

EDS

Engineering,
GM DAEWOO Auto & Technology
Standards

TEST METHOD OF MAGNETIC PARTICLE PENETRANT

EDS-T-7128

ISSUED DATE: 1990. 03. 27

REVISED DATE: 2006. 06. 19

VERSION: 3

1. PURPOSE

This standard aims at specifying the magnetic particle test method, thus helping the test engineer perform tests in an appropriate manner.

2. SCOPE

This standard specifies the method for magnetic particle penetrant test (hereinafter referred to as test) of ferrous materials and the products made from them (forged products, cast products, welded products, etc., hereinafter referred to as the test specimens.)

3. DEFINITIONS

- 3.1. Wet method: A method of applying magnetic particles suspended in a appropriate liquid.
- 3.2. Dry method: A method of applying magnetic particles dried.
- 3.3. Solution of magnetic particles: Solution that suspends magnetic particles used for wet method.
- 3.4. Application of magnetic particles: The operation for making magnetic particles in inspection liquid or for dry method easily reach the defects, etc. in the test specimen.
- 3.5. Magnetic particles pattern: The pattern produced by the adhesion of magnetic particles at the discontinuous part occurring due to the defects, etc. of the test specimen.
- 3.6. Continuous method: The method of completing the application of magnetic particles while flowing a magnetizing current or attaching a permanent magnet.
- 3.7. Residual method: A method wherein magnetic particles are applied after the magnetizing current has been turned off.
- 3.8. Magnetizing current: The electric current used to induce magnetic flux in the test specimen.
- 3.9. Demagnetizing field: The magnetic field which is produced by the magnetic poles appearing in the test specimen to reduce the magnetic field applied, when the test specimen is magnetized.
- 3.10. Effective magnetic field: The magnetic field actually working on the part under test. The residue of applied magnetic field subtracted by demagnetizing field.
- 3.11. Magnetic particles: Fine particles of ferromagnetic material used for the test.
- 3.12. Visible magnetic particles: Magnetic particles whose pattern shall be observed under the visible light.
- 3.13. Fluorescent magnetic particles: Magnetic particles processed to fluorescence when irradiated by ultraviolet rays.

3.14. False indication: The magnetic particles pattern produced by other reasons than defects.

3.15. Skin effect: The phenomenon of electric current and alternating magnetic flux applied to the test specimen accumulating in the part near the surface.

4. TESTING ENGINEER

The personnel in charge of the tests shall have the qualification necessary for the task or shall have enough knowledge, technique and experience equivalent thereto.

5. APPARATUS

5.1. The test apparatus shall, as a rule, be capable of performing the four operations on the test specimen, i.e., magnetization, application of magnetic articles, observation and demagnetization.

5.2. The magnetizing equipment shall be of either electric current using system of permanent magnet using system.

5.3. For the test fluorescent magnetic particles, an ultraviolet-ray irradiator shall be used.

6. TEST MATERIALS

6.1. Magnetic particles shall be classified into the ones for dry method used and the ones for wet method use by the quality of dispersible agent used in their application, and further classified into the fluorescent ones and visible ones by the method of observation.

6.2. The magnetic particles shall have suitable magnetism, particle size(usually, 1-4 micron), dispersing characteristics, suspending characteristics and colour tone depending on the quality of material surface condition and nature of defects of the test specimen.

6.3. For the wet method, the liquid composed of kerosene specified in KS M 2613 or water, etc. as the dispersible agent, added with suitable rust-preventive and surface active agent as necessary, shall be used.

6.4. For fluorescent magnetic particles, the concentration of magnetic particles dispersing in the suspension shall be determined taking consideration of the applying period, applying method of magnetic particles, but it shall be usually 0.2 ml - 0.5 ml for fluorescent ones and 1.5 ml - 3.4 ml for visible ones when the test is performed according to 14.1.1. However, the suspension composed of both fluorescent and nonfluorescent magnetic particles may not be used.

6.5. The performance of suspension and magnetic particles shall be confirmed, by using a suitable standard test piece.

7. LIGHTING EQUIPMENT

7.1. Visible magnetic particles

The illumination for the test shall be white light or visible light and 1100 lux or more.

7.2. Fluorescent magnetic particles

The test shall be performed in a darkroom of 10 lux or less in illumination and the illumination of suitably filtered ultraviolet-ray shall be 800 ~ 1000 uw/cm².

8. DEMAGNETIZING EQUIPMENT

The demagnetizing equipment shall be capable of demagnetizing the test specimen fully and the accuracy of demagnetizing shall be measured using a magnetometer having scaling division of 1.5 oersted.

9. TIME FOR TESTING AND PRETREATMENT

9.1. The test specimen shall as a rule be tested in the condition where all the working and treating process have finished. However, where surface treatment can interfere with the detection of defects, the test specimen shall be tested before the treatment.

9.2. In case of assemblies, the test shall be performed on the components before assembly, as a rule.

9.3. If the grease adhering to the test specimen and coating of paint and plating, etc. are likely to affect the accuracy of test or to contaminate the suspension, they shall be removed to make the test specimen clean. For that, shot blasting, detergent, organic solvent, oxide film remover, paint remover and ultrasonic cleaner may be used.

9.4. However, for dry method, the surface may not be wet.

10. TEST METHODS

10.1. Classification of test methods

Test methods are classified by the time for magnetization in relation to application of magnetic particles, kind of magnetic particles, magnetic particle dispersible agent, type of magnetizing current and magnetizing method as shown in Table 1.

Table 1. Classification of Test Methods

Classifying factor	Classification
Time for magnetization in relation to application of magnetic particle	Continuous magnetization method, residual method
Kind of magnetic particles	Fluorescent magnetic particles, visible magnetic particles
Magnetic particle dispersible agent	Dry method, wet method
Type of magnetizing current	D.C., A.C., pulsating current, impulse current
Magnetizing method	Axial current method, cross current method, through conductor method, coil method, yoke method, through flux method, prod method