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INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3858D

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Superseding AMS 3858C

Submitted for recognition as an American National Standard

ASBESTOS FELTING, "B" STAGE PHENOLIC RESIN IMPREGNATED
Low Pressure Molding

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 17 October 1990. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to the "C" revision of the subject specification.

"Noncurrent" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division does not recommend these as standard materials for future use in new designs. Each of these "Noncurrent" specifications is available from SAE upon request.

This specification is under jurisdiction of AMS Committee "CC".

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Issued 7-15-61
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ASBESTOS FELTING, "B" STAGE PHENOLIC RESIN IMPREGNATED
Low Pressure Molding

1. SCOPE:

1.1 Form: This specification covers asbestos felting impregnated with phenolic resin, the resin being processed to a "B" stage condition, and furnished in continuous rolls.

1.2 Application: Primarily for molding into flat sheets and contoured laminates requiring resistance to continuous exposure up to 260°C (500°F) or short-time (i.e., 1/2 hr or less) exposure up to 315°C (600°F).

1.3 WARNING: Numerous scientific studies have determined that asbestos presents a health hazard to those who are exposed to asbestos-containing products.

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

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

ASTM C177 - Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate
ASTM D229 - Testing Rigid Sheet and Plate Materials Used for Electrical Insulation
ASTM D256 - Impact Resistance of Plastics and Electrical Insulating Materials
ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position
ASTM D638 - Tensile Properties of Plastics
ASTM D695 - Compressive Properties of Rigid Plastics
ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

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 Specifications:

MIL-R-9299 - Resin, Phenolic, Laminating

2.3.2 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be an asbestos felting impregnated with a phenolic resin, partially processed to a "B" stage condition, which will yield a fully cured product by molding under 12 - 15 psi (85 - 105 kPag) pressure at a temperature within the range 150° - 175°C (300° - 350°F).

3.1.1 Reinforcement: Shall be made from long-staple, nonferrous asbestos fibers containing not less than 99.0% asbestos.

3.1.2 Resin: Shall be a heat-resistant phenolic resin conforming to MIL-R-9299, Type II, Class 1.

3.2 Shelf Life: The preimpregnated material shall have a shelf life of not less than three months from date of impregnation when stored at a temperature not higher than 7°C (45°F). It may be tested at any time during this period for conformance to this specification.

3.3 Properties: Felting shall conform to the following requirements, determined in accordance with specified test methods:

3.3.1 Uncured Properties of Impregnated Product: Shall be as follows, determined on the felting as-supplied:

Resin Content, by weight, average	40 - 50%	4.5.1
Volatile Content, by weight, max	10%	4.5.2
Resin Flow, by weight, min	10%	4.5.3

3.3.2 Properties of Cured Product: Shall be as follows, determined on fully-cured laminates prepared in accordance with manufacturer's recommendations:

3.3.2.1	Tensile Strength, min	20,000 psi (140 MPa)	ASTM D638
3.3.2.2	Compressive Strength, min		ASTM D695
	Flatwise	30,000 psi (205 MPa)	
	Edgewise	7,000 psi (48.5 MPa)	
3.3.2.3	Flexural Strength, Flatwise, min	25,000 psi (170 MPa)	ASTM D790
3.3.2.4	Charpy Impact Resistance, min	3.5 ft-lb per in. of notch (185 N.m/m of notch)	ASTM D256
3.3.2.5	Burning Time, max	3 sec	ASTM D635
3.3.2.6	Thermal Conductivity, max 0.125 in. (3.12 mm) thick specimens		ASTM C177

At Temperature of	Btu per in. per hr per sq ft per deg F	(W/m.C)
38°C (100°F)	3.0	0.435
93°C (200°F)	3.2	0.460
150°C (300°F)	3.4	0.490
205°C (400°F)	3.6	0.520
260°C (500°F)	3.8	0.550

3.3.2.7 Dielectric Strength, perpendicular to laminations, min — ASTM D229

Specimen Thickness			
Inch	mm	V per mil	V/mm
0.0625	1.560	100	3950
0.125	3.12	70	2750
0.500	12.50	35	1400

3.3.2.8 Weather Resistance: When specified, the product shall have weather resistance acceptable to purchaser, determined by a procedure agreed upon by purchaser and vendor.

