

MIL-A-47284(MI)  
~~9 August 1974~~  
SUPERSEDING  
MIS-14178  
30 June 1964  
MIS-15298  
18 February 1965

## MILITARY SPECIFICATION

### ADHESIVE, EPOXY RESIN BASE

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 adhesive consisting of an epoxy resin base and an amine type curing agent.

#### 2. APPLICABLE DOCUMENTS

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

### SPECIFICATION

#### Federal

QQ-A-362

Aluminum Alloy Plate and  
Sheet Alclad 2024

### STANDARDS

#### Federal

FED-STD-141

Paint, Varnish, Lacquer, and  
Related Materials; Methods  
of Inspection, Sampling and  
Testing

FED-STD-775

Adhesives - Method of  
Testing

FSC 8040

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Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage

(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 or request for proposals shall apply.

## American Society for Testing Materials

ASTM D 638	Tests for Tensile Properties of Plastics
ASTM D 1084	Methods of Test for Consistency of Adhesives
ASTM D 1475	Method of Test for Density of Paint Varnish, Lacquer, and Related Products
ASTM D 1484	Test for Penetration of Hard Rubber by Type D Durometer

Applications for copies should be addressed to Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania, 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 samples. Unless otherwise specified (see 6.2), a preproduction sample (4.2) of epoxy adhesive shall meet the requirements of this specification.

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3.2 Material. The adhesive shall consist of a two-component system consisting of an epoxy resin formulation with an inorganic filler and an amine type activator.

3.3 Chemical and physical properties of uncured resin and curing agent.

3.3.1 Epoxy resin.

3.3.1.1 Viscosity. The viscosity shall be 4000 to 10,000 poises at 23 degrees celsius (C).

3.3.1.2 Specific gravity. The specific gravity shall be 1.60 to 1.76 at 25 degrees C.

3.3.1.3 Solids content. The solids content shall be 99 percent minimum.

3.3.2 Curing agent.

3.3.2.1 Viscosity. The viscosity shall be 5 to 15 centipoises at 23 degrees C.

3.3.2.2 Specific gravity. The specific gravity shall be 0.940 to 0.960 at 25 degrees C.

3.4 Mechanical properties of cured epoxy. The material shall meet the requirements specified in 3.4.1 through 3.4.4 at 23 plus or minus 1.1 degrees C. 73.5 plus or minus 2 degrees F when tested accordant to the applicable test in 4.7.1.

3.4.1 Tensile strength. The tensile strength shall be 2200 pounds per square inch (psi), minimum.

3.4.2 Elongation. The percentage of elongation shall be greater than one and less than three percent.

3.4.3 Shear strength. The shear strength shall be 1600 psi, minimum.

3.4.4 Hardness. The hardness shall be a minimum of 85 Shore D.

3.5 Physical property. The material shall meet the requirements specified in 3.5.1 when tested according to the applicable test in 4.7.2.

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3.5.1 Shelf life. The shelf life of the resin and activator in unopened containers shall be a minimum of one year from date of manufacture when stored at temperature less than 27 degrees C (80.6 degrees F).

3.6 Workmanship. The workmanship shall be such as to insure a product which is uniform and in conformance with this specification. The resin and activator shall be free of dirt, foreign material 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 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 sample. The preproduction sample shall be prepared using the same methods proposed for the preparation of subsequent production lots of material. The preproduction sample shall be subjected to all examinations and tests specified herein. Unless otherwise specified, the Government will perform the examinations and test for preproduction sample acceptance at the contractors plant. Preproduction samples which do not meet all the requirements of this specification shall be rejected and returned to the contractor. Subsequent quantities will not be considered for acceptance until approval of the preproduction sample has been obtained.

4.3 Classification of examinations and tests. The examination and testing of material shall be classified as follows:

- a. Preproduction tests (4.4)
- b. Quality conformance tests (4.5)

4.4 Preproduction tests. Preproduction tests shall be conducted only on the preproduction sample and shall consist of all the examinations and tests specified herein.

