

AEROSPACE
MATERIAL
SPECIFICATION

AMS 3858B

Superseding AMS 3858A

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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).

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

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- 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 ASTM D638
(140 MPa)

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, 25,000 psi ASTM D790
Flatwise, min (170 MPa)

3.3.2.4 Charpy Impact Resistance, 3.5 ft-lb per in. of notch ASTM D256
min (185 N.m/m of notch)

3.3.2.5 Burning Time, max 3 sec ASTM D635

3.3.2.6 Thermal Conductivity, max ASTM C177
0.125 in. (3.12 mm)
thick specimens

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, ASTM D229
perpendicular to laminations,
min

<u>Specimen Thickness</u>		V per mil	V/mm
Inch	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.
 Ø 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:

	<u>Tolerance on Roll, %</u>	
	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
 Ø 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 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: 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 or 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 3858B, vendor's material designation, lot number, size, and quantity.
- 4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3858B, contractor or other direct supplier of felting, supplier's material designation, part number, and quantity. When felting for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of felting to determine conformance to the requirements of this specification and shall include in the report either a statement that the felting conforms or copies of laboratory reports showing the results of tests to determine conformance.
- 4.7 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the felting may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the felting represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

- 5.1.1 Felting shall be supplied in rolls of the size ordered.
- 5.1.2 Each roll shall be identified by an attached removable tag, using characters of such size as to be legible and which will not be obliterated by normal handling. Each label shall show not less than the following information:

ASBESTOS FELTING, "B" STAGE PHENOLIC RESIN IMPREGNATED,
 LOW PRESSURE MOLDING
 AMS 3858B
 MANUFACTURER'S MATERIAL DESIGNATION _____
 LOT NUMBER _____
 QUANTITY _____

- 5.1.3 Packaging shall be accomplished in such a manner as to ensure that the felting, during shipment and storage, will be protected against damage from exposure to moisture, weather, or any other normal hazard.