

MIL-V-13497A(Ord)  
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SUPERSEDING  
MIL-V-13497(Ord)  
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## MILITARY SPECIFICATION

### VARNISH, IMPREGNATING, ELECTRICAL-INSULATING (For Fire Control Instruments)

#### 1. SCOPE

1.1 Scope.- This specification covers an electrical insulating varnish for impregnating electrical windings of a synchro servo motor and other low torque precision rotating mechanisms requiring low friction bearings. These units are for use in Army Ordnance fire control instruments.

1.2 Classification.- Insulating varnish shall be furnished in the following type and grade:

Type M - Material for application by manufacturers of fire control equipment

Grade CB - Clear, impregnating, insulating (see 6.2)

#### 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids form a part of this specification to the extent specified herein.

##### Federal Specifications:

TT-P-143 - Paint, Varnish, Lacquer and Related Materials; General Specification for Packaging, Packing, and Marking

PPP-C-96 - Cans, Metal, 28 Gage and Lighter

PPP-P-704 - Pails: Shipping, Steel (1 through 12 gallon)

##### Federal Standards:

FED. TEST METHOD STD. No. 141 - Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing

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Military Specifications:

MIL-V-1137 - Varnish, Electrical-Insulating (for Electromotive Equipment)

MIL-T-13867 - Treatment, Moisture and Fungus Resistant for Fire Control Electrical and Electronic Instruments and Equipment

Military Standard:

MIL-STD-129 - Marking for Shipment and Storage

(Copies of specifications and standards required by contractor in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material.

3.1.1 The varnish shall be a thermosetting polymerizable material and consist only of phenol-aldehyde resins, modifying oils, thinners and driers.

3.1.2 Electrical insulating varnish shall be of a brand which has been tested and successfully passed the qualification tests specified in specification MIL-V-1137.

3.2 Suitability.

3.2.1 Application.- Insulating varnish shall be suitable in every respect for application and use on electrical windings, synchro and servo motors and other electrical mechanisms requiring low friction bearings. It shall preserve the initial dielectric strength of the insulation to which it is applied by the exclusion therefrom of moisture, lubricating oil and grease, acids, sea water, or other deleterious substances to which the electrical apparatus may be subjected in the armed services.

3.2.2 Cure.- The varnish shall be suitable for application by impregnation. The curing time to give the optimum electrical and mechanical properties of the applied varnish by impregnation shall be no longer than 40 hours at 275 degrees F.

3.3 Distillate corrosion resistance.- The varnish shall be capable of meeting the distillate corrosion resistance test specified in 4.5.2.1. Not more than 25 percent of metal foil surface shall show evidence of corrosion or gassing.

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3.4 Thinner.- The thinner used shall be of such a nature that it will not constitute an undue hazard to personnel when applying the varnish. Evidence to this effect shall be subject to review by departmental medical authority.

3.5 Workmanship.- The material shall be of the highest quality, and shall be free from deleterious substances.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facility and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that the supplies and services conform to the prescribed requirements.

4.2 Lot.- Unless otherwise specified in the contract or order, a lot shall consist of varnish from one batch or tank offered for delivery at one time. If material cannot be identified by batch or tank, a lot shall consist of not more than 1,000 gallons offered for delivery at one time.

4.3 Sampling.- Samples taken for purposes of the tests prescribed in this specification shall be selected in a manner as to represent correctly the material furnished and avoid needless destruction of finished material when samples representative of the material are available from other sources.

4.3.1 Sampling for lot acceptance.- Sampling shall be in accordance with Fed. Test Method Std. No. 141, method 1031.

#### 4.4 Examination.

4.4.1 Examination of containers.- Each filled container shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each filled container shall also be weighed to determine the amount of content.

4.4.2 Examination of the packaging, packing and marking for shipment shall be made for conformance to the requirements of section 5.

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#### 4.5 Tests.

4.5.1 Tests shall be made in accordance with the distillate corrosion test procedure of paragraph 4.5.2.1 and the following test procedures of specification MIL-V-1137.

