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MILITARY SPECIFICATION

COATING, EPOXY/AMINE

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

1. SCOPE

1.1 Scope. This specification covers one type of epoxy resin-modified aliphatic amine coating.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATION

Federal

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

STANDARD

Federal

	FED-STD-141	Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling and Testing

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Missile Research & Development Command, ATTN: DRDMI-ESD, Redstone Arsenal, AL 35809, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 8010

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
* MIL-STD-1188	Commercial Packaging of Supplies and Equipment

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring 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. Unless otherwise indicated the issue in effect on date of invitation for bids shall apply.

American Society for Testing and Materials

ASTM D 445-65	Kinematic Viscosity of Transparent and Opaque Liquids (Kinematic and Dynamic Viscosities)
ASTM D 1298	Density, Specific Gravity, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method, Test for, Epoxy Content of Epoxy Resins, Test for,

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

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

3. REQUIREMENTS

3.1 Preproduction sample. Unless otherwise specified (see 6.2), a preproduction sample shall meet all the requirements of this specification.

3.2 Material.

3.2.1 Composition and condition in container.

3.2.1.1 Composition. The coating compound shall consist of a liquid epoxy resin mixed with a modified aliphatic amine curing agent (see 6.3). The materials shall be furnished as individual ingredients.

3.2.1.2 Condition in container. The component materials, as received, shall be free of gel particles, dirt, or other contaminants which would affect their intended purpose.

3.2.2 Physical and chemical properties. The physical and chemical properties of the individual component materials shall be as specified in Table I.

Table I.
Physical and Chemical Properties of Component Materials

Property	Epoxy Resin	Amine Curing Agent
Viscosity (poise) 25°C (77°F)	100 to 160	1 to 2
Specific gravity 25/25°C (77/77°F)	1.14 to 1.19	
Weight per gallon (lbs)		8.50 to 8.67
Epoxide equivalent weight (g/eq)	180 to 195	
Amine nitrogen content (percent)		24.5 to 26.5
Color, Gardener		6

3.2.3 Storage life. The component materials shall be capable of meeting the requirements of this specification after storage in the original unopened containers at temperatures between 4 and 32 degrees Celsius (C) (39 and 90 degrees Fahrenheit (F) for not less than 12 months from the date of shipment.

3.2.4 Pot life. The pot life (see 6.4.1) of the mixed coating compound shall be not less than 15 minutes on a mass of 100 grams at 24 plus or minus 3 degrees C (75 plus or minus 5 degrees F).

3.3 Workmanship. The workmanship shall be such as to ensure a product which is uniform and in accordance with this specification. All the materials shall be free of dirt, foreign matter or other contaminants.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements as 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.

4.2 Preproduction inspection. Unless otherwise specified in the contractual document (see 6.2), a sample consisting of the quart of epoxy resin and one-half pint of amine catalyst, manufactured under the same conditions as those proposed for subsequent production, shall be subjected to preproduction inspection. Accomplishment of preproduction inspection shall be as specified herein. Subsequent units will not be considered for acceptance until Government approval of the preproduction sample has been obtained. Units subjected to preproduction inspection shall have successfully passed acceptance inspection. Testing of the preproduction sample to determine compliance with the characteristics listed in Table II shall be conducted in accordance with the corresponding test paragraphs.

Table II.

Preproduction Inspection		
Characteristic	Requirement Source	Test Paragraph
Storage life (component materials)	3.2.3	4.5.3.8
Pot life (mixed compound)	3.2.4	4.5.3.9

4.3 Quality conformance inspection.

4.3.1 Sampling for acceptance inspection. Sampling for acceptance inspection shall be conducted on a random sample selected from each inspection lot or less, in accordance with MIL-STD-105 at an acceptance quality level (AQL) of 4.0 percent defective.

4.3.2 Lot formation. A lot shall consist of all the component material manufactured in one continuous operation by the same process by the same manufacturer in accordance with this specification and submitted for inspection at one time.

4.3.3 Acceptance inspection. Acceptance inspection of the sample specified in 4.3.1, to determine compliance with the characteristics specified in Table III, shall be conducted in accordance with the corresponding test and inspection paragraphs.

Table III.

Acceptance Inspection		
Characteristics	Requirement Source	Test Paragraph
Composition and condition in container	3.2.1	4.5.3.1
Viscosity	Table I	4.5.3.2
Specific gravity (when applicable)	Table I	4.5.3.3
Weight per gallon (when applicable)	Table I	4.5.3.4
Epoxide equivalent weight (when applicable)	Table I	4.5.3.5
Amine nitrogen content (when applicable)	Table I	4.5.3.6
Color (when applicable)	Table I	4.5.3.7
Workmanship	3.3	4.7
Packaging and Packing	5.1	4.6
Marking	5.2	4.6

4.4 Inspection equipment. The inspection equipment for conducting examination and tests shall be as specified in the applicable test methods and procedures paragraphs.

