ZEROS

General Test Guideline – Magnetic Particle Testing (MT)

Non-destructive testing for the detection of surface defects in ferromagnetic materials

1. Purpose of the Test

Magnetic particle testing is used to detect surface and near-surface defects such as cracks, pores, lack of fusion, or shrinkage cavities.

The method is based on the magnetization of the test piece: at discontinuities, magnetic flux leakage occurs, causing applied magnetic particles to accumulate and thereby making the defects visible.

2. Suitable Materials

- All ferromagnetic materials such as steel, cast iron, nickel, and cobalt alloys.
- Not suitable are non-magnetic materials such as aluminum, copper, or austenitic stainless steels.

3. Required Test Equipment

- Magnetization device (yoke, coil, or current flow)
- Magnetic particles (dry or in suspension, optionally fluorescent)
- UV light (for fluorescent testing)
- Cleaning cloths, possibly degreaser or cleaning agent
- Reference and control specimens (e.g., MTU test block)

4. Test Procedure

Step 1: Cleaning

The surface must be free of oil, grease, rust, scale, and coatings. Then allow to dry completely.

Step 2: Magnetization

The component is magnetized. The field lines align within the material. At cracks or discontinuities, flux leakage occurs.

Step 3: Application of Magnetic Particles

Magnetic particles are applied (dusting dry powder or spraying in suspension).
For fluorescent testing, use under UV light.

Step 4: Indication

The magnetic particles accumulate at discontinuities, making them visible as dark or fluorescent indications.

Step 5: Evaluation and Documentation

All indications are assessed according to defined criteria and documented (sketch, photo, description).

Step 6: Demagnetization and Cleaning

After testing, the component is demagnetized and cleaned to remove residual magnetism and particle deposits.

5. Notes for Reliable Results

- Ensure sufficient magnetic field strength (check with reference specimen)
- Test the entire component, possibly using a combination of magnetization directions
- Stir or shake magnetic particles regularly
- For fluorescent testing: ensure darkness and observe UV safety measures
- Always demagnetize after testing

6. Typical Applications

- Weld inspections in steel structures
- Castings (engine blocks, valves, housings)
- Safety-critical components in mechanical engineering, automotive, energy, and railway industries
- Quality assurance in serial production

7. Safety Instructions

- Wear personal protective equipment: gloves, safety glasses
- For fluorescent testing: observe UV protection
- Ensure good ventilation, avoid open flames
- Do not inhale or ingest testing materials
- Observe safety data sheets
- Dispose of residues properly