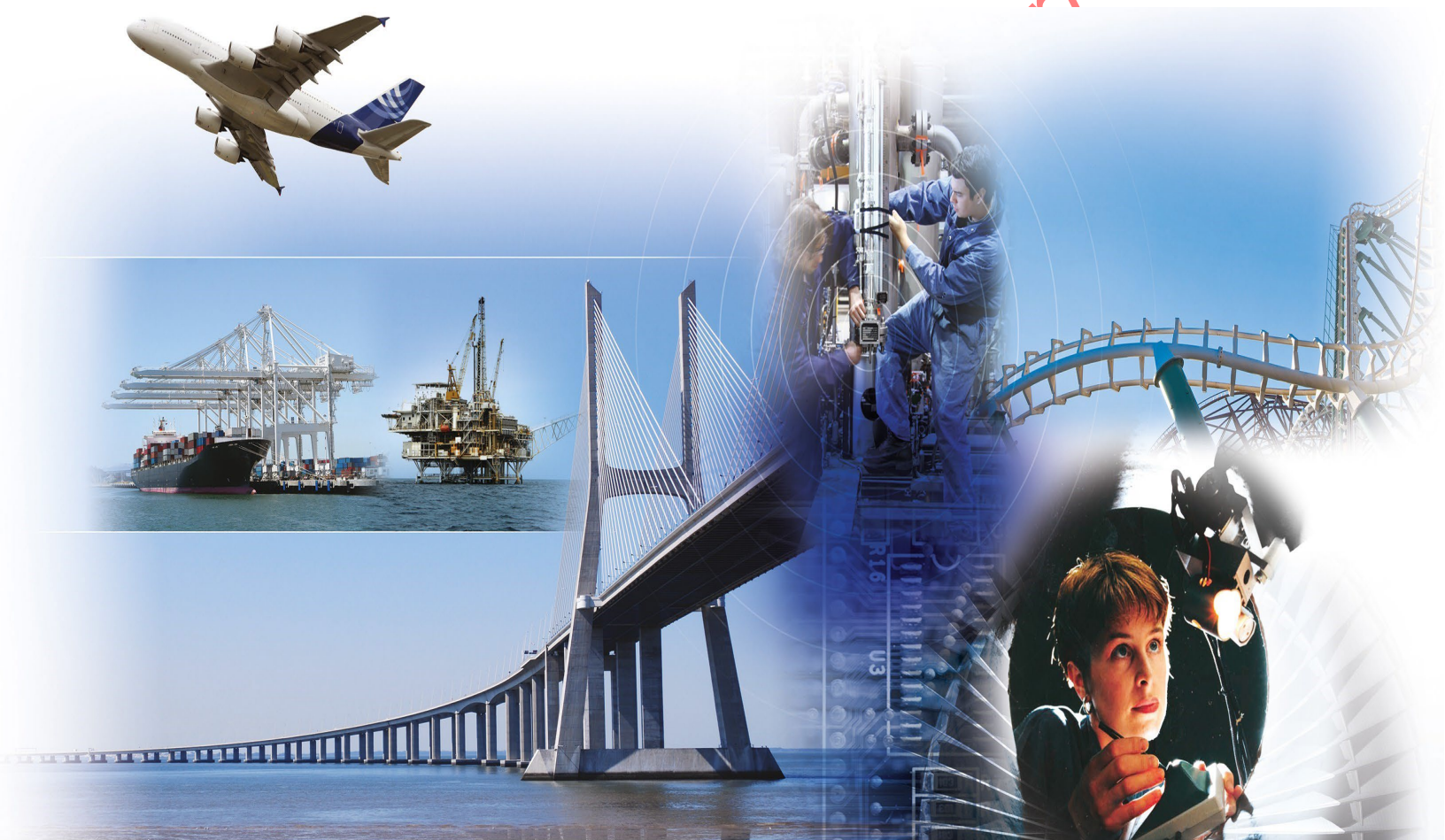


PCN TRAINING / EXAMINATION AND PRACTICAL TESTING SPECIMEN REQUIREMENTS DOCUMENT FOR: RADIOGRAPHIC TESTING (RT) AT PCN LEVELS 1, 2, and 3

