

METRIC

DOD-A-82720(OS)

9 March 1982

MILITARY SPECIFICATION

ADHESIVE, MODIFIED-EPOXY, FLEXIBLE, TWO-PART (METRIC)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of room temperature curing, two-part, flexible, modified-epoxy adhesive.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

STANDARDS

FEDERAL

| | |
|-------------|--|
| FED-STD-313 | Material Safety Data Sheets, Preparation and the Submission of |
|-------------|--|

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 |
| MIL-STD-1504 | Abrasive Blasting |

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Ordnance Station (524), Indian Head, MD 20640, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 2206

OSHA Safety and Health Standards (Part 1910,
Title 29 of the Code of Federal Regulations).

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z 129.1-76

Precautionary Labeling of Hazardous Industrial
Chemicals

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 638-80

Tensile Properties of Plastics

ASTM D 1338-56 (R 72)

Working Life of Liquid or Paste Adhesives
by Consistency and Bond Strength

ASTM D 2393-80

Viscosity of Epoxy Resins and Related Components

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

NATIONAL MOTOR FREIGHT ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to American Trucking Associations, Attn: Traffic Department, 1616 P Street, Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. When specified in the contract (see 6.2), first article samples of the adhesive are required and shall be manufactured using the methods and procedures proposed for production. The samples shall be tested as specified in Section 4 for the purpose of determining, prior to starting production, that the contractor's production methods are capable of producing adhesive that complies with the technical requirements of the contract (see 4.5).

3.2 Material. The material shall be a structural, thermosetting, flexible, modified epoxy adhesive capable of being cured at 15 to 35°C.

3.3 Form. The adhesive shall consist of two liquid components; an accelerator hardener or curative designated as component A, and a base resin designated as component B, furnished in a kit such that the entire contents of the kit when mixed thoroughly will meet the requirements of this specification.

3.4 Miscibility. Components A and B shall be entirely miscible when combined in accordance with the manufacturer's instruction sheet (see 3.8). There shall be no evidence of agglomeration or separation of ingredients throughout the pot-life of the material.

3.5 Physical and chemical properties.

3.5.1 Component properties. The properties of components A and B shall be in accordance with TABLE I.

3.5.2 Uncured adhesive properties. The properties of the uncured, mixed adhesive shall be in accordance with TABLE II.

3.5.3 Cured adhesive properties. The properties of the adhesive cured in accordance with 4.7.1.1 shall be in accordance with TABLE III.

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TABLE I. Component properties.

| Property | Component A | | Component B | |
|-----------------------|-------------|-------|-------------|-------|
| | Min | Max | Min | Max |
| Density, 25°C, g/ml | - | 1.370 | - | 1.400 |
| Viscosity, 25°C, Pa.s | 45 | 55 | 80 | 120 |

TABLE II. Uncured adhesive properties.

| Property | Minimum | Maximum |
|-------------------------|---------|---------|
| Viscosity, 25°C, Pa.s | 30 | 100 |
| Pot life, 25°C, minutes | 75 | - |

TABLE III. Cured adhesive properties.

| Property | Minimum | Maximum |
|-----------------------------|---------|---------|
| Tensile strength, 23°C, MPa | 14 | - |
| Tensile Modulus, 23°C, MPa | - | 83 |
| Elongation, 23°C, % | 20 | - |

3.6 Storage life. The adhesive components shall be capable of meeting the requirements of this specification for a period of 12 months from the date of manufacture when stored in the original unopened containers at a maximum temperature of 27°C.

3.7 Toxicity. Composition of adhesive kits conforming to this specification shall be submitted to the Navy's Bureau of Medicine and Surgery for approval and establishment of safety precautions in their use. These precautions will follow as a minimum the safety and health standards specified by OSHA 2206. When a manufacturer has previously furnished toxicological product data which has been approved by the Bureau of Medicine and Surgery, resubmittal will not be necessary unless there is a change in the material composition. The contractor shall prepare and submit material safety data sheets in accordance with FED-STD-313 as specified in the contract (see 6.4).

3.8 Instruction sheet. The manufacturer shall provide the following information either on the container label or on a separate instruction sheet as apart of the kit.

- a. Mixing instructions.
- b. Surface preparations.
- c. Recommended application procedure.
- d. Recommendations for clean up of application tools.
- e. Precautionary warning of any toxicity.

3.9 Workmanship. The material shall be uniform, free from contamination, foreign material or any other defect that would prevent its use for the purpose intended.

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 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 the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be performed under the following conditions:

- a. Temperature: Room ambient 18 to 35°C
- b. Humidity: Room ambient to 95 percent relative, maximum.

4.3 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.5).
- b. Quality conformance inspection (see 4.6).

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4.4 Sampling.

