall be cut from the following alloys: titanium (MIL-T-9046, Type II, Comp F and MIL-T-9046, Type III, Comp C), aluminum (QQ-A-250/11 -0 and QQ-A-250/4 -T3), Steel (MIL-S-7952), stainless steel (QQ-S-766, Class 410 and AMS 5510) and Nickel alloy (AMS 5536). Nickel-cadmium plated steel specimens shall be prepared in accordance with AMS 2416. Sermetel W coated specimens shall be prepared in accordance with MIL-C-81751, Type I, Class 4. Untreated specimens (unplated or uncoated) shall be degreased by wiping with absorbent paper tissue wet with methyl ethyl ketone (reagent grade) followed by wiping with isopropanol. After drying at ambient conditions for one hour, corrosion specimens of each alloy shall be immersed in diluted cleaning compound for 15 seconds then withdrawn, air dried, and baked at the following temperatures for 4 hours.

| | <u>Temperature °C (F°)</u> |
|-----------------------------|----------------------------|
| Titanium alloys | 482 (900) |
| Aluminum alloys | 454 (850) |
| Coated and plated specimens | 454 (850) |

| | <u>Temperature °C (F°)</u> |
|---------------------------------------|----------------------------|
| Stainless steel (QQ-S-766, Class 410) | 482 (900) |
| Stainless steel (AMS 5510) | 871 (1600) |
| Nickel Alloy (AMS 5536) | 1093 (2000) |

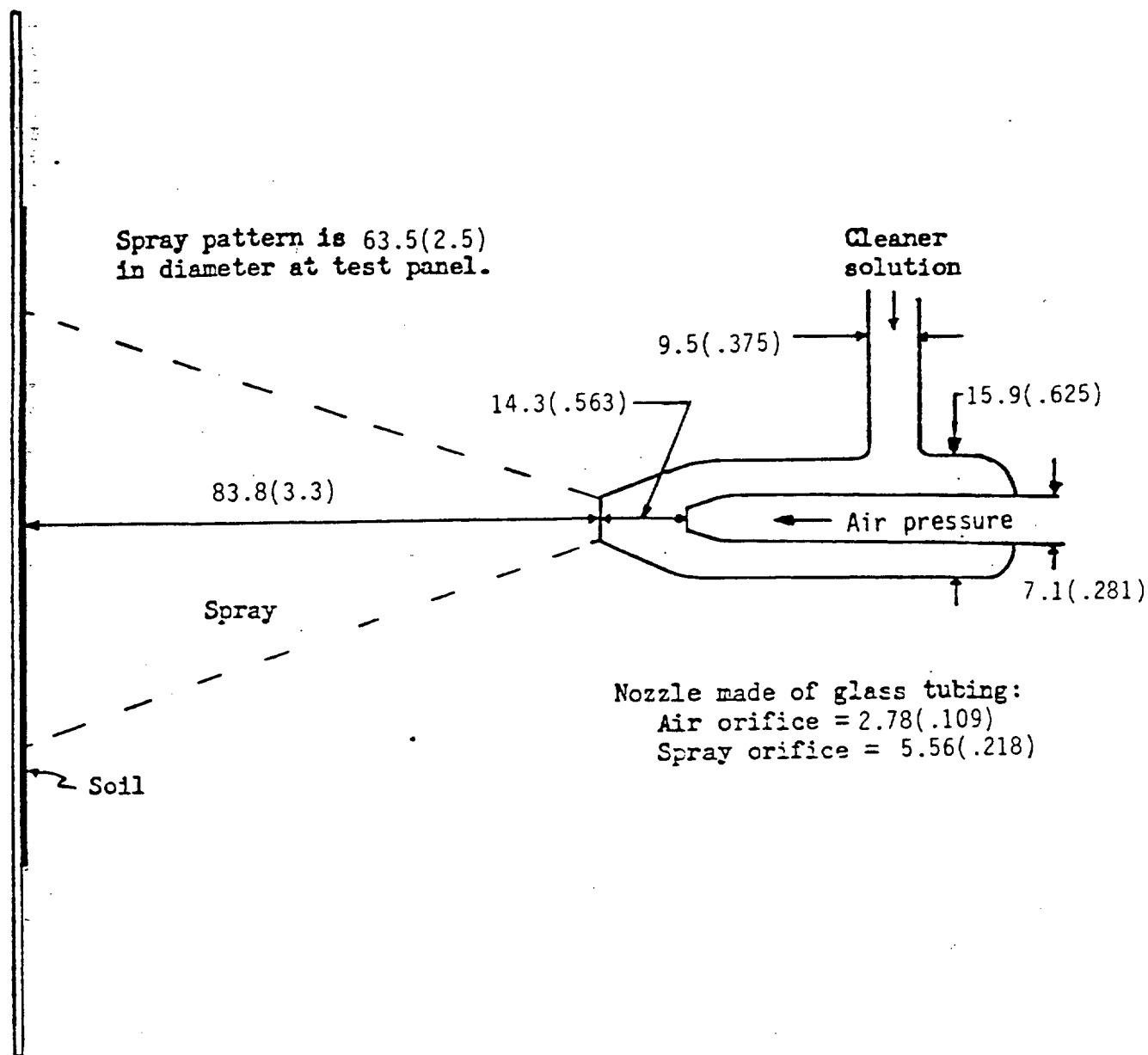
A control specimen of each alloy and surface treatment, degreased but not exposed to the cleaning solution, shall be baked for purposes of comparison. All specimens shall be cross-sectioned, mounted and examined at 250X magnification in accordance with standard metallographic practice.

