

INCH-POUND

MIL-I-16923H  
13 August 1991  
SUPERSEDING  
MIL-I-16923G  
4 October 1972  
(See 6.8)

## MILITARY SPECIFICATION

### INSULATING COMPOUND, ELECTRICAL, EMBEDDING, EPOXY

*This specification is approved for use by all departments and agencies of the Department of Defense.*

#### 1. SCOPE

**1.1 Scope.** This specification covers the requirements for a self-supporting epoxy compound for the molding, encapsulating, and potting of military electrical equipment. The compound is used to preserve the electrical properties of the component to which it is applied by sealing against such environmental conditions as moisture, dirt, fumes, fungus, or other deleterious substances that may be encountered in military service.

#### 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 (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5970

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

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**SPECIFICATIONS****FEDERAL**

**PPP-P-1892**      **Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing and Marking of**

**STANDARDS****FEDERAL**

**FED-STD-313**      **Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities**

**FED-STD-810**      **Environmental Test Methods and Engineering Guidelines**

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

**2.2 Non-Government publications.** The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, 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 are the issues of the documents cited in the solicitation (see 6.2).

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

<b>D 149</b>	<b>Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies; (DOD adopted)</b>
<b>D 150</b>	<b>Standard Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials; (DOD adopted)</b>
<b>D 256</b>	<b>Standard Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials; (DOD adopted)</b>
<b>D 257</b>	<b>Standard Test Method for D-C Resistance or Conductance of Insulating Materials</b>

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D 495	Standard Test Method for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation; (DOD adopted)
D 570	Standard Test Method for Water Absorption of Plastics; (DOD adopted)
D 638	Standard Test Method for Tensile Properties of Plastics (DOD adopted)
D 696	Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics; (DOD adopted)
D 792	Standard Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement; (DOD adopted)
D 1259	Standard Test Method for Nonvolatile Content of Resin Solutions (DOD adopted)
D 1674	Standard Methods of Testing Polymerizable Embedding Compounds used for Electrical Insulation
D 2196	Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer; (DOD adopted)
D 2240	Standard Test Method for Rubber Property -- Durometer Hardness; (DOD adopted)
D 2471	Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins
D 3487	Standard Specification for Mineral Insulating Oil in Electrical Apparatus (DOD adopted)
F 74	Standard Recommended Practice for Determining Hydrolytic Stability of Plastic Encapsulants for Electronic Devices

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

(Nongovernment standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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**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 document 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.** Insulating compounds furnished under this specification shall be products which are authorized by the qualification activity for listing on the applicable qualified products list at the time of award of contract (see 4.3 and 6.4).

**3.2 Materials.** The product shall be based on a bisphenol-A epoxy-based polymer with curing agent. The product formulation shall contain no unreactive volatile constituents.

**3.2.1 Components.** The product shall be a chemically reactive, single component, or multicomponent compound. If a multicomponent product, the component labeled A shall contain a resin base; component B shall contain a curing agent base; and component C, if required, shall contain a catalyst.

**3.2.2 Cure.** When mixed in the ratio specified by the manufacturer, the product shall cure at a temperature less than 130 degrees Celsius ( $^{\circ}\text{C}$ ) to meet the properties specified herein.

**3.2.3 Fillers and additives.** Fillers and additives may be incorporated into the product to obtain the properties defined by this specification. Fillers shall be uniformly dispersed throughout the product. Fillers shall not agglomerate or irreversibly settle during storage of the product. The fillers shall not settle during application or cure. Phase separation shall not occur in any component during the working life or cure of the product (see 4.3.1).

**3.2.4 Toxicity.** The components, individually or when mixed, and the cured product shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the Bureau of Medicine (BUMED) who will act as an advisor to the contracting activity (see 4.1.2).

**3.2.5 Appearance.** The packaged components shall be free from all foreign substances, such as grit, dirt, oil, and water. The components shall show no gel particles, ingredient lumps, or agglomerates.

**3.2.6 Change in raw material supplier.** Change of raw material supplier shall require notification of Naval Sea Systems Command (NAVSEA) and possible requalification of the product, as determined by NAVSEA.