4.4.1 First article sample. When specified in the contract (see 6.2), a first article sample of one kit totaling a minimum of 1 kilogram (kg) of adhesive, manufactured in accordance with 3.1, shall be subjected to the first article inspection detailed in 4.5 at an activity designated by the procuring activity (see 6.2). Acceptance of the first article sample shall be based on no defects in the sample. Further production of adhesive by the contractor prior to approval of the first article sample shall be at the contractor's risk.

4.4.2 Lot. Unless otherwise specified in the contract (see 6.2), a lot shall consist of all material manufactured in one continuous production run or in one batch, under essentially identical conditions, from the same raw materials, and to be offered for acceptance at one time. Several batches, manufactured from the same raw materials, may be blended to form a uniform larger batch which shall then constitute a lot for inspection purposes.

4.4.3 Sampling. The sample unit shall be one kit of adhesive or container of material. Each sample shall consist of sufficient material to perform the quality conformance tests as specified in 4.6.

4.5 First article inspection. One kit from the first article sample, having been submitted to and having passed the quality conformance inspection of 4.6, shall be subjected to the first article inspections of TABLE IV. When specified in the contract (see 6.2.2), a first article inspection test report shall be prepared and submitted to the procuring activity.

TABLE IV. First article inspection.

| Property | Requirement | Method |
|------------------|-------------|--------|
| Tensile strength | TABLE III | 4.7.1 |
| Elongation | TABLE III | 4.7.1 |
| Tensile modulus | TABLE III | 4.7.1 |

TABLE V. Quality conformance inspection.

| Property | Requirement | Method |
|-------------|---------------|--------|
| Density | TABLE I | 4.7.2 |
| Viscosity | | |
| Adhesive | TABLE II | 4.7.3 |
| Components | TABLE I | |
| Pot life | TABLE II | 4.7.4 |
| Examination | 3.3, 3.8, 3.9 | 4.7.5 |
| Packaging | 5.1, 5.2 | 4.7.6 |

4.6 Quality conformance inspection. Each sample obtained in accordance with 4.4.3 shall be subjected to the tests and examinations of TABLE V. Failure of any sample to meet any requirement of this specification shall be cause for rejection of the lot. When specified in the contract (see 6.2.2), the contractor shall furnish test reports showing quantitative results for all quality conformance inspections required by this specification for each lot of material.

4.7 Test methods.

4.7.1 Tensile strength, elongation and tensile modulus. Tensile strength, elongation and tensile modulus shall be determined in accordance with the following:

4.7.1.1 Specimen preparation. Prepare specimens by degassing the mixed adhesive and vacuum casting to give a finished specimen conforming to ASTM D 638 and having a thickness of 6.0 ± 0.4 mm and the Type IV specimen configuration. Cure specimens at 65°C for four hours using dead weights to produce a molding pressure of 20 to 35 kPa.

4.7.1.2 Test. Determine tensile strength, modulus of elasticity and maximum elongation in accordance with ASTM D 638 using a speed of testing of 50 mm/minute. Condition test specimens for two hours minimum, at 23°C before testing.

4.7.2 Density. Density of the epoxy resin and hardener shall be determined in accordance with the following:

- a. Weigh a calibrated specific gravity cylinder, with a ground glass stopper, to the nearest 0.1 milligram (mg). Fill about two-thirds full with the epoxy resin or hardener to be tested. Avoid getting the sample on the ground neck of the cylinder. Centrifuge for 10 minutes at 1800 revolutions per minute (rpm) and insert the ground glass stopper. Weigh to the nearest 0.1 mg.

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- b. Condition the sample in a constant temperature bath of $25.00 \pm .05^\circ\text{C}$ for 15 minutes. Fill the cylinder with silicone oil of known density which has also been conditioned at $25.00 \pm .05^\circ\text{C}$. Carefully seat the ground glass stopper with a uniform insertion pressure. Immediately apply acetone to remove the excess oil and water from the outside of the cylinder. Weigh the filled cylinder to the nearest 0.1 mg.

$$\text{Density at } 25^\circ\text{C, g/ml} = \frac{W_2 - W_1}{V - \frac{W_3 - W_2}{d}}$$

Where: W_1 = Weight of tared specific gravity cylinder, g
 W_2 = Weight of specific gravity cylinder plus sample, g
 V = Volume of specific gravity cylinder at 25°C , ml
 W_3 = Weight of specific gravity cylinder plus sample and oil, g
 d = Density of silicone oil at 25°C , g/mL

4.7.3 Viscosity. Viscosity in Pascal seconds (Pa·s) of the adhesive and components A and B shall be determined in accordance with ASTM D 2393, Model RVF with No. 7 spindle at 20 rpm.