4.5.7 Sandwich corrosion.

4.5.7.1 Test coupons. Test coupons shall measure approximately 50 by 100 by 1 mm (2 by 4 by 0.05 inch), prepared from each of the following:

- 2024-T3 aluminum alloy conforming to QQ-A-250/4
- 2024-T3 aluminum alloy alclad conforming to QQ-A-250/5
- 7075-T6 aluminum alloy conforming to QQ-A-250/12
- 7075-T6 aluminum alloy alclad conforming to QQ-A-250/13

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NOTE: DIMENSIONS IN MILLIMETERS(INCHES)

Figure 1. Side view of test apparatus for cleaning efficiency.

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Each coupon shall be identified by a suitable permanent method. The coupons shall be cleaned by solvent wiping or vapor degreasing with methyl ethyl ketone. Ink stamped markings shall be removed from the coupons. No acid, caustic, or abrasive materials shall be used to clean the coupons.

4.5.7.2 Test specimens. A test specimen shall consist of two coupons of the same alloy and surface treatment. There shall be two test specimens for each test.

4.5.7.3 Test procedure. A piece of glass fiber paper (Whatman GFA or equal, made from glass fibers) shall be cut to the approximate size of the coupons and fitted over one of the coupons. Add a 20 volume percent cleaning solution to the paper until saturated, then cover the wet paper with the second coupon of the sandwich pair. Repeat the operation for each of the coupon sets. The specimens shall be exposed at alternate intervals of 8 hours in the air oven and 16 hours in the humidity cabinet for 5 days. The humidity cabinet shall be maintained at $37.8^{\circ} \pm 1.1^{\circ}\text{C}$ ($100^{\circ} \pm 2^{\circ}\text{F}$) and 95 - 100 percent relative humidity. The air oven shall be maintained at $37.8^{\circ} \pm 2.8^{\circ}\text{C}$ ($100^{\circ} \pm 5^{\circ}\text{F}$). Each set of panels shall be exposed individually, not stacked, in a horizontal position. After exposure, the panels shall be rinsed in warm tap water, and scrubbed lightly with a soft non-metallic bristle brush. After drying, examine each panel under 10X magnification, and rate each set according to the following scale:

- 0 - No visible corrosion.
- 1 - Discoloration or very slight corrosion.
- 2 - Slight corrosion.
- 3 - Moderate corrosion.
- 4 - Extensive corrosion, pitting.

Pitting corrosion of any severity shall be given a rating of 4. Corrosion at the cut edges of the coupons shall be disregarded.

4.5.8 Effect on painted surfaces. The effect shall be determined in accordance with ASTM F 502 using finishes listed in Table XI, except that the cleaning solution shall be a 20 volume percent concentration, the exposure shall be for 15 minutes at room temperature, and the panels shall be allowed to dry at room temperature for 24 hours.

