

AEROSPACE MATERIAL SPECIFICATION



AMS 3042D

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Superseding AMS 3042C

Magnetic Particles, Nonfluorescent Wet Method, Dry Powder

1. SCOPE:

1.1 Form:

This specification covers nonfluorescent, magnetic particles in the form of dry powders intended to be suspended in oil or conditioned water vehicle for use in the wet method, magnetic particle inspection.

1.2 Application:

These particles have been used typically as the inspection medium in a wet magnetic particle inspection system in accordance with ASTM E 1444, using either an oil or a 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2641 Vehicle, Magnetic Particle Inspection, Petroleum Base

AS5282 Tool Steel Ring for Magnetic Particle Inspection

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or 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 magnetic particles, suitable for long-time use, which may have been treated to attain the color specified. This dry powder is designed for use with an aqueous vehicle or an odorless inspection oil conforming to AMS 2641, or equivalent, and shall disperse evenly and thoroughly in the recommended vehicle.

3.2 Test Suspension:

The test suspension for determining conformance to requirements of 3.3 shall be prepared by adding sufficient dry powder solids to conditioned water or odorless inspection oil, to produce a suspension concentration of 1.0 to 2.0 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 60 minutes, and reading, on the calibrated tube, the volume of the particles settled from the suspension.

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, using a test suspension prepared in accordance with 3.2:

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 During preparation of the test suspension as in 3.2.

- 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 the tests to determine other characteristics of the product.
- 3.3.2 Color: The color of the magnetic particles in suspension shall be black, red, gray, or as otherwise 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 (1075 lx) at the examining surface.
- 3.3.3 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 E 11, determined by passing a 1-quart (1-L) sample of stirred test suspension through the sieve. After the test suspension liquid carrier has completely passed through the sieve, rinse with 1 quart (1 L) of the original liquid carrier. Dry the sieve to remove all of the liquid and determine the dry weight of the residual particulate material not passing through the sieve as related to the original weight of the particulate material in the sample, reported in percent.
- 3.3.4 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:
- 3.3.4.1 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 amperes of direct current through the bar immediately before flushing the ring with the agitated test suspension that has passed the concentration and contamination tests. Examine the ring under a white light of not less than 100 foot-candles (1075 lx) at the examining surface.
- 3.3.5 Mechanical Durability: Magnetic particles shall retain their initial sensitivity, color, and brightness of indication after placing not less than 400 mL of thoroughly mixed suspension, prepared as in 3.2, 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 during each period between stirring cycles and, at the end of the cumulative 10 minutes blending, conducting the sensitivity (3.3.4) tests.
- 3.3.6 Chemical Durability: Magnetic particles shall retain their initial color (3.3.2) and sensitivity (3.3.4) 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 3.3.2 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. 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), color (3.3.2), particle size (3.3.3), and sensitivity (3.3.4) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Mechanical durability (3.3.5) and chemical durability (3.3.6) are periodic tests and shall be performed at a frequency selected by the manufacturer unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of a 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 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 be as specified in the applicable test procedures or, if not specified, 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 inspection at one time.

4.3.2 For Periodic and Preproduction Tests: As agreed upon by purchaser and manufacturer.

4.4 Tool Steel Test Ring:

Shall be in accordance with AS5282.

4.5 Approval:

4.5.1 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.