<u>Test</u>	<u>Test paragraph</u>
Nonvolatiles	4.5.1
Flash point	4.5.4
Drying time	4.5.5
Consistency and film properties	4.5.6
Dielectric strength (dry)	4.5.7.3
Fresh water immersion	4.5.10
Specific gravity	4.5.14
Viscosity	4.5.15

#### 4.5.2 Test procedures.

##### 4.5.2.1 Distillate corrosion test.

4.5.2.1.1 A 50-gm. sample of the varnish shall be placed in the bottom of each of four 500-ml. wide mouth Erlenmeyer flasks and shall be cured according to the following schedule:

- (a) 1 hour at 100°C
- (b) 1 hour at 125°C
- (c) 18 hours at 135°C

4.5.2.1.2 The baking shall be continuous and shall be done in a forced air circulation type oven. The greatest temperature differential existing between any two positions in this oven shall be not greater than 1 degree C.

4.5.2.1.3 After baking and cooling to room temperature, a tight-fitting lead-foil covered rubber stopper shall be inserted in each flask. Before insertion into flask, each stopper shall be tightly fitted with a 3/4 inch diameter side arm test tube. Then a metal foil (4.5.2.1.4), 2 inches in width, shall be wrapped tightly around the cylindrical portion of the test tube which will be placed in the flask. The foil shall be placed around the tube in such a manner that there will be no overlapping and that it will not touch the lead-foil or the rubber stopper. After the tube is inserted into the flask, it shall be fitted for circulation of cooling water, with the side arm connected to the outlet part of the system.

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4.5.2.1.4 Two of the foils shall be SAE blued steel (spring steel) and the other two shall be electrolytic copper. Before they are placed around the tubes, the steel foils shall be cleaned as follows:

- (a) Scrub the foils in hot soapy water and rinse with hot clear water.
- (b) Dip them in an approximately 0.1 N hydrochloric acid solution for 30 seconds and rinse in cold water.
- (c) Dip them in an approximately 0.1 N sodium hydroxide solution for 30 seconds and rinse in cold water.
- (d) Finally rinse in alcohol and air dry.

The copper foils shall be cleaned as follows:

- (a) Scrub in hot soapy water and rinse with hot clear water.
- (b) Dip in a solution containing 3 parts concentrated phosphoric acid and 1 part concentrated nitric acid for 30 seconds and rinse in cold water.
- (c) Rinse with alcohol and air dry.

4.5.2.1.5 The assembly shall be placed in the oven, and the cooling system connected. Then it shall be subjected to a temperature of 135 degrees C for 24 hours with the water circulating through the test tube continuously. The temperature of the water in each tube shall be maintained between 20 degrees and 32 degrees C.

4.5.2.1.6 At the end of the 24 hours, the foils shall be removed and replaced by fresh foils similarly prepared. The test tubes shall be wiped dry before the fresh foils are attached. These fresh foils shall also be exposed to the same temperature for 24 hours.

4.5.2.1.7 At the end of the test, all the foils shall be examined for evidence of corrosion or gummy deposits.

#### 4.6 Rejection.

4.6.1 Test failures.- A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.5.

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5. PREPARATION FOR DELIVERY

5.1 Packaging and packing.

5.1.1 Levels A and C.- Insulating varnish shall be prepared in accordance with specification TT-P-143 and shall be furnished in 1-gallon or 5-gallon containers as specified (6.2). Containers shall conform to specifications PPP-C-96 or PPP-P-704, except that 5-gallon containers will require no exterior protective coatings for domestic use.

5.2 Marking.- In addition to any special marking required by contract or order (see 6.2), marking for shipment shall be in accordance with specification MIL-STD-129.

6. NOTES

6.1 Intended use.

6.1.1 The insulating varnish covered by this specification is intended for applications by manufacturers of specialized Army equipment required to meet only the requirements of grade CB, type M specified in specification MIL-V-1137.

6.1.2 The varnish is intended for use where the distillation products which may be produced by the action of distillates on bearings at elevated temperatures will be harmful to the operation of the unit.

6.1.3 The material should be applied in accordance with the instructions of specification MIL-T-13867.

6.2 Ordering data.- Procurement documents should specify

- a. Title, number, and date of this specification.
- b. Size of containers required.
- c. Quantity of the varnish. The varnish should be furnished in 1-gallon volume, the unit being one U. S. liquid gallon of 231 cubic inches at 68°F (20°C).
- d. Type of containers.
- e. Level of packaging and level of packing (see 5.1).

NOTICE: When Government drawings, specifications, or other data are used in connection with a definitely intended procurement operation, the United States Government thereunto

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responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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