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**3.2.7 Change in product formulation.** Changes in the composition or manufacturing processes of any component shall require requalification of the product.

**3.2.8 Recovered materials.** Unless otherwise specified herein, all material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

**3.2.9 Working life.** Working life for two/three components epoxies, after mixing the two/three components thoroughly, the working life shall be that time beyond which the epoxy can no longer be satisfactorily applied brush, or beyond which it no longer flows evenly and is too viscous to wet the area to be patched. (see 4.3.2)

**3.3 Properties of individual components.** Properties of individual components shall be as specified in 3.3.1 through 3.3.3.

**3.3.1 Color.** Coloring additives may be used. Different colored products shall require separate qualification testing.

**3.3.2 Asbestos.** Asbestos shall not be used in the product formulation.

**3.3.3 Volatile content.** The components shall be free of nonreactive, volatile solvents. The total volatile matter measured in each component shall be not more than 1.0 percent by weight (see 4.5.3).

**3.4 Properties of mixed, uncured compound.** The pot life and viscosity of the uncured compound shall conform to the requirements shown in table I.

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TABLE I. Quantitative requirements.

Property	Units	Value (qualification)	Value (quality conformance)
Volatile content, maximum	Weight percent	1.0	1.0
Pot life at 23°C, minimum	Min	30-45	Min
Viscosity, maximum	cps	25,000	25,000
Working life, minimum	Min	30	
Flammability, extent of burning, maximum	in	1.0	
Average specific gravity	-	- <sup>1</sup>	± 0.1 of qualification value 75
Mean hardness, minimum	Shore D	75	
Average tensile strength, minimum	lb/in <sup>2</sup>	7,000	
Average elongation, minimum	Percent	2.0	
Average water absorption, maximum	Percent	0.2	
Mechanical shock, minimum	lb	3	
Average notched Izod impact, minimum	ft-lb/in	0.3	0.3
Thermal shock, minimum	Cycles	10	
Average thermal expansion coefficient, maximum	in/in/°C	$30 \times 10^{-5}$	
Thermal conductivity coefficient, minimum	Cal cm/cm <sup>2</sup> sec°C	$2.5 \times 10^{-4}$	
Dielectric strength, minimum	Volts/mil	325	325
Dielectric constant, maximum	-	5	
At 60 hertz (Hz)	-	4.5	
At 1 megahertz (MHz)	-		
Dissipation factor, maximum	-	0.04	
At 60 Hz	-	0.05	
At 1 MHz	-		
Arc resistance, minimum	Sec	50	
Volume resistivity, minimum	ohm cm	$1 \times 10^{13}$	
Hydrolytic stability:			
Average volume resistivity, maximum	ohm cm <sup>2</sup>		
Average hardness, maximum	Percent reduction from control <sup>2</sup>	10	
Fungus resistance	-	Grade 0	

<sup>1</sup>Informational purposes only.<sup>2</sup>After aging at conditions specified.

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**3.5 Properties of cured, cast specimens.** When cast and cured as specified, the product shall conform to the physical and electrical property requirements shown in table I.

**3.6 Material safety data sheet.** The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is Form OSHA-20, found in and part of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.6).

#### **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 (examinations and tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

**4.1.1 Responsibility for compliance.** All items shall 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 ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

**4.1.2 Toxicological product formulations.** The contractor shall have the toxicological product formulations and associated information available for review by the contracting activity to evaluate the safety of the material for the proposed use.

**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).

**4.3 Qualification inspection.** Qualification tests shall be conducted at a laboratory acceptable to NAVSEA. Qualification tests shall consist of the tests specified in table II. (see 6.4)

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TABLE II. *Qualification tests.*

Property	Test
Volatile content	4.5.3
Pot life	4.5.4
Viscosity	4.5.5
Working life	4.3.2
Flammability	4.5.6
Specific gravity	4.5.7
Hardness	4.5.8
Tensile strength	4.5.9
Elongation	4.5.9
Water absorption	4.5.10
Mechanical shock	4.5.11
Izod impact	4.5.12
Thermal shock	4.5.13
Thermal expansion coefficient	4.5.14
Thermal conductivity coefficient	4.5.15
Dielectric strength	4.5.16
Dielectric constant	4.5.17
At 60 Hz	
At 1 MHz	
Dissipation factor	4.5.17
At 60 Hz	
At 1 MHz	
Arc resistance	4.5.18
Volume resistivity	4.5.19
Hydrolytic stability:	
Hardness	4.5.20.2
Volume resistivity	4.5.20.1
Fungus resistance	4.5.21

**4.3.1 Samples.** The manufacturer shall furnish a sufficient amount of the compound ingredients to complete all qualification testing.