2024



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1. SCOPE:

This document prescribes the specific requirements by which candidates may be examined within the Radiographic Testing (RT) method and associated techniques when testing products listed within BS EN ISO 9712 Annex A, specifically A.2 for certification sought. Requirements herein are complementary to PCN24/GEN and BS EN ISO:9712. Annex A within this document provides information on the physical requirements for practical specimens when used by an Approved Training Organisations (ATO) or Authorised Qualifying Body (AQB).

Note: Document content will be of relevance to BINDT's network of Approved Training Organisations when preparing PCN candidates for PCN examinations as the document provides an understanding for the provision of suitable practical specimens for testing.

This document expands upon the candidate facing requirements document PCN24/GEN/APP/RT which can be download at www.bindt.org.

This document covers all techniques within the RT method as defined by BS EN ISO 9712:2022 Annex F3, including techniques classed as limited scope/certification.

By meeting requirements herein candidates can be assured AQBs are suitably placed to administer PCN examinations for the testing of products within industry and product sectors listed within section 6 herein.

Before attempting PCN examinations candidates should be familiar with the equipment in use at the chosen AQB, this may necessitate AQBs providing pre-examination refresher or familiarisation training to those candidates who request such services, the AQB shall establish procedures to accommodate such requests.

When producing NDT reports, drafting written Instructions and/or procedures, candidates shall only use computers provided by the AQB or Test centre throughout the duration of the PCN examination. All further access to external ports, Bluetooth/wireless connectivity and online resource shall be disabled by the AQB. Procedures for ensuring compliance with these requirements shall be established within the organisations written procedures.

Candidates will be required to demonstrate success for each individual examination element relevant to certification sought (initial/renewal/retest) and in addition demonstrate that they meet the requirements for acuity of vision, colour perception, and practical industrial experience prior to the award of certification by PCN. AQB's should also remind candidates that they shall undertake to abide by the BINDT's Code of Ethics published as PCN24/CP27 at all times.

2. ASSOCIATED DOCUMENTS:

- 2.1. PCN24/GEN: General Requirements for the Certification of Personnel Engaged in NDT.
- 2.2. PCN24/GEN/APP/RT: Examination requirements for personnel seeking PCN certification in the Radiographic Testing (RT) method, available to download free of charge at www.bindt.org.
- 2.3. PCN24/CP09. Requirements for BINDT Authorised Qualifying Bodies.
- 2.4. BS EN ISO 9712:2022: Non-destructive testing — Qualification and certification of NDT personnel.
- 2.5. DD CEN/TS 15053:2005: Non-destructive testing — Recommendations for discontinuity-types in test specimens for examination.

3. EMPLOYERS RESPONSIBILITY:

- 3.1. PCN24/GEN details specific requirements regarding employer responsibility, it is important that employers are aware of these responsibilities. As such it is advisable that the AQB informs candidates of the certification privileges and responsibilities awarded to them when PCN certification is issued following success in a PCN examination, and by reaffirming with the candidate that it is the employer's duty to issue them with the 'authority to operate', prior to PCN certificate holders testing an employer's plant or product(s) or those of the employer's customers or clients.
- 3.2. See PCN24/GEN – Section 5.5 for further details.

4. PCN RT CERTIFICATION AVAILABLE FOR SINGLE OR MULTISECTOR USE:

- 4.1. PCN Level 1
- 4.2. PCN Level 2
- 4.3. PCN Level 3
- 4.4. For a detailed breakdown of available PCN RT certification options, see Table 1.

