

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AMS 2640 A

Issued 6-13-40

Revised 8-1-44

M A G N E T I C I N S P E C T I O N

Page 1 of 3 pages

1. ACKNOWLEDGMENT: A vendor must mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. PURPOSE: To detect the presence of small grinding or quenching cracks, seams, non-metallic inclusions, and other defects on and immediately below the surface, in magnetizable materials.

3. APPLICATION: (a) To steel parts when this specification number appears on the drawing or when required by written instructions.

(b) The magnetic inspection must be performed on parts which have been fully heat treated and whose surfaces have been completely finish machined and electroplated when specified. If surface treatments are applied then the magnetic inspection may be applied before such treatment. If surface treatments are of the type which may cause cracks then the inspection shall again be applied using a magnetic substance with a suitable color.

(c) Magnetic inspection shall be performed on each individual part in such a manner as to insure satisfactory detection of defects having axes in any direction relative to the axes of the part. A complete inspection test shall consist of one or more distinct magnetizing, inspection, and demagnetizing operations so conducted that any defects are adequately revealed.

(d) If this specification number appears on a drawing, every part shall be inspected to this specification.

4. WET PROCESS: All material and parts shall be inspected by this process, unless otherwise specified, using either the continuous or the residual method as warranted by the particular material or part undergoing inspection.

(a) Materials and Control.-

(1) Liquid Vehicle.-Shall be a light petroleum distillate conforming to AMS 3160, except that it may have a higher flash point.

(2) Magnetic Substance.-Shall be suitable for the purpose and preferably in the form of a paste, but dry powder may be used provided equally good dispersion in the liquid vehicle is affected.

(3) Solution.- Shall consist of a suspension of the magnetic substance in the liquid vehicle in such quantity that the concentration of the mixture as applied is not less than one ounce by weight of the solid to one gallon of liquid. Stronger concentrations may be used if the indications are not obscured. Suitable means shall be provided for agitating the solution to maintain the magnetic substance thoroughly in suspension.

(4) Test of Solution.-The solution shall be tested by the following method as often as necessary to maintain proper control: Fill a standard 100 ml graduated container to the 100 ml mark with the solution directly from the hose or other device used for pouring it over the piece in making a test, demagnetize, and let it stand for 30 minutes to precipitate, or until the solid matter is apparently all down. Decant the clear liquid as far as practicable without loss of magnetic substance. Refill the graduate containing magnetic substance with benzol; shake well and let stand 1 hour to precipitate a second time. Read the height, or volume of the precipitate in the graduate. A volume of 1 to 2 ml of magnetized substance as precipitate is approximately equivalent to a concentration of one ounce by weight of solid to one gallon of liquid. This test shall not be construed to represent a measure of the total amount of the magnetic substance present in the tank, much of which may be lying unmixed on the bottom.

Note: Other methods of test which produce equivalent results may be substituted for the above method.

(b) Operation.-The solution shall be applied to the magnetized part by flowing from a hose, pouring or immersion, either while the magnetizing current is flowing (the continuous method), or after the part has been magnetized and the current turned off (the residual method).

5. DRY PROCESS: May be used when permitted by the Inspection and Engineering Departments for special applications where it might offer certain advantages.

(a) Material.-

(1) Magnetic Substance.-Shall be suitable for the purpose and in the form of a dry powder.

(b) Operation.- The dry magnetic powder shall be dusted directly on the magnetized part, using whichever magnetizing method proves most effective.

6. PROCEDURE: (a) The surfaces of all materials and parts shall be properly cleaned to free them from oil, grease, dirt, or other contamination which might interfere with the proper distribution and concentration, or with the intensity, character, or definition of the deposit of the magnetic substance.

(b) Oil holes and other openings which lead to areas from which the magnetic substance cannot be easily removed should be plugged with grease or otherwise covered before the part is magnetized.

(c) The magnetic field shall be induced in the piece being tested by placing the piece between the poles of electro-magnets or within a solenoid coil carrying direct current (Bi-Polar or Longitudinal Method); or by passing a high-amperage low-voltage direct current through the piece or through an adjacent conductor (Circular Method). The magnetic flux shall be of suitable intensity and direction to reveal all indications which might be cause for rejection. The magnetic substance shall be applied to the magnetized piece preferably by the wet process but the dry process may be used under special conditions when approved by the Inspection and Engineering Departments.