



AEROSPACE MATERIAL SPECIFICATION

AMS-I-538™

REV. A

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Superseding AMS-I-538

Insulation, Electrical, Pasted-Mica

FSC 5640

RATIONALE

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

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This document has been taken directly from U.S. Military Specification HH-I-538b and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace HH-I-538b. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers pasted-mica electrical insulation for molded armature slot bases, commutator insulation, shells, heating elements, and other similar insulating purposes.

1.2 Classification:

1.2.1 Types and forms: Pasted-mica electrical insulation furnished under this specification shall be of the following types and forms, as specified (see 6.1).

Type PMR - Pasted mica, rigid
Form S - Sheets (plates)
Type PMM - Pasted mica, moldable
Form R - Rings
Form S - Sheets (plates)
Form T - Tubes
Form X - Special shapes
Type PMF - Pasted mica, flexible
Form S - Sheets (plates)
Type PMH - Pasted mica, heat-resistant
Form S - Sheets (plates)

2. APPLICABLE DOCUMENTS:

The following publications, 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.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

PPP-B-585	Boxes, Wood, Wirebound
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-T-60	Tape, Pressure Sensitive Adhesive, Waterproof
FED-STD-102	Preservation, Packaging and Packing Levels
FED-STD-123	Marking for Domestic Shipment, (Civilian Agencies)
MIL-A-101	Adhesive, Water-Resistant, For Sealing Fiberboard Boxes

2.1 (Continued):

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

2.2 American Standards Association, Inc. Publications:

Available from the American Standards Association, Inc., 10 East 40th Street, New York 16, NY.

C68.1 Measurement of Test Voltage in Dielectric Tests

2.3 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 2131-62 Specification for Natural Muscovite Mica Splittings

2.4 National Electrical Manufacturers Association Publications:

Available from the National Electrical Manufacturers Association, 155 East 44th Street, New York 17, NY.

ME1-1956 Manufactured Electrical Mica

3. REQUIREMENTS:

3.1 Composition:

3.1.1 Pasted-mica electrical insulation shall consist of, or contain, muscovite mica conforming to the requirements of ASTM D 2131-62 unless phlogopite mica is specifically required. When use of phlogopite mica is required, the electrical insulation, unless otherwise specified, shall conform to the minimum standards of performance prescribed hereinafter, for the corresponding item employing muscovite mica.

3.1.2 The mica shall not be calcined or treated in any manner which will adversely affect its suitability for the purpose intended.

3.2 Construction:

3.2.1 General: The pasted mica shall consist of layers of overlapping mica splittings held together by a suitable binding material. The finished surface shall be reasonably smooth and free from excess binder and loosened mica, and shall not be tacky.

3.2.2 Mica splittings:

3.2.2.1 Mica splittings used for pasted-mica electrical insulation shall be sound, clean, and free from mineral inclusions.

3.2.2.2 The size and thickness range of mica splittings used in the specified types of pasted-mica electrical insulation shall conform to the requirements shown in table I and ASTM D2131-62 for the applicable grade.

TABLE I - Size and thickness ranges for mica splittings

Type	Thickness	Minimum grade of splittings	Thickness/10 splittings	
			Minimum	Maximum
	<i>Inch</i>		<i>Inch</i>	<i>Inch</i>
PMR	Up to 0.020, inclusive	Grade 6—3rd	0.007	0.011
	Over 0.020	Grade 6—3rd	.007	.011
PMM	Less than 0.015	Grade 6—3rd	.007	.011
	0.015 to 0.063 incl.	Grade 6—3rd	.007	.011
PMF	Less than 0.010	Grade 6—1st	.007	.010
	0.010 to 0.020, incl.	Grade 6—2nd	.007	.011
	Over 0.020	Grade 6—3rd	.007	.011

3.2.3 Binding material: The binding material for pasted mica electrical insulation shall be a high-quality insulating material free from any deleterious ingredients which may adversely affect the physical and electrical properties of the combination of mica and binder. The binding material shall be uniformly distributed and the proportion of binding material to mica shall be as low as is compatible with requisite mechanical and electrical properties hereinafter specified. It shall be chemically inert with respect to materials normally used in electrical equipment, under conditions of rated operating temperature and presence of humid salt atmosphere.

3.3 Type PMR, pasted mica, rigid:

3.3.1 General: Unless otherwise specified, type PMR mica shall be furnished in form S, sheets (plates).

3.3.2 Uniformity and density: The mica splittings and the binding material shall be as uniformly distributed as practicable, with neither high spots that have received excessive pressure nor low spots or pockets that are filled with binder. The density uniformity shall be taken as an index of the material uniformity and absence of air pockets. This density shall average not less than 0.088 pound per cubic inch per lot and shall be not less than 0.086 pound per cubic inch for each sheet.

3.3.3 Mica content: The mica content shall be not less than 93 percent by weight.

3.3.4 Binder-to-mica adhesion: The binding material shall provide satisfactory adhesion between the mica splittings. Satisfactory adhesion is indicated by the absence of delamination and surface cracking when sheets (plates) are bent to the radii specified in 4.5.4.

- 3.3.5 Compressibility, exudation, and slippage: The thickness of type PMR mica shall not decrease by more than 6 percent and there shall be only slight amounts of either splittings displacement or binder exudation when the material is compressed under 2,500 pounds per square inch at a temperature of 150 degrees C. (302 degrees F.) as described in 4.5.5.1.
- 3.3.6 Dielectric strength: The dielectric qualities of type PMR electrical insulation shall be expressed in terms of short-time and step-by-step dielectric break-down values. For all thicknesses, rigid mica sheets (plates) shall have average short-time dielectric strength of at least 600 volts per mil of specified thickness, and at least 390 volts per mil step by step.
- 3.3.7 Dimensions and tolerances: Size of sheets (plates) furnished shall be 18 by 36 inches or 25 by 37 inches, as specified. A tolerance of plus or minus 1/2 inch will be allowed. The sheets (plates) shall be furnished in standard thickness of 0.020, 0.025, 0.030, 0.0325, 0.035, 0.040, 0.045, and 0.050 inch, as specified. The thickness shall not vary by more than plus or minus 0.002 inch from the nominal value, and the average of 10 measurements shall be within plus or minus 0.001 inch of the specified thickness.
- 3.4 Type PMM, pasted mica, moldable:
- 3.4.1 Form R, rings:
- 3.4.1.1 General: The molded mica rings shall be made in accordance with an approved design or dimensional drawing furnished by the procuring agency. The rings may be either press-molded or form-molded, unless one is specified in the contract or order.
- 3.4.1.2 Mica content: The mica content of press molded rings, which, normally are 6 inches or less in diameter, shall be not less than 80 percent by weight. The mica content of form-molded rings, either complete or in sectional condition, shall be not less than 82 percent by weight, unless otherwise specified.
- 3.4.1.3 Dielectric strength: The dielectric strength for type PMM molded mica rings shall be as specified. Where particular values are not specified, minimum dielectric strength for type PMM mold rings shall be 125 volts per mil short-time and 75 volts per mil step-by-step.
- 3.4.1.4 Dimensions and tolerances: The dimensions and tolerances of molded mica rings shall be as specified on the dimensional drawing. The wall thickness shall not vary from those specified by more than the values shown in table II.