3.3.2.9 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metals shall not be considered objectionable. Method of test and acceptance standards shall be as agreed upon by purchaser and vendor.

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

3.5 Tolerances: Unless otherwise specified, the following tolerances shall apply:

	Tolerance on Roll, %	
	plus	minus
Width	10	5
Weight	10	10
Thickness, for nominal thicknesses:		
Up to 0.125 in. (3.12 mm), incl	10	10
Over 0.125 in. (3.12 mm)	15	10

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the felting 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 felting conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for uncured properties of impregnated product (3.3.1) and compressive strength (3.3.2.2), flexural strength (3.3.2.3), Charpy impact resistance (3.3.2.4), thermal conductivity at 150°C (300°F) (3.3.2.6), and dielectric strength (3.3.2.7) of cured product and tolerances (3.5) 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 felting to a purchaser, when a change in material, 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: Sufficient felting shall be taken at random from each lot to perform all required tests as follows:

Requirement	Paragraph Reference	Number of Determinations
Resin Content	3.3.1	3
Volatile Content	3.3.1	3
Resin Flow	3.3.1	1
Tensile Strength	3.3.2.1	1
Compressive Strength	3.3.2.2	2
Flexural Strength	3.3.2.3	1
Impact Resistance	3.3.2.4	1
Burning Time	3.3.2.5	1
Thermal Conductivity	3.3.2.6	5
Dielectric Strength	3.3.2.7	3

4.3.1.1 A lot shall be all felting produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time.

4.3.1.2 An inspection lot shall not exceed 2000 yd (1830 m). A lot may be packaged or delivered in smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.3 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.

4.4 Approval:

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

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production felting which are essentially the same as those used on the approved sample felting. 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, processing, or both and, when requested, sample felting. Production felting made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Resin Content: Shall be determined on three specimens cut from the felting, each specimen being approximately 1 in. (25 mm) square. Place each specimen in a dried and weighed crucible, dry at 175° - 205°C (350° - 400°F) in a circulating-air oven for not less than 5 min., cool in a desiccator, and determine original weight of each specimen. Heat to 480°C ± 3 (900°F ± 5), hold at heat for 4 hr ± 0.1 (to prevent the resin from carbonizing), and heat for not less than 1 hr at 815°C ± 5 (1500°F ± 10) (to eliminate the water of crystallization of the asbestos). Cool in a desiccator and determine the weight of the ash or residue from each specimen. Calculate resin content as follows:

$$\text{Resin content, \%} = 100 - \frac{\text{Ash Wt} \times 100}{\text{Original Wt} \times 0.86}$$

(The 0.86 in the above equation is the correction factor for the water of crystallization of the asbestos.)

4.5.2 Volatile Content: Shall be determined as the average of three specimens cut from the felting. The specimens shall be accurately weighed, dried in an oven at 120°C ± 1 (250°F ± 2) for not less than 15 min., cooled to room temperature in a desiccator, and weighed accurately. Calculate volatile content as follows:

$$\text{Volatile content, \%} = \frac{\text{Wt Loss} \times 100}{\text{Original Wt}}$$

4.5.3 Resin Flow: Shall be determined by template-cutting sufficient 4 in. (100-mm) square samples of felting to weigh approximately 32 g, weighing to the nearest 0.01 g, stacking, placing between waxed plates, pressing at 175°C ± 2 (350°F ± 3) for 15 min. or until the resin is completely cured. Remove sample, scrape off flash, and weigh sample. Calculate resin flow as follows:

$$\text{Resin flow, \%} = 100 - \frac{\text{Pressed Wt} \times 100}{\text{Original Wt}}$$

4.6 Reports:

4.6.1 The vendor of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3858C, vendor's material designation, lot number, size, and quantity.