

MMM-A-001993 (GSA-FSS)

February 28, 1978

INTERIM FEDERAL SPECIFICATION

ADHESIVE, EPOXY, FLEXIBLE, FILLED (FOR BINDING, SEALING, AND GROUTING)

This Interim Federal Specification was developed by the General Service Administration, Federal Supply Service, Washington, DC 20406, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers a two- or three component, mineral-filled, flexible, epoxy-resin-base adhesive, to be used in binding, sealing, and grouting concrete.

1.2 Classification. The epoxy-resin adhesive shall be of the following types as specified (see 6.2).

Type I - A two component system with mineral filler pre-mixed into each component.

Type II - A three component system including the epoxy resin, curing agent, and mineral filler.

2. APPLICABLE DOCUMENTS.

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

Federal Specifications:

SS-C-1960/Gen - Cement and Pozzolan; General Requirements for
SS-C-1960/3 - Cement, Portland

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Services Centers at the General Services Administration Regional Offices in Boston, New York, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specification and Standards from established distribution points in their agencies.

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Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Laws and Regulations:

49 CFR 170-179 - Hazardous Materials Regulations

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

D 695 - Compressive Properties of Rigid Plastics
D 905 - Strength Properties of Adhesive Bonds in Shear Compression Loading
D 1259 - Nonvolatile Content of Resin Solutions
D 1652 - Epoxy Content of Epoxy Resins

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

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Traffic Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., 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.)

3. REQUIREMENTS

3.1 Kit. The adhesive, supplied in two types, shall be of two or three components, as specified (see 1.2). It shall be packaged in a kit with each component in a separate container. The containers of each kit shall be filled with the adhesive components in exact mixing proportions and one container shall be large enough to mix all of the components. The size of the kit shall be the total volume of the mixed adhesive which shall be 1 gallon, 5 gallons, or 55 gallons as specified (see 6.2).

3.1.1 Base resin. The base resin shall be an epoxy thermosetting resin composed of 100 percent reactive constituents. The epoxy number of the resin shall be not less than 175 and not greater than 220 when tested as specified in 4.3.1. The type I resin shall contain mineral filler as specified in 3.1.3.

3.1.2 Curing agent. The curing agent shall be such that when mixed with the base resin according to the manufacturer's instructions, an adhesive shall be formed which meets the requirements of this specification. The type I curing agent shall contain mineral filler as specified in 3.1.3.

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3.1.3 Mineral filler. The inert filler shall be a finely divided quartz silica flour or feldspathic aluminum silicate flour of various sizes and dimensions such that the cured compound shall have a smooth surface free from bubbles and pockets when tested as specified in 4.3.2. Type I items shall have the filler flour pre-mixed in the resin and the curing agent, and a homogeneous mixture shall be formed when the two components are mixed for three minutes according to the manufacturer's instructions. The type II adhesive shall include the filler flour separately, and the three components shall form a homogeneous mixture when mixed for five minutes according to the manufacturer's instructions.

3.1.4 Mixing instructions. Complete mixing instructions shall be furnished by the manufacturer to the purchaser. The instructions shall specify the ratio of the volumes of each component to be mixed. The ratio of the volume of the epoxy resin to the volume of the curing agent shall be greater than or equal to 1/4 and less than or equal to 4. The mixing instructions shall be placed on the outside of all containers of each component by stencil, lithograph, or securely affixed label. Components shall be identified (A, B, or filler as appropriate for type specified) in this manner on the container, and not on the cap or lid.

3.2 Consistency. When tested as specified in 4.3.3, the coating shall not run or drip from the applied position before it has hardened.

3.3 Compressive single shear strength. Specimens prepared and tested as specified in 4.3.4 shall have a minimum strength of 200 psi.

3.4 Compressive flexible strength. When tested as specified in 4.3.5, the adhesive shall compress to an average of 85 percent of its original height without yielding, at which point it shall have an average compression strength of not less than 1500 psi.

3.5 Nonvolatile content. The mixed but uncured adhesive shall be free from volatile solvents, and the average nonvolatile matter in the adhesive system shall be not less than 99.0 percent when tested as specified in 4.3.6.

3.6 Pot life. When tested as specified in 4.3.7, the complete epoxy system shall remain workable, spreadable, and of smooth consistency for 1 hour.

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 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.

