

		<b>ADMINISTRATIVE PROCEDURE</b>	Allocation Centre 38A	Reference Number <b>KAR-240</b>	Rev <b>4</b>
<b>NNR: NO No.:</b>	<b>THE QUALIFICATION AND CERTIFICATION OF INSPECTION AND TEST NDT PERSONNEL AND ITS SUB-CONTRACTORS</b>				PAGE 1
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<b>DATE</b> 2018-11-19	<b>DATE</b> 2018-11-20	<b>DATE</b> 2018-11-27

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<b>FCA</b> COMPETENCY	<b>ALARA REVIEW</b> NO	<b>SUPERSEDES</b> KAR-240, Rev 3 dd. 2018-01-24 FULL REVIEW
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## 1.0 PURPOSE

1.1 To detail the process for the qualification and certification of Inspection and Test permanent staff engaged in NDT.

1.2 To detail the process whereby contractors NDT qualification and certification is deemed acceptable for work undertaken on behalf of Inspection & Test.

### 1.3 Applicability

This procedure is applicable to Inspection & Test personnel and its contractors engaged in the following Non-Destructive Testing methods:

- Eddy Current Testing (ET)
- Magnetic Testing (MT)
- Penetrant Testing (PT)
- Ultrasonic Testing (UT)
- Radiographic Testing (RT)
- Visual Testing (VT)
- ASME XI: VT1, VT2, VT3
- Non-ASME XI Leak Testing (LT)
- ASME XI: IWL Examinations

**NOTE:** *General Visual and Detailed Visual examination as applicable for ASME XI IWE are regarded as VT3 and VT1 respectively.*

## 2.0 SCOPE

2.1 The scope of this procedure includes:

- Qualification of I&T NDT personnel.
- Certification and re-certification of I&T NDT personnel.
- Acceptance of contractor NDT qualification and certification procedures (written practice) and the subsequent certification of NDT personnel.

### 3.0 DEFINITIONS AND ABBREVIATIONS

#### 3.1 Definitions

- 3.1.1 **(ASME XI IWA-2300) “Principal” NDT Level III** – Appointed in writing, by the Manager I&T, to train, examine and certify other NDT individuals and to assume full responsibility for the certification process to be used for those individuals so certified (KAR-240).
- 3.1.2 **(CP 189) “Appointed” NDT Level III** – Appointed in writing, by the Manager I&T, to train, examine and certify other NDT individuals and to assume full responsibility for the certification process to be used for those individuals so certified (KAR-240).
- 3.1.3 **(SNT-TC-1A) “Appointed” NDT Level III** – Appointed in writing, by the Manager I&T, to train, examine and certify other NDT individuals and to assume full responsibility for the certification process to be used for those individuals so certified (KAR-240).
- 3.1.4 **Accreditation Body** – A body recognised by government as the single National Accreditation Body providing conformity assessments and formal recognition in accordance with ISO 17024, e.g. SANAS, UKAS.
- 3.1.5 **Accredited Certification Body** – An accredited body that administers procedures for certification in accordance with ISO 9712 requirements e.g. SAIW-Certification, BINDT, (see ISO 9712).
- 3.1.6 **Approved Examination Centre** – Centre approved by the (accredited) certification body where qualification examinations are carried out, (see ISO 9712).
- 3.1.7 **Authorised Qualification Body** – Body, independent of the employer, authorized by the (accredited) certification body to prepare and administer qualification examinations e.g. SAIW-Certification, (see ISO 9712).
- 3.1.8 **Candidate** – Individual seeking qualification and certification who gains experience under the supervision of personnel having a qualification acceptable to the certification body, (see ISO 9712).
- 3.1.9 **Certification** – Written testimony that an individual has met the applicable requirements of the standard, (see CP-189).
- 3.1.10 **Contractor** – Company/personnel providing a service to Eskom.
- 3.1.11 **Employer** – Organization for which the candidate works on a regular basis, (see ISO 9712).

- 3.1.12 **Examiner** – Person certified to Level III in the method and product or industrial sector for which he is authorized by the certification body to conduct, supervise and grade the qualification examination, (see ISO 9712).
- 3.1.13 **NDT Training Centre** – Process of instruction in theory and practice in the NDT method in which certification is sought, which takes the form of training courses to a syllabus approved by the (accredited) certification body e.g. SAIW-NDT, (see ISO 9712).
- 3.1.14 **Outside Agency** – A company or individual who provides Level III services and whose qualifications to provide these services have been reviewed by the employer engaging the company or individual, (see SNT-TC-1A).
- 3.1.15 **Permanent Staff** – Personnel employed by, and receiving wages or salary from Eskom.
- 3.1.16 **Qualification** – Demonstrated skill, demonstrated knowledge, documented training and documented experience required for personnel to properly perform the duties of a specific job, (see SNT-TC-1A).
- 3.1.17 **Qualification Examination** – Examination, administered by the certification body or the authorized qualification body, which assesses the general, specific and practical knowledge and the skill of the candidate, (see ISO 9712).
- 3.1.18 **Responsible Engineer** – A registered Professional Engineer experienced in evaluating the in-service condition of structural concrete, with knowledge of the codes and other criteria used in design and construction of concrete containment in nuclear power plants.
- 3.1.19 **Written Practice** – A written procedure developed by the employer that details the requirements for qualification and certification of their employees, (see SNT-TC-1A).

## 3.2 Abbreviations

- 3.2.1 **ANDTc** – African Non-Destructive Testing Centre
- 3.2.2 **ANSI** – American National Standards Institute
- 3.2.3 **ASME** – American Society for Mechanical Engineers
- 3.2.4 **ASNT** – American Society of Non-Destructive Testing
- 3.2.5 **BINDT** – British Institute of Non-Destructive Testing
- 3.2.6 **EPRI** – Electric Power Research Institute
- 3.2.7 **I&T** – Inspection & Test

- 3.2.8 **IDP** – Individual Development Plan
- 3.2.9 **ISIPRM** – In-Service Inspection Programme Requirements Manual
- 3.2.10 **ISO** – International Organisation for Standardisation
- 3.2.11 **KNPS** – Koeberg Nuclear Power Station
- 3.2.12 **NDT** – Non-Destructive Testing
- 3.2.13 **NE** – Nuclear Engineering
- 3.2.14 **RT&D** – Research, Testing and Development
- 3.2.15 **RE** – Rotek Engineering
- 3.2.16 **SAIW** – South African Institute of Welding
- 3.2.17 **SANAS** – South African National Accreditation System
- 3.2.18 **UKAS** – United Kingdom Accreditation Service

## **4.0 REFERENCES**

### **4.1 Referenced Documents**

- 4.1.1 240-119362012, Rev 1: Fourth Interval In-Service Inspection Programme Requirements Manual (ISIPRM) for Koeberg Nuclear Power Station
- 4.1.2 240-123588530, Rev 1: Non Destructive Testing – Qualification of NDT Systems
- 4.1.3 335-2, Rev 4: Koeberg Nuclear Power Station Management Manual
- 4.1.4 KAA-500, Rev 13: The Process for Controlled Documents
- 4.1.5 KSA-011, Rev 14: The Requirements for Controlled Documents

### **4.2 Applicable Documents**

- 4.2.1 10 CFR 50.55a: USNRC Regulations: Title 10, Code of Federal Regulations Part 50, Codes and Standards
- 4.2.2 240-123597661: Non Destructive Testing – Personnel Certification Requirements
- 4.2.3 ANSI/ASNT CP-189: 1995: ASNT Standard for Qualification and Certification of Non-destructive Testing Personnel

- 4.2.4 ASME XI-2007 Edition up to and including 2008 Addenda:  
Rules for In-service Inspection of Nuclear Power Plant Components
- 4.2.5 ISO/TC 11774: 2011: Non-destructive Testing – Performance-Based  
Qualification
- 4.2.6 ISO-17024: 2012: Conformity Assessment - General Requirements for Bodies  
Operating Certification of Persons
- 4.2.7 ISO-9712: 2012: Non-destructive Testing Qualification and Certification of  
Personnel
- 4.2.8 KAR-020: Authorisation of Inspection & Test Personnel and its Sub-  
contractors
- 4.2.9 KFR-IP-014: Vision Testing
- 4.2.10 KFR-IP-093: Certification
- 4.2.11 KFR-IP-094: Examination Results
- 4.2.12 KFR-IP-095: On-job Training / Experience Record
- 4.2.13 KFR-IP-096: Formal Training Record
- 4.2.14 KGT-047: Training Programme Guide for Inspection & Test
- 4.2.15 KSA-038: Requirements for Quality Records
- 4.2.16 KSA-049: Koeberg Training Standard
- 4.2.17 SNT-TC-1A: 2011: Personnel Qualification and Certification in Non-destructive  
Testing

## **5.0 RESPONSIBILITIES**

- 5.1 The Manager of Inspection & Test is responsible for the implementation of this  
procedure.
- 5.2 The Inspection & Test Section Heads are responsible for ensuring that all NDT  
personnel are suitably trained and certified (i.e. permanent and contractor staff).
- 5.3 Individuals are responsible for maintaining their NDT certification records,  
training and experience hours.
- 5.4 All I&T personnel shall follow the requirements of KSA-049, Koeberg Training  
Standard and KGT-047, Training Programme Guide for Inspection & Test for  
booking of training and examinations.

## 6.0 PROCEDURE

### 6.1 Qualification and Certification: General

- 6.1.1 To perform NDT activities on Eskom plant, and within the Nuclear Division in particular, personnel must meet the qualification and certification requirements of 240-123597661, Non Destructive Testing – Personnel Certification Requirements.
- 6.1.2 Inspection and Test shall select from the following certification standards or recommended practice from Table 1, as appropriate:

**Table 1: Certification Standards and Recommended Practice**

<b>Qualification and Certification Standards or Recommended Practices Accepted by Eskom Koeberg Nuclear Power Station</b>	
ISO 9712	Non-destructive Testing – Qualification and Certification of NDT Personnel
ASNT ACCP-CP-1	ASNT Central Certification Program document CP-1
ASNT CP-189	Standard for Qualification and Certification of Non-destructive Testing Personnel
SNT-TC-1A	Recommended Practice – Personnel Qualification and Certification of Non-destructive Testing
ASME XI IWA 2300	Qualification of Non Destructive Examination Personnel

- 6.1.3 Inspection and Test personnel will only be considered certified or eligible for certification when all the requirements of the selected certification standard or recommended practice, listed in Table 1, have been met in full.
- 6.1.4 Inspection and Test shall consider ISO 9712 and ASNT ACCP-CP-1 as “Third Party Qualification”, i.e. external to the employer, (see ISO/TC 11774 and IAEA TCS 34).
- 6.1.5 Inspection and Test shall consider ASNT-CP-189, SNT-TC-1A and ASME XI IWA 2300 as “Second Party Qualification”, i.e. administered totally, or in-part, by the employer, (see ISO/TC 11774 and IAEA TCS 34).
- 6.1.6 Elements of one certification standard or recommended practice shall not be substituted with those from another certification standard or recommended practice, e.g. ISO 9712 practical examinations cannot be used in lieu of those described in ASNT CP-189 or vice versa.

6.1.7 The referencing code or standard defines the choice and requirements for the qualification and certification of NDT personnel. Some of these are summarised in Table 2, although the list is not exhaustive:

**Table 2: Examples of Referencing Codes or Standards**

<b>NDT Referencing Code or Standard</b>	<b>Standard for Qualification and Certification of NDT Personnel</b>
ASME Section III: Rules for Construction of Nuclear Facility Components	SNT-TC-1A.
ASME Section V Article 1: Non Destructive Examination. General Requirements	SNT-TC-1A or ASNT CP-189 or ASNT ACCP.
ASME Section VIII: Rules for Construction of Pressure Vessels	SNT-TC-1A <sup>[1]</sup> (Employer Defined).
ASME Section XI: Rules for In-service Inspection of Nuclear Power Plant Components	ASNT CP-189 <sup>[2]</sup> or ASNT ACCP.
ASME B31.1: Power Piping	Employer Defined <sup>[3]</sup> .
ASME B31.3: Chemical Plant and Petroleum Refinery Piping	Employer Defined <sup>[4]</sup> .
EN European Standards (various)	ISO 9712 (Includes EN 473).
ISO International Standards (various)	ISO 9712 (Includes EN 473).
Can be met with the following permissible code options: <sup>[1]</sup> Is met with ASNT CP-189 or ASNT ACCP <sup>[2]</sup> Or, ASNT CP-189 with ASME XI reliefs. <sup>[3]</sup> Is met with AWS QC1 for VT (welds). <sup>[4]</sup> May use SNT-TC-1A.	

6.1.8 Consideration shall be given when certification is in categories, product or industrial sector within a method and hence training and examination shall be scheduled accordingly.

6.1.9 Inspection & Test recognises that personnel qualified in accordance with previous revisions of EN 473 and ISO 9712 are considered qualified until re-certification is due.

**NOTE:** *The issuance of a NDT certificate does not authorize the holder to operate on KNPS plant; this authority can only be given by Inspection & Test, see KAR-020.*

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## **6.2 Qualification and Certification of Inspection and Test Permanent Staff**

### **6.2.1 Training**

- 6.2.1.1 The Section Head in consultation with the Manager I&T and the training coordinator shall determine the extent of NDT training and level of NDT certification required for each individual.
- 6.2.1.2 Previous training records may be reviewed for applicability and acceptance by an I&T designated Section Head or a NDT Level III, as allowed by the certification standard.
- 6.2.1.3 When long term planning permits, the training needs shall be reflected in the individuals IDP, and all additional training shall be reviewed and approved by the I&T training curriculum review committee.
- 6.2.1.4 The identified training, training centre and dates shall be arranged by the Section Head/Training Coordinator and this shall be communicated to the individual:
- For Third Party certification, training shall be undertaken at an approved training centre (e.g. SAIW, ANDT etc.) and the required curriculum and training hours shall be met.
  - For Second Party certification, training shall be undertaken at the Koeberg Training Centre or at a venue approved by the Section Head/Training Coordinator and the required curriculum and training hours shall be met, (see KGT-047).
  - For Second Party certification, Inspection and Test may use outside agencies to provide the required training (e.g. EPRI). Outside agencies must be approved by the Manager Inspection and Test as meeting the requirements of 240-123597661.
- 6.2.1.5 The individual shall complete the requisite curriculum and training hours to be eligible for examination.
- 6.2.1.6 An individual's completed training hours, as provided by the training centre, shall be recorded on the Formal Training Record Form (see KFR-IP-096) by the individual and authenticated by the Inspection and Test Section Head/Training Coordinator or NDT Level III as appropriate.
- 6.2.1.7 All training records shall be kept on file and stored in the ISI vault.

### **6.2.2 Examination**

- 6.2.2.1 When the requirements of section 6.2.1 have been met, an individual is eligible for examination.

- 6.2.2.2 When long term planning permits, the examination needs shall be reflected in the individuals IDP, and all additional examinations shall be reviewed and approved by the I&T training curriculum review committee.
- 6.2.2.3 The identified examination centre and examination dates shall be arranged by the Inspection and Test Section Head/Training Coordinator and this shall be communicated to the individual:
- For Third Party certification, examinations shall be undertaken at an approved examination centre (e.g. SAIW, ANDT etc.) and the required theoretical and practical examinations shall be undertaken.+
  - For Second Party certification, examination shall be undertaken at the Koeberg Training Centre or at a venue approved by the Inspection and Test Section Head/Training Coordinator and the examination requirements shall be met, (see KGT-047).
  - For Second Party certification, Inspection and Test may use outside agencies to provide the required examinations (e.g. EPRI). Outside agencies must be approved by the Manager Inspection and Test as meeting the requirements of 240-123597661.
- 6.2.2.4 The individual shall complete the examinations as directed by the examination centre.
- 6.2.2.5 An individual's result, as provided by the examination centre, shall be recorded on the Examination Results Form (see KFR-IP-094) by the individual and authenticated by the examiner / Inspection and Test Section Head or NDT Level III as appropriate.

**NOTE:** *Experience may be accrued pre or post examination.*

- 6.2.2.6 An individual who is unsuccessful in the scheduled examination shall be reconsidered by the Inspection and Test Section Head/Manager/Training Coordinator and consensus shall be reached on which aspects shall be repeated as prescribed by the applicable certification schemes.
- 6.2.2.7 All examination results shall be kept on file and stored in the ISI vault.

### **6.3 ISO 9712 Qualification and Certification**

- 6.3.1 Qualification and certification in accordance with the requirements of ISO 9712 is independent of I&T and certificates are issued by accredited bodies and the certificates are "Personal-to-Holder", i.e. an individual's certification does not expire upon termination of employment.
- 6.3.2 Numerous accredited bodies provide ISO 9712 qualification and certification of NDT personnel. Table 3 lists some of the ISO 17024 accredited bodies acceptable to Inspection & Test, although this list is not exhaustive.

**Table 3: Examples Qualification and Certification Bodies**

<b>Qualification and Certification Bodies</b>	
ANDTc	African Non Destructive Testing Centre
BINDT	The British Institute of Non-Destructive Testing.
COFREND	Confédération Française pour les Essais Non Destructifs (French Society for Non-Destructive Testing)
DGZfP	Deutsche Gesellschaft für Zerstörungsfreie Prüfung (German Society for Non-Destructive Testing)
SAIW	Southern African Institute of Welding

- 6.3.3 I&T shall periodically review the 'Accreditation' status of the Qualification and Certification Bodies to ensure that such bodies remain ISO compliant.
- 6.3.4 When I&T make the arrangement for ISO 9712 training and examination the following steps shall be followed:
1. Prior to certification, personnel shall be considered as trainees. Trainees may not independently perform tests or evaluate results of tests.
  2. I&T shall administer appropriate hands-on and on-site training and this, together with the experience gained, shall be documented in a personal log of training and experience hours which shall be endorsed by the I&T designated Section Head or a NDT Level III.
  3. At a time considered appropriate, formal training at an accredited body shall be arranged by I&T. The trainee shall have prior notification of the scheduled training.
  4. The trainee shall attend the scheduled training and shall complete, in full, the requisite training as determined by the accredited body. The trainee shall keep the personal log of training and experience hours current.
  5. Notification of the formal training hours completed by the individual is issued by the accredited body. This record shall be held in the KNPS quality documentation system.
  6. Where additional formal and/or hands-on training is deemed necessary by the I&T section head, this shall be scheduled and completed by the trainee. This additional training record shall be held in the KNPS quality documentation system.
  7. Only when I&T is satisfied that an individual is suitable for certification shall an examination be arranged by the I&T Section Head at an accredited body. The trainee shall have prior notification of the scheduled examinations.

8. Notification of the examination results is issued by the accredited body. A copy of this record shall be held in the KNPS quality documentation system. The trainee shall keep the personal log of training and experience hours current.
9. The minimum experience may be accrued pre or post examination, but before a certificate is issued.
10. Individuals successfully completing examination, and upon receipt of a certificate, shall be considered suitable for I&T Authorisation (see KAR-020, "Authorisation of Inspection & Test Personnel and its Sub-contractors"). A copy of the certificate shall be held in the KNPS quality documentation system.
11. Individuals who fail examination shall remain a trainee and steps 1-9 shall be repeated, as appropriate.

6.3.5 When I&T recruit new employees already in possession of ISO certification the following steps shall be followed:

1. The individual's qualification and certification records shall be submitted to I&T, i.e. training hours, accredited training hours, examination results, vision tests and experience records.
2. The records shall be reviewed by an I&T designated Section Head or his/her delegate for applicability and validity.
3. Where qualification, certification and experience records are deemed acceptable, the I&T designated Section Head shall endorse a copy of these records and the copy shall be kept in the KNPS quality document system.
4. Where additional site specific formal and/or hands-on training is deemed necessary by the I&T Section Head, this shall be scheduled and completed by the trainee. This additional training record shall be held in the KNPS quality documentation system.
5. Such individuals shall be considered suitable for I&T Authorisation (see KAR-020, "Authorisation of Inspection & Test Personnel and its Sub-contractors").

## 6.4 ASNT CP-189 Qualification and Certification

6.4.1 Qualification and certification of NDT personnel in accordance with ASNT CP-189 requires I&T to administer training and examinations and to issue certificates to personnel. ASNT CP-189 certification is “Not-Personal-to-Holder”, i.e. an individual’s CP-189 certification expires upon termination of service.

6.4.2 Inspection & Test shall ‘appoint’ in writing a NDT Level III<sup>(1)</sup> certified in accordance with CP-189 to develop and administer the qualification and certification of all personnel to NDT Level I or Level II.

*(1)The ‘Appointed’ NDT Level III may be one or more individual.*

*(1)The ‘Appointed’ NDT Level III may be in the direct employ of Inspection and Test or may be contracted via a third party organisation (e.g. EPRI).*

6.4.3 The administration of the examinations of the Appointed NDT Level III will be conducted by a current ASNT NDT level III in the method for the practical or specific examination being administered. The ASNT NDT Level III will also be knowledgeable and familiar with the standards and specifications applied at KNPS.

6.4.4 The ‘Appointed’ NDT Level III is that individual who is appointed to:

- Train, examine and certify other individuals to NDT Level I and NDT Level II.
- Assume full responsibility for qualification and certification process to be used for those individuals so certified.

6.4.5 The responsibilities of the ‘Appointed’ NDT Level III:

- Assembling and/or approving the I&T training materials and training courses.
- Provides oversight for certification of NDT Level I and II.
- Assembling and/or approving all NDT Level I and Level II examination questions and shall be responsible for the administration and grading of NDT Level I and Level II examination results.
- Development, maintenance and administration of examinations used for certification of personnel.
- Certification of personnel and signing the Certification Form, see KFR-IP-093.
- Designation of NDT Instructors for the appropriate methods.
- Responsible for training and examination of personnel for certification.
- Approving course outlines to be used by NDT Instructors.

- 6.4.6 On recommendation from the 'Appointed' NDT Level III, I&T shall be responsible for certifying NDT Level I and Level II personnel and for maintaining all records of training, experience and examination in the KNPS quality documentation system.
- 6.4.7 I&T may accept previous training, experience and examination records (from other employers) that are documented and can be verified by the I&T training co-ordinator and approved by the 'Appointed' NDT Level III. Where such records are deemed to be acceptable, I&T may re-certify such personnel.
- 6.4.8 The Administration of Training and Examinations in accordance with CP-189:
- The 'Appointed' NDT Level III shall hold a current ASNT Level III certificate which satisfies the CP-189 requirement for Basic and Method examinations.
  - The 'Appointed' NDT Level III shall also successfully pass employer administered examinations (or employer based examinations in the case of third party organisations providing Level III service) which satisfies the CP-189 requirements for Specific and Practical examinations.
  - Should the 'Appointed' NDT Level III be required to perform test or evaluate NDT results the practical examination shall be inclusive of that required for CP-189 Level II certification.
  - All I&T NDT Level I and Level II personnel shall receive training and examination as directed by the 'Appointed' NDT Level III.
  - Candidates for certification shall successfully complete sufficient organized training to become familiar with the principles and applicable techniques.
  - The individual shall pass a final examination covering the topics contained in the training to receive credit for training hours.

6.4.9 Table 4 details the Training and Experience Hours Requirements for NDT Level I and II.

**Table 4: CP-189 Training and Experience Hours Requirements**

Evaluation Method	Level	Technique	Required Training (Hours)	Required Experience	
				Minimum Hours in Method	(Total Hours in NDT)
AE	I		40	200	400
	II		40	600	1200
ET	I		12	65	130
	II		40	600	1200
LT	I	BT	4	7.5	15
	II	BT	2	40	80
	I	PCT	24	100	200
	II	PCT	16	265	530
	I	HDLT	12	100	200
	II	HDLT	8	265	530
	I	MSLT	40	265	530
	II	MSLT	24	400	800
MT	I		12	65	130
	II		8	200	400
NR	I		28	400	800
	II		40	1200	2400
PT	I		8	65	130
	II		8	135	270
RT	I		40	200	400
	II		40	600	1200
UT	I		40	200	400
	II		40	600	1200
VT	I		8	65	130
	II		12	130	270
AE = Acoustic Emission Testing ET = Electromagnetic Testing MT = Magnetic Particle Testing NR = Neutron Radiographic Testing PT = Liquid Penetrant Testing RT = Radiographic Testing UT = Ultrasonic Testing			VT = Visual Testing LT = Leak Testing BT = Bubble Test PCT = Pressure Change Test HDLT = Halogen Diode Leak Test MSLT = Mass Spectrometer Leak Test		
NOTES – : A: Experience shall be based on the actual hours worked in the specific method. B: A person may be qualified directly to NDT Level II with no time as a certified NDT Level I, providing the required training and experience consists of the sum of the hours required for NDT Level I and NDT Level II. C: The required minimum experience shall be documented by method and by hour with supervisor or NDT Level III approval. D: While fulfilling total NDT experience requirement, experience may be gained in more than one (1) method. Minimum experience hours must be met for each method.					

6.4.10 Table 5a and 5b lists the minimum Required Examination Content.

**Table 5a: CP-189 General Examination:**

Method	Minimum Number of Questions	
	Level I	Level II
Acoustic Emission	40	40
Electromagnetic	40	40
Leak Test:		
Bubble	20	20
Pressure Change	20	20
Halogen Diode	20	20
Mass Spectrometer	20	20
Liquid Penetrant	30	30
Magnetic Particle	30	30
Neutron Radiography	40	40
Radiography	40	40
Ultrasonic	40	40
Visual	30	30

**Table 5b: CP-189 Specific Examination:**

Method	Minimum Number of Questions	
	Level I	Level II
Acoustic Emission	20	20
Electromagnetic	30	20
Leak Test:		
Bubble	15	15
Pressure Change	15	15
Halogen Diode	15	15
Mass Spectrometer	20	40
Liquid Penetrant	20	15
Magnetic Particle	20	15
Neutron Radiography	15	15
Radiography	20	20
Ultrasonic	20	20
Visual	20	20

- 6.4.11 The minimum experience may be accrued pre or post examination, but before a certificate is issued.
- 6.4.12 Individuals successfully completing examination, and upon receipt of a certificate, shall be considered suitable for I&T Authorisation (see KAR-020, "Authorisation of Inspection & Test Personnel and its Sub-contractors"). A copy of the certificate shall be held in the KNPS quality documentation system.

## **6.5 ASME XI (Modified ASNT CP-189 Certification)**

- 6.5.1 Qualification and certification of NDT personnel in accordance with ASME XI requires I&T to administer training and examinations and to issue certificates to personnel. ASME XI certification is "Not-Personal-to-Holder", i.e. an individual's ASME XI IWA-2300 certification expires upon termination of service.
- 6.5.2 Inspection & Test shall appoint in writing a "Principal" NDT Level III<sup>(2)</sup> certified in accordance with ASME XI to develop and administer the qualification and certification of all personnel to NDT Level I or Level II.

*<sup>(2)</sup>The 'Principal' NDT Level III may be one or more individual.*

*<sup>(2)</sup>The 'Principal' NDT Level III may be in the direct employ of Inspection and Test or may be contracted via a third party organisation (eg EPRI).*

- 6.5.3 The 'Principal' NDT Level III is that individual who is appointed to:
- Train, examine and certify other individuals to NDT Level I and NDT Level II.
  - Assume full responsibility for qualification and certification process to be used for those individuals so certified.
- 6.5.4 The responsibilities of the 'Principal' NDT Level III:
- Assembling and/or approving the I&T training materials and training courses.
  - Provides oversight for certification of NDT Level I, II and III.
  - Assembling and/or approving all NDT Level I, II and III examination questions and shall be responsible for the administration and grading of NDT Level I, II and III examination results.
  - Development, maintenance and administration of examinations used for certification of personnel.
  - Certification of personnel and signing the Certification Form, see KFR-IP-093.

- Designation of NDT Instructors for the appropriate methods.
- Responsible for training and examination of personnel for certification.
- Approving course outlines to be used by NDT Instructors.

6.5.5 On recommendation from the ‘Principal’ NDT Level III, I&T shall be responsible for certifying NDT Level I, II and III personnel and for maintaining all records of training, experience and examination in the KNPS quality documentation system.

6.5.6 I&T may accept previous training, experience and examination records (from other employers) that are documented and can be verified by the I&T training co-ordinator and approved by the ‘Principal’ NDT Level III. Where such records are deemed to be acceptable, I&T may re-certify such personnel.

6.5.7 Table 6 details the NDT level III educational and experience requirements.

**Table 6: NDT level III Educational and Experience Requirements:**

Option	Requirement
1	Graduate of a 4-year accredited engineering or science college or university with a degree in engineering or science, plus 1 year experience in NDT in an assignment comparable to that of a Level II in the examination method
	UT Level III personnel performing examination to the requirements of ASME Section XI shall have 4200 experience hours in ultrasonic testing.
2	Completion with a passing grade of at least the equivalent of 2 full years of engineering or science study at a university, college, or technical school, plus 2 years experience in an assignment comparable to that of a Level II in the examination method
	UT Level III personnel performing examination to the requirements of ASME Section XI shall have 6300 experience hours in ultrasonic testing.
3	Four years experience in an assignment comparable to that of a Level II in the examination method
	UT Level III personnel performing examination to the requirements of ASME Section XI shall have 8400 experience hours in ultrasonic testing.

6.5.8 NDT Level III personnel shall be initially qualified by Basic, Method, Specific and Practical/Demonstration examinations.

6.5.9 Table 7 details the NDT level III examination requirements.

**Table 7: NDT level III Examination Requirements:**

<b>Type of Examination</b>	<b>Requirements</b>
<b>Basic</b>	<p>Basic and Method Examinations can be administered by an Outside Agency (e.g., ASNT, EPRI).</p> <p>Basic examination shall consist of at least 65 questions (required only once if certification is sought in more than one method), of which:</p> <ol style="list-style-type: none"> <li>(1) at least twenty questions related to understanding of ANSI/ASNT CP-189,</li> <li>(2) at least thirty questions related to applicable materials, fabrication, and product technology,</li> <li>(3) at least fifteen questions that are similar to published Level II questions for other NDT methods.</li> </ol>
<b>Method</b>	<p>Method examination shall consist of at least 65 questions, of which:</p> <ol style="list-style-type: none"> <li>(1) at least thirty questions related to fundamentals and principles that are similar to published ASNT Level III questions for each method,</li> <li>(2) at least fifteen questions related to application and establishment of procedures and techniques that are similar to published ASNT Level III questions for each method,</li> <li>(3) at least twenty questions related to capability for interpreting codes, standards, and specifications related to the method.</li> </ol>
<b>Specific</b>	<p>The Specific Examination shall contain at least 30 questions covering equipment, techniques, procedures, and administration of the Inspection &amp; Test written practice.</p> <p>The Specific Examination shall also cover the NDT requirements of ASME Section XI, including acceptance standards and referenced codes and standards.</p>
<b>Practical / Demonstration</b>	<p>Practical / Demonstration Examination shall be in accordance with ANSI/ASNT CP-189 requirements.</p>

6.5.10 The Administration of Training and Examinations in accordance with ASME XI:

1. ASME XI requirements allows for ASNT-CP-189 qualification and certification to be modified in the following manner:
  - The ASNT CP-189 requirement for the NDT Level III to hold an ASNT Level III certificate to satisfy the Basic and Method examination is not required [ASME XI IWA 2314(a)].
  - Certification of personnel shall be in accordance with the requirements of IWA 2300.

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- When Basic and Method examination requirements are met utilising section 6.4 any such certificate, and for those individuals certified by the NDT Level III, must identify that it is issued in accordance with the requirements of ASME XI and are not in accordance with ASNT CP-189.
2. The 'Principal' NDT Level III shall also successfully pass employer administered examinations (or employer based examinations in the case of third party organisations providing Level III service) which satisfies the CP-189 requirements for Specific and Practical examinations.
  3. Should the 'Appointed' NDT Level III be required to perform test or evaluate NDT results the practical examination shall be inclusive of that required for CP-189 Level II certification.
  4. All I&T NDT Level I and Level II personnel shall receive training and examination as directed by the 'Principal' NDT Level III.
  5. Candidates for certification shall successfully complete sufficient organized training to become familiar with the principles and applicable techniques.
  6. The individual shall pass a final examination covering the topics contained in the training to receive credit for training hours.
- 6.5.11 VT-2 Limited personnel may be qualified and certified in accordance with IWA-2316, Alternative Qualifications of VT-2 Visual Examination Personnel. Such Certification of personnel shall be identified on the Certification Form, see KFR-IP-093.
- 6.5.12 VT-3 personnel may be qualified and certified in accordance with IWA-2317, Alternative Qualifications of VT-3 Visual Examination Personnel. Such Certification of personnel shall be identified on the Certification Form, see KFR-IP-093.
- 6.5.13 The following apply for IWL certification:
- Personnel performing general or detailed visual examinations shall be approved by the Koeberg Operating Unit Appointed Responsible Engineer.
  - Personnel shall be certified in accordance with the requirements of IWL-2320.
  - Personnel performing visual examinations required by ASME Section XI Subsection IWL shall meet the vision test requirements as stipulated in IWA-2321 of ASME Section XI.
- 6.5.14 The minimum experience may be accrued pre or post examination, but before a certificate is issued.

6.5.15 Individuals successfully completing examination, and upon receipt of a certificate, shall be considered suitable for I&T Authorisation (see KAR-020, "Authorisation of Inspection & Test Personnel and its Sub-contractors"). A copy of the certificate shall be held in the KNPS quality documentation system.

## 6.6 SNT-TC-1A Qualification and Certification

6.6.1 Qualification and certification of NDT personnel in accordance with SNT-TC-1A requires I&T to administer training and examinations and to issue NDT certificates to personnel. SNT-TC-1A certification is "Not-Personal-to-Holder", i.e. an individual's SNT-TC-1A certification expires upon termination of service.

6.6.2 Qualification and certification of NDT personnel shall be administered by the I&T "Appointed" NDT Level III<sup>(3)</sup> supported by the I&T training co-ordinator.

**NOTE:** <sup>(3)</sup>*If the services of an outside agency are not made use of, the I&T manager shall be responsible for organising the initial Level III training and examinations in accordance with the requirements of SNT-TC-1A and this document. Thereafter, the Level III shall take full responsibility for qualification and certification of other individuals.*

6.6.3 The examinations of the Appointed NDT Level III will be prepared by a NDT expert. If the I&T manager is not a NDT expert, he/she should not assume this position and shall source the required expertise from within Eskom (e.g. NE, RT&D, RE) or externally (e.g. EPRI).

6.6.4 The "Appointed" Level III responsible for the qualification and certification of other individuals will be identified and authorised in writing by I&T<sup>(4)</sup>, i.e. The Level III responsible for qualifying and certifying other NDT personnel.

**NOTE:** <sup>(4)</sup>*The "Appointed" NDT Level III shall be certified in the NDT method for which he/she is appointed. I&T may, however, choose to use the services of a third party organisation (so called "outside agency") to provide the services of a NDT Level III and to administer qualification and certification services on behalf of I&T. In such instances I&T is responsible for evaluating the outside agency to ensure that the services meet the requirements of SNT-TC-1A and this document. I&T retain the responsibility for the certification of NDT personnel.*

6.6.5 The "Appointed" NDT Level III, supported by the I&T training co-ordinator, shall be responsible for ensuring that individuals are qualified and certified in accordance with the requirements of SNT-TC-1A and for:

- Assembling and/or approving the I&T training materials and training courses and ensuring the minimum training is administered to trainees.
- Assembling and/or approving all NDT examination questions and shall be responsible for the administration and grading of examination results.

- 6.6.6 On recommendation from the “Appointed” NDT Level III, I&T shall be responsible for certifying NDT personnel and for maintaining all records of training, experience and examination in the quality documentation system.
- 6.6.7 I&T may accept previous training, experience and examination records (from other employers) that are documented and can be verified by the I&T training co-ordinator and approved by the “Appointed” NDT Level III. Where such records are deemed to be acceptable, I&T may re-certify such personnel.
- 6.6.8 When I&T sub-contract an NDT operation, partially or in its entirety, then the following steps shall be followed:
1. The sub-contractors qualification and certification programme (written practice) shall be reviewed by the I&T delegated person against the requirements of SNT-TC-1A.
  2. Sub-contractor qualification and certification records shall be submitted to I&T, i.e. training hours, examination results, vision tests and experience records.
  3. The records shall be reviewed by the I&T training co-ordinator, Section Head and the “Appointed” NDT Level III for applicability and validity.
  4. Where qualification and certification records are deemed acceptable, the I&T training co-ordinator and approved by the “Appointed” NDT Level III level shall endorse a copy of these records and the copy shall be kept in the KNPS quality document system.
  5. Such individuals shall be considered suitable for re-certification by I&T and authorisation to work (see KAR-020, “Authorisation of Inspection & Test Personnel and its Sub-contractors”).

6.6.9 Table 8 details the Training and Experience Hours Requirements for NDT Level I and II.

**Table 8: SNT-TC-1A Training and Experience Hours Requirements:**

Examination Method	NDT Level	Technique	Training Hours	Experience	
				Minimum Hours in Method	Total Hours in NDT
Acoustic Emission	I		40	210	400
	II		40	630	1200
Electromagnetic	I	AC Field Measurement	40	210	400
	II		40	630	1200
	I	Eddy Current	40	210	400
	II		40	630	1200
	I	Remote Field	40	210	400
	II		40	630	1200
Ground Penetrating Radar	I		8	60	120
	II		20	420	800
Guided Wave	I		40	240	460
	II		40	240	460
Laser Methods	I	Profilometry	8	70	130
	II		24	140	260
	I	Holography/ Shearography	40	210	400
	II		40	630	1200
Leak Testing	I	Bubble Testing	2	3	4
	II		4	35	65
	I	Pressure Change	24	105	200
	II		16	280	520
	I	Halogen Diode	12	105	200
	II		8	280	520
	I	Mass Spectrometer	40	280	520
	II		24	420	800
Liquid Penetrant	I		4	70	130
	II		8	140	270
Magnetic Flux Leakage	I		16	70	130
	II		12	210	400
Magnetic Particle	I		12	70	130
	II		8	210	400
Neutron Radiography	I		28	420	800
	II		40	1680	2400
Radiological	I	Radiographic	40	210	400
	II		40	630	1200
	I	Computed Radiography	40	210	400
	II		40	630	1200
	I	Computed Tomography	40	210	400
	II		40	630	1200
	I	Digital Radiography	40	210	400
	II		40	630	1200
Thermal/Infrared	I		32	210	400
	II		34	1260	1800
Ultrasonics	I		40	210	400
	II		40	630	1200
	II	Time of Flight Diffraction	40	160	n/a
	II		Phased Array	80	160
	Vibration Analysis	I		24	420
II		72		1680	2400
Visual	I		8	70	130
	II		16	140	270

6.6.10 Table 9 lists the minimum Required Examination Content.

**Table 9: SNT-TC-1A Required Examination Content:**

Method	General		Specific	
	Level I	Level II	Level I	Level II
Acoustic Emission Testing	40	40	20	20
Electromagnetic Testing:				
Alternating Current Field Measurement	40	40	20	20
Eddy Current	40	40	20	20
Remote Field Testing	30	30	20	20
Ground Penetrating Radar	30	40	20	20
Guided Wave	40	40	20	20
Leak Testing:				
Bubble Test	20	20	15	15
Absolute Pressure Leak Test (Pressure Change)	20	20	15	15
Halogen Diode Leak Test	20	20	15	15
Mass Spectrometer Leak Test	20	20	20	40
Magnetic Flux Leakage	20	20	20	15
Magnetic Particle Testing	40	40	20	20
Neutron Radiography Testing	40	40	20	20
Penetrant Testing	40	40	20	20
Radiological Testing:				
Radiography Testing	40	40	20	20
Radiographic Film Interpretation – Non-Radiographer		40		20
Radiographic Film Interpretation - Radiographer (Certified RT NDT Level I)		20		15
Computed Radiography Testing	40	40	20	20
Computed Tomography Testing	40	40	20	20
Digital Radiography Testing	40	40	20	20
Thermal/Infrared Testing	40	40	20	20
Ultrasonic Testing:	40	40	20	20
Time of Flight Diffraction				30
Phased Array				30
Digital Thickness Measurement (numeric output only)		20		10
A-scan Thickness Measurement		30		15
Vibration Analysis	40	40	20	60
Visual Testing	40	40	20	20

- 6.6.11 The minimum experience may be accrued pre or post examination, but before a certificate is issued.
- 6.6.12 Individuals successfully completing examination, and upon receipt of a certificate, shall be considered suitable for I&T Authorisation (see KAR-020, "Authorisation of Inspection & Test Personnel and its Sub-contractors"). A copy of the certificate shall be held in the KNPS quality documentation system.

## **6.7 Acceptance of Contractor Qualification and Certification by Inspection & Test**

- 6.7.1 The contractor's written practice shall be submitted to Inspection and Test as part of the tender submissions, or if it is revised during a contract period.
- 6.7.2 The review shall be performed by the Section Head, appointed NDT Level III, I&T Training coordinator or I&T Manager, as appropriate.
- 6.7.3 The contractor's written practice shall be assessed against the referenced standard or recommended practice **and** the requirements of 240-123597661 as part of the Inspection and Test contract technical evaluation process.
- 6.7.4 The contractor's written practice shall only be accepted by Inspection and Test if it meets the requirements of the standard/recommended practice and 240-123597661.
- 6.7.5 The main/principal contractor shall verify that all sub-contracting personnel working under his direction meet the requirements of the main/principal contractor's written practice.
- 6.7.6 All contractor staff training, experience, examination, certification and vision test records shall be submitted to Inspection and Test for acceptance.
- 6.7.7 Contractor staff will only be recommended for site authorisation to work at KNPS, upon acceptance of certification records by Inspection and Test prior to mobilization to site.
- 6.7.8 All training, experience, examination, certification and vision test records will be kept on file and stored in the ISI vault.

## **6.8 Additional Requirements**

- 6.8.1 All experience hours shall be logged in a Logbook or On-Job Training / Experience Record Form (see KFR-IP-095) and be authenticated by the Inspection and Test Section Head/Training Coordinator or NDT Level III or contractor's supervisor as appropriate.

- 6.8.2 All on-job and continuing training shall be logged on the On-Job Training / Experience Record Form (see KFR-IP-095) and be authenticated by the Inspection and Test Section Head/Training Coordinator or NDT Level III or contractor's supervisor as appropriate.
- 6.8.3 When personnel are presented for Inspection and Test authorisation, consideration shall be given to the additional requirements as referenced in the application standards, e.g. ASME XI Appendix VII, 10 CFR 50.55a, etc.
- 6.8.4 When Inspection and Test personnel are presented for authorisation, limitations shall be imposed when certification is given in categories or product/industrial sector within a method.
- 6.8.5 Additional requirements, pending scope application may exist. The requirements are not addressed in the written practice but in the authorisation procedure.
- 6.9 Re-certification**
- 6.9.1 All levels of NDT personnel shall be re-certified periodically in accordance with the identified certification standard or recommended practice.
- 6.9.2 NDT Level I and NDT Level II personnel engage in ISIPRM activities shall be re-certified every three years by examination and consideration shall be given to the additional requirements as referenced in the application standards, e.g. ASME XI Appendix VII, 10CFR50.55a, etc.
- 6.10 Visual Acuity Testing**
- 6.10.1 During any period of certification, personnel shall maintain a visual acuity and colour differentiation record in accordance with the requirements of the standard to which they are certified.
- 6.10.2 All NDT personnel shall have documented proof of visual acuity that meets the requirements of the certification standard and the referenced application standard.
- 6.10.3 Visual Acuity tests shall be performed annually to allow for continued practice of NDT and the results shall be captured on the Vision Test record Form, see KFR-IP-014.
- 6.11 Expiration, Suspension, Revocation, and Reinstatement**
- 6.11.1 The expiration, suspension, revocation and reinstatement of all levels of NDT personnel shall be in accordance with the identified certification standard or recommended practice.
- 6.11.2 A Condition Report shall be generated for the expiration, suspension and revocation and reinstatement of all levels of NDT personnel.

## 7.0 RECORDS

- 7.1 A training, certification and authorisation file shall be maintained as an Inspection and Test QA Record for all NDT personnel. This file shall contain, as a minimum the following:
- Name of certified individual.
  - Level of certification and NDT method.
  - Educational background and experience records.
  - Evidence of satisfactory completion of training.
  - Vision examination results.
  - Evidence of successful completion of examinations.
  - Evidence of satisfactory qualifications if used in lieu of the prescribed examinations, (see SNT-TC-1A).
  - Evidence of examination grades.
  - Name and signature of NDT Level III that verified the qualifications for certification, (see SNT-TC-1A).
  - Certifications obtained dates.
  - Certification expiry dates.
  - Name and signature of certifying authority, e.g. SAIW Examination Manager, I&T or contractors Manager.
- 7.2 Proof of training, examination results, experience, vision test and certification (second party) are documented in accordance with the forms referenced in this procedure.
- 7.3 Other forms as used by contractors and Outside Organisations may be used for the recording of training hours, examination results, experience hours and vision tests.
- 7.4 Certifications and authorisations are permanent records and are generated, transmitted and stored in accordance with Standard KSA-038, 'Requirements for Quality Records'.

## 8.0 ATTACHMENTS

Appendix 1 – Justification

**APPENDIX 1**  
**JUSTIFICATION**

**Revision 3**

1. Major re-write to comply with the ISI 4<sup>th</sup> Interval Requirements.

**Revision 4**

1. Full Review.