Visual Testing (VT)

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

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PCN ATO Authorization Number: 0838

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PCN ATO Authorization Number: 0837

What is Visual Inspection?

Visual Testing (VT), also known as Visual Inspection, is the oldest and most widely used non-destructive testing (NDT) method. It involves direct or indirect observation of a component's surface using the human eye (aided or unaided) or optical instruments to detect surface discontinuities, defects, corrosion, misalignment or weld imperfections without damaging the part.

How It Works:

1. Illumination
2. Access & Preparation
3. Observation
4. Evaluation

Applications:

- Pre-weld & In-process: Fit-up, root pass, interpass cleaning.
- Post-weld: Final weld appearance, cap profile.
- In-service: Corrosion under insulation (CUI), erosion, fatigue cracks.
- General: Assembly checks, surface finish, coating integrity.
- Industries: Oil & gas, power, aerospace, construction, marine.

Advantages:

- Fast, low-cost, no equipment needed for basic VT.

About the Course

PCN Level 1&2

This course equips participants with a solid understanding of VT theory and its practical application on welds, castings & forgings (multi-sector) preparing and qualifying them as PCN Level I or II in Visual Testing.

PCN Level 3

This guidance course targets the PCN Level 3 requirements for Visual Testing practitioners. Its primary goal is to familiarise candidates with the examination scope and required knowledge level. It helps identify weaker subject areas and provides advice on any additional 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
5 Days	3 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

Upon completion, candidates will be able to:

1. Master Visual Testing Theory & Standards
2. Select & Use Advanced Visual Aids Independently
3. Conduct Full Pre-Weld, In-Process & Post-Weld VT
4. Accurately Measure & Classify Imperfections
5. Produce Professional Inspection Reports
6. Perform Practical Examination
7. Carry out system performance checks and record results.
8. Follow written instructions and report results accurately.

Certification allows: Routine testing under Level 2 supervision.

PCN Level 2

(Level 1 outcomes + advanced responsibilities)

1. Master Visual Testing Theory & Standards
2. Select & Use Advanced Visual Aids Independently
3. Conduct Full Pre-Weld, In-Process & Post-Weld VT
4. Accurately Measure & Classify Imperfections
5. Write & Follow VT Written Instructions
6. Produce Professional Inspection Reports
7. Perform Practical Examination

Certification allows: Independent testing, instruction writing and supervision.

PCN Level 3

Upon completion, the candidate shall be able to:

1. Master VT Theory, Optics & Human Factors
2. Design & Qualify VT Procedures for Critical Applications
3. Supervise, Train & Certify Level 1&2 Personnel
4. Integrate VT with Other NDT Methods
5. Lead Quality Assurance & Code Compliance
6. Apply Advanced & Automated Visual Systems
7. Prepare for PCN Level 3 Examination

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-VT, Issue 3, dated 01/09/2025 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

Syllabus reference number	Title	Module subcontent	Visual testing (VT)		
1	Terminology and history of VT		Level 1	Level 2	Level 3
1.0	History of VT	History of visual testing	X	X	X
1.1	Purpose of NDT	What is testing?	X	X	X
		What is the purpose of NDT?	X	X	X
		At what stage of life is NDT performed on a product?	X	X	X
		How does it add value?	X	X	X
		Who may carry out NDT?	X	X	X
		Main NDT methods	X	X	X
1.2	Purpose of VT	Definition	X	X	X
		Applicability and limitations	X	X	X
		Extended overview of visual testing applications	X	X	
		Use of visual testing as a complement to other NDT methods	X	X	
1.3	Terminology	Please refer to PCN24 standards document	X	X	X

2	Physical principles and associated knowledge		Level 1	Level 2	Level 3
2.1	Fundamentals	Goals and principles of visual testing	X	X	
		Comprehensive knowledge and understanding of the physical principles and physics of light	X	X	X
		Optical performance:	X	X	
		• Polarisation of light	X	X	
		• Stroboscopic principles	X	X	
		• Dispersion	X	X	
		• Refraction and refractive index	X	X	
		• Reflection	X	X	
		• Fluorescence	X	X	
		• Advantages and disadvantages of different wavelengths of optical radiation (UV, infrared (IR)), including colour temperature	X	X	X