**4.3.2 Working life.** After the mixing the epoxy shall still be useable for pitching at least 30 minutes. (see 3.2.9)

**4.4 Quality conformance inspection.** Quality conformance inspection shall consist of the inspections and tests listed in table III. (See 6.3)

**4.4.1 Lot.** For purposes of quality conformance inspection, a lot shall consist of individual epoxy components from a single, uniform batch, or uniform blend of batches (for each component) offered for delivery at one time. The addition of any substance to a batch shall constitute a new lot.



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4.4.1.1 **Quality conformance inspection sampling.** As a minimum, the contractor shall select two samples from each lot of each component necessary to form the epoxy. Minimum size for each sample shall be 1 quart. One sample shall be from the first container poured in the lot, and one sample shall be from the last container poured in the lot. The samples shall be subjected to the tests listed in table III. Detection of any nonconforming characteristic in any sample shall result in rejection of the entire lot. The contractor has the option of correcting the discrepancy, retesting, and resubmitting a conforming lot or submitting a new lot which shall be inspected and tested as specified herein. Quality conformance tests shall be conducted at a laboratory acceptable to NAVSEA.

TABLE III. *Quality conformance tests.*

Property	Test
Examination	4.5.2
Volatile content	4.5.3
Pot life	4.5.4
Viscosity	4.5.5
Flammability	4.5.6
Specific gravity	4.5.7
Hardness	4.5.8
Water absorption	4.5.10
Izod impact	4.5.12
Thermal shock	4.5.13
Dielectric strength	4.5.16

4.4.1.2 **Sampling for examination of filled containers.** As a minimum, the contractor shall randomly select a sample quantity of filled containers from each lot in accordance with table IV and examine them in accordance with 4.5.2. Detection of any nonconforming characteristic in any sample shall result in rejection of the entire lot. The contractor has the option of correcting the discrepancy, retesting, and resubmitting a conforming lot or submitting a new lot which shall be inspected and tested as specified herein.

TABLE IV. *Sampling for examination of filled containers.*

Lot size	Sample size
2 to 8	All
9 to 90	8
91 to 150	12
151 to 280	19
281 to 500	21
501 to 1,200	27
1,201 to 3,200	35
3,201 to 10,000	38
10,001 to 35,000	46
35,001 to 150,000	56
150,001 and over	64

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**4.4.2 Quality conformance tests.** Quality conformance tests for each lot shall consist of all the tests specified in table III.

**4.4.2.1 Quality conformance report.** When specified in the contract or order, a test report shall be prepared (see 6.3).

**4.5 Tests.** Tests shall be as specified in 4.5.1 through 4.5.21.

**4.5.1 Test conditions, tolerances, casting, and mold.** Test conditions, tolerances, casting, and mold shall be as specified in 4.5.1.1 through 4.5.1.4.

**4.5.1.1 Conditions.** Unless otherwise specified, specimens shall be conditioned 48 hours at 23 °C and 50 percent relative humidity before being tested. Testing shall be conducted at 23 °C and 50 percent relative humidity. (see 6.2)

**4.5.1.2 Temperature and humidity tolerances.** Unless otherwise specified, specified temperatures shall be maintained between plus or minus 2 °C, and specified relative humidity shall be maintained within an absolute plus or minus 5 percent relative humidity.

**4.5.1.3 Mold.** Specimens shall be cast at the testing laboratory. Unless otherwise specified, the mold shall consist of two highly polished metal plates, of suitable thickness, coated with a release agent and spaced to the desired specimen thickness with U-shaped spacers of polytetrafluoroethylene or a similar material to which the compound will not adhere. The mold assembly shall be clamped together with sufficient pressure to prevent leakage of the compound. A mold to produce 6- by 6-inch specimens is recommended. The resulting cast slab shall then be cut into the specimen size required.

