

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

- 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 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

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

- Reversed Capillary Action
- Visibility of Indication
- Categories of Test Processes
- Types of Dye: Type I (Fluorescent) and Type II (Visible)
- 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

- Selection of Penetrant Materials
 - Cleaners
 - Penetrant
 - Developer
 - Selection based on family
- Application of Penetrant
- Standard Temperature Limits
- Dwell time
- Drying
- Drying Parameters
- Drying Time Limits
- Application of Developers
- Types of Developers
 - Aqueous
 - Non-Aqueous
- Developing Time
- Fluorescent Inspection
 - Black Light Warm Up Time
 - Minimum intensity and light meter
 - Visual Adaptation
- Visual Inspection
 - Minimum light intensity and light meter

- Post Cleaning
- Limitation of Penetrant Testing

MODULE 6: INTERPRETATION

- Interpretation of Test Results
- Flow Chart for Interpretation
- 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 Standard Practice for Liquid Penetrant Examination
- ASTM E-1209 Fluorescent Water Washable Liquid Penetrant Testing

Other codes and standards can be discussed at the request of the students.
Please make such requests at time of registration

PRACTICAL TRAINING

Test on Flawed Samples

Visible

- Solvent Removable

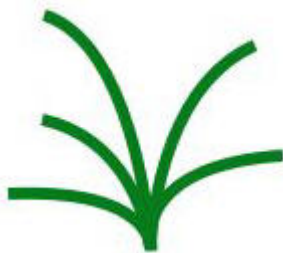
Fluorescent

- Water Washable
- Solvent Removable
- Emulsifier both Hydrophilic and Lipophilic
- Tests on Weld samples

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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