2.2	Vision	The eye:	X	X	
		• Operation	X	X	
		• Construction	X	X	
		• Vision limitations	X	X	
		• Adaption and accommodation	X	X	
		• Disorders	X	X	
		• Vision ranges	X	X	X
		• Effects of disorders	X	X	X
2.3	Lighting	Transmission	X	X	
		Reflection	X	X	
		Absorption	X	X	
		Physics of light	X	X	
		Electromagnetic radiation	X	X	
		Visible wavelengths	X	X	
		Types of light source:	X	X	X
		• Natural	X	X	X
		• Artificial – including laser	X	X	X

2.3 *(continued)*		LED light sources (advantages and disadvantages):	X	X	X
		● Different wavelengths of optical radiation (UV, IR)			X
		● Colour temperature		X	X
		● LED light sources	X	X	X
		Photometry	X	X	
		Light levels	X	X	
		Light measurement	X	X	
		Luminance:	X	X	
		● Lighting levels	X	X	
		● Lighting techniques	X	X	
		● Contrast	X	X	
2.4	Optical principles	Operation of lenses		X	
		Operation of magnifiers		X	
		Image construction		X	
		Virtual images		X	
		Chromatic aberration		X	
		Geometric distortion		X	
		Magnification principles		X	

2.5	Camera and photo sensor operation and principles	Optical filters			X
		Construction of digital images and problems			X
		Image processing			X
		Image analysis			X
		Image compression and transmission			X
		Image storage			X
		Resolution			X
		Video monitors			X
		Other monitors			X
		Light meters and photometers			X
2.6	Principles of operation of fibre bundles and lenses	Coherent			X
		Incoherent			X
2.7	Photogrammetry				X
2.8	Visual perception	What the eye sees		X	
		What the mind sees		X	
		What others perceive		X	
		What the designer, engineer, etc, sees		X	

2.9	Material attributes affecting the test	Colour	X	X	
		Surface condition	X	X	
		Surface preparation	X	X	
		Cleanliness	X	X	
		Shape	X	X	
		Size	X	X	
		Temperature	X	X	
		Texture	X	X	
		Type	X	X	
		Surface finish	X	X	

2.10	Environmental and physiological factors	Atmosphere		X	
		Comfort		X	
		Perspective		X	
		Distance		X	
		Accessing		X	
		Fatigue		X	
		Health		X	
		Humidity		X	
		Mental attitude		X	
		Position		X	
		Safety		X	
		Temperature		X	
		Cleanliness		X	
2.11	Direct and remote methods		X	X	
2.12	Vision	Requirements	X	X	
		Employer's responsibility		X	

3	Product knowledge and capabilities		Level 1	Level 2	Level 3
3.1	Product knowledge	Outline of basic flaws detected with visual testing as necessary to work in a specific sector	X		
		Evaluation of surfaces			X
		Test objects and flaws		X	X
		Basic production and degradation process		X	X
		Terms, origin, nature and appearance of flaws		X	X
		Product technology sectors		X	X
		Basic metallurgy of the process/component		X	X
		Welding/joining methods		X	X
		Cladding and buffering:		X	X
		• Wrought product production methods		X	X
		• Cold working processes		X	X
		• Heat treatment processes		X	X

		Roughness and waviness			X
		Definition of shape and geometry of flaws			X
		Material composition:		X	X
		● Surface-finishing methods		X	X
		● Basic foundry technology		X	X
		● Machining and material removal processes		X	X
		● Polymers/composites		X	X
		In-service aspects:		X	X
		● Service-induced flaws		X	X
		● Mechanically		X	X
		● Thermally		X	X
		● Tribology		X	X
		● Wear		X	X
		● Chemical		X	X
		● Electrochemical		X	X

3.2	Capability and limitations of visual testing	Overview/awareness	X		
		Detectability:	X	X	
		• Flaw size	X	X	
		• Shape	X	X	
		• Orientation/position	X	X	
		• Flaw types	X	X	
		• Surface condition effects	X	X	
		• Equipment limitations	X	X	
		• Lighting effects	X	X	
3.3	Associated techniques	Gauging		X	
		Comparators		X	
		Measurement		X	
		Thermographic imaging		X	
		Replication		X	

4	Equipment		Level 1	Level 2	Level 3
4.1	Introduction and applications	Mirrors	X	X	X
		Magnifiers	X	X	X
		Borescopes	X	X	X
		Fibrescopes	X	X	X
4.2	Photographic and video	Imaging cameras	X	X	
		Video monitors	X	X	
		Light sources and special lighting	X	X	
		Gauges	X	X	
		Templates	X	X	
		Scales	X	X	
		Special tools			X
		Automated systems		X	X
		Computer-enhanced systems		X	X
		Demonstration test-piece	X	X	
		Resolution targets	X	X	X
		Graticules		X	X

		Effect on test arrangement			X
		Evaluation of equipment to fulfil a particular task			X
		Development of verification for equipment performance:			X
		• Choice/design			X
		• Application of demonstration test-pieces			X
4.3	Image recording, transfer and storage equipment	Equipment selection		X	
		Equipment limitations		X	
		Verification of equipment	X	X	
		Procedure for control, maintenance and adjustment of equipment			X
4.4	Sizing of indications	Imaging systems		X	
		Special optical systems		X	
		Special equipment requirements (*ie* underwater, radiation resistant)	X	X	

5	Information prior to testing		Level 1	Level 2	Level 3
5.1	Information about the test object	Identification or designation of material:		X	X
		• Object to be tested		X	X
		• Kind of manufacture		X	X
		• Catalogue of defects		X	X
		• Extent of test coverage		X	X
5.2	Test conditions and application of standard	Accessibility		X	X
		Infrastructure		X	X
		Particular test conditions		X	X
		Application of standard		X	X
		Stage of manufacture or service life when testing is to be carried out		X	X
		Standard and codes assigned to the test object		X	X
		Requirements of test personnel		X	X
		Acceptance criteria		X	X

5.3	Technique and sequence of performing test	Surface condition		X	
		Surface preparation		X	
		The illumination (type, level and direction)		X	
		Post-test documentation		X	
		Visual testing equipment to be used		X	
		Demonstration test-piece and inspection checkpoints		X	
		Requirement for recorded images		X	
5.4	Instructions	Preparation of written procedure			X
		Preparation of written instruction		X	
		Performing inspection in accordance with written instruction	X		
		Documents		X	X
		Presentation of the standards, codes and procedures			X

6	Testing		Level 1	Level 2	Level 3
6.1	Test set-up	Demonstration test-pieces	X	X	
		Resolution targets	X	X	
		Adjustment		X	
		Written instruction		X	X
		Written procedure		X	X
7	**Evaluation and reporting**		**Level 1**	**Level 2**	**Level 3**
7.1	Reporting results	Reference to test standards	X	X	
		Adjustment status	X	X	
		Reference points for location of indications	X	X	
		Classification of indications:	X	X	
		• Instructed acceptance criteria	X	X	
		• Reports and documentation	X	X	
		• Reporting verification results	X	X	

7.2	Control and monitoring of test results	Interpretation		X	X
		Evaluation:		X	X
		• Objective		X	X
		• Subjective		X	X
		Reporting of results to specifications and standards		X	X
		Completion of adjustment forms		X	X
7.3	Developing report forms	Organisation of final forms			X
7.3 *(continued)*		Storage of final forms			X
		Distribution of final forms			X
		Investigation of suitable codes and product standards for each application			X
		Acting as a reference point for Level 2 advice for interpretation and evaluation			X

8	Assessment		Level 1	Level 2	Level 3
8.1	Classification and assessment of observations	Acceptance criteria:		X	X
		• Codes		X	X
		• Standards		X	X
		• Written instructions		X	X
		• Level 3 reference where no codes or standards exist		X	X
		• Design specifications			X
		By comparison		X	X
		By measurement		X	
		Automated evaluation (for example pattern recognition)		X	
		Recording		X	
		Reporting		X	
		Analysing results			X
		Translation of codes, standards and design specifications, etc, into clear acceptance criteria to be written into procedures and instructions			X
		Finding information of assistance to investigate observations not covered by codes and standards, and develop acceptance criteria			X
		Training of Level 1 and 2 for acceptance criteria			X

9	Quality aspects		Level 1	Level 2	Level 3
9.1	Personnel qualification	ISO 9712	X	X	X
		Other NDT qualification and certification systems			X
9.2	Documentation	Format and scope of working procedures			X
		Qualification of NDT procedures			X
		Authorisations (NDT instruction, procedures and personnel)			X
		Developing written instruction		X	
		Working correctly to written instructions	X		
		Traceability of documents		X	X
		Reliability of measurements		X	X
9.3	Knowledge of applicable NDT application and product standards	Correct technique selection		X	X
		Use of correct test parameters		X	X
		NDT method selection			X
		Job-specific training			X
		Equipment verification	X	X	X

10	Developments	Level 1	Level 2	Level 3
10.1	Importance of investigating current and developing technology and methods of application			X
10.2	Summary of latest developments			X