Penetrant Testing (PT)

Course Curriculum

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Who we are?

African NDT Centre (Pty) Ltd is an NDT training and service provider organization located in Roodepoort, South Africa, providing complete solutions for NDT training and inspection.

We conduct training for PCN certification for level 1,2 and 3 in the following methods:

- PCN - Eddy Current Testing (ET)
- PCN - Ultrasonic Testing (UT)
- PCN - Magnetic Particle Testing (MT)
- PCN - Liquid Penetrant Testing (PT)
- PCN - Radiographic Testing (RT)
- PCN – Radiographic Interpretation (RI)
- PCN – Basic Radiation Safety (BRS)
- PCN – Visual Testing (VT)
- PCN – UT Phased Array (PAUT)
- PCN – UT Time of Flight Diffraction (TOFD)

How to Book Your Training Course

To book a training course, simply contact us via phone or email and we will be happy to discuss your requirements. If necessary, we can provide advice on which type of training and certification is appropriate for you or your company.

Courses can be booked and paid online on the following links:
ANDTC Constantia Kloof Campus: https://andtc.com/courses-constantia-kloof/
ANDTC Vaal Training Centre: https://andtc.com/courses-vaal/

Training courses are conducted on a regular basis at both our branches, and PCN examinations are run ongoing at our Roodepoort Examination Centre.

Contact Us

ANDTC Constantia Kloof

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PCN ATO Authorization Number: 0838

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What is Penetrant Testing?

Penetrant Testing (PT), also known as Liquid Penetrant Inspection or LPI, or Dye Penetrant Testing, is a widely used non-destructive testing (NDT) method to detect surface-breaking defects in non-porous materials.

How It Works (Step-by-Step)

- Preclean
- Apply Penetrant
- Excess Penetrant Removal
- Developer Application
- Inspection
- Post-Cleaning

Advantages

- Detects very small surface defects.
- Works on non-ferrous and ferrous metals, ceramics, glass, plastics, etc.
- Low cost, portable, and fast.
- No need for complex equipment (except UV lamp for fluorescent).

Limitations

- Only detects surface-breaking defects (cannot find subsurface flaws).
- Requires clean, smooth surfaces.
- Not suitable for porous materials (e.g., wood, untreated castings).
- Operator skill affects reliability.

Applications

- Aerospace: Turbine blades, welds, landing gear.
- Automotive: Engine blocks, crankshafts.
- Oil & Gas: Pipelines, valves.
- Manufacturing: Weld inspection, castings, forgings.

About the Course

PCN Level 1&2

This course equips participants with a solid grasp of penetrant testing theory and its practical application on welds, castings & forgings (multi-sector). It trains and qualifies them to achieve PCN Level I or II certification in penetrant testing.

PCN Level 3

This preparatory course aligns with PCN Level 3 requirements for penetrant testing practitioners. Its primary goal is to familiarise candidates with the exam scope and required knowledge depth, helping them pinpoint areas of weakness. It also provides tailored advice on any additional study or training needed.

Qualification Requirements

Prerequisites

- Matric (Grade 12) with Mathematics and/or Science
- Basic understanding of physics principles (recommended)
- For Level 3: Previous PCN certification as required by PCN standards

Training Hours

Level 1& Level 2 combined	Level 3
7 Days	4 Days

Note: Direct access to Level 2 or 3 requires the total days shown in the table for Levels 1 and 2, or Levels 1, 2 and 3 respectively.

Product Sector

Multi Sector - This course prepares candidates for certification across multiple product sectors as defined by PCN standards.

Experience Requirements

Level 1& Level 2 combined	Level 3
60 Days	240 Days

Note: Experience may be acquired either prior to (for Level 1 and 2 entry only) or following success in the qualification examination. However, the chances of success in a PCN examination may be significantly reduced if candidates have little or no current experience in the application of the NDT method in the sector concerned.

Documents to be Submitted for Examination

- PSL 57-A Initial Examination Application
- PSL 30 - Log of Experience
- PSL 44 - Vision Requirements
- CP-27 Code of Ethics
- PCN ID (wallet or e-certificate) -only for existing PCN certificate holders
- Proof of either holding PCN certification or successful completion of BINDT PCN Online Product Technology- cert with QR code
- One government-approved identity document (Passport/ID Card/Driver's License)
- Note: Blank PSL and CP forms can be collected from ANDTC offices during course or downloaded from BINDT website.

