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| NOT MEASUREMENT<br>SENSITIVE |
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MIL-DTL-85054C(AS)  
20 May 2002  
SUPERSEDING  
MIL-C-85054B(AS)  
05 November 1993

## DETAIL SPECIFICATION

### CORROSION PREVENTIVE COMPOUND, CLEAR (AMLGUARD)

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers a clear, corrosion preventive compound that may be applied by brushing or spraying (see 6.1). This compound is available in the original water-displacing, high volatile organic compound (VOC) formulation and a non-water-displacing low VOC version.

1.2 Classification. The compound will be of the following types and classes, as specified (see 6.2b).

1.2.1 Types. The types of compounds are as follows:

Type I - Self-pressurized spray container (High VOC - Exceeds 250 grams/liter)

Type IA - Self-pressurized spray container (Low VOC - No more than 250 grams/liter)

Type II - Bulk form (High VOC - Exceeds 250 grams/liter)

Type IIA - Bulk form (Low VOC - No more than 250 grams/liter)

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| 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 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100, by using the 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 8030

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1.2.2 Classes. The classes of compounds are as follows:

Class 134A - Hydrofluorocarbon (HFC) propellant

Class CO<sub>2</sub> - Carbon dioxide (CO<sub>2</sub>) propellant

## 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

|           |   |   |
|-----------|---|---|
| A-A-51126 | - | Anodes, Cadmium                             |
| TT-I-735  | - | Isopropyl Alcohol (Inactive for new design) |

## DEPARTMENT OF DEFENSE

|             |   |                                |
|-------------|---|--------------------------------|
| MIL-A-18001 | - | Anodes, Sacrificial Zinc Alloy |
| MIL-PRF-680 | - | Degreasing Solvent             |

## STANDARDS

## DEPARTMENT OF DEFENSE

|             |   |   |
|-------------|---|---|
| MIL-STD-290 | - | Packaging of Petroleum and Related Products |
|-------------|---|---|

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

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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

#### ENVIRONMENTAL PROTECTION AGENCY (EPA)

40 CFR 60 - Standards of Performance for New Stationary Sources

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

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).

#### AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-Z129.1 - Chemicals, Hazardous Industrial, Precautionary Labeling of.  
(DoD adopted)

(Application for copies should be addressed to the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.)

#### AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

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

(Application for copies should be addressed to the American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.)

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-B36 - Plate, Brass, Sheet, Strip, and Rolled Bar. (DoD adopted)  
ASTM-B152 - Copper Sheet, Strip, Plate, and Rolled Bar. (DoD adopted)  
ASTM-D1719 - Isobutyl Alcohol. (DoD adopted)  
ASTM-F519 - Mechanical Hydrogen Embrittlement Evaluation of Plating Processes and Service Environments

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(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-AMS4375        | - | Sheet and Plate, Magnesium Alloy 3.0Al-1.0Zn-0.20Mn (AZ31B-0) Annealed and Recrystallized. (DoD adopted) |
| SAE-AMS-S-5000     | - | Steel, Chrome-Nickel-Molybdenum (E4340), Bars and Reforging Stock. (DoD adopted)                         |
| SAE-AMS5046        | - | Sheet, Strip and Plate, Carbon Steel (SAE1020 and 1025) Annealed. (DoD adopted)                          |
| SAE-AMS-QQ-A-250/4 | - | Aluminum Alloy 2024, Plate and Sheet. (DoD adopted)  |
| SAE-AS22805        | - | Spray Kit, Self Pressurized. (DoD adopted)   |

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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 First article. When specified (see 6.2 and 6.3), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2. Toxicity. The compound supplied under this specification shall have no adverse effect on the health of personnel when used for its intended purpose (see 6.6).

#### 3.3 Materials.

##### 3.3.1 Formulations.

3.3.1.1 High VOC formulations (types I and II). The ingredients used in the manufacture of type I and II compounds shall conform to the applicable document listed in table I or be chemically identical to the spectra listed in table I (see 6.5). Type I compound shall be formulated in accordance with the percentages in table I. The compound shall be homogeneous, free of grit, abrasives, water, chlorides, and other impurities and shall meet all requirements of this specification. Type II compound shall be of type I formulation containing one of the propellants in 3.3.2.

3.3.1.2 Low VOC formulations (types IA and IIA). The formulation of type IA compound shall be determined by the manufacturer and shall have a VOC content of not more than

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250 grams/liter (see table IV). The compound shall be homogeneous, free of grit, abrasives, water, chlorides, and other impurities and shall meet all requirements of this specification. Type IIA compound shall be of type IA formulation containing one of the propellants of 3.3.2.

TABLE I. Compound ingredients.

| Ingredient                        | Document or applicable figure | Percent by weight |
|-----------------------------------|-------------------------------|-------------------|
| Isopropanol                       | TT-I-735                      | 17.0              |
| Barium petroleum sulfonate        | Figure 1                      | 2.2               |
| Alkyl ammonium organic phosphate  | Figure 2                      | 3.5               |
| Silicone resin                    | Figure 3                      | 17.2              |
| Silicone alkyd resin              | Figure 4                      | 8.6               |
| Acrylic resin                     | Figure 5                      | 17.3              |
| Isobutyl alcohol                  | ASTM-D1719                    | 8.6               |
| VM&P naphtha                      | Figure 6                      | 17.0              |
| Propylene glycol monomethyl ether | Figure 7                      | 8.6               |
| Solvent blue 36 (see table V)     | --                            | 2.5 mg/100 ml     |

3.3.2 Propellant classes.

3.3.2.1 Class CO<sub>2</sub> propellant. The propellant for class CO<sub>2</sub> shall consist of carbon dioxide. The propellant shall contain no chlorinated solvents, hydrochlorofluorocarbons, or fully halogenated chlorofluorocarbons.

3.3.2.2 Class 134A propellant. The propellant for class 134A shall consist of hydrofluorocarbons or a blend containing hydrofluorocarbons. Class 134A propellant blends shall contain no chlorinated solvents, hydrochlorofluorocarbons, or fully halogenated chlorofluorocarbons.

3.3.3 Unit of issue.

3.3.3.1 Self-pressurized containers. The unit of issue for types I and IA shall be one self-pressurized container.

3.3.3.2 Bulk form. The unit of issue for types II and IIA shall be one quart.

3.4 Properties. The corrosion preventive compound, when tested as specified in the applicable tests in section 4, shall meet the requirements of table II.

3.4.1 Appearance. The applied compound shall form a uniform transparent film. High VOC products (types I and II) shall appear light blue when applied on a white surface. Low VOC products (types IA and IIA) shall contain no dye, pigments, or extenders.

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TABLE II. Properties.

| Property   | Requirement  | Test paragraph      |
|--|--|---------------------|
| Dryness  | 0.0100 gram (max)  | 4.6.1               |
| Synthetic sea water-sulfurous acid spray               | No visible corrosion on carbon steel after 12 cycles   | 4.6.2               |
| Synthetic sea water displacement (types I and II only) | No visible corrosion   | 4.6.3               |
| Sprayability   | Uniform spray pattern  | 4.6.4               |
| Corrosivity  | No visible pitting, etching, or dark discoloration. No weight change greater than 0.5 mg/cm <sup>2</sup> for magnesium, cadmium, or zinc. No weight change greater than 0.2 mg/cm <sup>2</sup> for aluminum, copper, or brass. | 4.6.5               |
| Storage stability (types IA and IIA only)              | Shall meet all requirements herein (except storage stability) after one year storage at room temperature   | 4.6.6               |
| Hydrogen embrittlement (types IA and IIA only)         | No embrittlement of cadmium plated AISI 4340 steel specimens <u>1/</u>   | 4.6.7 and ASTM-F519 |

1/ Steel specimens shall be in accordance with SAE-AMS-S-5000.

3.5 Self-pressurized containers. Filled self-pressurized containers (see 3.3.3.1) shall meet the requirements of 3.5.1 through 3.5.3.

3.5.1 Leakage. The self-pressurized containers shall not leak nor become distorted when tested as specified in 4.6.8.1.

3.5.2 Fill. Self-pressurized containers for classes CO<sub>2</sub> and 134A shall contain 11 ounces of the compound, when tested as specified in 4.6.8.2.

3.5.3 Performance of self-pressurized containers. Compounds packaged in self-pressurized containers shall have a spray pattern with a width of not less than 1.5 inch (38.1 mm), shall adhere to the panel, and shall not foam excessively or sag, when tested as specified in 4.6.8.3.

3.6 Identification of compound. Individual containers shall be identified in accordance with MIL-STD-290 and ANSI-Z129.1. Unless otherwise specified (see 6.2), the identification shall be

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legible, be accomplished by lithographing or silkscreen process, and be white on an orange label. Paper coated identification labels on self-pressurized containers are not acceptable; any special marking specified in the contract or order shall also be included. There shall be front and rear face identification located opposite each other on the container.

