

# Liquid Penetrant Testing Level I and II Training Course Outline

## **SCOPE**

This course covers the principles of Liquid Penetrant 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: PRINCIPLES**

- Purpose of Liquid Penetrant Testing
- Physical Principles
- Wetting Characteristics and Contact Angle
- Wetting Ability
- Force of Cohesion and Surface Tension
- Capillary Action
- Viscosity
- Application of Penetrant: Dwell Time
- Reversed Capillary Action
- Visibility of Indication
- Categories of Test Processes
- Types of Dye: Type I and Type II
- Methods of Removal of excess Penetrant including Water Washable, Emulsifiers and Solvent Removable
- Sensitivity Levels – ½, 1, 2, 3, 4
- Selection of Process

- Limitations of Penetrant Testing

### **MODULE 3: BASIC STEPS**

This module covers the basic steps involved in the following processes

- Method A – Water Washable
- Method B – Lipophilic Emulsifier
- Method C – Solvent Removable
- Method D – Hydrophilic Emulsifier

### **MODULE 4: PRE AND POST CLEANING**

- Choice of Cleaning Method
- Different Cleaning Methods including Detergent, Solvent, Alkaline, Steam, Ultrasonic cleaning, Vapor Degreasing

### **MODULE 5: APPLICATION OF PENETRANTS AND DEVELOPERS**

- Different ways of applying penetrants
- Standard Temperature Limits
- Dwell time
- Drying
- Drying Parameters
- Drying Time Limits
- Application of Developers
- Types of Developers
- Developing Time
- Fluorescent Inspection
- Black Light, Black Light Warm Up Time,
- Visual Adaptation
- Post Cleaning

### **MODULE 6: INTERPRETATION**

- Interpretation of Test Results
- Flow Chart for Interpretation
- Types of Indications like True, False, Relevant and Non Relevant indications
- Categories of Indications: - Rounded and Linear
- Evaluation of Indications
- ASTM E-433 Reference Photographs of Indications types

### **MODULE 7: CODES & STANDARDS (SPECIFIC TRAINING )**

#### **Codes**

- ASME Section V, Article 6
- ASME Section VIII, Appendix 8 (Accept/Reject Criteria)

**Standards**

- ASTM E-165
- ASTM E –1417
- Other codes and standards can be discussed at the request of the students. Please make such requests at time of registration

**PRACTICAL TRAINING**

## Visible

- Solvent Removable

## Fluorescent

- Water Washable
- Solvent Removable
- Emulsifier both Hydrophilic and Lipophilic

Tests on Weld samples (Flaw tech)

**EXAMINATIONS**

- General
- Specific
- Practical Tests

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

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