5. PCN RT CERTIFICATION OPTIONS AVAILABLE:

Table 1:		PCN Radiographic Testing (RT) Certification Option Codes.				
Technique within the RT Method	Technique within the RT Method with Limited Scope	PCN Certification Abbreviation:	Sector/materials available	PCN Certification Level		
				1	2	3
Film Radiography	-	RT-F	1. Dense metal welds 2. Light metal welds	✓	✓	✓*2
Computed Radiography (using Imaging plates)	-	RT-CR	3. Dense & Light metal welds 4. Dense metal castings 5. Light metal castings	✓	✓	✓*2
Digital Radiography (using Direct detectors)	-	RT-DR*1	6. Dense & Light metal castings 7. Composites*4	✓	✓	✓*2
Computed Tomography	-	RT-CT*1	8. Wrought (wall thickness and tangential)	✓	✓	✓*2
-	Film Interpretation	RT-FI	1. Dense metal welds 2. Light metal welds	-	✓	-
-	Digital Image Interpretation	RT-DI	3. Dense & Light metal welds 4. Dense metal castings 5. Light metal castings	-	✓	-
-	Film & Digital image interpretation (Combined)	RT-FDI	6. Dense & Light metal castings 7. Composites*4	-	✓	-
Notes: *1: The PCN schemes for Digital Radiography using direct detectors (RT-DR) and Computed Tomography (RT-CT) are currently under development. *2: Level 3 certification is available in weld or casting RT which encompass all material sectors. *3: All RT certification is available using X-Ray or Gamma Ray sources or a combination of both, as applicable. *4: The RT of composites is currently under development.						
Product sector Key (As shown on resultant certificates)		Where offered *		(D) = dense	(L) = Light	Castings (c)
				Wrought products (wp)	Welds (w)	Composites (m) *4

6. INDUSTRIAL and PRODUCT SECTORS FOR PCN CERTIFICATION

- 6.1. Industry and product sectors for PCN certification have been taken from reference lists at Annex A (specifically A.2 and A.3) within BS EN ISO 9712, however this does not preclude the development of additional sectors to satisfy national needs where required, and which have been accepted for future use by BINDT.
- 6.2. The scope of the certification examination shall be specified on the candidate's results notice by the AQB, the AQB will issue the results notice to PCN confirming the details and results of the specific PCN examination attempted by the candidate from the list of available certification options listed within Table 1, for the appropriate industrial and product sector(s) listed at 6.3 and 6.4 respectively.
- 6.3. **Industrial Sectors:**
- Manufacturing.
 - Pre-and in-service testing which includes manufacturing.

6.4. Product sectors: (metallic materials).

- a) Castings (c) (ferrous and nonferrous materials).
- b) Wrought products (wp) which includes the following:
 - (Parent material checking, wall thickness checking and corrosion monitoring).
 - Wall thickness testing using tangential radiography
- c) Welds (w) (all types of welds, including soldering, for ferrous and non-ferrous materials).

7. EXAMINATION ELIGIBILITY

- 7.1. Candidates shall fulfil the minimum requirements for eligibility as detailed in PCN24/GEN section 7) and PCN24/CP09.
- 7.2. For those candidates who are classified as new entrants within the PCN Certification scheme and therefore, have never held PCN certification, it shall be a requirement that they satisfactorily complete the PCN Knowledge and training module for Product Technology before they are accepted onto any NDT method specific Approved Training Course and consequently for PCN certification examinations.
- 7.3. Candidates for RT training and examinations shall provide confirmation of compliance with additional national requirements for radiation safety compliance by holding:
 - a) PCN Certification for Basic Radiation Safety (BRS).
 - b) PCN Certification for Advanced Radiation Safety (ARS).
 - c) Other radiation safety certification / authorisation acceptable to BINDT and PCN.
- 7.4. Where certification for Radiographic Interpretation only is required, PCN candidates will be exempt from the need to prove compliance for radiation safety.

