AEROSPACE MATERIAL SPECIFICATION

AMS3041™	REV. G

Issued 1974-03
Reaffirmed 2014-08
Revised 2023-02

Superseding AMS3041F

Magnetic Particles, Nonfluorescent Wet Method, Oil Vehicle, Ready-to-Use

RATIONALE

AMS3041G is the result of a Five-Year Review and update of the specification. The revision adds classes of powder to define testing requirements based on type of powder (1.1, 1.3, 3.1, 3.3.7, 4.2.1, 8.4), updates conversion of foot-candles (3.3.3.1, 3.3.4), renames test procedures (3.3.6, 3.3.7), and requires all testing for acceptance thereby deleting periodic and preproduction tests and approvals (4.2, 4.3).

1. SCOPE

1.1 Form

This specification covers nonfluorescent magnetic particles in the form of a mixed, ready-to-use suspension in an odorless inspection oil vehicle. The magnetic particles shall be in the form of either a single material or composite material as defined in 1.3.

1.2 Application

These products have been used typically as the inspection medium in a wet magnetic particle inspection system in accordance with ASTM E3024/E3024M, but usage is not limited to such application.

1.3 Classification

1.3.1 The magnetic particles covered by this specification are classified as follows:

Type 1 - Single particles, e.g., iron or iron oxide

Type 2 - Composite material, e.g., iron and pigment

1.4 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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For more information on this standard, visit
https://www.sae.org/standards/content/AMS3041G/

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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2641 Vehicle, Magnetic Particle Inspection, Petroleum Base

AS5282 Tool Steel Ring for Magnetic Particle Inspection

AS7766 Terms Used in Aerospace Metals Specifications

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 E11 Woven Wire Test Sieve Cloth and Test Sieves

ASTM E709 Guide for Magnetic Particle Testing

ASTM E3024/E3024M Standard Practice for Magnetic Particle Testing for General Industry

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Material

The product shall be composed of durable magnetic particles, suitable for long-term use. Particles are classified solely to define the testing requirements for the particle type supplied. Particles shall be supplied ready-to-use, mixed in the proper proportion with odorless inspection oil conforming to AMS2641 or equivalent.

3.2 Storage Life

The product shall meet the requirements specified in 3.3 when tested at any time up to 12 months from date of manufacture.

3.3 Properties

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

3.3.1 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:

3.3.1.1 Immediately after mixing the test suspension.

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

3.3.1.3 During tests to determine other characteristics of the product.

3.3.2 Concentration

The concentration of magnetic particles in the vehicle shall be 1.0 to 2.4 mL of magnetic particles in 100 mL of suspension, determined by mixing the suspension thoroughly, filling a 100 mL calibrated centrifuge tube as specified in ASTM E709, demagnetizing, allowing to stand undisturbed for at least 30 minutes, and reading, on the calibrated tube, the volume of particles settled from the suspension.

3.3.3 Sensitivity

The product shall provide indications of at least the first six holes of the test ring specimen of 4.4 when tested as follows:

3.3.3.1 Place the ring on a 1-inch (25-mm) diameter copper bar and circularly magnetize in a standard magnetic particle inspection unit by passing 2500 A of direct current through the bar immediately before flushing the ring with the agitated test suspension which has passed the concentration (3.3.2) and contamination (3.3.1) tests. Examine the ring under a white light of not less than 100 foot-candles (1076 lx) at the examining surface.

3.3.4 Color

The color of the magnetic particles in suspension shall be black, red, gray, or as specified by purchaser, determined by observing a well-dispersed sample of the test suspension in a glass container under a white light of not less than 100 foot-candles (1076 lx) at the examining surface.

3.3.5 Particle Size

The 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 E11, determined by passing a 1-quart (1-L) sample of agitated test suspension through the sieve. After the test suspension vehicle has completely passed through the sieve, rinse with 1 quart (1 L) of the original AMS2641 vehicle. Dry the sieve to remove all liquid and determine the weight of the residual particulate material not passing through the sieve. A comparison sample shall be obtained by passing 1 quart (1 L) of agitated suspension through a preweighed #2 Whatman filter paper, or equivalent. Dry the filter and retained particles to remove all liquid and re-weigh. The weight of the particles retained on the sieve shall not be greater than 2% of the weight of particles retained on the filter paper.

3.3.6 Durability

Magnetic particles shall retain their initial sensitivity and color after placing not less than 400 mL of agitated suspension in a 1-quart (1-L) capacity, constant speed blender, operating the blender at approximately 10000 to 12000 rpm for a total of 10 minutes in 2-minute intervals, allowing the suspension to cool for 5 minutes during each period between stirring cycles and, at the end of the cumulative 10 minutes blending, conducting the sensitivity tests and color tests (see 3.3.3 and 3.3.4).

3.3.7 Long-Term Durability - Only required for Type 2 Particles

Magnetic particles shall retain their initial color and sensitivity after allowing a 1.5-quart (1.4-L) volume of freshly prepared, thoroughly mixed suspension to stand undisturbed at room temperature for not less than 14 days. After standing, the suspension shall be stirred and shall meet the requirements of 3.3.3 and 3.3.4.

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. The 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 (3.3.1), concentration (3.3.2), sensitivity (3.3.3), color (3.3.4), particle size (3.3.5), and durability (3.3.6) are acceptance tests for both Type 1 and Type 2 particles and shall be performed on each lot. Long-term durability (3.3.7) is an acceptance test for Type 2 particles only, and shall be performed on every lot.

4.3 Sampling and Testing

Shall be as follows:

4.3.1 For 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 as specified in the applicable test procedures or, if not specified therein, not less than three.

4.3.1.1 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 producer'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.

4.4 Tool Steel Test Ring

Shall be in accordance with AS5282.

4.5 Reports

The producer and/or distributor of the product shall furnish with each shipment a report stating that the product conforms to all technical requirements. This report shall include the purchase order number, lot number, AMS3041G, manufacturer's material designation, date of manufacture, and quantity.

4.6 Resampling and Retesting

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

5. PREPARATION FOR DELIVERY

5.1 Packaging and Identification

5.1.1 Magnetic particles in the form of a mixed, ready-to-use suspension shall be packaged in containers of a type and size agreed upon by purchaser and producer and/or distributor.

5.1.2 A lot of particles may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.