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BINDT
 THE BRITISH INSTITUTE OF
 NON-DESTRUCTIVE TESTING



APPROVED TRAINING ORGANISATION

Non-Destructive Academy of South Africa	Document Title	: Liquid Penetrant Testing Curriculum
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Liquid Penetrant Testing Curriculum

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Revision control sheet:

Revision No:	Revision Description:
0	First draft of document
1	Revised toward improvement Name change Aligned to BINDT approved course notes

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1.0 Course Duration:

1.1 Level 1 and 2 Combined:

- a) The minimum training hours administered in Level 1 shall be 16.
- b) The minimum training hours administered in Level 2 shall be 24.
- c) For Level 1 and 2 combined courses the total training hours shall be a minimum of 40.

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 0: Course Content, Student Conduct and Examinations	Course Content Student Conduct During Classroom Training End of Course Examination Breakdown End of Course Examination Rules
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

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	<p><i>Chapter 2: Basic Principles continued:</i> Basic Penetrant Testing Process Classification of Penetrant Materials and Processes</p>
<p>Chapter 3: Pre-Cleaning Methods</p>	<p>Pre-Cleaning Solvent Cleaning Detergent Cleaning Vapour Degreasing Steam Cleaning Ultrasonic Cleaning Chemical Cleaning Acid Pickling Pre-Cleaning Processes To Be Avoided Cleanliness Check</p>
<p>Chapter 4: Adequate Illumination</p>	<p>Lighting condition in test area Light Intensities For The Fluorescent Method Light Intensities For The Visible Method</p>
<p>Chapter 5: Visible Methods</p>	<p>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 Suspensible Developer Non Aqueous Wet Developer Developer Dwell Time Viewing Conditions Interpretation False Indications Non-Relevant Indications Relevant Indications Evaluation Post Cleaning Reporting</p>

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<p>Chapter 6: Fluorescent Methods</p>	<p>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</p>
<p>Chapter 7: Special Purpose Chemicals</p>	<p>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</p>
<p>Chapter 8: Inline Penetrant Systems</p>	<p>Inline penetrant systems pictures depicting process</p>

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<p>Chapter 9: Control Checks</p>	<p>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</p>
<p>Chapter 10: Health and Safety</p>	<p>Example of a typical MSDS</p>
<p>Chapter 11: Classification of Discontinuities</p>	<p>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</p>

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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.

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