4.5.9 Effect on silicone elastomers.

4.5.9.1 Preparation of test specimens. Dow Corning elastomers Silastic J and 93-118 and General Electric elastomer RTV 159 (or equivalent) shall be mixed as specified by the manufacturer and pressed in a 1/8-inch thick sheet mold until cured. Silastic J and RTV 159 shall be cured at room temperature for one week, while 93-118 sealant shall be cured at 150°C (302°F) for 2.25 hours. 25 by 50 mm (one inch by two inch) specimens shall be cut from the sheet stock.

4.5.9.2 Test procedure. Immerse two specimens of each elastomer in a 20 volume percent solution of the cleaning compound at $66^{\circ} \pm 1^{\circ}\text{C}$ ($150^{\circ} \pm 2^{\circ}\text{F}$) for 30 minutes. Remove from the solution, rinse with cool tap water, and test within 30 minutes for Shore A hardness in accordance with ASTM D 2240.

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4.5.10 Effect on epoxy adhesives.

4.5.10.1 Preparation of test specimens. Using unprimed, 0.51 mm (0.020 inch) 2024 (QQ-A-250/4) bare aluminum sheet, prepare panels coated with .13 to .25 mm (5 to 10 mils) of 3M Company AF163 adhesive (or equal) cured for one hour at $121^{\circ} \pm 1^{\circ}\text{C}$ ($250^{\circ} \pm 2^{\circ}\text{F}$) at 40 psi. Panels coated with .13 to .25 mm (5 to 10 mils) of Dexter-Hysol EA 9649 adhesive (or equal) shall be cured for 1 hour at $177^{\circ} \pm 1^{\circ}\text{C}$ ($350^{\circ} \pm 2^{\circ}\text{F}$) at 55 psi. Panels shall be cured in a press using a sheet of polyvinyl fluoride to release the adhesive coated panel from the top plate.

4.5.10.2 Test procedure. Immerse a two-inch square test specimen in a 20 volume percent solution of cleaning compound at $66^{\circ} \pm 1^{\circ}\text{C}$ ($150^{\circ} \pm 2^{\circ}\text{F}$) for 30 minutes. Remove from the solution, rinse with cool tap water, and test for pencil hardness (ASTM F 502) after 24 hours at room temperature.

4.5.11 Emulsibility. Ten ml of undiluted cleaning compound shall be placed in a 50-ml glass-stoppered graduated cylinder and 40 ml of distilled water shall be slowly added. After 60 seconds, the cylinder shall be capped and slowly inverted once, then allowed to stand for 60 seconds before examining for homogeneity. If a homogeneous emulsion does not form, the cleaning compound is unsatisfactory. If a homogeneous emulsion forms, the cylinder shall be shaken thoroughly and allowed to stand undisturbed for 48 hours. At the end of the 48-hour period, the contents of the cylinder shall be examined for solvent on top and water at the bottom.

4.5.12 Rinsability.

4.5.12.1 Test panels. The test panels used in this test shall conform to panel C of Table XI.

4.5.12.2 Synthetic sea water. Synthetic sea water shall be prepared in accordance with ASTM D 1141, Formula a.

4.5.12.3 Procedure. The panels shall be placed in a horizontal position, lacquered surface up, and sprayed with the synthetic sea water. An atomizer, paint spray gun or equivalent may be used for this operation. When the panels are thoroughly covered by sea water droplets, the panels shall be dried under an infrared lamp. The salt-coated panels shall be partially immersed in a glass tray, approximately 125 by 200 mm (5 by 8 inches), containing 150 ml of a 10 percent by weight of a distilled water solution of the cleaning compound. The panels shall be tilted from the horizontal in such a manner that only half of the panel is beneath the surface of the solution. The panels shall be soaked in this manner for one minute without agitation, then removed and allowed to drain in an upright position for one minute. They shall then be dried under the infrared lamp. The panels shall then be rinsed in a moderate stream of distilled water until the salt on the portion of the panel that has not been submerged in the cleaning solution, appears to have been dissolved. The panel shall then be dried under the infrared lamp. The presence of a residue shall then be determined by visual comparison of the immersed and nonimmersed halves of the panel.

4.5.13 Hard water stability.

4.5.13.1 Preparation of stock solution. A 10-grain hard water stock solution shall be prepared by dissolving 0.20 ± 0.005 grams (g) of analytical reagent

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grade calcium acetate, $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$, and 0.14 ± 0.005 g of analytical reagent grade magnesium sulfate, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, in one liter of boiled distilled water.

