

LIQUID PENETRANT TEST

1.0 INTRODUCTION TO LIQUID PENETRANT TESTING:

- History of Liquid penetrant Testing
- Non Destructive Testing
 - Reasons for selecting Liquid Penetrant Testing
- Availability of Liquid Penetrants
 - Type I Fluorescent
 - Method of Removal
 - Developer forms
 - Solvent Classes
- Qualification and Certification Requirements
 - Training and Qualification Process
 - Three levels of Qualifications
 - Qualification Requirements
 - Certification
- Safety Precautions
 - Fire
 - Skin Irritation
 - Air Pollution
 - Ultraviolet Radiation

2.0 LIQUID PENETRANT PROCESSING:

- Procedures and Techniques
- Pre-cleaning of test objects
 - Preparation of Test Objects
 - Pre Cleaning and Post Cleaning
 - Solvent Cleaning
 - Detergent Cleaning
 - Vapor degreasing
 - Steam Cleaning
 - Ultrasonic Cleaning
 - Rust, Surface Scale, Paint Removal
 - Etching
 - Drying the objects
 - Dwell Time
- Application of Penetrant
- Adequate Illumination
- Penetrant
 - Water Rinse (Methods A, B, & D)

Solvent Removable

- Developer Application Form A
- Water Soluble Developer Form B
- Water Suspendable Developer Form C
- Non-aqueous (Aerosol Can) Type I & Type II
- Development Dwell Time

- Interpretation and Evaluation
- Types of Indications
 - Discontinuities
 - False Indications
 - Non-relevant Indications
 - Relevant Indications
 - Continuous Line Indications
 - Intermittent Line Indications
 - Rounded or Dot Indications
- Post Cleaning
- Methods of Removal of excess penetrant including water washable, Emulsifiers and Solvent Removable.
- Sensitivity Levels -1/2, 1, 2, 3, 4
- Selection Process

3.0 LIQUID PENETRANT TESTING METHODS:

- Introduction
- Method Characteristics
 - Type I Fluorescent versus Type II Visible
 - Solvent or Water Removable
 - Inline Penetrant System
- Lipophilic Emulsification
- Hydrophilic Emulsification

4.0 LIQUID PENETRANT TESTING EQUIPMENT:

- Liquid Penetrant Testing Unit
 - Liquid Penetrant Stations
 - Auxiliary Equipment
 - Modular Units
 - Testing Station Pumps
 - Sprayers and Applicators
 - Electrostatics Spray System
 - Automatic Electrostatic Spray
 - Lamps for Penetrant Stations
 - Liquid Penetrant Station Timers
 - Thermostats and Thermometers
 - Exhaust Fans at Penetrant Stations
 - Refractometers
 - Hygrometers
- Portable Penetrant Equipment
 - Visible Dye Penetrant Kit
 - Fluorescent Penetrant Kit
- Ultraviolet Illumination
 - Lamp Filters
 - Ultraviolet Radiation Sources
 - Tubular Fluorescent Cold Discharge Sources
 - Subdued White Light Inspection
 - Light Meters
- Materials for Liquid Penetrant Testing
 - Pre-Cleaning and Post Cleaning

- Water Washable Penetrants
- Post Emulsification Penetrants
- Emulsifiers
 - Lipophilic Emulsifier
 - Hydrophilic Emulsifier
- Solvent Removers
- Developers
 - Dry Developer
 - Non-Aqueous Wet Developer
 - Water based Developers
- Special Purpose Penetrants
- Precautions

5.0 SELECTION OF LIQUID PENETRANT METHOD:

- Introduction
- Selection of Penetrant Type
- Advantages & Disadvantages
 - Penetrant versus Other Methods
 - Penetrant Method as a Complimentary Method
- Selection of Penetrant Method
 - Portability
- Post Emulsification
- Dry Developer
- Wet Developers

6.0 INTERPRETATION AND EVALUATION OF INDICATIONS:

- Discontinuity Categories
- Discontinuities
 - Inherent Discontinuities
 - Processing Discontinuities
 - Casting Discontinuities
 - Service Induced Discontinuities
 - Cracking
- Typical Penetrant Applications
 - Forming of Penetrant Indications
 - Time of indications to Appear
 - Effects of Temperature
- Factor affecting Indications
 - Prior Processing
- Crack Indications
- Indications from specific Material Forms
- Indications from discontinuities
- Evaluation of Indications
 - False indications
 - Relevant and Non-Relevant indications

7.0 LIQUID PENETRANT PROCESS CONTROL:

- Introduction
- Quality Control of Test Materials
 - Test Material Control Samples
- Reference Blocks
 - Test Panels
 - System Monitor Panels
 - Aluminum Reference Block
 - Ceramic Reference Blocks
 - Anodized and Plated Test Panels
 - Low Cycle Fatigue Blocks
- Test of Penetrant Materials
- Emulsifier Test
- Dry Developer Test
- Wet Developer Test
- Conclusion