3.6.1 Front face identification. The front face identification shall be as follows:

(Stock no.)  
 CORROSION PREVENTIVE COMPOUND, CLEAR (AMLGUARD)  
 MIL-DTL-85054C(AS) Type \_\_\_\_\_  
 Lot \_\_\_\_\_ Date manufactured \_\_\_\_\_  
 VOC content \_\_\_\_\_  
 (Contract no.)  
 (Manufacturer's name)  
 (Manufacturer's address)  
 (Manufacturer's product no.)  
 (Net wt) Includes \_\_\_\_\_ % by weight of propellant

Important: For best results follow instructions on reverse side of container.

3.6.2 Rear face identification. The rear face identification shall be as follows:

### USES

This product is intended for use on unpainted metal surfaces or where the paint has cracked or been damaged, such as around fasteners, seams, and access panels. It is not intended for use on moving parts that require a lubricated surface. Type I and II compounds can be used to displace water from surfaces in severe environments. Type IA and IIA compounds do not displace water.

Instructions - For best results:

1. Clean and dry surfaces to be protected prior to applying the corrosion preventive compound.
2. Apply a thin uniform coat of corrosion preventive compound directly on area to be protected.
3. Allow to dry for one-half hour.
4. Apply a second uniform coat of corrosion preventive compound.

NOTE: Application by wiping is not recommended. Reapplication of compound is necessary after solvent cleaning or where coating has been damaged by abrasion. Remove types I and II (high VOC compounds) by spraying with fresh compound and immediately wiping off.

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Remove types IA and IIA (low VOC compounds) by wiping with isopropyl alcohol in accordance with TT-I-735.

### WARNING - CONTENTS FLAMMABLE

#### CAUTION (for spray cans)

Contents pressurized. Do not puncture, incinerate, or store above 120 °F (48 °C). Do not place can near open flame or other heat source. Use with adequate ventilation and avoid breathing spray. Harmful if swallowed. Shake before using.

3.7 Workmanship. The coating shall be homogeneous and, when sprayed, shall yield a smooth uniform film. The ingredients shall be uniformly processed to produce the quality of compound established by this specification. The finished product shall be clean, uniform, and free of any defects that might impair its use, such as sediment, metal, or other foreign particles in the self-pressurized containers, education tubes, and valve assemblies. The exterior orifice of the self-pressurized containers shall be symmetrical and free of ragged edges and, if drilled, shall be symmetrical and in direct alignment with angle of discharge.

## 4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall consist of subjecting the first article sample to examination and testing to determine conformance to all the requirements specified in section 3. The first article test sample shall consist of at least five self-pressurized containers of the type I and IA compound and five one-quart containers of the type II and IIA compound. For high VOC compounds, three ounces of each ingredient used in the formulation shall be provided when requested by the testing laboratory (see 6.3.2b).

#### 4.3 Conformance inspection.

4.3.1 Inspection of product. Conformance inspection shall consist of all applicable tests and examinations in table III. Samples shall be selected in accordance with ASQC-Z1.4, inspection level as specified in table III. The sample unit shall be one self-pressurized container and one quart of the compound from which these samples were filled (exclusive of the propellant).



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4.3.2 Visual inspection of filled containers. Samples shall be selected at random from each lot (see 6.4.1) in accordance with ASQC-Z1.4, inspection level S-2. The lot size for this inspection shall be the number of containers of product fully prepared for delivery. The selected samples shall be examined for container fill, and proper location and completion of compound identification (see 3.6).

TABLE III. Conformance inspections.

| Requirement Paragraph | Inspection                       | Test Paragraph | Sample Size (Inspection Level)<br><u>1/</u> ASQC-Z1.4 |
|-----------------------|----------------------------------|----------------|---|
| 3.4.1                 | Appearance                       | Visual         | 1   |
| 3.4                   | Dryness                          | 4.6.1          | S-2   |
| 3.4                   | Synthetic sea water displacement | 4.6.3          | S-2   |
| 3.4                   | Sprayability                     | 4.6.4          | S-2   |
| 3.5.2                 | Fill                             | 4.6.8.2        | S-2   |

1/ Based on inspection lot size (see 6.4.1).

4.4 Test specimen preparation.

4.4.1 Test disks and panels required. Panels measuring 2 by 4 by 0.125 inch (51 by 101 by 8 mm) and disks measuring 2.125 inches (54 mm) in diameter by 0.063 inch (1.6 mm) thick, shall be prepared from carbon steel conforming to SAE-AMS5046 (SAE1020). The panels and disks shall have all sharp edges and burrs removed and shall have all holes chamfered to prevent injury in handling. The panels and disks shall be surface ground and hand polished with a 240 grit silicon carbide or aluminum oxide cloth or paper to produce a surface finish of 10 to 20 microinches root mean square (rms). Iron oxide media or wet and dry papers and cloths shall not be used. The number of disks and panels required for individual tests shall be as follows:

| <u>Test Paragraph</u> | <u>Disks</u> | <u>Panels</u> |
|-----------------------|--------------|---------------|
| 4.6.1                 | 3            | 0             |
| 4.6.2                 | 3            | 0             |
| 4.6.3                 | 0            | 3             |
| 4.6.8.3               | 0            | 3             |

4.4.2 Cleaning of test panels and disks. The utensils and cloths used to clean test panels and disks shall be clean and free of contamination. Solvents shall be fresh and renewed frequently. In all stages of treatment, handling of panels and disks with bare hands shall be avoided. The panels and disks shall not be permitted to contact contaminated surfaces during the cleaning procedure and shall be handled by tongs and hooks during and after dipping. After polishing, they shall be cleaned with a surgical gauze swab in a beaker of hot mineral spirits conforming to MIL-PRF-680, type II. Cleaning and scrubbing shall be followed by immersing sequentially in containers of

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(1) hot mineral spirits, (2) boiling 95 percent methanol, and (3) boiling absolute methanol. The panels and disks shall be allowed to dry and shall then be stored in a desiccator until ready for use. If storage exceeds 24 hours, the surface preparation shall be repeated starting with hand polishing.

4.4.3 Coating of the test disks. Application of the compound to the test disks shall be performed under the atmospheric conditions of 4.5. The disks shall be held at an angle of 30° from the horizontal. A coating of the compound shall be sprayed on the disks from a self-pressurized container or a container conforming to SAE-AS22805 held 12 inches (305 mm) away. After ten minutes a second coating shall be applied. The combined thickness of the two coats after drying shall be 1.2 to 1.5 mils. After application, the disks shall be conditioned for 24 hours under the atmospheric conditions of 4.5.

4.5 Test conditions. Unless otherwise specified, the tests contained in this specification shall be conducted under controlled atmospheric conditions having a relative humidity (RH) of 50 ±10 percent and a temperature range of 68 to 78 °F (20 to 25 °C). Waiver of this requirement shall be permitted where proper conditioning facilities are not available for control testing. However, for referee purposes, the specified tests shall be performed under the specified atmospheric conditions.

4.6 Test methods. The tests of this specification shall be conducted in accordance with table IV.

TABLE IV. Test methods.

| Test   | Requirement Paragraph | Test Method or Test Paragraph   |
|--|-----------------------|---------------------------------|
| VOC content                                    | 3.3.1.1 and 3.3.1.2   | 40 CFR 60 Appendix A, Method 24 |
| Appearance                                     | 3.4.1                 | Visual                          |
| Dryness  | 3.4                   | 4.6.1                           |
| Synthetic sea water/sulfurous acid spray       | 3.4                   | 4.6.2                           |
| Synthetic sea water displacement               | 3.4                   | 4.6.3                           |
| Sprayability                                   | 3.4                   | 4.6.4                           |
| Corrosivity                                    | 3.4                   | 4.6.5                           |
| Storage stability                              | 3.4                   | 4.6.6                           |
| Hydrogen embrittlement (types IA and IIA only) | 3.4                   | 4.6.7-4.6.7.2                   |
| Self-pressurized container tests:              |                       |                                 |
| Leakage  | 3.5.1                 | 4.6.8.1                         |
| Fill   | 3.5.2                 | 4.6.8.2                         |
| Performance                                    | 3.5.3                 | 4.6.8.3                         |

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4.6.1 Dryness. Three test disks prepared as specified in 4.4.1 and 4.4.2 shall be coated as specified in 4.4.3 using compound conditioned as in 4.6.2.1.2 and allowed to hang in a vertical position for two hours. They shall then be weighed and completely immersed vertically in talcum powder and withdrawn immediately. They shall then be reweighed to the nearest 0.0001 gram. The average change in weight shall be recorded. This procedure shall be repeated with uncoated test panels. These panels shall be used as controls. The average weight increase of the coated panels as compared with the weight increase of the uncoated panels shall be the measure of dryness.

