Magnetic Particle Testing

Level I and II

Training Course Outline

SCOPE

This course covers the principles of Magnetic Particle Testing and prepares a candidate to

• Setup and calibrate equipment

• Interpret and Evaluate Results with respect to Applicable Codes, Standards and Specifications

• Familiar with the scope and limitations of the Methods

• Write test reports.

TRAINING

Training Material is presented in Module that are followed by Quizzes

GENERAL TRAINING

Personnel Certification: ASNT SNT-TC-1A and NAS 410

MODULE 1: MANUFACTURING DISCONTINUITIES

• Types of Discontinuities: Inherent, Processing and Service

• Casting Discontinuities: Hot Tear, Cold Shut, Porosity, Shrinkage

• Primary Processing Discontinuities including discontinuities in Rolling, Forging, Drawing, Extruding

• Secondary Processing Discontinuities including discontinuities in Grinding, Heat Treating, Machining, Welding, Plating

• Service Discontinuities: Erosion, Wear, Fatigue, Corrosion, Creep, Hydrogen Attack

MODULE 2: THEORY OF MAGNETISM

• Magnetic field, Lines of force, Flux density

• Definitions of Permeability, Reluctance, Retentivity, Residual Magnetism and Coercive Force

• Diamagnetic, Paramagnetic and Ferromagnetic materials

• Leakage flux

• Fleming's Right Hand and Left Hand Rule

• Types of Magnetic Fields: Circular, Longitudinal, Vector

• Hysteresis Curve

MODULE 3: METHODS OF MAGNETIZATION

• Magnetization By Means of Electric Current

• Types of current AC, 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
- Accessories

MODLULE 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

MODLULE 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
- 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 2004
• ASME Section VIII (Accept/Reject Criteria)
• ASME B 31.1 – Power Piping
• ASME B 31.3 – Petrochemical Piping

Standards
• ASTM E-709
• ASTM E-1444
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 defect samples (Flaw Tech sample kits), OCTG 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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