4.2 Sampling and inspections.

4.2.1 Lot. The kits of adhesive (see 3.1.4) shall be assembled into lots as specified in MIL-STD-105.

4.2.2 Sampling for inspection. For purposes of sampling, the lot shall be expressed in kits. A random sample of kits offered for delivery shall be selected in accordance with MIL-STD-105 at inspection level I and an acceptable quality level (AQL) = 2.5 percent defective.

4.2.3 Inspection of the end item. Each kit randomly selected from the

lot offered for inspection shall be examined for defects of construction of the containers and closures, for evidence of leakage, and for unsatisfactory markings; each kit selected shall also be inspected to determine the number of components and the amount of contents in each component. Any kit in the sample having one or more defects or under required fill shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected.

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4.2.4 Inspection of preparation for delivery. An inspection shall be made to determine whether the packaging, packing, and marking comply with the requirements of section 5. The packaging and packing shall be examined as specified in Table I for the cited defects. The sample unit shall be one shipping container fully prepared for delivery and selected at random. Sampling shall be in accordance with MIL-STD-105. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 with an AQL of 4.0 defects per hundred units.

TABLE I. Classification of preparation for delivery defects

Examine	Defects
Markings and mixing instructions	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Material	Any component missing or damaged or wrong type.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping inadequate stapling, or distortion of container.

4.2.5 Sampling of the end item for testing. For purposes of sampling, one unit shall consist of component A and component B, and the filler when appropriate, in proper proportion, to formulate 1 gallon of epoxy grout. The lot shall be expressed in such 1 gallon units. Samples from lots shall be taken in accordance with MIL-STD-105 using inspection level S-2 and AQL of 2.5 percent defective.

4.3 Test methods. All tests shall be conducted in accordance with the methods specified. Unless otherwise specified, all tests shall be performed at standard testing conditions which are 23 +/- 1 deg. C and a relative humidity of 50 +/- 5 percent. All test reports shall contain the individual values utilized in obtaining the final results. Each final result shall be compared with the applicable requirement in section 3 to determine compliance with this specification. Failure to pass any test or nonconformance with any requirement shall be cause for rejection of the sample.

4.3.1 Epoxy number. The epoxy resin shall be tested as specified in ASTM D 1652 for weight per epoxy equivalent.

4.3.2 Mineral filler. The epoxy system shall be mixed and applied according to manufacturer's instructions to one side of a glass plate measuring 50 x 50 mm minimum. The applied coat shall be 10 +/- 5 mm thick and shall be allowed to cure for 72 hours in a horizontal position. The epoxy surface and the epoxy-glass interface shall be examined for conformance with 3.1.3.

4.3.3 Consistency. Immediately after mixing a 3 mm-thick coat of the epoxy mixture shall be applied to a clean, dry, 50 mm diameter, 300 mm long round steel rod held in a vertical position. The temperature of the mixture, the steel rod, and the surrounding atmosphere shall be not less than 40 +/- 2 deg. C during this test. Sagging, running, or dripping of the grout from its position before it has hardened shall constitute failure of this test.

4.3.4 Compressive single shear strength. Samples shall be prepared and

tested as specified in ASTM D 905 using the following procedures:

4.3.4.1 The blocks shall be bonded with an adhesive coating, 1.27 +/- 0.12 mm (.05 +/- .005 inches) thick, which shall be cured at standard conditions for 7 days.

4.3.4.2 The crosshead speed of testing shall be .020 inches/minutes.

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4.3.5 Compressive flexible strength. The adhesive shall be tested as specified in ASSTM D 695 using the following procedures:

4.3.5.1 The molded sample shall have dimensions of 1/2 by 1/2 by 1 inch.

4.2.5.2 The samples shall be conditioned at standard conditions for 7 days.

4.3.5.3 Five samples shall be tested, and the average value shall be used to determine compliance with 3.4.

4.3.6 Nonvolatile content. The sample shall be mixed according to the manufacturer's instructions and then tested for nonvolatile content as specified in ASTM D 1259, Method B.

