

Liquid Penetrant Testing

Level I and II – 16 hours

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 2024

Training, experience and examination requirements

Training Requirements

- Recommended Course Outline
- Training Hours
- Practicals
- Quizzes and examinations

MODULE 1: INTRODUCTION

MODULE 2: PRINCIPLES

- Purpose of Liquid Penetrant Testing
- Physical Principles
- Wetting Ability and Contact Angle
- 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: SURFACE PREPARATION AND PRECLEANING

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

MODULE 5: APPLICATION AND REMOVAL OF PENETRANTS

- 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

Module: MIL STD/NAVSEA Codes – As needed

- MIL-STD 2035A Class 3 Acceptance Criteria

PRACTICAL TRAINING

Test on Flawed Samples

Visible

- Solvent Removable

Fluorescent

- Water Washable
- Solvent Removable

EXAMINATIONS

- General
- Specific
- Practical Tests

Candidates must score a minimum of 70 % in written tests, 80% in practicals and a minimum of 80% average for all the three tests.



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