Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 3043

Issued March 1, 1974
Revised

MAGNETIC PARTICLES
Wet Method, Oil Vehicle, Aerosol Canned

1. SCOPE:

1.1 Form: This specification covers magnetic particles having black, red, or other color, as ordered, supplied in the form of a mixed, ready-to-use suspension in an odorless inspection oil vehicle and packaged in aerosol cans.

1.2 Application: Primarily as the inspection medium in a wet magnetic particle inspection system as defined in AMS 2640 or MIL-I-6868.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2640 - Magnetic Particle Inspection
AMS 3161 - Inspection Oil, Odorless, Heavy Solvent

2.2 ASTM PUBLICATIONS: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM D96 - Water and Sediment in Crude Oils
ASTM E11 - Wire-Cloth Sieves for Testing Purposes

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Military Specifications:

MIL-I-6868 - Inspection Process, Magnetic Particle

3. TECHNICAL REQUIREMENTS:

3.1 Material: The product shall be composed of durable magnetic particles which may have been dyed or otherwise treated to attain the color specified. The particles shall be mixed in the proper proportion with odorless inspection oil conforming to AMS 3161, or equivalent odorless oil, and packaged in aerosol cans.

3.2 Properties: The product shall conform to the following requirements. Tests shall be performed on the product supplied and in accordance with the test procedures of this specification, using a test suspension prepared by spraying the complete contents of several aerosol cans into a clean container to produce at least 1 qt (1 dm^3) of suspension, agitating the aerosol cans frequently to exhaust all particulate material.

Printed in U.S.A.

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 3.2.

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

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

3.2.2 Concentration: The concentration of magnetic particles in the freshly sprayed suspension shall be 1.5 - 2.4 cm^3 of magnetic particles to 100 cm^3 of suspension, determined by mixing the suspension thoroughly, filling a 100-cm^3 pear-shaped calibrated centrifuge tube as specified in ASTM D96, and allowing to stand undisturbed for at least 30 minutes. Read the volume of the settled particles in the suspension on the calibrated tube.

3.2.3 Color: The color of the magnetic particles shall be black, red, or as ordered, determined by observing a well-dispersed sample of the test suspension in a glass container under a white light of not less than 100 ft-candles (1076 lm/m^2) at the examining surface.

3.2.4 Particle Size: The magnetic particles shall be of such size that not less than 98% by weight shall pass through a 3-in. (76-mm) diameter U. S. Standard No. 325 sieve as defined in ASTM E11, determined by passing a 1-pt (0.5-dm^3) sample of stirred test suspension through the screen/sieve. After the test suspension liquid carrier has completely passed through the sieve, rinse with 1 qt (1.0 dm^3) 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 screen/sieve as related to the original weight of the particulate material in the sample, expressed in percent.

3.2.5 Magnetic Extraction: The magnetic particles shall be attracted and removed from the vehicle with no more than a trace remaining in the bottom of the container, determined as follows:

3.2.5.1 Prepare an electromagnet consisting of an armco iron core, 0.312 in. ± 0.031 (7.92 mm ± 0.79) in diameter and 3.00 in. ± 0.13 (76.2 mm ± 3.3) long, with a 2-in. (51-mm) long nonmagnetic handle attached to one end, the core being wrapped with 25 turns of No. 12 (2.052 mm diameter) enameled copper conductor, or use an equivalent electromagnet.

3.2.5.2 Place 100 cm^3 of freshly-stirred suspension prepared as in 3.2 into a 150 cm^3 glass container (approximately 2 in. (51 mm) in diameter). Lower the magnet, energized with 15 A of direct current, into the slurry and progressively extract the particles by carefully removing the probe from the sample, shutting off the current, and removing the particles from the electromagnet. Repeat the extraction operation until all possible magnetic particles have been removed from the vehicle. Allow the liquid in the container to stand undisturbed for not less than 30 min. and examine the container over a white surface under a white light of not less than 100 ft-candles (1076 lm/m^2) at the examining surface.

3.2.6 Sensitivity: The product shall show a five-hole indication of the ring test specimen defined in MIL-I-6868, determined as follows:

3.2.6.1 Place the ring on a 1-in. (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 spraying the ring with the contents of an agitated aerosol can from the same lot that has passed the concentration, contamination, and magnetic extraction tests. Examine the ring under a white light of not less than 100 ft-candles (1076 lm/m^2) at the examining surface.

