Tel: +27(0) 31 708 3433
Cell: +27(0) 83 3210618
Email: nish@nondestructive.co.za
Web: www.nondestructive.co.za

APPROVED TRAINING ORGANISATION

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NASA 212

Liquid Penetrant Testing Curriculum

Revision control sheet:

Rev No:	Date:	Compiled by:	Reviewed by:	Revision Description:
1	09-Jan-2018	Meyuri Moodley	Nish Kanhaye	Revised toward improvement. Name change. Aligned to BINDT approved course notes.
2	02-Apr-2025	Acacia Sureschandra	Nish Kanhaye	The document format was updated.
3	04-Jun-2025	Acacia Sureschandra	Nish Kanhaye	The training duration was changed from Hours to Days following the publication of ISO 9712:2021. In this revision NASA has retained the hours and added the number of days.

1.0 Course Duration:

1.1 Level 1 and 2 Combined:

a) The minimum training administered in Level 1 shall be 3 days (24 Hours).

b) The minimum training administered in Level 2 shall be 2 days (16 Hours).

c) NASA shall provide a combined Level 1 and 2 course with a total of 6 days (48 Hours).

1.2 In all cases, level 1, level 2 or combined level 1 and 2, NASA shall administer the full theory content of Level 1 and 2.

2.0 Course Content:

2.1 Theory: The table below shows theory aspects covered:

Chapter Reference:	Level 1 and 2 combined:
Chapter 1: Qualification, Certification and Authorisation	SNT-TC-1A and ISO 9712 Levels of Qualification

Chapter 2: Basic Principles	SNT-TC-1A and ISO 9712 Levels of Qualification Introduction Penetrant Principles Viscosity Cohesion and Adhesion Surface Tension Wetting Ability Capillary action (capillarity) Penetrant Properties Flash Point Volatility Chemical Inertness Toxicity Solvent Ability Removability Water Tolerance Density Penetrant Sensitivity History Test Procedures Test Objective Advantages Disadvantages *Chapter 2: Basic Principles continued:* Basic Penetrant Testing Process Classification of Penetrant Materials and Processes

Chapter 3: Pre-Cleaning Methods	Pre-Cleaning Solvent Cleaning Detergent Cleaning Vapour Degreasing Steam Cleaning Ultrasonic Cleaning Chemical Cleaning Acid Pickling Pre-Cleaning Processes to Be Avoided Cleanliness Check

Chapter 4: Adequate Illumination	Lighting condition in test area Light Intensities for The Fluorescent Method Light Intensities for The Visible Method

Chapter 5: Visible Methods	Pre-Requisites for Inspection Visible Water Washable Process Visible Solvent Removable Process Visible Post Emulsification Process Drying Prior to Penetrant Application Penetrant Application Penetrant Dwell Time Removal of Excess Penetrant Solvent Wipe Method Post Emulsification – Hydrophilic (Water Based) Post Emulsification – Lipophilic (Oil Based) Water Wash Method Drying After Excess Penetrant Removal Developer Application Dry Powder Developer Water Soluble Developer Water Suspendable Developer Non-Aqueous Wet Developer Developer Dwell Time Viewing Conditions Interpretation False Indications Non-Relevant Indications Relevant Indications Evaluation Post Cleaning Reporting

Chapter 6: Fluorescent Methods	Pre-Requisites for Inspection Fluorescent Solvent Removable Process Fluorescent Post Emulsification Process Fluorescent Water Washable Process Drying Prior To Penetrant Application Penetrant Application Penetrant Dwell Time Removal of Excess Penetrant Solvent Wipe Method Post Emulsification – Hydrophilic (Water Based) Post Emulsification – Lipophilic (Oil Based) Water Wash Method Cleanliness Check Drying After Excess Penetrant Removal Developer Application Dry Powder Developer Water Soluble Developer Water Suspendable Developer Non-Aqueous Wet Developer Developer Dwell Time Viewing Conditions Interpretation False Indications Non-Relevant Indications Relevant Indications Evaluation Post Cleaning Cleanliness Check Reporting

Chapter 7: Special Purpose Chemicals	Filtered particle testing Food compatible Liquid oxygen (lox) compatible penetrants Low temperature applications High temperature penetrant materials Low sulphur and chloride Reversed fluorescence method Plastic-film developers Fingerprints' detection

Chapter 8: Inline Penetrant Systems	Inline penetrant systems pictures depicting process

Chapter 9: Control Checks	Liquid penetrant materials Contamination of penetrant, emulsifier and developers Concentration of hydrophilic emulsifiers Concentration of developers Water washability test Sensitivity comparison test Water content test Corrosive properties of penetrants Fluorescent luminance test Ultraviolet light

Chapter 10: Health and Safety	Example of a typical MSDS

Chapter 11: Classification of Discontinuities	Discontinuity categories Inherent discontinuities Processing discontinuities Service discontinuities Crack indications Solidification cracks Processing cracks Service cracks Porosity indications Indications from specific material forms Forgings Castings Plate Welds Typical welding type discontinuities Extrusions Grinding cracks Heat treatment cracks Fatigue cracks

2.2 Practical: The table below shows practical aspects covered:

Level 1 and Level 2 Combined:
Pre-test checks Visible penetrant techniques Visible light intensity measurement and verification at test area Pre-cleaning of test specimens Penetrant application, dwell periods and removal techniques. Developer application and dwell periods Viewing and interpretation of detected indications Recording and reporting according to written instructions Post cleaning Fluorescent penetrant techniques Ultraviolet light intensity measurement and verification at test area Selection of testing techniques Evaluation of indications according to codes, specifications or procedures

3.0 Learning outcomes:

3.1 Upon completion of training, students should be able to carry out and understand the following regarding visual testing:

Level 1 and Level 2 Combined:
Basic principles
General advantages and limitations
Discontinuity associated with manufacturing processes, categories and types
Differences between visible and fluorescent methods
Select test technique to be used based on specimen type, material, surface finish, etc.
Interpret codes, specifications and procedures.
Compile instructions according to specifications, codes or procedures
Carry out pre-test checks, set up equipment, perform tests and report results
Interpret and evaluate test results according to specifications, codes or procedures

4.0 Course Outcome:

4.1 Successful Completion of Training:

Upon successful completion of the course, a successful completion of training certificate at the level attempted will be issued which meets eligibility to undertake the external PCN examination.