4.6.2 Synthetic sea water/sulfurous acid spray test.

4.6.2.1 Materials.

4.6.2.1.1 Spray test solution. The spray test solution shall consist of a solution made by adding 2 milliliters of sulfurous acid (6.4 percent assay as  $\text{SO}_2$ ) to each liter of synthetic sea water. The pH shall be measured and shall be between 3.3 and 3.5. If it is not, additional acid or synthetic sea water must be added to adjust the pH to this range. The synthetic sea water shall be prepared by adding 50 grams of sodium chloride ( $\text{NaCl}$ ), 22 grams of magnesium chloride ( $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ), 3.2 grams of calcium chloride ( $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ ), and 8 grams of anhydrous sodium sulfate ( $\text{Na}_2\text{SO}_4$ ) to a liter of distilled or demineralized water. One liter of fresh test solution shall be used for each cycle.

4.6.2.1.2 Conditioning of compound sample. A container of the compound shall be exposed to the following cycle four times without physical disturbance of the compound:

Eight hours at  $130 \pm 2^\circ\text{F}$  ( $55 \pm 1^\circ\text{C}$ )  
Sixteen hours at  $-40 \pm 2^\circ\text{F}$  ( $-40 \pm 1^\circ\text{C}$ )

At the end of this cyclic exposure the contents of the sealed container shall be allowed to remain at  $75 \pm 5^\circ\text{F}$  ( $24 \pm 2^\circ\text{C}$ ) for 24 hours.

4.6.2.1.3 Apparatus. The apparatus used in this test shall conform to figures 8 through 11.

4.6.2.1.4 Procedure. Test disks prepared as specified in 4.4.1 and 4.4.2 shall be coated as specified in 4.4.3 using compound conditioned as in 4.6.2.1.2, allowed to dry overnight in a horizontal position on a level surface and then placed in the disk holders. The disk holders shall be placed in the turntable and the turntable started. The air, regulated to a flow of  $1.0 \pm 0.1$  cubic foot per minute, shall be supplied to the nozzle to produce the spray. The spray shall continue for one hour at which time the spray is shut off, and the disk holders containing the test disks shall be moved to a position away from the spray apparatus where they can air dry for three hours. The combination of one hour of spraying and three hours of drying shall be one cycle. At the completion of the twelve cycles, the disks shall be cleaned in mineral spirits conforming to MIL-PRF-680, type II, after which they shall be examined for any visible corrosion, pitting, or staining under 10X magnification.

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4.6.3 Synthetic sea water displacement. Panels prepared in accordance with 4.4.1 and 4.4.2 shall be placed so that one 2-inch end shall be raised one inch above a horizontal surface. The panels shall then be sprayed with the synthetic sea water of 4.6.2.1.1 so that the entire upper surface of the specimen is covered with tiny droplets. Within one minute after spraying, one milliliter of the test compound shall be poured along the upper two-inch edge of the panels and allowed to run slowly down the specimen to completely cover the test panel. After another minute, a second milliliter of the test compound shall be poured and allowed to run down the panels in the same manner. After waiting an additional minute, the panels shall be picked up and held in a vertical position for one minute and shall then be placed flat (test side up) above distilled water at 72 °F (22 °C) in a closed desiccator. After 4 hours, they shall be removed and cleaned with mineral spirits, and then evaluated for visible corrosion.

4.6.4 Sprayability.

4.6.4.1 Self-pressurized container (types I and IA). A filled self-pressurized container shall be cooled to 0 °F (-18 °C) and held at that temperature for 3 hours, then stored at 40 °F (4 °C) for 20 hours. Immediately after conditioning, the container shall be vigorously shaken for 15 seconds and the material shall be sprayed for 30 seconds. The material shall pass the test if it meets the requirements of 3.5.3.

4.6.4.2 Bulk form container (types II and IIA). A container conforming to SAE-AS22805 shall be filled with the compound, then tested in accordance with 4.6.4.1.

4.6.5 Corrosivity.

4.6.5.1 Preparation of specimens. Specimens of the following metals shall be used for this test:

|           |                    |
|-----------|--------------------|
| Magnesium | SAE-AMS4375        |
| Cadmium   | A-A-51126          |
| Zinc      | MIL-A-18001        |
| Aluminum  | SAE-AMS-QQ-A-250/4 |
| Copper    | ASTM-B152          |
| Brass     | ASTM-B36           |

The specimen size shall be 3 by 0.5 by 0.063 inch (76 by 13 by 1.6 mm).

4.6.5.2 Test procedure. Three specimens of each of the metals listed in 4.6.5.1 shall be polished to remove pits, burrs, and irregularities from all faces and edges. The panels shall be finished and cleaned as specified in 4.4.1 and 4.4.2. After weighing, the specimens shall be coated on both sides as specified in 4.4.3. After drying for one hour, the specimens shall be placed in a chamber maintained at  $130 \pm 2$  °F ( $55 \pm 1$  °C) and 75 percent RH for seven days. Upon completion, the coating and any loose corrosion products shall be removed by cleaning in acetone. The specimens shall be reweighed and the weight loss or gain shall be calculated in milligrams per square centimeter ( $\text{mg}/\text{cm}^2$ ).

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4.6.6 Storage stability. A container of compound for each type shall be stored at room temperature for one year, after which the compound shall be tested for all requirements of this specification with the exception of storage stability.

4.6.7 Hydrogen embrittlement (types IA and IIA only). Hydrogen embrittlement characteristics shall be determined in accordance with ASTM-F519, using type 1a, AISI 4340 specimens (see table II).

4.6.7.1 Specimen coating. Cadmium plated specimens shall be prepared as specified using Treatment B without conversion coating. Plating shall cover the notch and surfaces within 0.5 inch (13 mm) of the notch; threaded surfaces shall not be plated. Plated specimens shall be baked in accordance with ASTM-F519.

4.6.7.2 Procedure. Four specimens shall be tested. Brush the compound onto the notch area and immediately load the specimen by applying a load equivalent to 75 percent of notch fracture strength for 200 hours; alternatively, a load equivalent to 45 percent of notch fracture strength shall be applied for 24 hours, then stepped an additional 5 percent each hour until failure. Failure is indicated if a specimen fractures in less than 200 hours or, for the alternative procedure, if a specimen fractures at less than 85 percent of the notch fracture strength.

4.6.8 Specialized tests for self-pressurized containers.

4.6.8.1 Leakage. The self-pressurized container shall be completely submerged for five minutes in water maintained at not less than  $130 \pm 2$  °F ( $55 \pm 1$  °C) during which it shall be observed for the emission of bubbles. Distortion of the container or the emission of bubbles from any part of the container shall denote leakage.

4.6.8.2 Fill. A sample container shall be weighed and then shall be sprayed at three-minute periods with one-minute intervals until the container is emptied. The container shall be reweighed and the net difference determined. The net weight of the compound shall be computed by multiplying the net difference by the fraction of the contents which has been identified as compound (see 6.3.2).

4.6.8.3 Performance of self-pressurized containers. Panels as described in 4.4.1 shall be used. A panel shall be supported such that the longer dimension forms a 45° angle with the horizontal. A self-pressurized container shall be sprayed on the panel from a distance of 12 inches (305 mm). The panel shall be examined for uniformity, pattern of spray, foaming, and adherence to the substrate (see 3.5.3). After a 10-second pause, the same panel shall be resprayed and examined for adhesion and sag. After a 5-second pause, the same panel shall be resprayed and re-examined.

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## 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 materiel 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 which may be helpful, but is not mandatory.)

6.1 Intended use. The compound covered by this specification can be used on metal surfaces not exceeding 250 °F (121 °C) as a transparent, temporary corrosion preventive coating. It is intended for use on non-moving parts not requiring a lubricated surface (such as fasteners, seams, access panels, points, unpainted metal, and where paint is cracked or damaged); however, it should not be used around liquid oxygen fittings. Type I and II compounds may be used to displace fresh or salt water from surfaces. Since Type IA and IIA compounds do not displace water, they should be used only after washing, rinsing, and drying the areas to be coated. This compound is military-unique since its corrosion resistance capability is much greater than that of an off-the-shelf commercial compound, in order to protect against the harsh environment typically encountered by military aircraft.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification, including any amendments.
- b. Type and class (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. First article (see 3.1).
- e. Labeling or other special marking required (see 3.6).
- f. Quantity (specify number of cans or bulk quantity).
- g. Packaging requirements (see 5.1).
- h. Addresses for submission of Material Safety Data Sheets.

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory, and the number of items to be tested as specified in 4.2. The contracting officer should also include specific instructions in

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acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles (see 6.3.1). Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract (see 6.3.3). Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.3.1 First article test samples. First article samples are selected at random from materials which have been manufactured or which have been used for filling the contract. (Self-pressurized containers are not required when only quarts are purchased.) Samples will be forwarded at no charge to the Government, and tested at a laboratory approved by the Naval Air Warfare Center Aircraft Division for conducting first article inspection tests for this specification. Information on approved test laboratories may be obtained from the Commander, Naval Air Warfare Center Aircraft Division, AIR 4.3.4.1, 48066 Shaw Rd., Bldg 2188, Patuxent River, MD 20670-1908. First article samples must be plainly identified by securely attached durable tags marked with the following information:

## CORROSION PREVENTIVE COMPOUND, CLEAR (AMLGUARD)

Samples of material subjected to first article

Name of manufacturer (plant in which material is manufactured)

Manufacturer's designation

Date of manufacture

Submitted by (name) (date) for contract no.

