AEROSPACE MATERIAL SPECIFICATION

AMS3732	REV. B

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Superseding AMS3732A

Potting Compound, Epoxy
One Part, Filled, Heat Cure, Low CTE

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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1. SCOPE:

1.1 Form: This specification covers a filled epoxy resin formulation, supplied as a one-component system, requiring an oven cure for attainment of its properties.

1.2 Application: Primarily for cast shapes; for encapsulation of electronic parts, transformers, coils, and conductors; and for sealing.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2825 - Material Safety Data Sheets

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D256 - Impact Resistance of Plastics and Electrical Insulating Materials
ASTM D257 - D-C Resistance or Conductance of Insulating Materials
ASTM D570 - Water Absorption of Plastics
ASTM D648 - Deflection Temperature of Plastics Under Flexural Load
ASTM D695 - Compressive Properties of Rigid Plastics
ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics
ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D792 - Specific Gravity and Density of Plastics by Displacement
ASTM D1002 - Strength Properties of Adhesives in Shear by Tension Loading (Metal-to-Metal)
ASTM D1824 - Apparent Viscosity of Plastisols and Organosols at Low Shear Rates by Brookfield Viscometer

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be an epoxy based compound complete with fillers and curing agents or other ingredients necessary to yield products which meet the requirements of 3.2 and 3.3.

3.2 Storage Life: Compound shall meet the requirements of 3.3 at any time up to six months from date of receipt by purchaser when stored below 0°C (32°F) in the original unopened container. The supplier may also provide special storage instructions, such as cold storage, which, when used, can further extend this storage life.

3.3 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with test methods specified in 4.5.

3.3.1 Uncured Compound: The compound, prepared in accordance with manufacturer's instructions, shall exhibit the following properties:

3.3.1.1 Viscosity: Shall be not greater than 20,000 centipoise (20.0 Pa•s) at 74°C (165°F), determined within 5 min. after mixing, using a Brookfield Model LVF Viscometer and No. 4 spindle at 12 revolutions per minute.

3.3.1.2 Pot Life: Usable life of the compound, defined as the time to attain double the initial viscosity determined in 3.3.1.1, shall be not less than 30 min. at 74°C (165°F).

3.3.1.3 Curing Time: The time required to develop the cured product properties specified in 3.3.2 shall be not more than 16 hr at 74°C (165°F)

3.3.2 Cured Product: The compound, mixed and cured in accordance with manufacturer's instructions, shall exhibit the following properties:

3.3.2.l Flexural Strength, min	13,000 psi (90 MPa)
3.3.2.2 Flexural Modulus, min	1.6 x 10 psi (11,000 MPa)
3.3.2.3 Total Work to Break, min	30 in.-lb per sq. in. (0.525 N•M/cm)
3.3.2.4 Compressive Strength, min	
3.3.2.5 Compressive Modulus, min	6 psi (6,900 MPa)
3.3.2.6 Izod Impact Strength, per unit of width, min	0.3 ft-lb per in. (16 J/m)
3.3.2.7 Heat Deflection Temperature, at 264 psi (1.8 MPa), min	93°C (200°F)
3.3.2.8 Coefficient of Linear Thermal Expansion, max	
3.3.2.8.1 From -54° to +23°C (-65° to +73°F)	26 x 10^{-6} (14.5 x 10^{-6}
3.3.2.8.2 From 23° to 74°C (73° to 165°F)	34 x 10^{-6} (19 x 10^{-6}
3.3.2.9 Specific Gravity	
3.3.2.10 Bond Strength to Steel, min	3,000 psi (21.0 MPa)
3.3.2.11 Water Absorption after 24 hr immersion, max	0.06%
3.3.2.12 Volume Resistivity	
3.3.2.12.1 At 23°C (73°F), min	14 ohm
3.3.2.12.2 At 121°C (250°F), min	1 x 10^{12}
3.3.2.13 Hydrolytic Stability	
3.3.2.13.1 Volume Resistivity, After Aging, min	1 x 10^{12} ohm - cm

3.4 Quality: Compound, as received by purchaser, shall be uniform in quality and condition, clean, and free from foreign materials detrimental to usage of the compound.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of compound shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the compound conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for viscosity (3.3.1.1), flexural properties (3.3.2.1 and 3.3.2.2), compressive properties (3.3.2.4 and 3.3.2.5), heat deflection temperature (3.3.2.7), and quality (3.4) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of compound to a purchaser, when a change in material or processing, or both, requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows:

4.3.1 For Acceptance Tests: Each lot shall be sampled at random to provide sufficient compound to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all compound produced in a continuous production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time. A lot shall not exceed 6000 lb (2700 kg) of compound and may be packaged in smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6.1 shall state that such plan was used.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor. The sample size is normally not less than one gallon (4 L).

4.4 Approval:

4.4.1 Sample compound shall be approved by purchaser before compound for production use is supplied, unless such approval be waived by purchaser. Results of tests on production compound shall be essentially equivalent to those on the approved sample.

4.4.2 Vendor shall use ingredients, manufacturing procedures and processes, and methods of inspection on production compound which are essentially the same as those used on the approved sample compound. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material or processing, or both, and, when requested, sample compound. Production compound made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods: Shall be in accordance with the following:

Requirement	Test Method
Viscosity	4.5.1
Flexural Strength	ASTM D790
Flexural Modulus	ASTM D790
Total Work to Break	ASTM D790
Compressive Strength	ASTM D695
Compressive Modulus	ASTM D695
Izod Impact Strength	ASTM D256
Heat Deflection Temperature	ASTM D648
Coefficient of Linear Expansion	ASTM D696
Specific Gravity	ASTM D792
Bond Strength to Steel	4.5.2
Water Absorption	ASTM D570
Volume Resistivity	ASTM D257
Hydrolytic Stability	4.5.3

4.5.1 Viscosity: Shall be determined in accordance with ASTM D1824 with the following exceptions: the sample quantity shall be taken from a container of compound in a homogenous state. The samples shall be brought to the test temperature and shall be stirred to fully disperse filler and to combine all ingredients immediately before being tested. The spindle shall be at the test temperature when the test is started. The viscosity reading shall be taken during the 10th revolution of the spindle.

4.5.2 Bond Strength to Steel: Shall be determined in accordance with ASTM D1002. No primer shall be used for the test. Tests shall be run on l/2-hard, cold rolled, steel specimens which have been grit blasted using 100 - 200 mesh (150 - 75 µm) grit. Bond area shall be a nominal 1/2 in. (12 mm) overlap.