SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

AMS 2309A

Issued JUL 1994
Cancelled APR 2007

Superseding AMS 2309

Magnetic Rubber Inspection Material

RATIONALE

AMS 2309 has been designated cancelled because it is not being used in industry.

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of April, 2007. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, indicating that it has been "CANCELLED".

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2309

Issued JUL 1994

Magnetic Rubber Inspection Material

1. SCOPE:

1.1 Form:

This specification covers an inspection material in the form of a liquid room-temperature vulcanizing rubber filled with magnetic particles which is cured by addition of one or more curing agents. The product may be supplied in a variety of viscosities and colors.

1.2 Application:

This product is used typically in the inspection of ferrous metals for detection of surface cracks.

1.3 Safety-Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2825 Material Safety Data Sheets

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
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2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 2196 Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer

2.3 U.S. Government Publications:

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

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a liquid room-temperature vulcanizing rubber filled with magnetic particles. The product shall be a uniform blend free of skins, lumps, and gels or coarse particles. There shall be no separation of ingredients which cannot be readily redispersed. When components are mixed, a smooth uniform consistency shall result.

3.2 Properties:

The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified test procedures:

3.2.1 Viscosity: The viscosity of the uncatalyzed product shall be ±10% of the value reported by the manufacturer, determined in accordance with ASTM D 2196 at 25 °C (77 °F).

3.2.2 Cure Times: The cure time of the product, following addition of curing agents, shall be ±50% of the value reported by the manufacturer, determined in accordance with 4.4.1.

3.2.3 Undispersed Particle Size: There shall be no undispersed particles larger than 0.13 mm, determined in accordance with 4.4.2.

3.2.4 Magnetic Response: The product shall exhibit satisfactory magnetic response, determined in accordance with 4.4.3.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

Tests for all technical requirements are acceptance tests and shall be performed on each lot.

4.3 Sampling and Testing:

Sufficient product shall be selected at random from each lot 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. 3.8 liters (1 gallon) of product is required for tests.

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

4.4 Test Methods:

4.4.1 Cure Time: Transfer 20 grams of freshly mixed material to a suitable container and stabilize at 25 °C ± 3 (77 °F ± 5). Add curing agents in accordance with manufacturer's instructions. Stir thoroughly using a wooden tongue depressor or any suitable nonferrous stirrer and pour into a 38 mm nonferrous dish. Cure time is measured starting at the time of the addition of the curing agents and ending when both top and bottom surfaces of the material are tack free.

4.4.2 Undispersed Particle Size: The lower surface of the cured material (See 4.4.1) shall be viewed under 10 to 100X magnification. The size of undispersed particles shall be measured with a calibrated eyepiece micrometer.

4.4.3 Magnetic Response: Prepare a magnetic discontinuity as follows:

4.4.3.1 Cut a piece of 0.025 mm ± 0.003 thick nickel foil into a 13 by 13 mm square. Place the nickel foil in the center of a 38 by 38 mm piece of 0.05 mm ± 0.005 thick aluminum foil and cover the entire surface of the aluminum foil with 0.025 mm ± 0.003 thick mylar tape (See Figure 1). Place the prepared foil in the center of a 76 mm ± 8 by 152 mm ± 15 sheet of 0.625 mm ± 0.06 thick aluminum sheet with the nickel foil side down. Tape down with 0.025 mm ± 0.0003 thick mylar tape, covering the entire surface of the aluminum sheet (See Figure 2).

4.4.3.1.1 Magnetic discontinuities as described above are available from the manufacturer of the product.

4.4.3.2 Place the standard discontinuity on a DC electromagnetic yoke so that the position of the nickel foil is midway between the poles. Adjust the magnetic field intensity at the position of the nickel foil to 100 gauss ± 5 (0.01 T ± 0.0001). Place a nonferrous cup reservoir over the nickel foil and seal with putty (See Figure 3).

4.4.3.3 Prepare 20 grams of freshly mixed material and add curing agents in accordance with manufacturer's instructions. Note exact time of addition of curing agents. At exactly 30 seconds before the expiration of the pot life (provided by manufacturer) with the magnet "on", pour the mixture into the reservoir. After a 30-second interval, turn the magnet "off" and allow the material to cure. Following cure, remove the casting and examine under a microscope at 7 to 10X magnification. The detection of two dark lines (corresponding to the two edges of the nickel foil lying perpendicular to the magnetic lines of force) indicates satisfactory magnetic response (See Figure 4).