6.3.2 Inspection report and other data. The first article test facility will request the manufacturer to simultaneously submit the following with the samples:

- a. A copy of test results showing conformance with all the requirements of this specification and the applicable requirements of the Department of Transportation (containing numerical test data where applicable).
- b. Test samples (see 4.2).
- c. A certified statement specifically identifying each ingredient in the compound by chemical name, source, and percentage by weight.
- d. Information on the percent by weight of the propellant used and the composition of the propellant furnished in type I and IA containers.
- e. Instructions for the application of the compound.
- f. A Material Safety Data Sheet for the samples being submitted for test (see 6.6).

6.3.3 First article sample and inspection for a subsequent contract. If a contractor has previously furnished the compound in accordance with the requirements of this specification and that product has been found to be satisfactory, the requirement for a first article sample and its submittal for any subsequent contract or order may be waived. Waiver is at the discretion of the



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Commander, Naval Air Warfare Center Aircraft Division, AIR 4.3.4.1, 48066 Shaw Rd., Bldg 2188, Patuxent River, MD 20670-1908.

#### 6.4 Conformance inspection information.

6.4.1 Inspection lot. An inspection lot is all the compound produced during a single batch operation and offered for acceptance at one time.

6.4.2 Certification. The manufacturer at the time of conformance inspection will certify that there has been no formulation or process change from that which resulted in the production of the first article inspection sample. Each ingredient material is identified with the name of its manufacturer and that manufacturer's trade name and formula number.

6.4.3 Conformance rejection and retest. Failure of any conformance inspection will result in the rejection of the batch from which it was obtained and constitutes justification for first article rejection. Rejected material cannot be resubmitted for acceptance without written approval from the responsible activity (see 6.3.1). The application for resubmission will contain all details concerning previous rejections and measures taken to correct these deficiencies.

6.5 Ingredients. The original ingredients and manufacturers for types I and II are listed in table V.

TABLE V. Ingredients.

| Ingredient                        | Tradename              | Source   |
|-----------------------------------|------------------------|--|
| Isopropanol                       | Isopropyl alcohol      | TT-I-735   |
| VM+P naphtha                      | 2429 naphtha           | Esso Chemical Canada   |
| Barium petroleum sulfonate        | NaSUL BSN              | King Industries, Inc.  |
| Alkyl ammonium organic phosphate  | Rust Preventive #2     | E. I. DuPont de Nemours and Company<br>Petroleum Chemical Div. |
| Silicone resin                    | SR-80M                 | General Electric Co.   |
| Silicone alkyd resin              | Varkyd 385-50E         | McWhorter, Inc,  |
| Acrylic resin                     | B67                    | Rohm and Haas Company  |
| Isobutanol                        | Isobutyl alcohol       | ASTM-D1719   |
| Propylene glycol monomethyl ether | Dowanol PM             | Dow Chemical   |
| Solvent blue 36                   | Oil Blue A organic dye | E. I. DuPont de Nemours and Company                            |



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6.6 Toxicity. Questions pertinent to the effect of this compound on the health of personnel when used for its intended purpose can be referred by the acquiring activity to the appropriate medical service who will act as adviser to the acquiring activity (see 6.3.2f). A Material Safety Data Sheet must be prepared and submitted in accordance with FED-STD-313 (see 6.2h and 6.3.2f) and must conform to 29 CFR 1910.1200.

6.7 Part or Identifying Number (PIN). The PIN used for cataloging purposes for this specification may be coded as follows:

|                          |   |                                |   |  |
|--------------------------|---|--------------------------------|---|--|
| M85054                   | - | X                              | - | XXXX                                       |
| specification identifier |   | type designator<br>(see 1.2.1) |   | <u>1</u> / class designator<br>(see 1.2.2) |

1/ Class designations are applicable only to types I and IA.

6.8 Subject term (key word) listing.

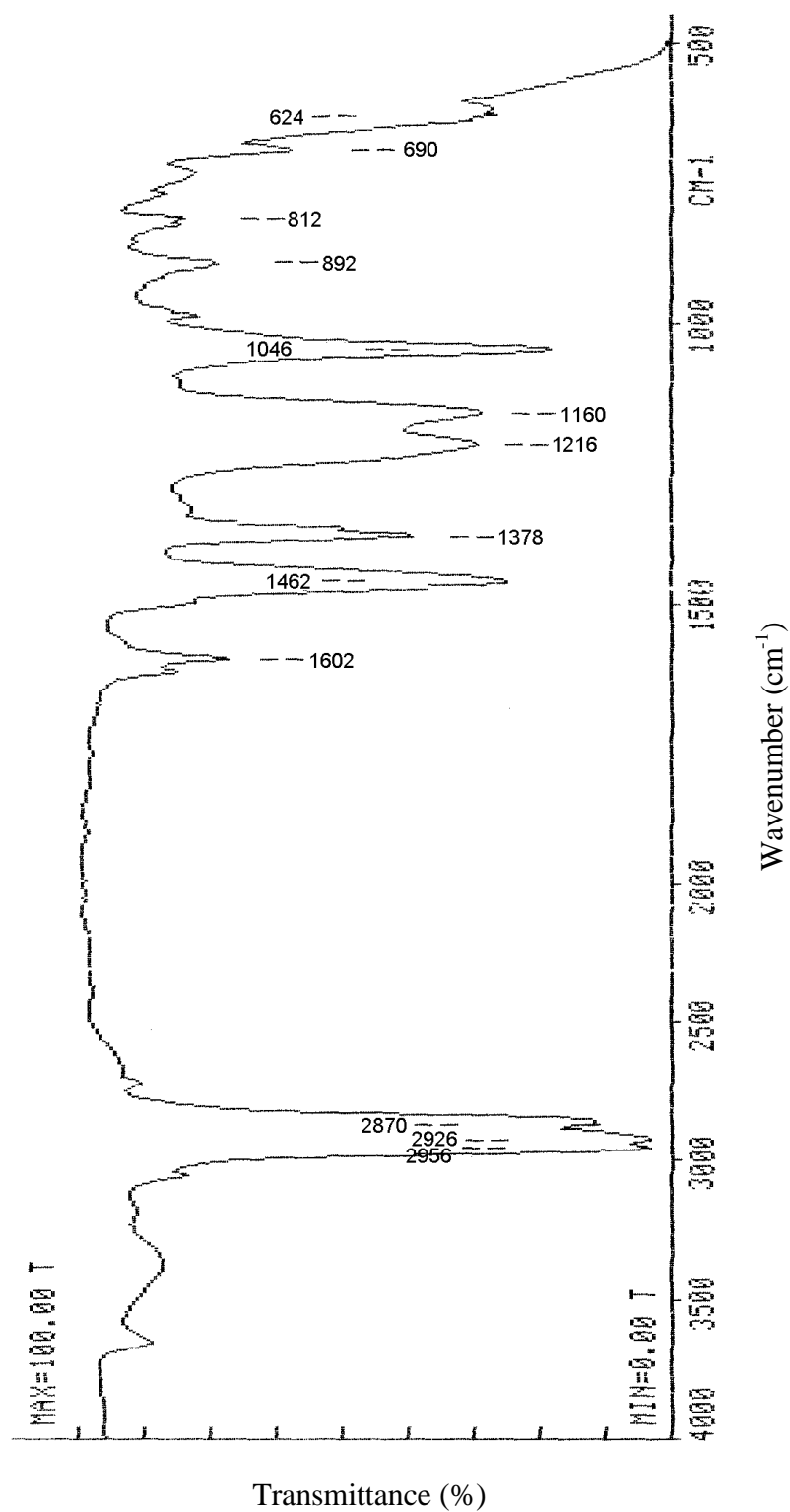
Barium petroleum sulfonate  
Carbon dioxide propellant  
Coating  
Glycol ether  
Hydrofluorocarbon  
Penetrant  
Rust proofing  
Sealer  
Water-displacing  
Waterproofing

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.

