Radiographic Testing (RT)
Level 2

Doc Ref No. POP 16-8: 40 Rev 0 RT 2 Abbreviated

SCOPE OF CERTIFICATION

Method Title : Radiographic Testing Level 2

Method Code : RT 2.A

Scope of Certification:

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

Product sector :

RT 2.1	Γ-ray: Forgings & Castings
RT 2.2	X-ray: Forgings & Castings
RT 2.5	Γ-ray: Welds
RT 2.6	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

RT 1.A qualification is required i.e. training provided by an ATB for a period of 80 hours and a pass mark for an AQB qualification examination performed in accordance with ISO 9712. Level 1 certification is not mandatory for the candidate to be eligible, however should certification be applied for, then a total period of four months industrial experience has to be submitted.

Courses are presented in English. 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 day (24 hrs) 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

- NDT Methods, applications, limitations and advantages
- Understanding radiation origin, characteristics & influence on matter & living tissue
- Equipment

Specific Theory

- Interpretation and usage of NDT codes and procedures
- Radiographic testing in accordance with codes and procedures
- Typical defects and their origins
- Testing conditions, Quality, functionality checks
- System calibration and verification
- Safety and environmental considerations
- Interpret, evaluate and report

Practical Skills

- Selection of technique
- Compilation of written instruction
- Performance of tests
- Interpret and evaluate indications
- Report compilation

Course notes shall be provided on first day:

- RT 2 Gen & Spec Notebook
- RT Code Book
- Questions & answer sheets
- Homework

TRAINING – ATB
(continued)

Course conduct / requirements

Approved training programs, provided in accordance with the SAQCC requirements, by approved training bodies, or through distance education programmes, 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, film interpretation and written instructions to be handed in and assessed

Formative Assessment

Two class tests shall be written during the course duration. Pass mark ≥ 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 NDT procedure. Furthermore, the candidate shall be capable of performing the following actions:

1. select the NDT technique for the testing method to be used;
2. define the limitations of application of the testing method;
3. translate NDT codes, standards, specifications, and procedures into NDT instructions adapted to the actual working conditions; (Create Written Instruction)
4. set up and verify equipment settings; (Ensure quality of inspection)
5. perform and supervise tests; (Ensure scope coverage & compliance with customer requirements)
6. interpret and evaluate results according to applicable standards, codes, specifications or procedures; (Accept or reject relevant indications)
7. carry out and supervise all tasks at or below Level 2;
8. provide guidance for personnel at or below Level 2; (Establish and maintain method report sheets)
9. report the results of NDT. (Compile and sign report)
10. Level 2 Responsibilities: (Ensure quality of specific inspection and reported 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.
- ***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
- 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

QUALIFICATION EXAMINATION – AQB
(Approved Qualification Body)

Qualification examination

General	40 Multiple Choice Questions 2 minutes / question **Pass ≥ 70%**
Specific	30 Multiple Choice Questions Additional 10 Marks / Questions from Calculations / narrative questions 2 minutes / question or mark **Pass ≥ 70%**
Practical	3 x samples (SWSI, DWDI, DWSI) 2 hrs / sample Interpret 12 Radiographs 30 minutes / radiograph 1 x Written instruction (1 hr) **Pass ≥ 70% for each sample / WI**

- 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 **(should the correct e-mail address have been supplied 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 : 9 month / 1584 hrs**

As soon as the candidate has passed his / her personnel qualification examination, he / she is required to obtained 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 PCB 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 & set of radiographs
Industrial experience log	9 months (1584 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

Perform / Supervise Inspection, compliant with quality documentation and compile report

An individual certified to Level 2 has demonstrated competence to perform NDT according to NDT procedures (created by Level 3 personnel and compliant with international procedures and client requirements). Within the scope of the competence defined on the certificate, Level 2 personnel may be authorized by the employer to:

- select the NDT technique for the testing method to be used;
- define the limitations of application of the testing method;
- translate NDT codes, standards, specifications, and procedures into NDT instructions adapted to the actual working conditions; (Create Written Instruction)
- set up and verify equipment settings; (Ensure quality of inspection)
- perform and supervise tests; (Ensure scope coverage & compliance with customer requirements)
- interpret and evaluate results according to applicable standards, codes, specifications or procedures; (Accept or reject relevant indications)
- carry out and supervise all tasks at or below Level 2;

JOB / TASK DESCRIPTION
(continued)

- provide guidance for personnel at or below Level 2; (Establish and maintain method report sheets)
- report the results of NDT. (Compile and sign report)
- Level 2 Responsibilities: (Ensure quality of specific inspection and reported 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

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.