4.5.13.2 Procedure. Ten ml of cleaning compound shall be added to a 50-ml graduated cylinder. Forty ml of the synthetic hard water shall be added to the graduated cylinder and the contents shaken vigorously for 15 seconds. Allow the solution to stand undisturbed for 16 hours at a temperature of $25^\circ \pm 5^\circ\text{C}$ ($77^\circ \pm 10^\circ\text{F}$). At the end of the 16 hours examine the solution for separation.

4.5.14 Salt water stability. To fifty ml of a 20 volume percent cleaning solution, add 5 ml of synthetic salt water prepared in accordance with ASTM Method D1141, and shake vigorously for 15 seconds. Examine after 1 hour for separation.

4.5.15 Acid stability. To fifty ml of a 20 volume percent cleaning solution add 5 ml of a 1 percent acetic acid solution, and shake vigorously for 15 seconds. Examine after 1 hour for separation.

4.5.16 Accelerated storage stability.

4.5.16.1 Preparation of test sample. A 150 ml portion of a well shaken cleaning compound shall be poured into each of two chemically clean 250 ml pressure resistant clear glass bottles which shall be approximately 240 mm (9.5 in.) in height and 64 mm (2.5 in.) in outside diameter. One bottle shall be capped and stored in the dark for at least six days at room temperature. A strip of steel 150 by 125 by 0.5 mm, (6 by 0.5 by 0.02 in.) conforming to MIL-S-7952 shall be polished to remove surface contamination and then cleaned by boiling for one minute in chemically pure isopropyl alcohol and one minute in mineral spirits. The steel strip shall be placed in the other test bottle and the bottle shall be capped. The capped bottle containing the steel strip shall be thoroughly shaken for one minute.

4.5.16.2 Procedure. The capped bottle containing the steel strip shall be placed in a water bath and heated at a uniform rate to a temperature of $60^\circ \pm 2^\circ\text{C}$ ($140^\circ \pm 4^\circ\text{F}$) over a period of five hours. It shall be held at this temperature for 3 hours. No heat shall be applied to the bath overnight. The above heating procedure shall be repeated each day for five days. (This test need not necessarily be attended if an interval timer is used to regulate the temperature automatically. The test may be started on a Wednesday, Thursday or Friday and still have the pressure bottle removed on a normal workday.) On the morning of the sixth day, the bottle shall be removed from the bath, uncapped, examined for separation and the steel strip carefully withdrawn from the cleaning compound. Separation into layers shall be cause for rejection. The portion of the steel strip which had been immersed in the compound shall be examined for evidence of pitting, corrosion and uneven darkening. The open bottle shall be capped and the two bottles shall be thoroughly shaken for one minute, then allowed to remain undisturbed for one hour at room temperature and then examined. Any marked change in the color and uniformity of the aged sample shall be considered as showing unsatisfactory stability properties.

4.5.17 Low temperature stability. Approximately 50 milliliters of undiluted cleaning compound shall be poured into a suitable test tube and capped. The sample shall be subjected to a temperature of -12.2°C (10°F) for 16 hours and

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examined for crystallization or gellation. The sample shall then be refrigerated at -26°C (-15°F) for 24 hours then removed from the cold box to room temperature for 8 hours, after which it shall be examined for homogeneity.

4.5.18 Storage stability. The 3.78 liter (one gallon) metal pail conforming to PPP-P-704, type I, class 1, filled with cleaning compound furnished for storage stability shall be stored for 6 months at $21^{\circ} \pm 3^{\circ}\text{C}$ ($70^{\circ} \pm 5^{\circ}\text{F}$). In addition, one gallon of the cleaning compound shall be poured into a glass container to which has been added a cleaned and polished metal strip conforming to MIL-S-7952. The total surface area of both sides of the steel strip shall be 150 ± 12.5 sq mm (6 ± 0.5 sq in.). The second solution shall be stored under the same conditions of time and temperature. After the 6 month storage period, specimens from both samples shall be tested for cleaning efficiency (4.5.4), rinsability (4.5.12), salt water stability (4.5.14), and acid stability (4.5.15).

4.5.19 Service test. Service evaluation shall consist of the cleaning and examination of aircraft turbine engines at an engine test cell designated by the qualifying activity. The supplier shall provide a sufficient quantity of cleaning compound to the designated test facilities for this evaluation, not to exceed 1890 liters (500 gallons).

5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial, as specified (see 6.2.1).