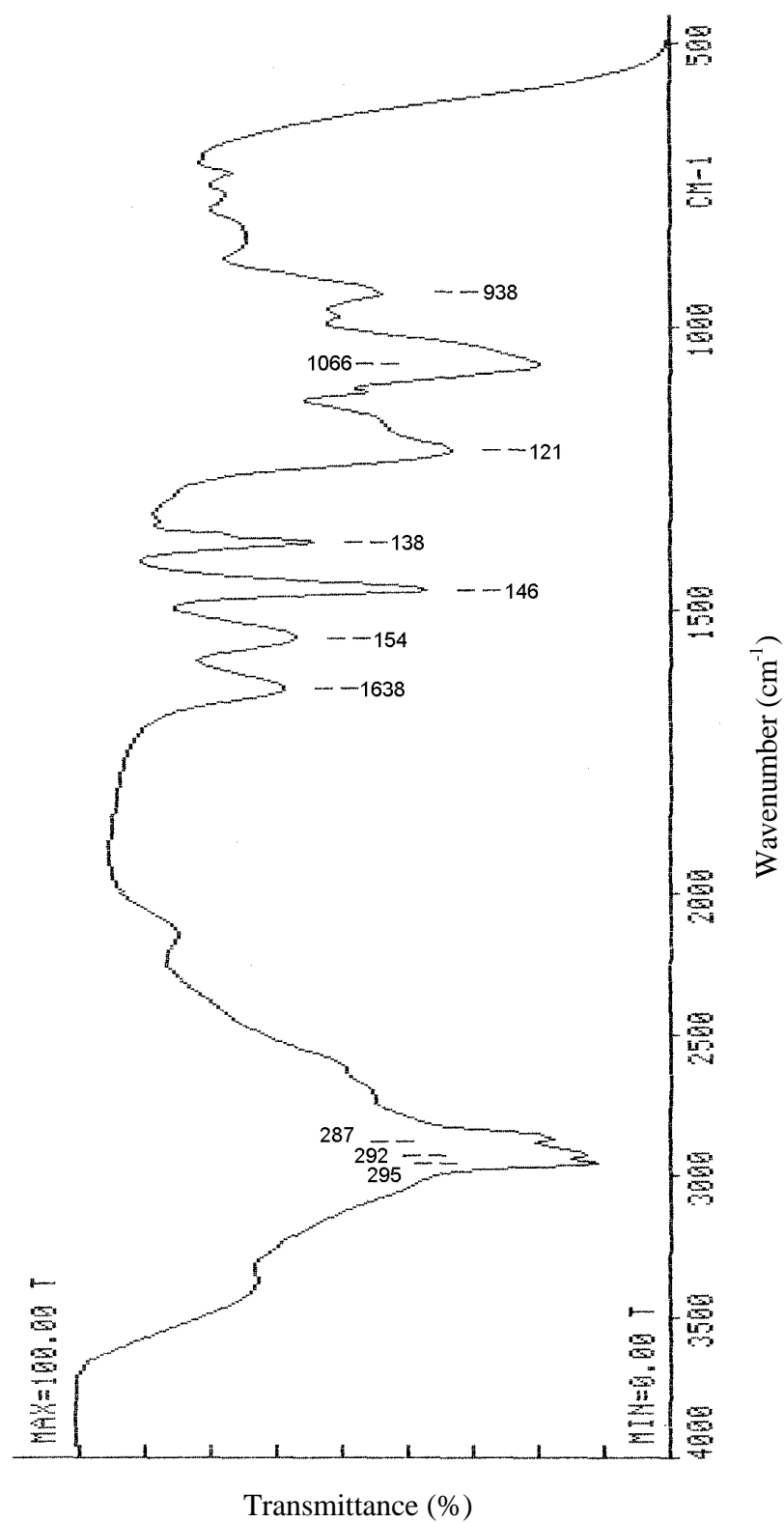
## CONCLUDING MATERIAL

Preparing activity:  
Navy – AS  
(Project 8030-N810)

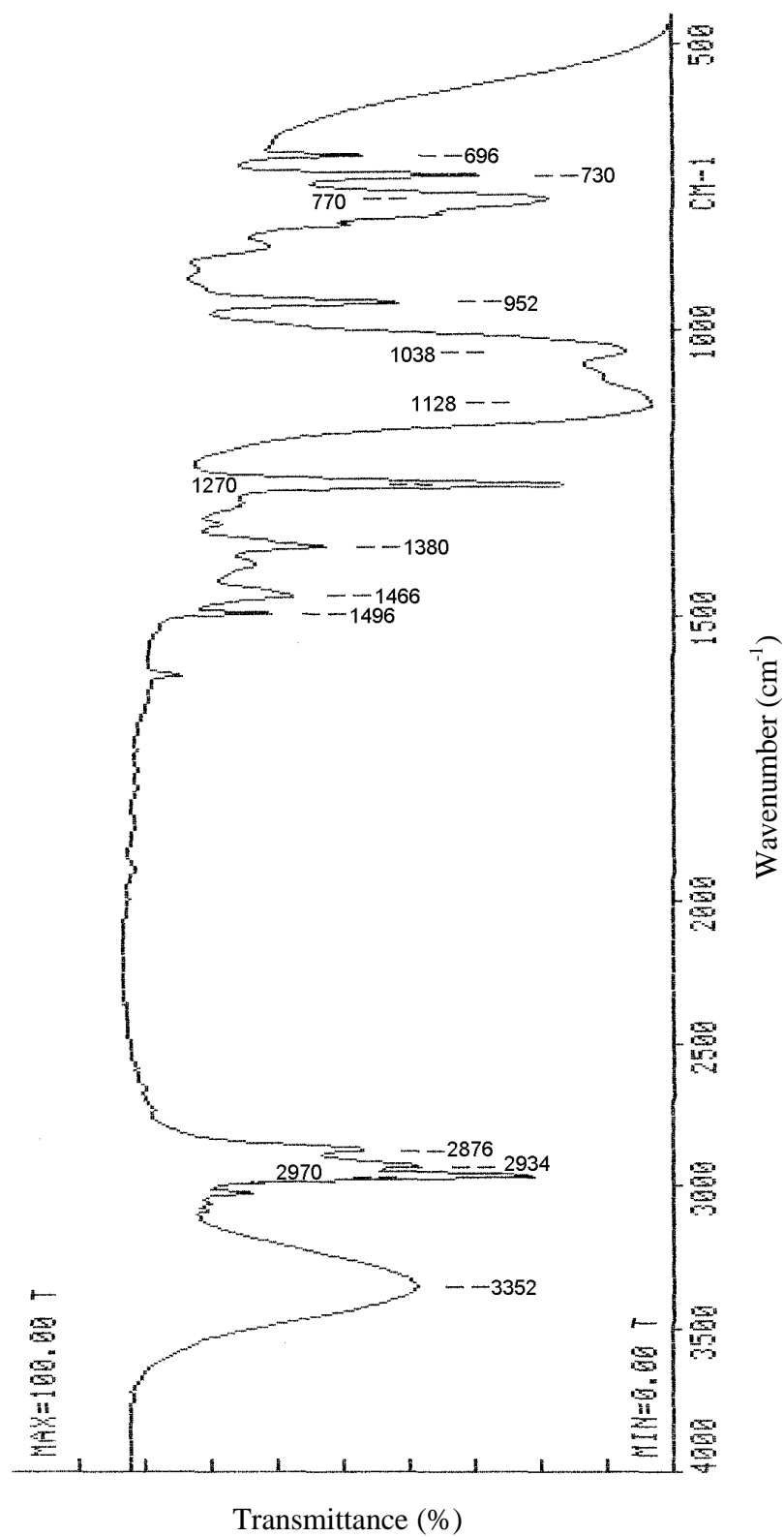
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FIGURE 1. Infrared spectrum of barium petroleum sulfonate.

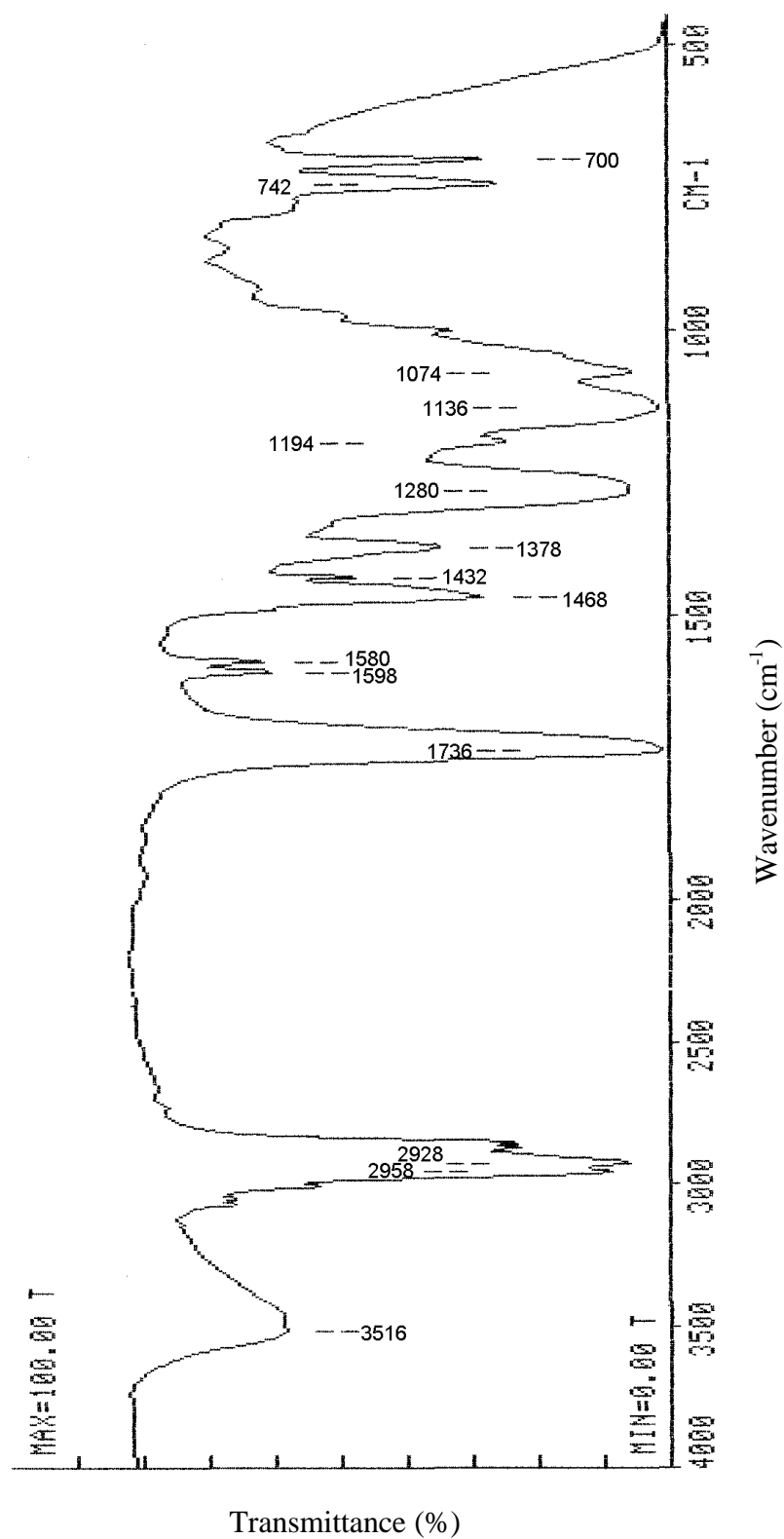
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FIGURE 2. Infrared spectrum of alkyl ammonium organic phosphate.