4.4.3.3.1 The purpose of the delay between addition of curing agents and magnetization is to measure the magnetic response of the material near the expiration of the pot life.

4.5 Reports:

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. This report shall include the purchase order number, lot number, AMS 2309, vendor's product designation, date of manufacture, and quantity.

4.5.1 A material safety data sheet conforming to AMS 2825, or equivalent, shall be supplied to each purchaser prior to, or concurrent with, the report of preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of product for production use. Each request for modification of formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.6 Resampling and Retesting:

If any sample used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional samples for each original nonconforming sample. Failure of any retest sample to meet the specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 Product shall be assigned an identification (designation) name, number, letter, or code, traceable to a specific set of ingredients, sources of raw materials, proportions, method of manufacture, and control procedures for the product. The identification (designation) shall be changed if any change is made in materials, proportions, methods of manufacture, or control procedures.

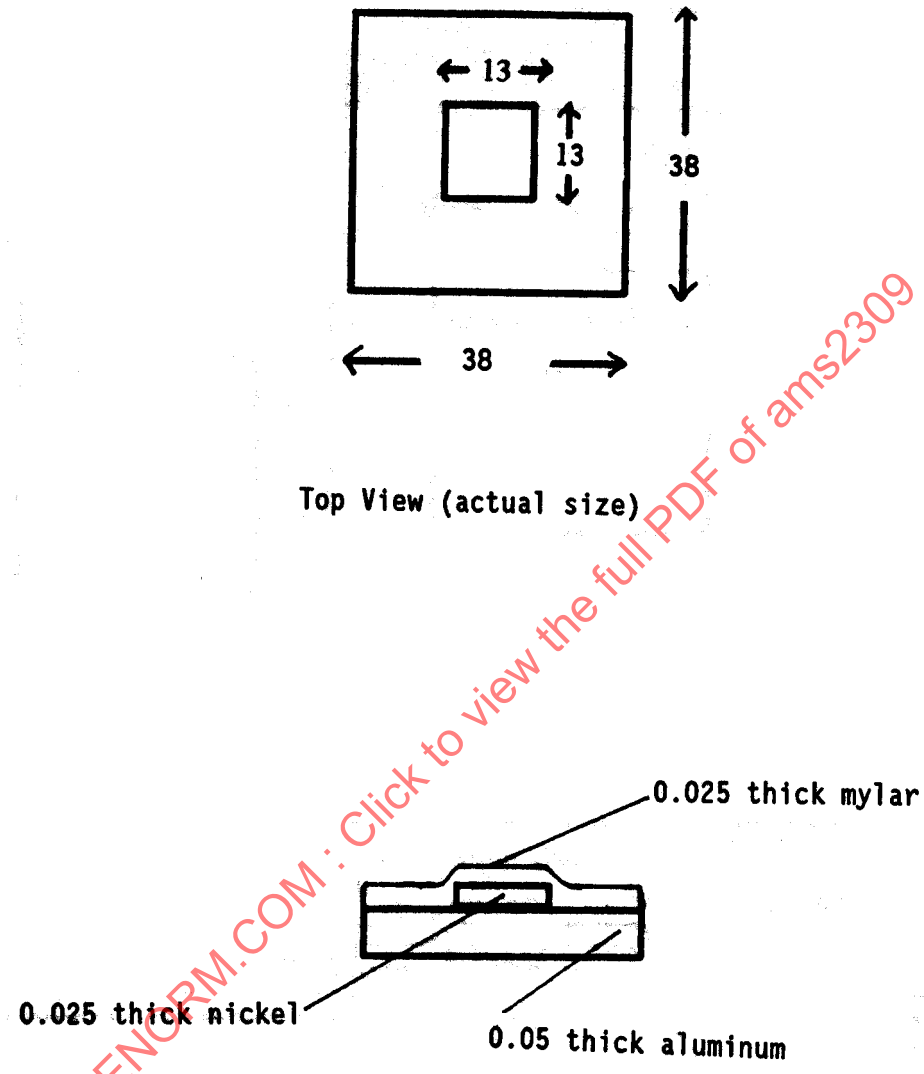

FIGURE 1 - Preparation of Magnetic Discontinuity - Step 1
(Taping Nickel Foil to Aluminum Foil)

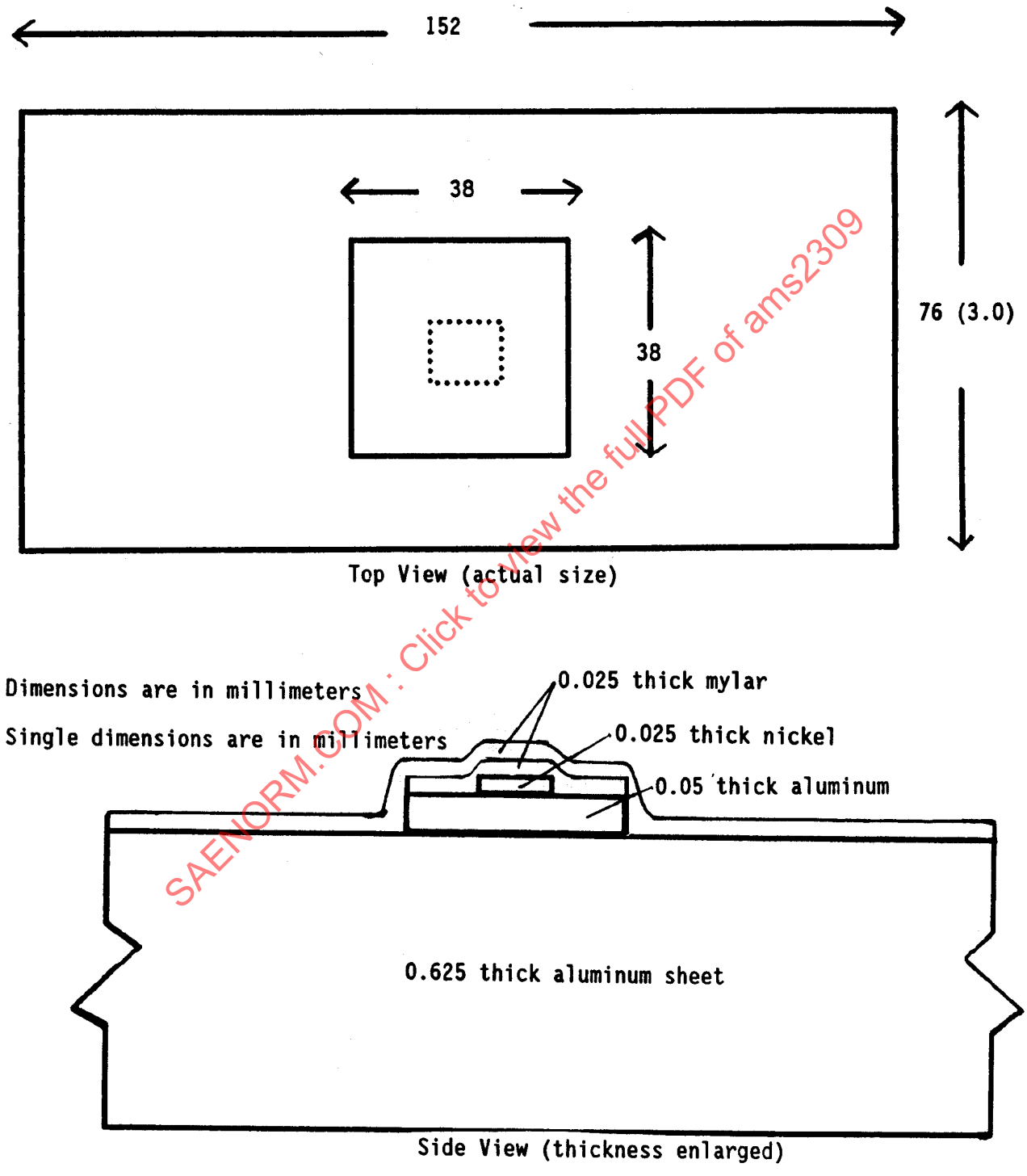

FIGURE 2 - Preparation of Magnetic Discontinuity - Step 2
(Taping Foil Assembly to Aluminum Sheet)