5.1.1 Level A. The cleaning compound shall be furnished in 18.9, 56.8 or 208.2-liter (5-, 15- or 55-gallon) containers, as specified (see 6.2.1). Unless otherwise specified in the contract or order, the 18.9-liter (5-gal.), 56.8-liter (15-gal.) and 208.2-liter (55 gal.) containers shall conform to type I, class 3 of PPP-P-704; type II of PPP-D-705 and type II of PPP-D-729, respectively. The flanges shall have three or more full threads, and the plugs shall have sufficient length of thread that three or more full threads are engaged when the plug is screwed tight with gaskets in place. The threads shall be American Standard modified pipe threads. The 18.9-liter (5-gal.) pail in which the cleaning compound is furnished for uses, other than the foam generator, shall have a flexible spout. The internal surfaces of all containers shall be protected with a material that shall not adversely affect nor be adversely affected by the cleaning compound.

5.1.2 Commercial. The cleaning compound shall be packaged in specified quantities in a manner that shall afford adequate protection to prevent damage during shipment under environmental conditions utilizing containers required by the Code of Federal Regulations, parts 100-199.

5.2 Packing. Packing shall be level A, B or Commercial, as specified (see 6.2.1).

5.2.1 Level A and B. The cleaning compound, when packaged as specified in 5.1.1, shall require no overpacking. Standard 4-way entry pallets are required for handling by mechanical equipment.

5.2.2 Commercial. The cleaning compound, packaged as specified in 5.1.2, shall be packed in shipping containers in a manner that will afford adequate

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protection, at the lowest rate, against damage during direct shipment from the supply source to the first receiving activity. The shipping containers shall be in compliance with the requirements of the National Motor Freight Classification and the Uniform Freight Classification rules.

5.3 Palletization. Unless otherwise specified (see 6.2.1), cleaning compound of one type only, packaged in 18.9, 56.8 or 208.2-liter (5, 15 or 55-gal.) containers as specified in 5.1.1, shall be palletized in accordance with load type III of MIL-STD-147, except that for overseas shipment, the over-all height of the load shall not exceed 1.1 meters (43 inches). Each prepared load shall be banded with primary, secondary and horizontal straps in accordance with means K, L and E and shall have storage aid 5 applied.

5.4 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.

5.4.1 Product identification. The following identification marking shall appear in 2-inch high bold block lettering on each product container:

TURBINE ENGINE GAS PATH CLEANER

5.4.2 Warnings. The following warning shall appear on each product container:

Do not use full strength (dilute 1 part cleaner to 4 parts fresh water)
Do not use in a hot engine (allow a minimum of 45 minutes after
engine operation)
Rinse with fresh water within 30 minutes of cleaning engine (NEVER
USE SALT WATER).

6. NOTES

6.1 Intended use. The cleaning compound covered by this specification is intended for cleaning the compressor section of gas turbine aircraft engines. The cleaning compound, when diluted to 20 volume percent and sprayed into the air intake ducts of starter cranked engines, will remove accumulated dirt and oily residues from the gas path. In addition it will remove accumulated salt deposits from turbine sections to reduce corrosion.

6.1.1 Instructions for use of cleaning compound. General instructions for use are as follows:

- a. Prepare turbine engine for washing as described in applicable maintenance manuals.
- b. Observe starter motor limitations.
- c. With ignition off - Crank engine at maximum starter rpm.
- d. Spray 5 gallons (20 liters), 2.5 gallons (10 liters) for small engines, of a 20% by volume solution of cleaning compound into the compressor inlet duct. The solution may be premixed or applied with a spray mix applicator set to deliver a 20 percent solution.
- e. Allow a 15 minute soak time, then spray the same areas with fresh water until water running from exhaust port is clear. (Usually 5 gallons (20 liters) of water is sufficient.)
- f. Service engine as required.

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6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Quantity of cleaning compound desired.
- c. Type and capacity of containers required (see 5.1.1).
- d. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).
- e. When palletization is not required (see 5.3).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List (QPL-85704) 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 Systems Command, Department of the Navy, Washington, DC 20361; however, information pertaining to qualification of products and letter of authorization for submittal of sample may be obtained from the Director, Aircraft and Crew Systems Technology Directorate, Code 6062, Naval Air Development Center, Warminster, PA 18974.