**4.5.1.4 Casting.** The compound ingredients shall be mixed in accordance with the manufacturer's directions, then poured into the molds. When the ingredients are mixed at temperatures above 23 °C, the molds shall be preheated approximately 10 °C above the mixing temperature before the mixture is poured into the molds. In pouring, precautions shall be taken to avoid entrapment of air. Specimens shall then be cured in accordance with the manufacturer's instructions regarding time and temperature.

**4.5.2 Examination of filled containers.** Each sample filled container selected in accordance with 4.4.1.2 shall be examined for defects of the container and closure, for evidence of leakage, and for unsatisfactory markings. Each sample filled container shall also be weighed to determine the amount of the contents. Any container in the sample having one or more defects or under required fill shall be rejected.

**4.5.3 Volatile content.** Volatile content of each component shall be determined in accordance with ASTM D 1259, method B (see 3.4).

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**4.5.4 Pot life.** Pot life shall be determined at  $23 \pm 1$  °C in accordance with ASTM D 2471. A 14-fluid ounce working volume and a 14-fluid ounce test volume in a 1-pint metal container shall be used (see 3.4).

**4.5.5 Viscosity.** Viscosity shall be measured at  $23 \pm 0.5$  °C in accordance with method A, of ASTM D 2196 with a spindle speed of 20 revolutions per minute (r/min) (see 3.4).

**4.5.6 Flammability.** Flame test shall be determined in accordance with ULVN. Ten specimens 6 inches by approximately 0.5 inch by approximately 0.125 inch cut from slabs cast as specified in 4.5.1.4 shall be used (see 3.4).

**4.5.7 Specific gravity.** Specific gravity shall be determined in accordance with method A of ASTM D 792. Three specimens 3 inches by 1 inch by approximately 0.125 inch cut from slabs shall be cast as specified in 4.5.1.4. The average of the three measurements shall be reported (see 3.4).

**4.5.8 Hardness.** Shore D hardness shall be measured on three areas of one cast specimens in accordance with ASTM D 2240. The mean hardness value shall be reported (see 3.4).

**4.5.9 Tensile strength and elongation.** Tensile strength and elongation shall be determined in accordance with ASTM D 638, type I. Five specimens shall be tested at a crosshead speed of  $0.2 \pm 0.05$  inch per minute (see 3.4).

**4.5.10 Water absorption.** Water absorption shall be determined in accordance with the 24-hour immersion procedure specified in ASTM D 570. Three specimens cast in accordance with 4.5.1.4 and with a thickness of approximately 0.125 inch shall be preconditioned in an oven for 24 hours at  $50 \pm 3$  °C, cooled in a desiccator, and immediately weighed before testing (see 3.4).

**4.5.11 Mechanical shock.** Mechanical shock shall be determined by the following method (see 3.4).

**4.5.11.1 Specimen.** Three specimens 2 by 2 inches by approximately 0.5 inch, prepared as specified in 4.5.1.4 shall be tested.

**4.5.11.2 Apparatus.** A set of steel balls varying in size from 1 to 4 inches in diameter shall be used. The balls shall vary in size in increments of approximately 0.0625 inch up to approximately 2.5 inches. Increments shall be 0.25 inch thereafter. The steel balls shall be held and released by a rigidly supported magnetic device that shall drop the balls on the exact center of the specimen. The specimen shall be placed on a 1-inch thick steel plate of surface dimensions larger in all directions than the test specimen (see 4.5.11.1).

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**4.5.11.3 Procedure.** A specimen shall be placed flat on a horizontal steel plate. When dropped a vertical distance of 3 feet, the steel balls shall strike the center of the specimen. Each specimen shall be struck with steel balls starting with the smallest and proceeding toward the largest until the specimen visibly cracks. The weight of the ball which caused the crack of each specimen shall be reported.

**4.5.12 Izod impact.** Izod impact shall be determined on five specimens in accordance with method A of ASTM D 256 (see 3.4).