8. PCN EXAMINATION CONTENT LEVEL 1 AND 2

- 8.1. All initial candidates will be required to attempt an examination comprised of the following examination elements:
 - a) General Theory written examination element.
 - b) Specific Theory written examination element.
 - c) Specific practical examination element.
 - d) NDT Instruction writing element (Level 2 candidates only).
- 8.2. For direct certification under the limited scope options detailed in table 1 (Film and/or Digital image interpretation), candidates shall complete the General and Specific written examination elements PLUS the practical interpretation part of the practical element attempted by a full level 2 RT candidate. They shall complete a Written Instruction element related to the image interpretation process.
- 8.3. Renewal, Recertification and re-test examinations may include some, or all of the examination elements listed, dependent upon the candidate's specific examination requirements and as confirmed by individual circumstance. See PCN24/GEN.

8.4. GENERAL THEORY WRITTEN EXAMINATION ELEMENT.

- 8.4.1. The general theory written examination element shall assess the candidate's knowledge and understanding of the general theory and principles of the (RT) method at the appropriate level for certification sought.
- 8.4.2. PCN questions shall be written against BINDT's PCN syllabus requirements document PCN24/GEN/SYL for RT.
- 8.4.3. For PCN Level 1 and Level 2 certification the general theory examination element shall be a closed-book examination consisting of 40 multi-choice answer type questions, covering the general theory of the NDT method at the appropriate level for certification.
- 8.4.4. One multichoice question answer being correct, the other remaining answers being incorrect or incomplete.
- 8.4.5. The examination shall include only those validated questions selected in an unpredictable way from the collection of general questions approved by the British Institute of NDT at the time of the examination.
- 8.4.6. The AQB will be provided with controlled access to the use of established and approved examination questions and or question papers.
- 8.4.7. For General Theory certification examinations at Level 1 and Level 2, the total allowable examination time for the general theory examination element shall be based on two minutes per multiple choice examination question.
- 8.4.8. Allowable examination time shall be confirmed to the candidate on the front of the PCN examination paper in writing.
- 8.4.9. Permissible extension to examination times are detailed in PCN24/GEN section 8.2.
- 8.4.10. The pass mark shall be $\geq 70\%$.

8.5. SECTOR SPECIFIC THEORY EXAMINATION ELEMENT

- 8.5.1. The specific written examination element shall be multiple choice examination questions selected from the certification body's established PCN examination papers valid at the date of examination. AQBs may submit additional examination papers for approval, if deemed appropriate.
- 8.5.2. The examination will include questions relating to the specific product technology, and for use of codes, standards, specifications, procedures, and acceptance criteria within the defined industry and product sector(s) for certification.
- 8.5.3. The examination may be an open book examination where candidates have access to authorised and controlled reference material provided to them by the AQB's examiner. Reference material supplied shall be restricted to copies of those specifications, standards and or codes upon which specific examination questions are based.
- 8.5.4. For single sector certification the specific theory examination shall consist of the following:
 - For Level 1: A minimum of 25 questions.
 - For Level 2: A minimum of 30 questions.

8.5.5. For multi sector RT certification the specific theory examination shall consist of the following:

- For Level 1: A minimum of 35 questions.
- For Level 2: A minimum of 40 questions.

8.5.6. The questions shall be multi-choice answer type based upon the application of the NDT method and technique(s) at the appropriate level for certification. Questions relating specific method/technique-based product technology will also be included.

8.5.7. One question answer being correct, the other remaining answers being incorrect or incomplete.

8.5.8. Where the specific examination is multi-sector i.e., (castings, welds etc.) the questions will be evenly spread between the sectors concerned.

8.5.9. The examination shall include only validated questions selected in an unpredictable way from the collection of specific questions approved by the British Institute of NDT at the time of the examination. The AQB will be provided with controlled access to the use of approved examination questions or question papers.

8.5.10. For Specific Theory certification examinations at Level 1 and Level 2, the total allowable examination time for the general theory examination element shall be based on three minutes per multiple choice examination question

8.5.11. Allowable examination time shall be confirmed to the candidate on the front of the PCN examination paper in writing.