Preparing Activity:
Navy - AS
Project No. 6850-0789

Custodians:

Army - AV
Navy - AS
Air Force- 68

Review activities:

DLA - GS
Army - GL, MR, MD, EA

User interest:

Army - MI

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TABLE I. Elemental content.

| Element | Max in ppm |
|-------------------------|------------|
| Sulfur | 500 |
| Chlorine | 100 |
| Sodium | 50 |
| Potassium | 50 |
| Phosphorous | 50 |
| Other metallic elements | 10 |

TABLE II. Corrosion Limits.

| Test panel | Weight change in mg/cm ² /24 hrs. |
|---|---|
| Aluminum (QQ-A-250/11 -0) | 1.0 |
| Aluminum (QQ-A-250/4 -T3) | 1.0 |
| Magnesium, Chrome pickled (QQ-M-44) | 5.0 |
| Titanium (MIL-T-9046 Type III, Comp C) | 1.0 |
| Nickel Alloy (AMS 5536) | 1.0 |
| Steel (MIL-S-7952) | 2.0 |
| Stainless steel (QQ-S-766 Class 410) | 2.0 |
| Cadmium - plated steel (MIL-S-7952; plated in accordance with QQ-P-416, Type I) | 5.0 |
| Nickel-cadmium plated steel (MIL-S-7952; plated and treated in accordance with AMS 2416) | 5.0 |
| Sermetal W coated steel (MIL-S-7952; coated with MIL-C-81751, Type I, Class 4) | 2.0 |

TABLE III. Allowable durometer changes.

| Elastomer 1/ | Change in hardness, pts |
|--|-------------------------|
| Elastomer No. 1 (Dow Corning Silastic J) | 5 |
| Elastomer No. 2 (Dow Corning 93-118) | 7 |
| Elastomer No. 3 (General Electric RTV 159) | 5 |

1/ Elastomers shall be as specified or equivalent molecular structure.

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TABLE IV. Allowable hardness changes.

| Adhesive <u>1/</u> | Change in pencil hardness values |
|---------------------------------------|----------------------------------|
| Adhesive No. 1 (3M Company AF 163) | 3 |
| Adhesive No. 2 (Dexter-Hysol EA 9649) | 1 |

1/ Adhesives as specified, or equivalent molecular structureTABLE V. Qualification inspection.

| Characteristics | Paragraph | |
|-------------------------------|-------------|-----------|
| | Requirement | Test |
| Compositional assurance | 3.3.1 | 4.5 |
| Water content | | |
| Non-volatile content | | |
| Infrared spectrogram | | |
| Elemental content | 3.3.2 | 4.5.1 |
| Phenolic content | 3.3.3 | <u>1/</u> |
| Insoluble matter | 3.3.4 | 4.5.2 |
| Ash content | 3.3.5 | 4.5.3 |
| pH | 3.4 | 4.5 |
| Flash point | 3.5 | 4.5 |
| Viscosity | 3.6 | 4.5 |
| Cleaning efficiency | 3.7 | 4.5.4 |
| Total immersion corrosion | 3.8.1 | 4.5.5 |
| Hot corrosion | 3.8.2 | 4.5.6 |
| Titanium stress corrosion | 3.8.3 | 4.5 |
| Sandwich corrosion | 3.8.4 | 4.5.7 |
| Effect on painted surfaces | 3.9.1 | 4.5.8 |
| Effect on silicone elastomers | 3.9.2 | 4.5.9 |
| Effect on epoxy adhesives | 3.9.3 | 4.5.10 |
| Effect on acrylic materials | 3.9.4 | 4.5 |
| Emulsibility | 3.10 | 4.5.11 |
| Rinsability | 3.11 | 4.5.12 |
| Hard water stability | 3.12 | 4.5.13 |
| Salt water stability | 3.13 | 4.5.14 |
| Acid stability | 3.14 | 4.5.15 |
| Accelerated storage stability | 3.15 | 4.5.16 |
| Low temperature stability | 3.16 | 4.5.17 |
| Storage stability | 3.17 | 4.5.18 |
| Service test | 3.18 | 4.5.19 |
| Workmanship | 3.19 | <u>2/</u> |

1/ Supplier shall certify to this requirement for qualification (see 4.3.2).2/ Visual examination.