4.7.4 Pot life. The pot life of the adhesive shall be determined as specified in ASTM D 1338, Procedure A, using a 200-g sample and eight stirring cycles, minimum. Pot life is defined as the time elapsing between the moment the adhesive is ready for use and the time at which more than five seconds is required to complete a stirring cycle.

4.7.5 Examination. Sample containers shall be visually examined to verify conformance with the requirements of 3.3, 3.8 and 3.9.

4.7.6 Packaging inspection. The packaging, packing and marking shall be inspected to verify conformance with the requirements of Section 5.

5. PACKAGING

5.1 Packaging and packing. Unless otherwise specified in the contract (see 6.2), packaging and packing shall be commercial.

5.1.1 Commercial. Unless otherwise specified in the contract (see 6.2), packaging and packing of the adhesive kits shall be in accordance with standard commercial practice applicable to the type of material. The packaging and packing shall be of such construction and material that the contents will be adequately protected against loss or contamination. Minimum requirements for commercial packaging shall be in accordance with MIL-STD-1188. Containers shall conform to Uniform Freight Classification, National Motor Freight Classification or to rules of other carriers applicable to the mode of transportation. The amount of adhesive (net) contained in each kit shall be as specified in the contract (see 6.2).

5.2 Marking. In addition to any special marking required by the contract (see 6.2), each container shall be marked in accordance with MIL-STD-129. Precautionary labels shall be in accordance with ANSI Z 129.1. Marking shall include, but not be limited to, the following information:

- a. Title, number and date of this specification
- b. Manufacturer's name and address
- c. Material trade name
- d. Net weight and volume
- e. Lot number and date of manufacture
- f. Storage conditions
- g. Toxicity precautions
- h. Contract number

6. NOTES

6.1 Intended use. This adhesive is intended for use in assembly of the aft closure of the MK 56 DTRM used on the Standard (MR) surface to air missile.

6.2 Ordering data. Procurement documents should specify the following:

6.2.1 Procurement requirements.

- a. Title, number and date of this specification
- b. That material is to be shipped within 3 months of manufacture
- c. Quantity required, including first article samples (see 4.4.1)
- d. Place of delivery
- e. Whether a first article sample is required (see 3.1, 4.3 and 4.5)
- f. Inspection conditions when other than as specified (see 4.2)
- g. Assigned activity for first article inspection (see 4.4.1)
- h. Lot size if other than as specified (see 4.4.2)
- i. Packaging requirements if other than as specified (see 5.1)
- j. Size of container required (see 5.1.1)
- k. Net weight of adhesive per kit
- l. Any special markings required (see 5.2)
- m. Safety precautions (see 6.4)

6.2.2 Data requirements. When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraph:

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| PARAGRAPH | DATA REQUIREMENT | APPLICABLE DID |
|-----------|-------------------------------------|----------------|
| 4.5 | First article inspection report | DI-T-5247 |
| 4.6 | Quality conformance inspection data | DI-T-3721 |

(Copies of data item descriptions required by the contractors in connection with specific procurements functions should be obtained from the procuring activity or as directed by the contracting officer.)

6.4 Toxicity data. Material safety data sheet requirements are applicable and should be specified in the contract as required by DAR 1-323.2 (see 3.7).

6.5 Storage conditions. The material should be stored at 27°C maximum.

6.6 Shelf life. Material should be retested to the requirements of TABLES I and II within the 3 month period preceding use to assure the shelf life has not been exceeded.

6.7 Suggested source of supply. A product that has met the requirements of this specification in past procurement actions is Scotch Weld 2216 B/A (white base/gray accelerator) manufactured by 3M Co., Adhesives, Coatings and Sealers Division, 13M 223-6NE, 3 M Center, St. Paul, MN 55101. This information is for the convenience of the procuring activity and is not to be construed as a waiver of any requirements of this specification nor as any limitation of additional potential sources of supply.

6.8 First article sample waiver. First article samples submitted and approved on a recent contract may be accepted by the procuring activity in lieu of an additional first article inspection. When the first article sample is not required (see 6.2.1(e)) the procurement document should contain a statement specifying that the standards of workmanship exhibited by the previously approved first article sample shall determine the minimum requirements of the current contract or purchase order.

Preparing activity:
Navy - OS

Project No. 8040-N113

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DOCUMENT IDENTIFIER (Number) AND TITLE

DOD-A-82720(OS), Adhesive, Modified-Epoxy, Flexible, Two-Part (Metric)

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

VENDOR USER MANUFACTURER

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? IS ANY PART OF IT TOO RIGID, RESTRICTIVE, LOOSE OR AMBIGUOUS? PLEASE EXPLAIN BELOW.

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2. REMARKS

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1 OCT 76

Replaces edition of 1 Jan 72 which may be used.

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