**4.5.13 Thermal shock.** Thermal shock shall be determined in accordance with ASTM D 1674. The temperature limits shall be 130 °C and minus 55 °C during the test. If four of the five specimens complete the 10 cycles, the compound shall be considered as having passed the test (see 3.4).

**4.5.14 Thermal expansion coefficient.** The coefficient of thermal expansion shall be determined in accordance with ASTM D 696. Testing shall be conducted over a temperature range of minus 40 to 66 °C (see 3.4).

**4.5.15 Coefficient of thermal conductivity.** The coefficient of thermal conductivity shall be determined in accordance with ASTM D 1674 (see 3.4).

**4.5.16 Dielectric strength.** Dielectric strength shall be determined in accordance with ASTM D 149. Tests shall be on specimens immersed in transformer oil conforming to ASTM D 3487. Test electrodes shall consist of two metal cylindrical rods 0.25 inch in diameter with edges rounded to a radius of 0.0313 inch. The pressure between electrodes shall be approximately 0.1 pound. The short-time test to breakdown using 500 volts per second shall be conducted on eight specimens 3 by 3 inches by 0.125 inch cast in accordance with 4.5.1.4. Dielectric strength shall be reported as the minimum, maximum, and average of the eight measurements, in volts per mil (see 3.4).

**4.5.17 Dielectric constant and dissipation factor.** Dielectric constant and dissipation factor shall be determined in accordance with ASTM D 150. Dissipation factor and dielectric constant measurements shall be made on each of three specimens at 60 Hz and 1 MHz (see 3.4).

**4.5.18 Arc resistance.** Arc resistance shall be determined in accordance with ASTM D 495 (see 3.4).

**4.5.19 Volume resistivity.** Volume resistivity shall be determined in accordance with ASTM D 257. The test specimen shall be a flat, molded sheet of approximately 0.125 inch thickness. Five specimens shall be prepared as specified in 4.5.1.4. The disc electrode configuration shall be as specified in ASTM D 257 for flat specimens (see 3.4).

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**4.5.20 Hydrolytic stability.** Hydrolytic stability shall be as specified in 4.5.20.1 through 4.5.20.2.1.

**4.5.20.1 Volume resistivity.** After exposure to high humidity, the apparatus for measuring volume resistivity shall be the same as specified in 4.5.20. The apparatus for exposing the specimens to high humidity at elevated temperature shall be in accordance with ASTM F 74. Five test specimens shall be placed in a humidity chamber that maintains  $95 \pm 3$  percent relative humidity at  $71 \pm 1$  °C for 120 days. After 120 days, the specimens shall be removed and cooled for  $4 \pm 0.5$  hours at 23 °C and 50 percent relative humidity before testing and held at these conditions. Five control specimens shall be molded as specified in 4.5.1.4. Each control specimen and all specimens aged at high humidity shall be tested for volume resistance in accordance with ASTM D 257. The disc electrode configuration shall be as specified in ASTM D 257 for flat specimens (see 3.4).

**4.5.20.1.1 Report.** After exposure to high humidity, volume resistivity shall be calculated using the appropriate equation specified in ASTM D 257. The average volume resistivity of the five aged specimens shall be subtracted from the average volume resistivity of the control specimens to obtain the change in volume resistivity caused by exposure.

**4.5.20.2 Hardness.** Apparatus for measuring hardness shall be in accordance with ASTM D 2240. The apparatus for exposing the specimens to high humidity at elevated temperature shall be in accordance with ASTM F 74. The test specimen shall be a flat, molded sheet of not less than 0.25 inch thickness. Specimens shall be prepared as specified in 4.5.1.4. Five test specimens shall be placed in a humidity chamber which shall maintain  $95 \pm 3$  percent relative humidity at  $71 \pm 1$  °C for 120 days. After 120 days, the specimens shall be removed and cooled for  $4 \pm 0.5$  hours at 23 °C and 50 percent relative humidity before testing and held at these conditions. Five control specimens shall be molded as specified in 4.5.1.4. Each control specimen and all test specimens aged at high humidity shall be tested for hardness in accordance with ASTM D 2240 (see 3.4).