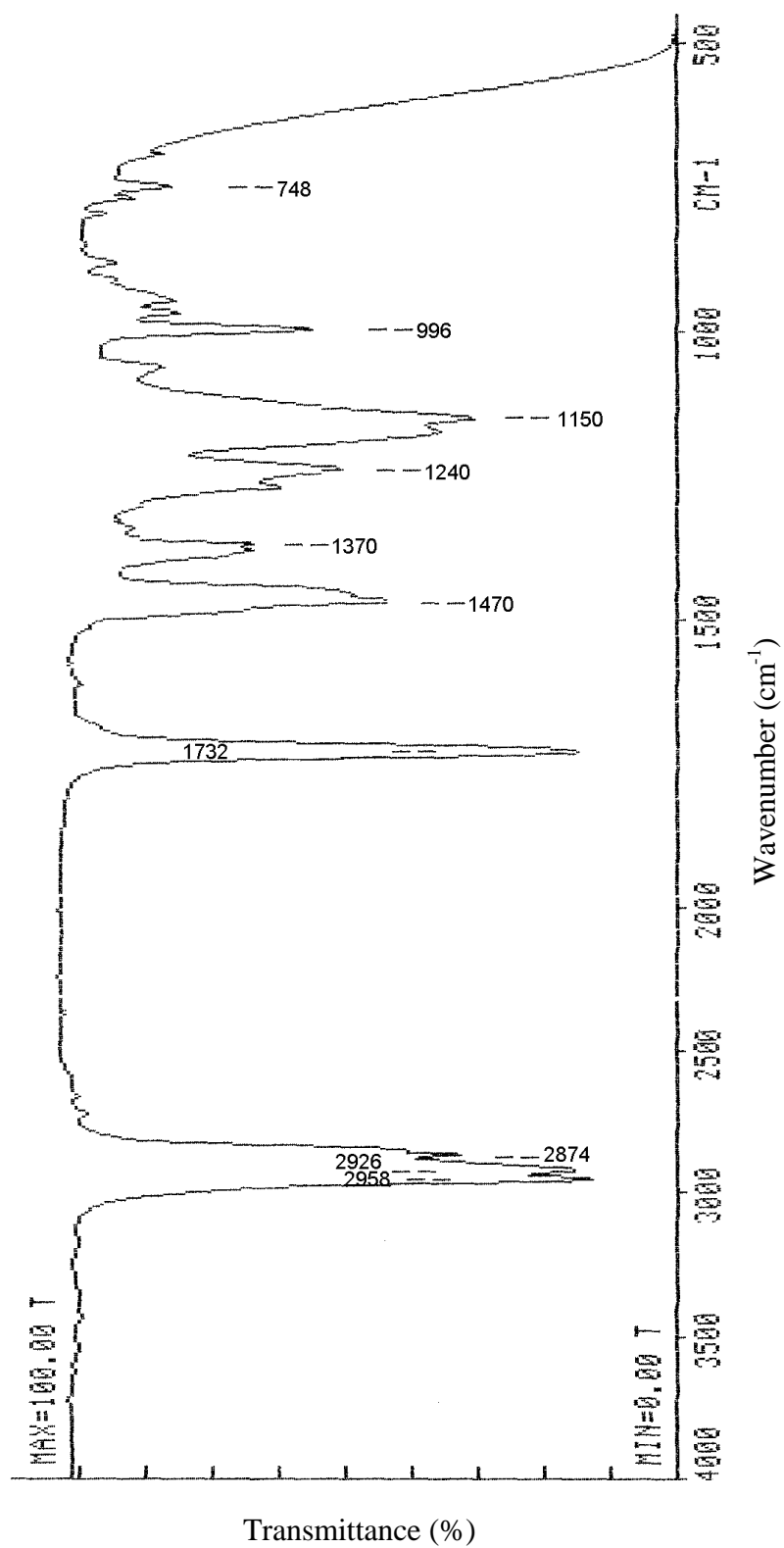
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FIGURE 3. Infrared spectrum of silicone resin.

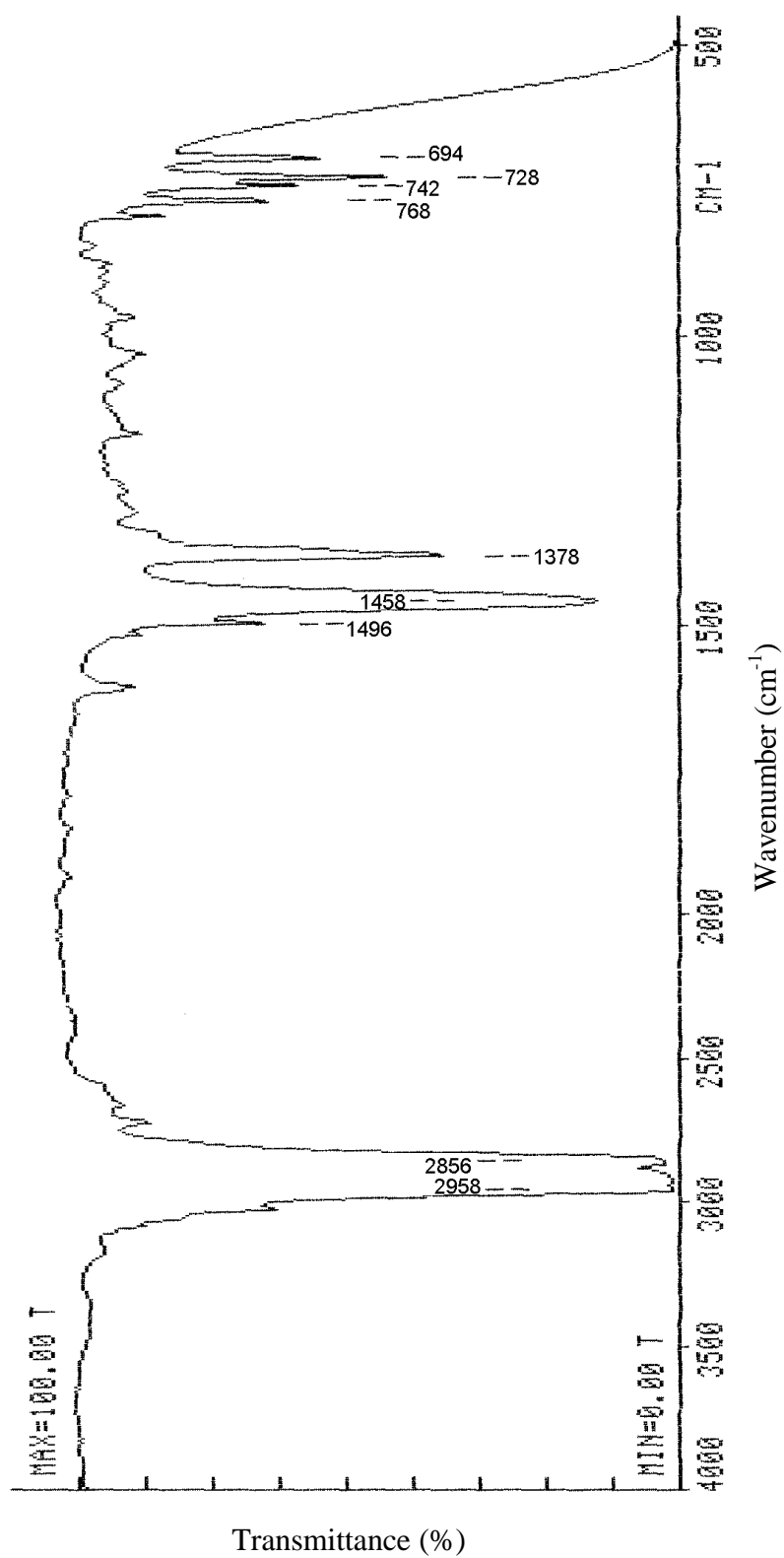
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FIGURE 4. Infrared spectrum of silicone alkyd resin.