Learning Outcomes

PCN Level 1&2

Upon completion, candidates will be able to:

- Understand the fundamental principles of liquid penetrant testing (PT), including capillary action, penetrant types, and defect detection mechanisms.
- Perform all stages of penetrant inspection on welds in accordance with approved procedures (cleaning, application, dwell time, removal, development, and inspection).
- Identify and classify surface-breaking defects such as cracks, porosity, lack of fusion, and laps with high accuracy.
- Interpret indications correctly under both visible and fluorescent lighting conditions.
- Comply with relevant codes and standards.
- Achieve PCN Level I or II certification through structured training, practical assessments, and written examinations.

Level 1 Certification allows: Routine testing under Level 2 supervision.

PCN Level 3

Upon completion of the guidance course, candidates will be able to:

- Demonstrate in-depth knowledge of penetrant testing theory, techniques, limitations and applications across industries.
- Develop, review, and approve penetrant testing procedures and techniques in line with international standards.
- Evaluate and interpret test results critically, distinguishing relevant from non-relevant indications.
- Assess the competence of Level 1 and 2 personnel and oversee NDT operations.
- Identify personal knowledge gaps and prepare effectively for the PCN Level 3 examination (Basic, Main Method, and Procedure Writing modules).
- Apply advanced concepts in quality control, process optimisation and audit requirements for PT programs.
- Qualify to sit and pass the PCN Level 3 Penetrant Testing certification exam with confidence.

What to Bring?

- Own PPE (coveralls or lab coat, safety boots)
- PCN wallet card or other form of photographic identification

Special Notes

- African NDT Centre reserves the right to disqualify participants from the certification program when personnel are found not to meet PCN requirements
- Participants are not allowed to use their own equipment during training and examination. African NDT Centre provides all necessary ET equipment and accessories
- Professional dress code must be followed during the entire training and examination period
- Once enrolled, joining instructions will be sent via email with all necessary information communicated telephonically

Training and Examination Information

The training program comprises daily assessments after completion of each chapter, and participants are required to achieve above 70% marks. Based on daily assessment performance, candidates are awarded successful completion of training.

Participants are then required to undergo PCN examination which consists of:

- Theory examination
- Practical examination
- NDT instruction writing (Level 2 only)

Candidates must obtain a minimum of 70% in each examination element to achieve PCN certification as Level 1, 2, or 3.

PCN certification is valid for 5 years from the date of certification. The certificate must be renewed according to PCN requirements.

Syllabus Reference

This curriculum is aligned with the PCN examination syllabus as published in **PCN24/GEN/Appendix Z1 - NDT Examination Syllabi, Issue 1, February 2024**.

The detailed syllabus breakdown covering all topics for Level 1, 2, and 3 is available in our comprehensive course documentation (Document No: CC-PT, Issue 2, dated 01/07/2024 noted as Annexure A)

African NDT Centre regularly reviews and updates the curriculum in line with scientific, industrial, and technological developments in eddy current testing, as well as any changes to PCN certification requirements.

ANNEXURE A

Contents	Level 1	Level 2	Level 3
1.0 Introduction, Terminology, purpose and history of NDT	1.0 History Purpose	1.0 History Purpose	1.0 History Purpose
	1.1 Terminology Product family EN ISO 12706 Penetrant Developer Remover Reference block e.g.	1.1 Terminology Product family EN ISO 12706 Sensitivity level Post emulsifiable Dual purpose penetrant Background	1.1 Terminology Product family EN ISO 12706 Sensitivity level Post emulsifiable Dual purpose penetrant Background
2.0 Physical principles of the method and associated knowledge	2.0 Relevant standards: - EN 571-1: General principles Viscosity Bleed out Flash point Emulsification of penetrant Development Coloured and fluorescent penetrant	2.0 Relevant standards: - EN 571-1: General principles Viscosity Bleed out Capillarity Flash point Emulsification of penetrant	2.0 Relevant standards: - EN 571-1: General principles Physical basics of the method Superficial tension Viscosity Contact angle Vapour pressure