4.5 Test methods and procedures.

4.5.1 Test conditions. Unless otherwise specified herein, the following conditions shall be used as a basis to establish performance requirements:

a. Temperature, room ambient (16 to 32 degrees C) (60 to 90 degrees F).

b. Altitude, facility ground.

c. Humidity, facility ambient up to 95 percent relative humidity.

4.5.2 Test sequence. Test sequence within each classification of inspection (preproduction or acceptance) shall be at the option of the supplier.

4.5.3 Tests.

4.5.3.1 Composition and condition in container. The composition shall be certified by the supplier and the condition in the containers shall be determined visually to establish conformance to 3.2.1.

4.5.3.2 Viscosity.

4.5.3.2.1 Epoxy resin. The viscosity of the epoxy resin shall be determined in accordance with ASTM D 445, and reported in poises. The viscosity shall conform to Table I.

4.5.3.2.2 Amine curing agent. The viscosity of the amine curing agent shall be determined in accordance with Method 4287 of FED-STD-141 except that a Model LVF Brookfield viscosimeter, or equivalent, with a Number 4 spindle at 30 revolutions per minute shall be used. The viscosity shall conform to Table I.

4.5.3.3 Specific gravity. The specific gravity of the epoxy resin shall be determined at 25/25 degrees C (77/77 degrees F) in accordance with ASTM D 1298 and shall conform to Table I.

4.5.3.4 Weight per gallon. The weight per gallon of the amine curing agent shall be determined in accordance with Method 4184 of FED-STD-141 and shall conform to Table I.

4.5.3.5 Epoxide equivalent weight. The epoxide equivalent weight of the epoxy resin shall be determined in accordance with ASTM D 1652 and shall conform to Table I.

4.5.3.6 Amine nitrogen content. The amine nitrogen content of the amine curing agent shall be determined in accordance with Method 7391 of FED-STD-141 and shall conform to Table I.

4.5.3.7 Color. The color of the amine curing agent shall be determined in accordance with Method 4248 of FED-STD-141 and shall conform to Table I

4.5.3.8 Storage life. A sufficient amount of materials in the original unopened containers shall be stored under the conditions specified in 3.2.3. At the end of the storage period, the materials shall meet all the requirements specified herein. The supplier's certification of compliance to the storage life requirements (see 3.2.3) may be accepted during the storage period.

4.5.3.9 Pot life. The pot life test shall be conducted in a temperature controlled area maintained at 24 plus or minus 3 degrees C (75 plus or minus 5 degrees F). A total mass of 100 plus or minus 5 grams of the coating compound shall be mixed in a clean paper container (see 6.3). Upon completion of mixing, timing shall be started (see 6.4.1). The material shall be checked at intervals of 5 to 10 minutes to determine its working ability and application characteristics. At the time when the material ceases to be workable or suitable for coating, the pot life has ended. The pot life shall conform to 3.2.4.

* 4.6 Preservation, packing, and marking. The inspector shall ascertain that the preservation, packing, and marking of the component materials conform to this specification.

4.7 Workmanship. The materials shall be visually examined to assure conformance to the workmanship requirement specified in 3.3.

* 5. PACKAGING

5.1 Preservation, packing, unitization, and marking - Level A or B or commercial packaging (see 6.2).

5.1.1 Level A or B. Preservation, packing, unitization, and marking shall be in accordance with specification PPP-P-1892.

5.1.2 Commercial. Preservation, packing, unitization and marking shall be in accordance with MIL-STD-1188.

6. NOTES

6.1 Intended use. This material is intended for use as a wipe-on coating to minimize fiber "show-through" on filament wound or laminated epoxy/fiber glass structures.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. Whether a preproduction sample is required (see 3.1) and, if so, pertinent details (see 4.2).

c. Quantity and size of containers.

d. Component material.

e. Requirements for certification of composition (see 4.5.3.1).

f. Requirements for certification of storage life (see 4.5.3.8).

6.3 Coating compound composition. The composition of the mixed coating compound is specified in Table IV.

Table IV.

Coating Compound Composition	
Component	Parts by Weight
Liquid epoxy resin	85 plus or minus 2
Modified aliphatic amine	10 plus or minus 0.5

6.4 Definitions.

6.4.1 Pot life. Pot life is defined as the time lapsed from the initial mixing of the coating components (i.e., adding the curing agent) to the time when the viscosity of the mixture has increased so that the material is no longer capable of being handled conventionally and is considered unsuitable for coating.

6.5 Supersession data. This specification includes the requirements of Missile Interim Specification MIS-13975, dated 2 April 1969.

6.6 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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