4.3.7 Pot life. Mix the adhesive components in accordance with the manufacturer's instructions and transfer to a 400 ml beaker. After a 10-min. interval has elapsed, place a glass stirring rod (6 mm, 1/4 in. in diameter and long enough to be handled conveniently) in the center of the beaker touching the bottom of the beaker. Rotate the glass rod in this position with a spiral motion, moving outwardly towards the wall of the beaker. Make 5 complete revolutions at a rate of one revolution per second. At the end of this operation allow the stirring rod to rest in the beaker. Every 10 minutes repeat the stirring operation. After 60 minutes measured from the moment of transfer to the beaker, examine the adhesive for workability, spreadability, and consistency.

5. PREPARATION FOR DELIVERY

5.1 Packaging. The packaging shall be level A or Commercial as specified (see 6.2). Packaging shall be in units of kits as described in 3.1.

5.1.1 Level A. Components shall be packaged as specified in 5.1.1.1 and 5.1.1.2.

5.1.1.1 Type I components. The base polymer and the hardener shall be packaged in 1 gallon 28-gauge double seamed tins with multi-friction top, 5-gallon 28-gauge pails with standard crimp top and rubber seal, or 55-gallon 18-gauge drums DOT 17H type as specified in contract or purchase order.

5.1.1.2 Type II components. The base polymer and hardener shall be packaged as specified in 5.1.1.1. The base aggregate shall be packaged in multi-wall sacks. Quantities of base aggregate for the one-gallon and 5-gallon base polymer and hardener components shall be furnished in multi-wall sacks made of wet strength kraft paper having a minimum basis weight (24 x 36 inches - 500 sheets) of 200 pounds for the total of all the walls. The sack shall contain a minimum of three walls. Quantities of base aggregate for the 55-gallon base polymer and hardener components shall be furnished in multi-wall sacks made of wet strength kraft paper having a minimum basis weight (24 x 36 inches - 500 sheets) of 260 pounds for the total of all the walls. The sacks shall contain a minimum of four walls. A moisture proof barrier wall shall be placed next to the outer wall. The sack shall be securely closed to prevent accidental opening, and the ends shall be sealed with a moisture proof wax or barrier material.

5.1.2 Commercial. Each component shall be packaged in cans, pails, drums, or sacks, as specified, in accordance with normal commercial practice. The complete package shall be designed to protect the item against damage

during shipment, handling and storage.

5.2 Packing. The packing shall be level A or Commercial as specified (see 6.2).

5.2.1 Level A. Type I and type II Components, packaged in 1-gallon cans as specified in 5.1, shall be packed together as a kit in fiberboard boxes made from weather-resistance fiberboard with a bursting test strength of not less than 275 lbs. per square inch. The box flaps shall be secured with water-resistant adhesive applied to not less than 75 percent of the surface area of contact between the flaps, or with 3 inch wide waterproof tape applied to the full length of the seams and extending over the ends not less than 3 inches. Alternatively, wirebound, cleated plywood, or nailed wood boxes shall be acceptable shipping containers when lined with a waterproof barrier material. The barrier material shall be sealed at the edges with waterproof tape or adhesive. The aggregate for these kits shall not be packed in the box with the cans. Kits comprised of appropriate components packaged as specified in 5.1 in 5 gallon pails, 55 gallon drums, or multi-wall sacks shall not require further packing.

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5.2.2 Commercial. The packaged components shall be packed in fiberboard boxes to insure safe delivery at destination, to provide for safe redistribution by the initial receiving activity, and shall be acceptable by common carrier under National Motor Freight Classification or Uniform Freight Classification.

5.3 Palletization. When shipment to Government depots are full car or truckload, the shipping containers shall be palletized on expendable wooden pallets, 2 or 4 way design, to facilitate handling, in accordance with normal commercial practice. The palletized load shall not exceed 2,500 pounds in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

5.4 Marking. Marking shall be as specified in the contract or order.

6. NOTES

6.1 Intended use. The two or three component epoxy adhesive is intended to be used to repair spalls and other defects in portland-cement pavements. In many cases, 40 mesh sand should be added to the adhesive in a proportion which achieves an optimum balance between performance characteristics, heat of mixing, and cost.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

- (a) Title, number and date of this specification.
- (b) Level of packaging and level of packing required (see 5.1 and 5.2).
- (c) Unitization if applicable (see 5.4)
- (d) Special marking required (see 5.4).
- (e) Size of kit (see 3.1).

6.3 Shelf life update. In order to update the shelf life of this material, the adhesive should be evaluated for conformance with 3.2, 3.3, 3.4 and 3.6.