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4.5 Quality conformance tests. Quality conformance tests for acceptance of material shall consist of the following examinations and tests:

- a. Viscosity (4.6.1)
- b. Specific gravity (4.6.2)
- c. Solids content (4.6.3)
- d. Shear strength (4.7.1.2)
- e. Hardness (4.7.1.3)

4.5.1 Lot size and sampling.

4.5.1.1 Lot size. Lot size shall consist of all the material submitted for acceptance at the same time, which has been prepared by the same company without change in materials or processes in one continuous period of operation.

4.5.1.2 Sampling. Unless otherwise specified, sampling shall be in accordance with MIL-STD-105.

4.6 Test methods. For chemical and physical properties of uncured resin and curing agent.

4.6.1 Viscosity.

4.6.1.1 Epoxy resin. The viscosity of the epoxy resin shall be determined in accordance with ASTM-D1084 using a Brookfield Viscometer Model RVF or an approved equivalent with spindle 7 at 4 revolutions per minute (rpm).

4.6.1.2 Curing agent. The viscosity of the curing agent shall be determined in accordance with ASTM-D1084 using a Brookfield Viscometer Model RVF, or approved equivalent with spindle 1 at 20 rpm.

4.6.2 Specific gravity. The specific gravity of the epoxy resin and curing agent shall be determined in accordance with ASTM-D1475.

4.6.3 Solids content. The solids content of the epoxy resin shall be determined in accordance with FED-STD-141, Method 4041.

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4.7 Test methods for physical properties of cured epoxy.

4.7.1 Mechanical property tests.

4.7.1.1 Tensile strength and elongation. The tensile strength and elongation shall be determined in accordance with ASTM-D-638. The speed of testing shall be 0.20 to 0.25 inch per minute.

4.7.1.1.1 Test specimen preparation. The test specimen shall be cured for a minimum of 7 days at 25 plus or minus 3 degrees C (77 plus or minus 5.4 degrees F) or 2 hours minimum at 75 plus or minus 3 degrees C (167 plus or minus 5.4 degrees F). The test specimen size shall conform to ASTM-D-638 with the following exceptions:

- a. Overall width shall be 0.970 to 1.030 inch
- b. Width of flat section shall be 0.360 to 0.390 inch
- c. Radius of fillet shall be 0.470 to 0.530 inch
- c. Thickness of specimen shall be 0.235 to 0.265 inch

4.7.1.2 Shear strength. The shear strength shall be determined in accordance with FED-STD-175, Method 1033.1 T using aluminum test specimens conforming to QQ-A-362, 2024T3. The test specimen shall be cured as specified in 4.7.1.1.1.

4.7.2 Physical property test.

4.7.2.1 Shelf life. The adhesive shall be tested for conformance with all the requirements specified herein after completion of storage period. The manufacturers certificate of compliance with shelf life requirements (3.5.1) may be accepted during the storage period.

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## 5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. The resin and activator shall be prepared for shipment in such manner that damage during shipping and storage is prevented.

5.2 Marking. Each container or kit of resin and activator shall be legibly and durably marked in accordance with MIL STD-129. Marking information shall include, but shall not necessarily be limited to, the following:

- a. Title, number and date of this specification.
- b. Lot or batch number.
- c. Mixing ratios.
- d. Necessary precautionary notices.

## 6. NOTES

6.1 Intended use. The adhesive covered by this specification is intended for use in bonding metal to metal. Other constructions such as metal to plastic or plastic to plastic may be bonded provided the use of the adhesive is substantiated by testing the combination of the materials in question.

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
- c. Any special marking requirement

6.3 Supersession data. This specification includes the requirements of Missile Interim Specifications MIS-14178, dated 30 June 1964 and MIS-15298, dated 18 February 1965.

Custodian:  
Army-MI

Preparing Activity:  
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