Magnetic Particle Testing
Level I and II – 24 hours
Training Course Outline

SCOPE
This course covers the principles of Magnetic Particle Testing and prepares a candidate to
- Select equipment to conduct test
- Setup test equipment
- Steps to conduct test
- Familiarize with codes and standards
- Interpret results with respect to applicable codes and standards
- Understand limitation of the test method
- Write test reports.

TRAINING
Training material is presented in modules that are followed by quizzes

PERSONNEL CERTIFICATION
ASNT SNT-TC-1A
NAS 410
Training, experience and examination requirements

Training Requirements
- Recommended Course Outline
- Training Hours
- Practicals

Quizzes and examinations

MODULE 2: THEORY OF MAGNETISM
- Magnetic field, Lines of force, Flux density
- Permeability, Reluctance, Retentivity, Residual Magnetism and Coercive Force
- Diamagnetic, Paramagnetic and Ferromagnetic materials
- Leakage flux
- Fleming’s Right Hand and Left Hand Rule
- Magnetic Fields: Circular, Longitudinal
- Hysteresis Curve

MODULE 3: METHODS OF MAGNETIZATION
- Faraday’s Law: Electromagnetism
- Types of current AC, DC, HWDC
- Circular field: Head Shot (Direct Contact), Prods and Central Conductor Techniques, Offset Central Conductor
- Advantages and disadvantages of circular field
- Longitudinal field: Coils and Yoke
• Advantages and disadvantages of Longitudinal Field
• AC and DC Field Distribution in a Magnetic and a Nonmagnetic Conductor
• Demagnetization

MODULE 4: EQUIPMENT
• Equipment consideration
• Wet Horizontal, Mobile and Portable Equipments
• Fluorescent testing, Black Light
• Light meter
• Accessories

MODULE 5: MEDIUMS AND THEIR PREPARATION
• Dry and Wet method
• Particles: Dry and Wet
• Properties of particles
• Visibility of particles
• Methods of Application
• Contamination of Magnetic Particles
• Settling Test Procedure
• Concentration for Wet suspensions as per ASME Sec V Article 7
• Bath Maintenance

MODULE 6: APPLICATIONS
• Residual and Continuous Method
• Magnetic Particle Inspection of Solid Cylindrical Parts, Gears, Multiple diameter Articles, Discs, Hollow Cylindrical Articles
• Selection of proper method of magnetization
• Verification of magnetic fields
• Checking the adequacy of field using the Pie gauge, shims
• Fluorescent Inspection
  o Black Light Warm Up Time
  o Minimum intensity and light meter
  o Visual Adaptation
• Visual Inspection
  o Minimum light intensity and light meter
• Magnetic Rubber Inspection

MODULE 7: TYPES OF INDICATIONS
• Interpretation including Relevant, False, Non-relevant indications

MODULE 8: CODES AND STANDARDS (Specific Training)
• MT Inspection Procedures

Codes
• ASME Section V Article 7: Magnetic Particle Examination
ASME Section VIII (Accept/Reject Criteria)

Standards
- ASTM E-709: Standard Guide for Magnetic Particle Testing
- ASTM E-1444: Standard Practice for Magnetic Particle Testing

Other codes and standards can be discussed if prearranged with the instructor at the time of registration

PRACTICAL TRAINING
- MT Yoke: Dry Visible, Wet Visible, Wet Fluorescent
- Central Conductor
- Coil Shot – Longitudinal
- Ketos (Betz) Ring – Depth of penetration
- Training on Weld flaw samples

EXAMINATIONS
- General
- Specific
- Practical

Candidates must score a minimum of 70% in each individual test and a minimum average of 80% in all three tests.

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