8.5.12. Permissible extension to examination times are detailed in PCN24/GEN section 8.2.

8.5.13. The specific theory examination element pass mark shall be $\geq 70\%$.

8.6. SECTOR SPECIFIC PRACTICAL EXAMINATION ELEMENT

8.6.1. *Sector Specific Practical Testing Examination Element*

8.6.1.1. For RT, the specimens to be tested do not need to contain discontinuities as the interpretation of RT discontinuities is addressed in the image interpretation part of the practical examination. The actual RT practical specimens attempted shall test the candidates ability to inspect them in accordance with a defined test specification and produce radiographs of an acceptable standard in accordance with that specification.

8.6.1.2. Candidates shall demonstrate use of appropriate equipment and NDT techniques for use within the RT method relevant to the specimens tested for certification sought.

8.6.1.3. Guidelines for discontinuity types within examination specimens and radiographs for interpretation can be found in:

- APPENDIX A to this document: Practical testing specimen requirements for use in PCN RT training, and examinations.
- DD CEN/TS 15053:2005: Non-destructive testing — Recommendations for discontinuity-types in test specimens for examination.

8.6.2. **Discontinuity**

8.6.2.1. For the purpose of this document, and when making reference to the word “Discontinuity” we are referring to any interruption in the normal physical structure or configuration of the part or product under test such as cracks, laps, seams, inclusions, or porosity etc., We also acknowledge that a discontinuity is not necessarily a defect until it has been identified, defined, evaluated, and classified as being so against a code, industrial standard, written instruction or work procedure. As such the reader shall be aware of the above where the noun “discontinuity” is used herein.

8.6.3. **PCN Examination – Practical Testing Control Checks**

8.6.3.1. Candidates shall demonstrate knowledge and correct use of NDT (RT) equipment to include system control and validity of verification checks. See Annex D Table D.1 Item 1 within BS EN ISO 9712.

8.6.3.2. Time allowed 30 minutes.

8.6.3.3. The examination pre-use and control checks need not form an individual examination element in its own right but shall be recorded by the AQB as having been completed satisfactorily in accordance with a written procedure or industrial standard provided to the candidate for use by the AQB examiner.

8.6.4. **PCN Practical Testing of Specimens - RT Level 1 initial examination (Welds)**

8.6.4.1. Candidates shall apply appropriate RT techniques to those specimens provided for testing by the AQB's examiner. For the RT level 1 practical element, the initial candidate shall complete the following:

- a) Testing five specimens selected by the examiner from plate butt welds and pipe butt welds using single wall single image, double wall single image and double wall double image techniques in accordance with the NDT instructions provided. It is acceptable for the AQB to accept images created using a minimum of one exposure that is representative of each exposure arrangement within the testing technique for each specimen.
- b) Examine and evaluate the suitability for interpretation of the radiographs produced during (a) above.
- c) Reporting significant areas for further investigation detected in (b) above in a prescribed manner in accordance with the NDT instructions provided.

8.6.4.2. The total time allowed for this practical part is 8 hours.

8.6.4.3. The minimum pass mark for the practical part is 70% for each specimen tested. The candidate must achieve 70% or greater for each specimen. Failure in any specimen shall result in the failure of the whole of this practical testing element.

8.6.4.4. The specimens tested shall reflect the material types required (Light or dense metals or a combination of both) and utilise the radiation source types required (X-ray or gamma ray or both).

8.6.5. **PCN Practical Testing of Specimens (& Image interpretation) - RT Level 2 initial examination (Welds)**

8.6.5.1. Candidates shall apply appropriate RT techniques to those specimens provided for testing by the AQB's examiner. Candidates shall record, *(and for level 2, interpret)* the resulting information to the degree required, reporting results in the AQB's required format.