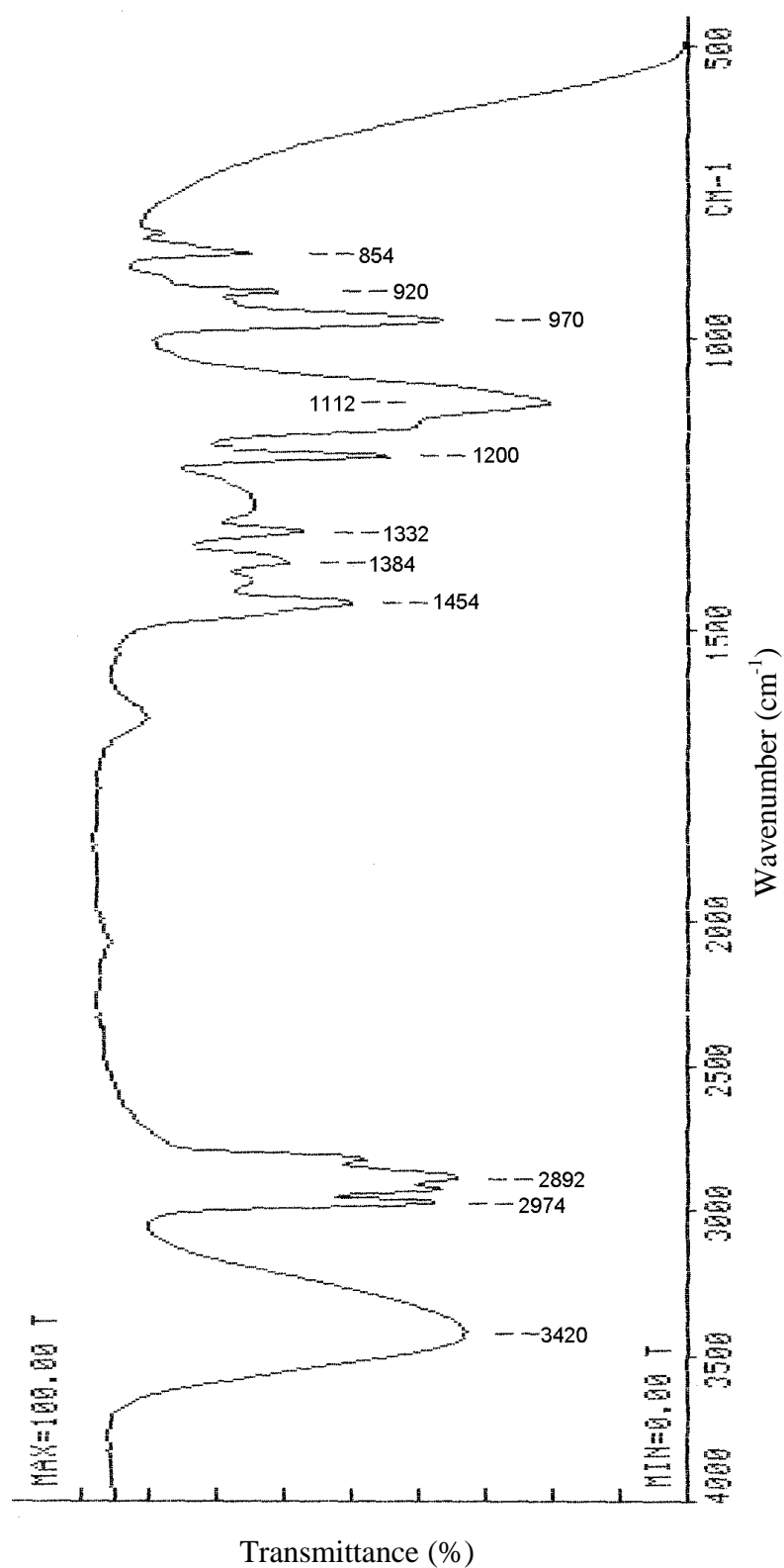
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FIGURE 5. Infrared spectrum of acrylic resin.

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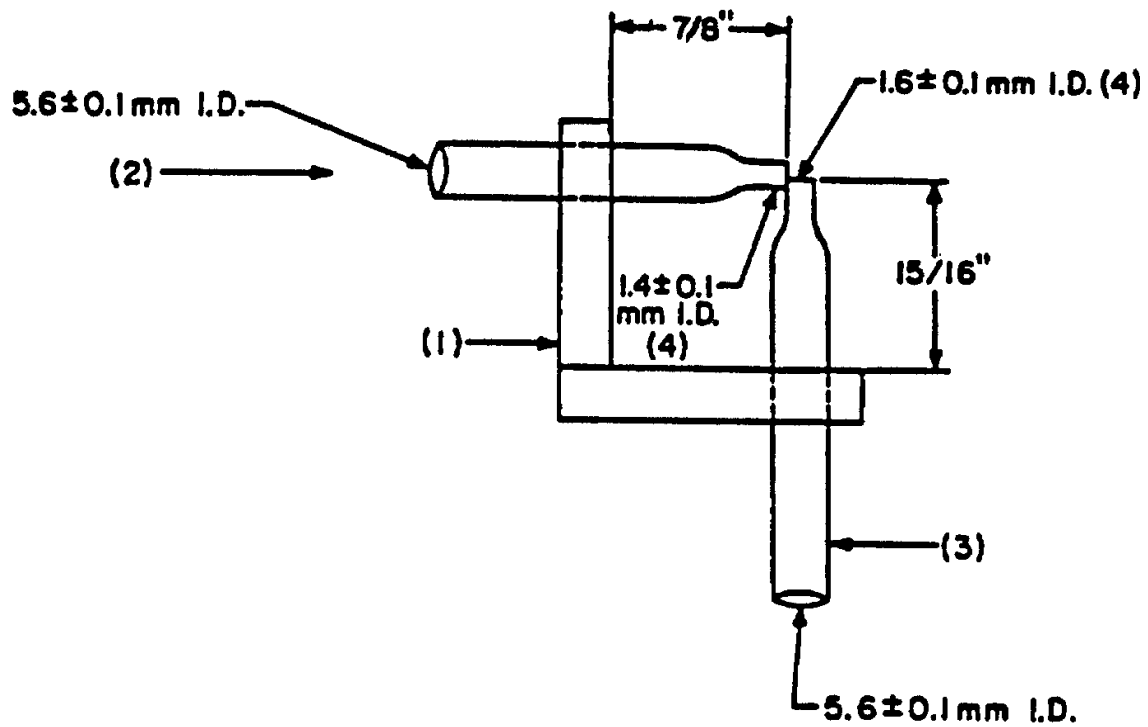
FIGURE 6. Infrared spectrum of VM&P naphtha.

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FIGURE 7. Infrared spectrum of propylene glycol monomethyl ether.



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1. 1/4 inch acrylic material
2. Filtered air source
3. Liquid pickup tube
4. Orifice

FIGURE 8. Spray nozzle.