**4.5.20.2.1 Report.** The average hardness shall be measured on the five test specimens after humidity exposure and then subtracted from the average hardness of the five control specimens. The result is the change in hardness caused by humidity exposure. To calculate percent change in hardness, the value shall be divided by the average hardness of the five control specimens.

**4.5.21 Fungus resistance.** Fungus resistance shall be determined in accordance with FED-STD-810, method 508 (see 3.4).

**4.6 Inspection of packaging.** Sample packages and packs, and the inspection of the preservative, packing, and container marking for shipment, stowage, and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

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**5. PACKAGING**

(The packaging requirements specified herein apply only for direct Government acquisition.)

**5.1 Packaging requirements.** The requirements for packaging shall be in accordance with the following. Preservation shall be level A, or commercial, and packing shall be levels A, B, or commercial, as specified (see 6.2) and in accordance with PPP-P-1892 and applicable packaging acquisition options therein as specified (see 6.2). The multi-component product shall be packaged as a kit, with the weight ratio of each component in agreement with the manufacturers mixing ratio.

**5.1.1 Component identification.** Containers having the epoxy resin component shall be marked as "Component A". Containers having the curing agent component shall be marked as "Component B". If required, a third component shall be marked "Component C".

**5.2 Marking.** In addition to any special marking required (see 6.2), shipments shall be marked, including bar coding, in accordance with PPP-P-1892, as applicable.

**5.2.1 Containers.** Each container of component A, B, and C, if applicable, shall be permanently labeled with at least the following information:

- a. Component identification
- b. This specification number
- c. Manufacturer's code, batch number, and date of manufacture
- d. Storage life
- e. Manufacturer's name.

**6. NOTES**

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

**6.1 Intended use.** Compounds covered by this specification are intended for use in embedding or encapsulating electrical or electronic parts. The expected operating temperature will range between  $-32^{\circ}\text{C}$  to  $+130^{\circ}\text{C}$ .



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**6.2 Acquisition requirements.** Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Issue of DODISS to be cited in the solicitation, and is required the specific issue of individual documents referenced (see 2.1 and 2.2)
- c. Test conditions, if other than specified (see 4.5.1.1)
- d. Levels of preservation and packing required (see 5.1)
- e. Special marking required (see 5.1.1, 5.2 through 5.2.1)

**6.3 Consideration of data requirements.** The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Description (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To insure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirements for a DD Form 1423.

Referenced paragraph	DID Number	DID Title	Suggested Tailoring
4.4	DI-T-2072	Report, tests	-

The above DID's were those cleared as of the data of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

**6.4 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-16923 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 Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4.1).

**6.4.1** Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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**6.5 Product definition.** Product, as used herein, is defined as a single or multicomponent system containing up to three components comprising resin, curing agent, and catalyst manufactured from specific formulas.

**6.6 Material safety data sheets.** Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets (MSDS) prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313. In order to obtain the MSDS, FAR clause 52.223-3 must be in the contract.

**6.7 Subject term (key word) listing.**

Viscosity  
Hardness  
Volatile content  
Pot life  
Thermal shock  
Water absorption

**6.8 Changes from previous issue.** Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of changes.

**Custodians:**

Army - ER  
Navy - SH  
Air Force - 20

**Preparing activity:**

Navy - SH  
(Project 5970-1011)

**Review activities:**

Army - MI, AR, EA  
Navy - EC, OS  
Air Force - 85

**User activities:**

Army - ME  
Navy - MC, AS



# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

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### RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-I-16923H

2. DOCUMENT DATE (YYMMDD)  
13 AUGUST 1991

#### DOCUMENT TITLE

INSULATING COMPOUND, ELECTRICAL, EMBEDDING, EPOXY

NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

### REASON FOR RECOMMENDATION

#### 8. SUBMITTER

a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code)	7. DATE SUBMITTED (YYMMDD)
		(1) Commercial	
		(2) AUTOVON (If applicable)	

#### 9. PREPARING ACTIVITY

a. NAME COMMANDER NAVAL SEA SYSTEMS COMMAND (SEA 56224)	b. TELEPHONE (Include Area Code)	(2) AUTOVON
	(703) 602-3123	(AV) 332-3123
c. ADDRESS (Include Zip Code) WASHINGTON, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	