3.0 Product knowledge and capabilities of method and its derivate techniques	3.0 Typical defects according to the production process (forgings, castings, rolling, welding, …)	3.0 Typical defects according to the production process (forgings, castings, rolling, welding, …)	3.0 Typical defects according to the production process (forgings, castings, rolling, welding, …) Welding process, casting process, process of rolled bars
4.0 Equipment	4.0 Design and operation of penetrant installations and units Aerosol spray cans Dip installations, brushing, light sources, measuring units and reference blocks	4.0 Design and operation of penetrant installations and units Electrostatic systems, fluidised bed Aerosol spray cans Dip installations, brushing, light sources, measuring units and reference blocks (EN 3452-3 and EN 3452) Viewing condition (EN ISO 3059)	4.0 Design and operation of penetrant installations and units Semiautomatic and automatic systems Electrostatic systems, fluidised bed Aerosol spray cans Dip installations, brushing, light sources, measure units and reference blocks (EN 3452-3 and EN 3452-4) (According to various standards e.g. EN ISO 3452-4) Viewing condition (EN ISO 3059)

5.0 Information prior to testing	5.0 Verification that the test object is in suitable conditions for testing Written instructions are given	5.0 Information about the test object, prepare written instruction Identification or designation Material, dimensions, field of application Kind of product family, catalogue of defects Test conditions, Applicable standards and codes, assigned to the test object	5.0 Prepare written procedure. Identification or designation Material, dimensions, field of application Kind of product family, catalogue of defects Test conditions Applicable standards and codes assigned to the test object
6.0 Testing	6.0 Performance of the test According to written instruction	6.0 Preparation and performance of the test Preparation of written instructions according to EN 1371-1, EN 10228-2, EN 1289	6.0 Preparation of the test According to EN 571-1
7.0 Evaluation And Reporting	7.0 Test report Welding according to EN 1289 Casting according to EN 1371-1 Forging according to EN 10228-2 Rolled products	7.0 Check test report Welding according to EN 1289 Casting according to EN 1371-1 Forging according to EN 10228-2	7.0 Written procedure with check of test reports: Welding according to EN 571-1 Casting according to EN 1371 Forging according to EN 10228-2 `
	7.1 Basics of evaluation Viewing conditions according to EN ISO 3059 Reference block No 2 (according to EN ISO 3452-3)	7.1 Basics of evaluation Viewing conditions according to EN ISO 3059 Reference block Nos. 1 and 2 (according to EN ISO 3452-3)	7.1 Basics of evaluation Viewing conditions according to EN ISO 3059 Reference block Nos. 1 and 2 (according to EN ISO 3452-3)

	Verification the indication quality Report of simple welding, forging, rolled products and casting imperfections	Other used reference blocks Calibration of test units Batch test report	Other used reference blocks Calibration of test units
		7.2 Evaluation Verification the indication quality Report of discontinuities according to EN 1289, EN 1371-1, EN 10228-2	7.2 Evaluation Verification the indication quality
8.0 Assessment	8.0 Assessment of discontinuities Depth, width, shape, position, orientation	8.0 Assessment of discontinuities Influence of manufacture and material	8.0 Assessment of discontinuities Depth, width, shape, position, orientation
9.0 Quality aspects	9.0 Personnel qualification (according to EN ISO 9712) Equipment verification	9.0 Personnel qualification (according to EN ISO 9712) Equipment verification Written instructions Traceability of documents A review of applicable NDT application and product standards	9.0 Personnel qualification (according to EN ISO 9712) Equipment verification Format of working procedures Traceability of documents Other NDT qualification and certification systems A review of applicable NDT application and product standards

10.0 Environmental and Safety conditions	10.0 Disposing of chemicals Penetrants Developer Emulsifier Material of process excess removal Safety data sheet	10.0 Disposing of chemicals Penetrants Developer Emulsifier Material of process excess removal Safety data sheet Active carbon method, ultrafiltration method UV radiation, electrical hazard Disposal is regulated by national regulations	10.0 Disposing of chemicals Penetrants Soluble remover Developer Safety data sheet UV radiation, electrical hazard A review of applicable NDT application and product standards
11.0 Developments	(Not applicable)	Special installations Automotive installations (examples)	Creative and innovative special Installations Automotive installations (examples) Tube installations