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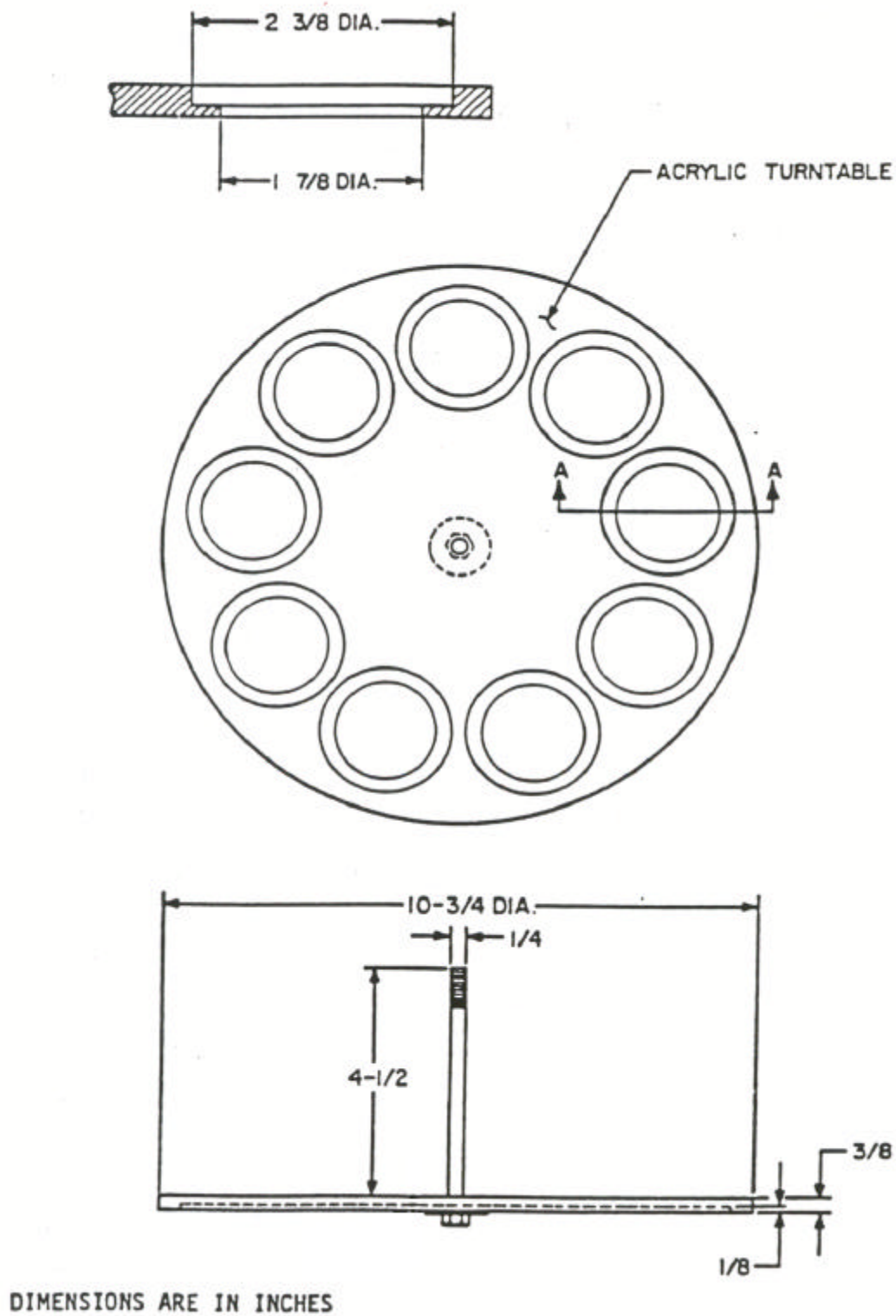
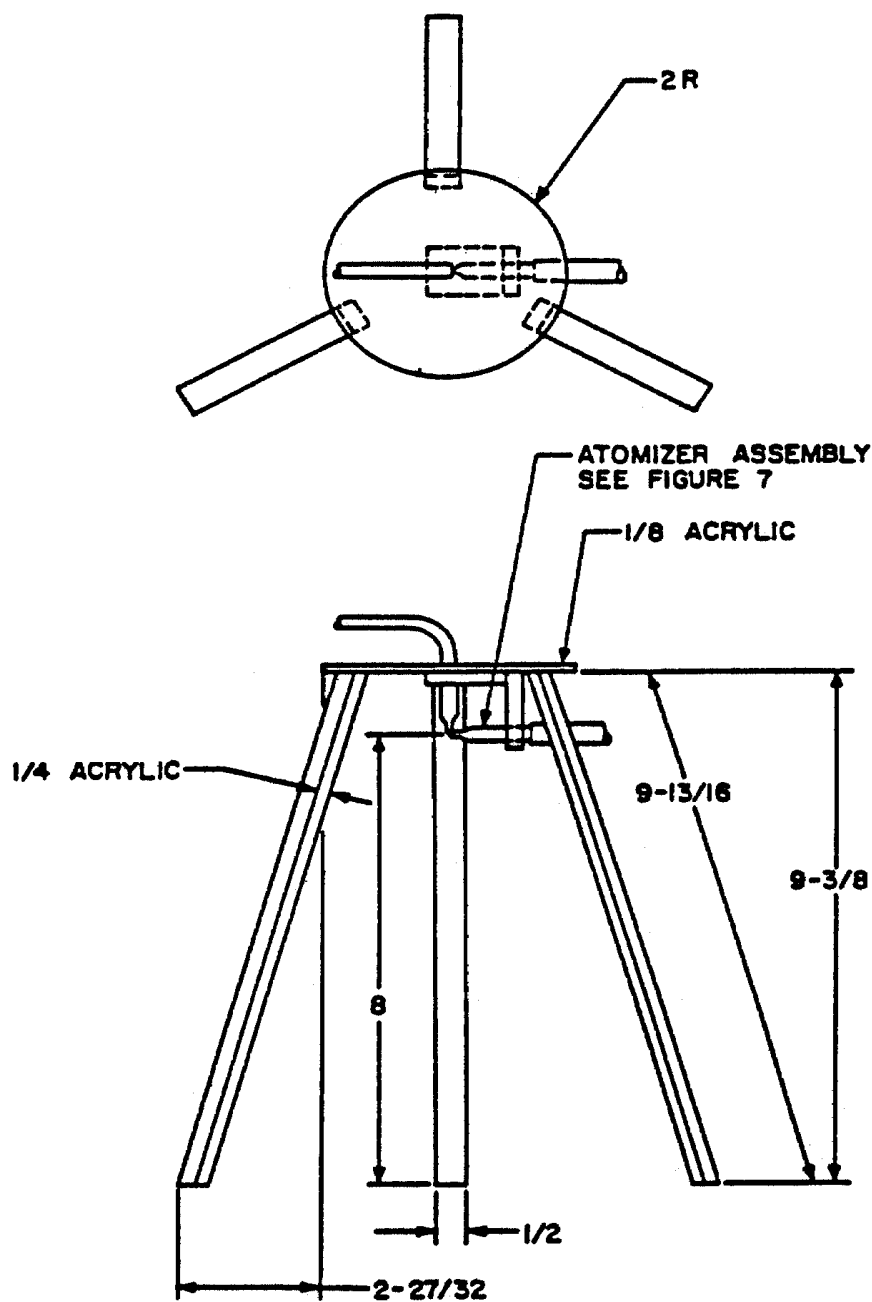


FIGURE 9. Acrylic turntable detail.

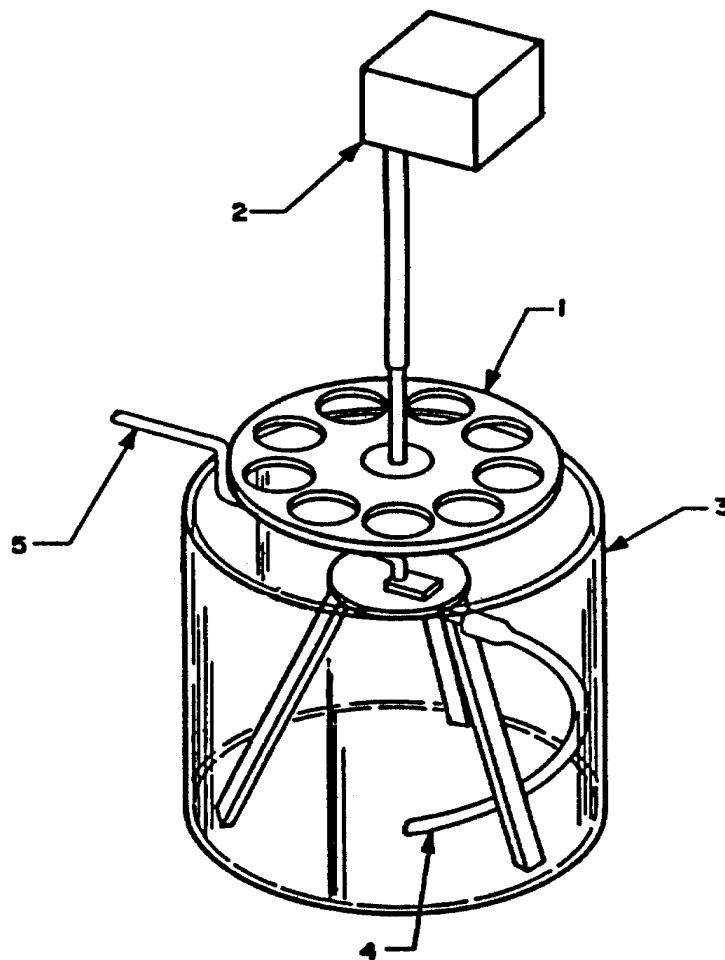
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DIMENSIONS ARE IN INCHES

FIGURE 10. Atomizer support.

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LEGEND

1. Acrylic turntable, positioned with the lower surface 1.5 inches above the jar rim. The turntable (see figure 9) is provided with holes for the mounting of the test disk holders. The turntable is mechanically rotated, driven by the electric motor (2) encased in a protective acrylic box, mounted above the jar.
2. Electric drive motor
3. Jar, 12 inches diameter, 12 inches high
4. Liquid pickup tube
5. Compressed air inlet, 12 psi, 1 ft<sup>3</sup>/min.
6. Acrylic atomizer support - See figure 10
7. Atomizer assembly - See figure 10

FIGURE 11. Synthetic sea water - sulfurous acid spray test apparatus.