3.3 Aerosol Spray Cans: The magnetic particles shall be packaged in aerosol cans meeting the requirements specified herein. The aerosol cans selected for test shall be maintained at room temperature for not less than 12 hr prior to testing. During testing, the aerosol can may be immersed in water at 25° C ± 1 (77° F ± 1.8) periodically to maintain the container and its contents at room temperature.

3.3.1 Sprayability and Leakage:

3.3.1.1 All aerosol pressure cans shall be equipped with a spray nozzle. The nozzle shall provide a fine, steady spray and shall deposit the product evenly on a flat or vertical surface. No chunks of solids shall be expelled and no clogging of the nozzle shall occur. After clearing the nozzle in accordance with the manufacturer's instructions, there shall be no perceptible leakage.

3.3.1.2 The characteristics of the spray pattern and the performance of the spray nozzle shall be evaluated by vigorously shaking the can for not less than 30 sec with the contained pellet sounding on each shake and spraying a pattern on large sheets of newspaper or similar surfaces to determine the coverage and evenness of the spray. After spraying several patterns, the nozzle shall be examined for evidence of chunks of solids and clogging. The nozzle shall then be cleared by inverting the can and spraying until only gas escapes. The can shall then be immersed for not less than 15 min. in water at 52° - 54° C (125.6° - 129.2° F); there shall be no visible evidence of leakage from, or distortion of, the pressurized container. The pressurized can shall then be immersed in water at 25° C ± 1 (77° F ± 1.8) until the temperature has stabilized and, after vigorous shaking, two more patterns shall be sprayed. The spray characteristics shall have not changed and there shall be no chunking of particles or clogging of the nozzle.

CAUTION: DO NOT HEAT THE PRESSURIZED CAN OVER 54° C (129° F)

3.3.2 Complete Expulsion: The complete usable portion of the contents shall have been expelled before the propellant is expended. The expelled contents shall be not less than 5 fl oz (148 cm^3) and the particle content shall conform to the aerosol spray requirements. Vigorously shake for not less than 30 sec each unused can to be tested, with the contained pellet sounding on each shake, and expel the contents in a series of short blasts into a clean glass container graduated in ounces (cm^3) in such a manner that the entire contents of the can will be retained in the glass container. The aerosol can may be immersed periodically in water at 25° C ± 1 (77° F ± 1.8) to maintain the can and its contents at room temperature. Repeat the vigorous shaking and short blasts until there is no further escape of gas. Examine the spray nozzle for chunking of particles and clogging during the test.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling:

4.3.1 Sampling Schedule: Sufficient material shall be taken at random from each lot to perform all required tests in triplicate.

4.3.2 Lot: A lot shall be all material produced in a single production run from the same batch of raw materials under the same fixed conditions, mixed with vehicle, packaged in aerosol cans, and presented for inspection at one time. The cans in a lot may be delivered separately under the basic lot approval as long as lot identity is maintained.

4.4 Approval:

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

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production material which are essentially the same as those used on the approved sample material. If any change is necessary in ingredients, in type of equipment for processing, or in manufacturing procedures which could affect quality or properties of the material, vendor shall submit samples for reapproval unless purchaser grants written approval after review of a detailed statement of materials and processing used on the approved sample and those proposed. No production material made by the revised procedure shall be shipped prior to receipt of approval of such procedure.

4.5 Reports: The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, material specification number, vendor's material designation, lot number, date of manufacture, color, and quantity.

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 and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Magnetic particles supplied in aerosol cans shall be completely mixed with vehicle and each can shall contain a pellet to aid in agitation or mixing of the material prior to spraying. The aerosol cans shall be of suitable size for hand application of the material or as specified on the purchase order.

5.1.2 Each aerosol can shall be identified by attaching a durable label bearing characters of such size as to be clearly legible and which will not be obliterated by normal handling. Each label shall show the following information:

MAGNETIC PARTICLES, WET METHOD, OIL VEHICLE, AEROSOL
AMS 3043
COLOR ____*____
MANUFACTURER'S MATERIAL DESIGNATION_____
DATE OF MANUFACTURE_____
LOT NUMBER_____
QUANTITY_____
MANUFACTURER'S INSTRUCTION FOR USE ____**____
APPROPRIATE WARNINGS OR PRECAUTIONARY NOTICES_____

*Enter color, "BLACK", "RED", or as ordered.
**May be on separate sheet.

5.1.3 The aerosol cans shall be packed in an exterior shipping container capable of protecting the cans during transit and storage against damage from exposure to weather or any normal hazard.

5.1.4 Each exterior shipping container shall be legibly marked with the following information in such a manner that the markings shall not smear or be obliterated during normal handling or use: