AEROSPACE MATERIAL SPECIFICATION

AMS3044	REV. F

Issued 1974-03
Revised 2008-12
Reaffirmed 2014-08

Superseding AMS3044E

Magnetic Particles, Fluorescent Wet Method, Dry Powder

RATIONALE

AMS3044F has been reaffirmed to comply with the SAE five year review policy.

1. SCOPE

1.1 Form

This specification covers fluorescent magnetic particles in the form of a dry powder.

1.2 Application

These particles have been used typically as the inspection medium in wet, fluorescent magnetic particle inspection system as defined in ASTM E 1444 using either an oil or conditioned-water vehicle, but usage is not limited to such application.

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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS3044F

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2641	Vehicle, Magnetic Particle Inspection, Petroleum Base
AS4792	Water Conditioning Agents for Aqueous Magnetic Particle Inspection
AS5282	Tool Steel Ring for Magnetic Particle Inspection

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 1966	Test Method for Foots in Raw Linseed Oil
ASTM E 11	Wire-Cloth Sieves for Testing Purposes
ASTM E 1444	Magnetic Particle Examination

3. TECHNICAL REQUIREMENTS

3.1 Material

The product shall be composed of durable fluorescent magnetic particles, suitable for long time use, which have been treated to obtain the fluorescent color specified. This dry powder shall be formulated for use with an aqueous vehicle containing appropriate conditioning agents, a magnetic particle vehicle conforming to AMS2641, or equivalent odorless oil, and shall disperse evenly and thoroughly in the recommended vehicle.

3.2 Properties

The product shall conform to the following requirements; tests shall be performed, on the product supplied, in accordance with specified test methods using a test suspension prepared as in 4.3.3.

3.2.1 Contamination

The product shall show no evidence of foreign material, agglomeration, or scum, determined by visual examination of the test suspension at the following times:

3.2.1.1 During preparation of the test suspension as in 4.3.3.

3.2.1.2 After mixing the test suspension, allowing it to stand for not less than 30 minutes, and agitating it slightly.

3.2.1.3 During tests to determine conformance with other characteristics of the product.

3.2.2 Color

The color of the magnetic particles shall be fluorescent in the yellow-green range, unless another color is specified by purchaser. The color shall be determined by observing the indications formed, during the sensitivity test of 3.2.5, in a darkened area under ultraviolet light with a minimum UV-A intensity of 1000 μW/cm^2 at the inspection surface. Visible light shall not exceed 2 foot-candles (20 lx) at the inspection surface.

3.2.3 Particle Size

The fluorescent magnetic particles shall be of such size that not less than 98% by weight shall pass through a 3-inch (76-mm) diameter U.S. Standard No. 325 (45 µm) sieve, as defined in ASTM E 11, determined by passing a 1-quart (1-L) sample of thoroughly-mixed test suspension, as in 4.3.3, through the screen/sieve. After the test suspension liquid vehicle has completely passed through the sieve, rinse with 1 quart (1 L) of the original liquid vehicle. Dry the sieve to remove all of the liquid and determine the dry weight of the residual particulate material not passing through the screen/sieve as related to the original weight of the particulate material in the sample, expressed in percentage.

3.2.4 Durability

Fluorescent magnetic particles shall retain their initial sensitivity, color, and brightness of indication after placing not less than 400 mL of thoroughly-mixed test suspension, prepared as in 4.3.3, in a 1-quart (1-L) capacity constant speed blender, operating the blender at approximately 10,000 to 12,000 rpm for a total of 10 minutes, in 2 minute intervals, allowing the suspension to cool for 5 minutes between stirring cycles, and, at the end of the cumulative 10 minute blending, conduct the sensitivity test of 3.2.5.

3.2.5 Sensitivity

3.2.5.1 Ring Test

The product shall show a seven-hole indication on the ring test specimen defined in 4.3.4, determined by placing the ring on a 1-inch (25-mm) diameter copper bar and circularly magnetizing the ring in a standard magnetic particle inspection unit by passing 2500 amperes of direct current through the copper bar immediately before flooding the ring with agitated test suspension that has passed the contamination (3.2.1) and concentration (4.3.3) tests. Examine the ring in a darkened area under blacklight as defined in 3.2.2. The test shall be repeated using a sample of test suspension that has been subjected to the durability test of 3.2.4.

3.2.5.2 Flaw-to-Background Test

Obtain a test part, or prepare a test specimen, containing flaws of the size expected to be found in production inspection. The surface finish of the test specimen shall be representative of production parts. Magnetize and flood the test specimen as specified in 3.2.5.1, using a sample of agitated test suspension that has passed the contamination (3.2.1) and concentration (4.3.3) tests. View the flaw indications in a darkened area under blacklight as defined in 3.2.2. Indications shall be sharp and distinct. Background fluorescence around the flaws shall be of a level which will neither obscure the flaw indications nor cause difficulty in flaw detection. The test shall be repeated using a sample of test suspension that has been subjected to the durability test of 3.2.4.

3.2.6 Long-Term Durability

Fluorescent magnetic particles shall retain their initial sensitivity, color, and brightness of indication after allowing 1.5 quarts (1.4 L) of freshly-prepared, thoroughly-mixed test suspension, prepared as in 4.3.3, to stand undisturbed at room temperature for not less than 14 days. Following the dwell, the test suspension shall be well dispersed when stirred and shall meet the requirements of 3.2.1 through 3.2.5.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

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

4.2 Classification of Tests

4.2.1 Acceptance Tests

Contamination (3.2.1), color (3.2.2), particle size (3.2.3), durability (3.2.4), and sensitivity (3.2.5) are acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product to a purchaser, when a change in ingredients and/ or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing

Shall be as follows:

4.3.1 Acceptance Tests

Sufficient product shall be taken 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.

4.3.1.1 Lot

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

4.3.1.2 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1.

4.3.2 For Preproduction Tests

As agreed upon by purchaser and vendor.

4.3.3 Test Suspension Preparation

The test suspension shall be prepared in accordance with manufacturer's recommendation by adding sufficient dry powder solids to distilled water containing conditioning agents in accordance with AS4792 or to AMS2641 magnetic particle inspection vehicle, usually 0.025 to 0.18 ounce per gallon (0.19 to 1.3 g/L), to produce a suspension concentration of 0.10 to 0.40 mL of magnetic particles in 100 mL of suspension. The concentration shall be verified by mixing the suspension thoroughly, filling a 100-mL calibrated centrifuge tube as specified in ASTM D 1966, allowing the tube to stand undisturbed for at least 30 minutes, and reading, on the calibrated tube, the volume of the particles settled from the suspension.

4.3.4 Tool Steel Test Ring

Shall be in accordance with AS5282.

4.4 Approval

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