

MIL-A-81253(WP)
1 March 1965

MATERIAL SPECIFICATION
ADHESIVE, MODIFIED EPOXY RESIN
WITH POLYAMINE CURING AGENT

This specification has been approved by the
Bureau of Naval Weapons, Department of the Navy

1. SCOPE

1.1 Scope. This specification covers one kind of low viscosity, modified epoxy resin.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Military

MIL-P-116

Preservation, Methods of

STANDARDS

Military

MIL-STD-129

Marking for Shipment and Storage

(When requesting any of the above documents, give the title and complete designation of the item shown above. Copies of this specification and other unclassified specifications, standards, and publications required by contractors in connection with specific procurement functions may be obtained from the Commanding Officer, Navy Supply Depot (CDS), 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120.)

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 or request for proposal, shall apply.

FSC-8040

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PUBLICATIONS**American Society for Testing and Materials**

ASTM D 1078-58	Method Test for Distillation Range of Lacquer Solvents and Diluents
ASTM D 1002-53T	Method of Test for Strength Properties of Adhesives in Shear by Tension Loading (Metal to Metal)
ASTM D 891-59	Method of Test for Specific Gravity of Industrial Aromatic Hydrocarbons and Related Materials
ASTM D 445-61	Method of Test for Kinematic Viscosity
ASTM D 1652-62	Method of Test for Epoxy Content of Epoxy Resins
ASTM D 1544-58	Method of Test for Color of Transparent Liquids (Gardner Color Scale)
ASTM D 1475-60	Method of Test for Density of Paint, Varnish, Lacquer, and Related Products

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

3. REQUIREMENTS

3.1 Preproduction samples. Unless otherwise specified in the contract or order, preproduction samples of the adhesive shall be manufactured using the methods and procedures proposed for the production. The sample will be tested as specified in Section 4 herein and is for the purpose of determining that, prior to starting production, the contractor's production methods are capable of yielding items that comply with the technical requirements of the contract. After satisfactorily passing all the preproduction tests specified herein, no changes in raw materials and processing of materials for production shall be made without prior written approval of the procuring activity.

3.2 Data requirements. No data is required by this specification or by applicable documents referenced in Section 2 unless specified in the contract or order (see 6.2).

3.3 Material. The material shall be made from a low-viscosity modified epoxy resin and an aliphatic polyamine such as triethylenetetramine.

3.4 Resin physical and chemical properties.

3.4.1 Viscosity. The resin viscosity shall be no less than 2100 centipoises (cps) nor greater than 3600 cps when tested at 25 ± 2 degrees Centigrade (C).

3.4.2 Epoxy value. The resin epoxy value shall be no less than 0.40 equivalents per 100 grams (gm) nor more than 0.43 equivalents per 100 gm.

3.4.3 Color. The resin color value shall be a maximum of three on the Gardner Color Scale.

3.4.4 Weight per gallon. The resin weight per gallon value shall be no less than 9.3 pounds per gallon (lbs/gal) nor more than 9.6 lbs/gal.

3.5 Triethylenetetramine properties

3.5.1 Boiling range. The boiling range at 760 millimeters of mercury shall be no less than 260 nor more than 290 degrees C.

3.5.2 Specific gravity. The specific gravity shall be no less than 0.976 nor more than 0.982 at 25/25 degrees C.

3.6 Tensile shear. The tensile shear value of the cured resin shall be a minimum individual value of 3250 pounds per square inch.

3.7 Workmanship. The material shall be uniform in quality and shall be free from impurities and other defects that could adversely affect its use.

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, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where

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such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. Inspection of the adhesive shall be classified as follows:

- a. Preproduction inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

4.3 Sampling

4.3.1 Preproduction samples. A preproduction sample of sufficient quantity of the resin and curing agent manufactured in accordance with 3.1 shall be subjected to the preproduction tests detailed in 4.4 at an activity designated by the procuring activity. Further production of the adhesive by the supplier, prior to the approval of the preproduction sample, shall be at the supplier's risk.

4.3.2 Quality conformance inspection sampling. Unless otherwise specified, sufficient material shall be taken from each lot to perform the tests as specified in 4.5.

4.3.3 Inspection lot. An inspection lot of resin and curing agent shall consist of all the material presented for acceptance at one time, and produced in a single manufacturing run under homogeneous conditions of manufacture.

4.4 Preproduction inspection. The preproduction sample shall satisfactorily pass the quality conformance inspections detailed in 4.5.

4.5 Quality conformance inspection

4.5.1 Visual examination. Each container in a lot shall be visually examined to determine compliance with 3.7 and Section 5.

4.5.2 Viscosity test. The viscosity of the modified epoxy resin shall be determined in accordance with ASTM D 445-61.

4.5.3 Epoxy value test. The epoxy value of the modified epoxy resin shall be determined in accordance with ASTM D 1652-62.

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4.5.4 Color test. The color value of the modified epoxy resin shall be determined in accordance with ASTM D 1544-58.

4.5.5 Weight per gallon test. The weight per gallon of the modified epoxy resin shall be determined in accordance with ASTM D 1475-60.

4.5.6 Boiling range test. The boiling range shall be determined in accordance with ASTM D 1078-58 with the following exceptions:

- a. All-glass condenser substituted for metal condenser
- b. Thermometer 2C is used; temperature to include -5 degrees C to 300 degrees C; 76 millimeters immersion; 1 degree C graduations. Platinum resistance thermometer may be used as alternate.

4.5.7 Specific gravity test. The specific gravity shall be determined in accordance with ASTM D 891-59.

4.5.8 Tensile shear strength test. The specimens for the tensile shear test shall be made by mixing 10 parts by weight of triethylenetetramine with 100 parts by weight of the modified epoxy resin and cured for no less than 2 hours nor more than 8 hours at 100 ± 5 degrees C. The tensile shear value of the cured adhesive shall be determined in accordance with ASTM D 1002-53T, using 1-inch steel strips with 1/2-inch overlap.

4.6 Acceptance criteria

4.6.1 Preproduction. Failure of any sample to meet any of the requirements of this specification shall be cause for rejection of the lot.

4.6.2 Quality conformance. Failure of any sample to meet any requirement of this specification shall be cause for rejection of the lot.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging and packing. Unless otherwise specified by the procuring activity, the preservation, packaging and packing shall be in accordance with MIL-P-116, method III.

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5.2 Marking. Each container shall be marked in accordance with **MIL-STD-129.** Marking shall include, but not be limited to, the following information:

- a. **Manufacturer's name and location**
- b. **Material trade name**
- c. **Net weight or volume**
- d. **Lot number, batch number and date of manufacture**
- e. **Shelf life or storage limitations**
- f. **Number and revision letter of this specification**

6. NOTES

6.1 Intended use. The material purchased in accordance with this specification is intended to be used as an adhesive in rocket motor systems.

6.2 Ordering data. Procurement documents should specify, but not be limited to, the following information:

- a. **Title, number and revision letter of this specification**
- b. **Minimum lot size, if applicable**
- c. **Whether preproduction sample is required**
- d. **Place of delivery**
- e. **Size of container**
- f. **Request for test data**

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SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
INSTRUCTIONS		
This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).		
SPECIFICATION		
MIL-A-81253(WP) ADHESIVE, MODIFIED EPOXY RESIN WITH POLYAMINE CURING AGENT		
ORGANIZATION (of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		\$
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?		
A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE?		
<input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE