

SCOPE OF CERTIFICATION

Method Title : Radiographic Testing Level 1
Method Code : RT 1.A

Scope of Certification:

Industrial sector : Pre-and in service testing
 (Dense Alloys)
 (Light alloys can be added on request)

Product sector : RT 1.1 Γ -ray: Forgings & Castings
 RT 1.2 X-ray: Forgings & Castings
 RT 1.5 Γ -ray: Welds
 RT 1.6 X-ray: Welds

Practical applications / techniques

- * SWSI, DWSI, DWDI
- * Plates and pipe
- * Isotope : Ir-192
- * X-ray

CERTIFICATION REQUIREMENTS

TRAINING - ATB (Approved Training Body)

Course pre-requisite

DOH Radiation safety course shall be completed prior to RT 1 course. Students must be older than 19 years to be registered as a radiation worker.

Grade 12 with mathematics and science or pass mark in the SAQCC-NDT proficiency test ($\geq 70\%$).

Courses are presented in English, thus the student must be able to speak, read, write and understand the English language.

Candidates should indicate, on the course application form, any special needs they might have during the training program or subsequent examination.

Necessities for the first day

Students are required to bring a copy of their ID/Passport, course booking confirmation, 4 x ID photo's (Colour), protective clothing (for use during practical) , scientific calculator, blue / black pen and pencil as well as a ruler

Course duration : 10 days (80 hrs)
 3 days (24hrs) Exam

Daily program : 8am to 4 pm daily

- * Tea and coffee breaks in morning and afternoon.
- * Lunch is included.

Abbreviated course description

(Detailed syllabus and course program provided as part of training manual)

General Theory

- * Advantages, disadvantages & limitations
- * Discontinuities, indications, defects
- * Radiation Safety, ionisation radiation
- * Electromagnetic radiation
- * Origin and properties of Γ & X rays
- * Interaction with matter
- * Equipment

Specific Theory

- * Sample preparation
- * Calibration and functionality checks
- * Radiation exposure and film parameters
- * Typical defects and detectability
- * Calibration and reference samples
- * Calibration and system checks
- * Signal interpretation & plotting

Practical Skills

- * Performance and quality checks
 - * Performance of tests
 - * Exposure charts
 - * Film development
 - * Characterisation of indications
 - * Recording results / Report writing
-

Course notes shall be provided on first day:

- * RT 1 Gen & Spec Notebook
- * Written instructions
- * Questions & answer sheets
- * Homework

TRAINING – ATB (continued)

Course conduct / requirements

Approved training programs, provided in accordance with the SAQCC requirements, by approved training bodies, shall be acceptable towards certification.

(Refer to ATB approval audit checklist)

Class participation

100% attendance is required with candidate expected to participate in class discussions and quizzes

Practical work

Practical Assignments to be handed in and assessed

Formative Assessment

Two class tests shall be written during the course duration. Pass mark $\geq 70\%$

Homework

Homework to be completed and assessed on a daily basis

Course outcomes

After completion of this course the candidate shall be able to perform NDT in accordance with a written instruction. Furthermore, the candidate shall be capable of performing the following actions:

1. Set-up the equipment
2. Perform the tests
3. Record and classify the inspection results based on written instructions
4. Report the results

The candidate shall be eligible for the qualification examinations once he / she has successfully completed the training course.

Course deliverables

Proof of training record shall be issued after completion of training.

Suggested / additional reading material

(Available in the SAIW Technical Library)

- * **ASNT NDT Handbook Vol 3 – RT**; Bossi, R.H., F.A. Iddings and G.C. Wheeler, tech. ed., Moore P.O, ed
- * **Materials and Processes for NDT Technology**; ANST
- * **Annual Book of ASTM Standards, Vol. 03.03**, NDT
- * **ASNT Study Guide: Industrial Radiography Radiation Safety**; McCain, D.
- * **Working Safely in Radiography**; McGuire, S.A. and C.A. Peabody
- * **Industrial X-ray Interpretation**; Schneeman, J.G.
- * **ASNT Level II Study Guide: Radiographic Testing Method**
- * **ASNT Level III Study Guide: Radiographic Testing Method.**
- * **Basic Metallurgy for Non-Destructive Testing**; Taylor J L
- * **Defects and Failures in Pressure Vessels and Piping** ; Thielsch, H..
- * **Radiographic Testing**; Marks P.T. (PTP Series).
- * **Introduction to NDT: A Training Guide**; Mix, P.E.
- * **Non-destructive Evaluation and Quality Control: ASM Handbook, Volume 17**

Applicable Codes

Specific training is based on the codes mentioned below.

- * 2013 ASME BPVC Sect V Art 2 & 22
- * 2013 ASME BPVC Sect VIII Div 1 Mand App 4 & UW 51
- * ISO 5817 Fusion-welded joints in steel Quality levels for imperfections
- * ISO 5579 NDT – RT: X- and gamma-rays - Basic rules
- * ISO 5580 NDT – RT: Industrial Radiographic illuminators – Minimum requirements
- * ISO 5576 NDT – RT: X-ray and gamma-ray radiology – Vocabulary
- * ISO 11699 – 1 NDT – RT: Classification of film systems for industrial radiography
- * ISO 11699 – 2 NDT – RT: Control of film processing by means of reference values
- * ISO 10675 – 1 NDT – RT: Acceptance levels: Steel, nickel, titanium and their alloys

TRAINING – ATB (continued)

Applicable Codes (Continued)

- * ISO 19232 – 1 NDT – RT: Wire image quality indicators
- ISO 19232 – 2 NDT – RT: Step / hole image quality indicators
- * ISO 19232 – 3 NDT – RT: Image quality classes for ferrous metals
- * ISO 19232 – 4 NDT – RT: Experimental evaluation of image quality values and image quality tables
- * ISO 19232 – 5 NDT – RT: Duplex wire image quality indicators
- * ISO 3999 NDT – RT: Apparatus for gamma radiography
- * ISO 4993 NDT – RT: Steel castings
- * ISO 17636 – 1 NDT – RT: X and gamma-ray techniques with film

Although codes do not form part of the Level 1 specific training, it is important for the student to have exposure to it, since, during Level 2 specific training, the codes are discussed in detail and the specific examination is an open book examination based on a supplied code.

QUALIFICATION EXAMINATION – AQB (Approved Qualification Body)

Qualification examination

- | | |
|-----------|---|
| General | 40 Multiple Choice Questions
2 minutes / question
Pass ≥ 70% |
| Specific | 40 Multiple Choice Questions
2 minutes / question
Pass ≥ 70% |
| Practical | 3 x samples (SWSI, DWDI, DWSI)
2 hrs / sample
Pass ≥ 70% for each sample |
- * Two rewrite opportunities are allowed, not earlier than 1 month, nor later than two years, from date of initial examination.
 - * Results are valid for 2 years after successful completion and prior to certification.

Examination deliverables

- * Examination result letter shall be issued, no later than four weeks after completion of examination (**correct e-mail address needed on the examination application form**).

VISION ACUITY

The candidate shall provide documentary evidence of satisfactory vision in accordance with the following requirements:

- * near vision acuity shall permit reading a minimum of Jaeger number 1 or Times Roman N 4.5 or equivalent letters (having a height of 1,6 mm) at not less than 30 cm with one or both eyes, either corrected or uncorrected;
- * colour vision shall be sufficient that the candidate can distinguish and differentiate contrast between the colours or shades of grey used in the NDT method concerned, as specified by the employer.

INDUSTRIAL EXPERIENCE

- * **Industrial Experience duration : 3 month / 528 hrs**

As soon as the candidate has passed his / her personnel qualification examination, he / she is required to obtain industrial experience, which consists of two aspects viz. company specific training as well as performing NDT tasks within industry.

Industry specific training focuses on the mastering of individual techniques and is performed in accordance with the company quality manual / written practice.

Once completed, industrial experience records shall be submitted to the CB in the form of a 'On the job training and experience Matrix', (Refer to logbook) compiled by the applicable mentoring staff and verified by the Responsible Level 3 or suitably qualified individual.

CERTIFICATION

Certification (Initial)

Complete the NDT logbook and submit a copy together with application form and proof of payment to the Administration Controller - Certification

All of the following criteria **must be** met before certification shall be awarded:

- * ID / Passport
- * Proof of training record 80 hrs
- * Examination results ≥ 70% for each paper & sample
- * Industrial experience log 3 month (528 hrs)
- * Vision acuity Refer to Logbook

Certification decision is made by the certification body based on evidence provided and verified.

The applicant shall be issued with a Code of Ethics which must be signed before the original certificate is issued.

Certification is valid for a period of five years

Certification becomes invalid:

- * on the expiry date indicated on the certificate;
- * behaviour incompatible with the certification procedures or failure to abide by a code of ethics;
- * if the individual becomes physically incapable of performing his duties based upon failure of the visual acuity examination taken annually under the responsibility of his employer;
- * if a significant interruption takes place in the method for which the individual is certified;
- * if the individual fails recertification, until such time as the individual meets the requirements for recertification or initial certification.

Restitution:

Criteria for restitution of the certificate, shall depend on the reason for and the duration of the certificate being invalid, and can range from having to write only a practical examination, to writing a completed qualification examination as per initial candidate requirements.

RENEWAL (CERTIFICATION SURVEILLANCE)

The candidate shall apply for renewal at least three months prior to the expiry date by completing the certification application form and providing proof of payment. Copies of the relevant sections of the NDT logbook should be submitted as supportive evidence.

Prior to the completion of the first 5 year period of validity and every 10 years thereafter, certification may be renewed by the certification body for a new period of five years on production of:

- * The individual shall successfully complete a full practical examination which demonstrates continued competence to carry out work within the scope defined on the certificate.
- * Annual submission of NDT activity report, including documentary evidence of a satisfactory visual acuity examination taken within the preceding 12 months.
- * Verifiable documentary evidence of continued satisfactory work activity without significant interruption in the method and sector for which certificate renewal is sought.

RECERTIFICATION

Prior to the completion of each second period of validity (every 10 years), the certified individual may be recertified by the certification body for a new period of five years, provided that the individual meets the criterion for renewal viz. annual submission of NDT activity report and meets the applicable conditions described in the following.

- * The individual shall successfully complete a full specific and practical examination which demonstrates continued competence to carry out work within the scope defined on the certificate.
- * Annual submission of NDT activity report, including documentary evidence of a satisfactory visual acuity examination taken within the preceding 12 months.
- * Verifiable documentary evidence of continued satisfactory work activity without significant interruption in the method and sector for which certificate renewal is sought.

JOB / TASK DESCRIPTION

An individual certified to Level 1 has demonstrated competence to carry out NDT according to written instructions (created by Level 2 personnel, based on Level 3 compiled / approved procedures) and under the supervision of Level 2 or Level 3 personnel. Within the scope of the competence defined on the certificate, Level 1 personnel may be authorized by the employer to perform the following in accordance with NDT instructions:

- * set up NDT equipment;
- * perform the tests;
- * record and classify the results of the tests according to written criteria;
- * report the results.

Level 1 certified personnel shall neither be responsible for the choice of test method or technique to be used, nor for the interpretation of test results.

SCOPE MODIFICATION / ADDITION

Should the candidate want to modify the current certification scope, then the following shall be required:

- * Proof of training record relating to the sector or category to be added.
- * Copy of current SAQCC-NDT certificate in the applicable method and level.
- * Pass mark in a specific and practical (two samples) examination relating to the new sector or category.
- * Industrial experience within the new sector or category as per CB requirements

Once all of these requirements have been met, a certificate shall be issued indicated the newly added sectors / categories. The expiry date of the original supplied certificate shall however still be applicable.

CHANGING BETWEEN CERTIFICATION BODIES (CB)

Should a candidate want to change from the current certification body to another then the following shall be required

- * Copy of current certificate, qualification examination results, industrial experience, current curriculum vitae and proof of training records.
- * The candidate shall be required to write and pass a specific and practical examination at the current level of qualification to be eligible for new CB certificate. Please note that the original date of the supplied certificate shall still be applicable.
- * Should any, excluding proof of training, of the abovementioned documentation not be available, then a full examination shall be required. If the applicant is not successful after the second rewrite, then the he / she would have to re-sit the course at the current level.

CODE OF CONDUCT / ETHICS

Certificate holders shall:

- * abide by a code of ethics published by the certification body;
- * undergo an annual test of visual acuity and submit the results of tests to the employer;
- * notify the certification body and the employer in the event that the conditions for validity of certification are not fulfilled, or has changed, viz. in the case of changes to physical abilities