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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 3040B

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Superseding AMS 3040A

MAGNETIC PARTICLES, NONFLUORESCENT
Dry Method

1. SCOPE:

1.1 Form:

This specification covers nonfluorescent, magnetic particles having black, red, gray, or other color, as specified, supplied in the form of dry powders.

1.2 Application:

This product is used typically as an inspection medium in a dry magnetic particle inspection process in accordance with ASTM E 1444, 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 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

SAE J438 Tool and Die Steels

2.2 ASTM Publications:

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

ASTM B 214 Sieve Analysis of Granular Metal Powders
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 1444 Magnetic Particle Examination

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:

(R) The product shall be composed of durable nonfluorescent magnetic particles suitable for use in the dry magnetic particle inspection process in accordance with ASTM E 1444 and which may have been treated to attain the color specified.

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 Contamination: The dry powder shall show no evidence of foreign material or agglomeration, determined by visual examination during the tests to determine other characteristics of the product.

3.2.2 Color: The product shall be black, red, gray, as specified, determined by applying the dry powder onto white paper at least 8-1/2 x 11 inches (216 x 279 mm), completely covering an area not less than 4 inches (102 mm) in diameter. The color shall be observed under a white light of not less than 100 foot-candles (1076 2x) at the examining surface.

3.2.3 Particle Size: The magnetic particles shall be of such size that not less than 98% by weight shall pass through a U.S. Standard No. 80 screen/sieve, determined in accordance with ASTM B 214. Determine the dry weight of the residual particulate material not passing through the screen/sieve as related to the original weight of the sample, expressed in percent.

3.2.4 (R) Sensitivity: The product shall show a minimum eight-hole indication of the test ring specimen, of 4.3.1.2, determined as follows:

3.2.4.1 (R) 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. While the current is flowing, apply approximately 1.0 gram of fresh dry powder that has passed the contamination test, using a suitable squeeze-bulb or shaker applicator. Examine the ring under white light of not less than 100 foot-candles (1076 lx) at the examining surface.

4. QUALITY ASSURANCE PROVISIONS:

4.1 (R) Responsibility for Inspection:

The manufacturer of the product shall supply all samples for manufacturer'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:

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

4.2.1 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, contracting officer, or request for procurement.

4.3 Sampling and Testing:

4.3.1 For Acceptance Tests: Sufficient powder 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 (R) A lot shall be all powder 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 Preparation of Sensitivity Test Ring: Test ring shall be fabricated from 5.5 inch (140 mm) or larger diameter hot rolled, tool steel bar stock conforming to SAE J438, 01 series, or equivalent. Bar stock, prior to machining, shall be normalized by heating to 1500 ºF ± 100 (816 ºC ± 56), holding at heat for 60 minutes ±5 per inch (25 mm) of diameter, heating to 1600 ºF ± 100 (857 ºC ± 56), holding at heat for 60 minutes ±5 per inch (25 mm) of diameter, and cooling in air. Ring shall be machined to the configuration, dimensions, and surface finish shown in Figure 1. Ring shall have nine or more side-drilled holes as shown in Figure 1. After machining, ring shall be annealed by heating within the range 1425 to 1475 ºF (774 to 802 ºC), holding at heat for 60 minutes ±5, cooling at a rate of 40 F± 4 (22 C ± 2) degrees per hour to 1000 ºF (538 ºC) or lower, and furnace or air cooling to room temperature. Surface oxidation, resultant from heat treatment may be removed by dry blasting using either glass beads or aluminum oxide at 25 to 40 psi (172 to 276 kPa). Protect rings from oxidation by coating with oil or grease. Rings, after annealing, shall have hardness of 90 to 95 HRB, or equivalent (See 8.2), determined in accordance with ASTM E 18.

4.3.2 For Preproduction Tests: Shall be acceptable to purchaser.

4.4 Approval:

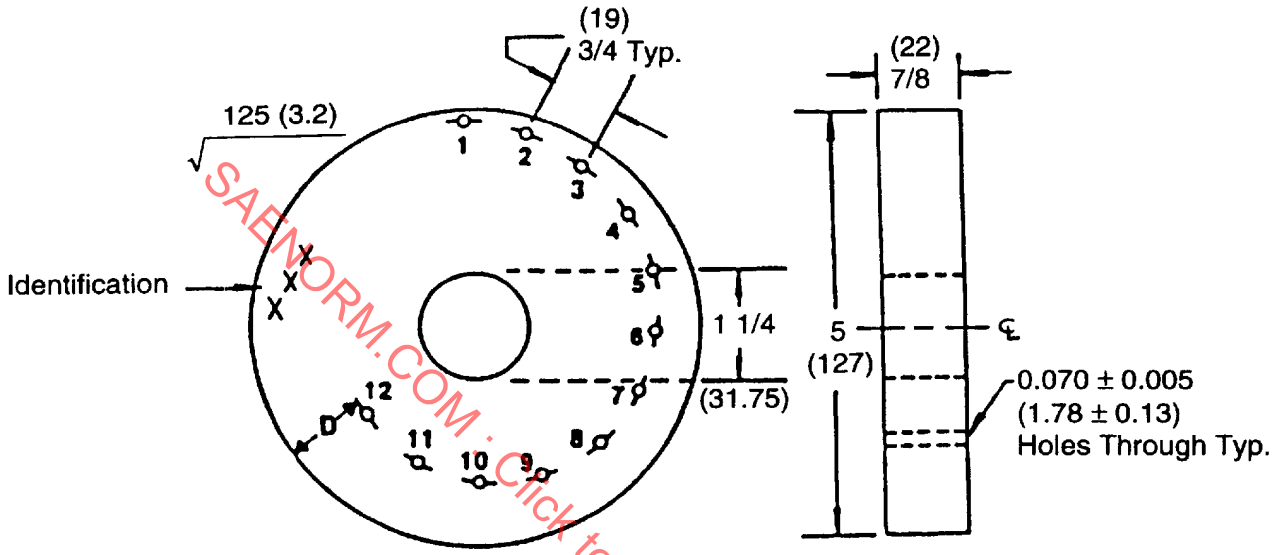
4.4.1 Sample powder shall be approved by purchaser before powder for production use is supplied, unless such approval be waived by purchaser. Results of tests on production powder shall be equivalent to those on the approved sample.

4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production powder that are essentially the same as those used on the approved sample. If necessary to make any changes in ingredients, processing techniques, or manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample powder. Production powder shall not be shipped prior to receipt of reapproval.

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 and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3040B**,** 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 the product for production use. Each request for modification of product formulation shall be accompanied by a revised data sheet for the proposed formulation.



NOTES: 1. All tolerances are ± 0.03 (±0.8) except where shown.
2. Holes 10 thru 12 are optional.
3. All dimensions are in inches and (millimeters).

HOLE	1	2	3	4	5	6	7	8	9	10	11	12
D, Inch ±0.005	0.070	0.140	0.210	0.280	0.350	0.420	0.490	0.560	0.630	0.700	0.770	0.840
D,Millimeters ± 0.13	1.78	3.56	5.33	7.11	8.89	10.67	12.45	14.22	16.00	17.78	19.56	21.34
										OPTIONAL		

FIGURE 1 – 01 Tool Steel Ring for use in Magnetic Particle System Verification and Testing of Magnetic Particles