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TABLE VI. Quality conformance visual inspection.

| Examine | Defect |
|------------|---|
| Fill | Average net content per container less than specified in contract or order (Volume corrected to 15.6°C (60°F)). |
| Material | Not as specified. |
| Appearance | Presence of foreign matter. Not homogeneous |

TABLE VII. Quality conformance - physical testing.

| Characteristics | Paragraph | |
|-----------------------------------|-------------|--------|
| | Requirement | Test |
| Compositional assurance <u>1/</u> | 3.3.1 | 4.5 |
| Ash content | 3.3.5 | 4.5.3 |
| pH | 3.4 | 4.5 |
| Flash point | 3.5 | 4.5 |
| Flammability | 3.6 | 4.5.4 |
| Viscosity | 3.6 | 4.5 |
| Cleaning efficiency | 3.7 | 4.5.4 |
| Total immersion corrosion | 3.8.1 | 4.5.5 |
| Stress crazing of acrylic | 3.9.4 | 4.5 |
| Emulsibility | 3.10 | 4.5.11 |
| Hard water stability | 3.12 | 4.5.13 |
| Salt water stability | 3.13 | 4.5.14 |
| Acid stability | 3.14 | 4.5.15 |
| Accelerated storage stability | 3.15 | 4.5.16 |
| Low temperature stability | 3.16 | 4.5.17 |
| Workmanship | 3.19 | Visual |

1/ (See 4.4.3)

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TABLE VIII. Packaging inspection.

| Examine | Defect |
|-----------|--|
| Packaging | Container not as specified; closures not accomplished by specified or required methods or materials. Leakage or seepage of contents. Non-conforming component, component missing, damaged or otherwise defective. Bulged or distorted container. |
| Markings | Data omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements. |

TABLE IX. Palletization inspection.

| Examine | Defect |
|--------------------|---|
| Finished dimension | Length, width, or height exceeds specified maximum requirement. |
| Palletization | Not as specified. Pallet pattern not as specified. Interlocking of loads not as specified. Load not banded with required straps as specified. |
| Weight | Exceeds maximum load limits. |
| Marking | Omitted, incorrect, illegible, of improper size, location, sequence or method of application. |

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Table X. Test methods.

| Requirements paragraph | Test | Test Method |
|------------------------|--|-------------|
| 3.3.1 | Water content | ASTM E 203 |
| 3.3.1 | Non-volatile content and infrared spectroscopy <u>1/</u> | ASTM D 2834 |
| 3.4 | pH | ASTM E 70 |
| 3.5 | Flash point | ASTM D 93 |
| 3.6 | Viscosity (Cannon-Fenske) | ASTM D 445 |
| 3.8.1 | Total immersion corrosion <u>2/</u> | ASTM F 483 |
| 3.8.3 | Titanium stress corrosion | ARP 1795 |
| 3.9.1 | Effect on painted surfaces <u>3/</u> | ASTM F 502 |
| 3.9.4 | Acrylic stress crazing <u>4/</u> | ASTM F 484 |

Note 1/ An infrared spectrogram of the non-volatile matter smeared on a Sodium Chloride plate shall be recorded using a double beam diffraction gradient spectrophotometer with a minimum resolution of 3 wavenumbers. Non-volatile content shall be determined using a forced-draft oven at 105 \pm 2°C (221 \pm 4°F) for 16 hours).

2/ As modified in 4.5.5.

3/ As modified in 4.5.8.

4/ Type A and Type C specimens shall be stressed to 2000 and 3000 psi, respectively.

TABLE XI. Test Panel Finishes.

| Panel designation | Coating | Number of coats | Thickness per coat, mils (mm) | Drying time between coats <u>1/</u> (min) |
|-------------------|----------------------------------|-----------------|---|---|
| A | TT-L-32 (Color No. 17875) | 2 | 0.7 - 1.0 (0.018 - 0.025) | 1 hour at room temperature |
| B | MIL-C-22750 (Color No. 17875) | 1 1 | mist coat 1.2 - 1.4 (0.030 - 0.036) | 1/2 hour at room temperature |
| C | MIL-C-83286 (Color No. 17875) | 1 1 | mist coat 1.7 - 2.3 (0.043 - 0.058) | 1/2 hour at room temperature |

1/ All specimens shall be baked for 1 week at 66° \pm 1°C (150° \pm 2°F) following final coat.

(See Instructions – Reverse Side)

PREVIOUS EDITION IS OBSOLETE.