- 8.6.5.2. Where the certification examination covers two or more product sectors, practical examination specimens tested shall include a minimum of one specimen from each product sector for certification. This may require the candidate to demonstrate their practical ability to deploy different RT techniques for certification sought.
- 8.6.5.3. Failure to detect and report a reportable (mandatory) discontinuity and for Level 2 interpret and classify results in any one specimen tested shall result in failure of the examination specimen and consequently subsequent failure of the PCN certification examination element.
- 8.6.5.4. For the RT level 2 practical element, the initial candidate shall complete the following:
- a) Testing five specimens from plate butt welds and pipe butt welds in metals selected by the examiner appropriate to the certification sought using single wall single image, double wall single image and double wall double image techniques. Level 2 candidates shall select the applicable NDT technique and determine the required testing conditions from basic written instructions, a given code, standard or specification provided by the AQB. It is acceptable for the AQB to accept images created using a minimum of one exposure that is representative of each exposure arrangement within the testing technique for each specimen.
 - b) Processing the resulting radiographs and reporting significant areas for further investigation detected in (a) above in a prescribed manner in accordance with the NDT instructions provided. Time allowed: 2 hours per sample. However, BINDT allows the AQB to extend this time period, if required, based upon the individual component complexity.
 - c) Radiographic or Image Interpretation (as applicable). The candidate will be required to read, mark up (film) and report on a **minimum** of 10 radiographs or digital images representative of the categories of certification sought (the candidate will read and report on a **minimum** of 10 radiographs or digital images regardless of the categories attempted) - see table 1 below for further guidance. Time allowed: 3 hours.
- 8.6.5.5. The minimum pass mark for the practical part is 70% for each specimen tested. The candidate must achieve 70% or greater for each specimen. Failure in any specimen shall result in the failure of the whole of this practical testing element. 10 Radiographs or digital images (minimum) in Item (c) above equate to one specimen. Therefore, the candidate must achieve 70% or greater for each radiograph or image attempted to pass this part of the practical examination. Failure on the interpretation of any one image shall mean failure in the interpretation part of the practical element.
- 8.6.5.6. The specimens tested shall reflect the material types required (Light or dense metals or a combination of both) and utilise the radiation source types required (X-ray or gamma ray or both).
- 8.6.5.7. Candidates who fail the full RT level 2 practical examination element, at level 2, for reasons other than the interpretation part of the practical examination may be awarded the limited interpretation certification relevant to the sector and materials attempted. They must have successfully passed the General and Specific written examination elements and the written instruction element to qualify for the limited certification.
- 8.6.6. **PCN Practical Testing of Specimens - RT Level 1 initial examination (Castings)**
- 8.6.6.1. Candidates shall apply appropriate RT techniques to those specimens provided for testing by the AQB's examiner. For the RT level 1 practical element, the initial candidate shall complete the following:

- a) Testing two castings using either X-Ray or gamma ray radiation sources or both. The specimens shall be selected by the examiner from light and/or dense metals appropriate to the category of certification sought. Testing shall be in accordance with techniques/NDT instructions provided by the AQB.
- b) Examine and evaluate the suitability for interpretation of the radiographs or images produced during (a) above.
- c) Reporting significant areas for further investigation detected in (b) above in a prescribed manner in accordance with the NDT instructions provided.

8.6.6.2. The total time allowed for this practical part is 6 hours.

8.6.6.3. The minimum pass mark for the practical part is 70% for each specimen tested. The candidate must achieve 70% or greater for each specimen. Failure in any specimen shall result in the failure of the whole of this practical testing element.

8.6.6.4. The specimens tested shall reflect the material types required (Light or dense metals or a combination of both) and utilise the radiation source types required (X-ray or gamma ray or both).

8.6.7. PCN Practical Testing of Specimens (& Image interpretation) - RT Level 2 initial examination (Castings)

8.6.7.1. Candidates shall apply appropriate RT techniques to those specimens provided for testing by the AQB. Candidates shall record, *(and for level 2, interpret)* the resulting information to the degree required, reporting results in the AQB's required format.

8.6.7.2. Where the certification examination covers two or more product sectors, practical examination specimens tested shall include a minimum of one specimen from each product sector for certification. This may require the candidate to demonstrate their practical ability to deploy different RT techniques for certification sought.

8.6.7.3. Failure to detect and report a reportable (mandatory) discontinuity and for Level 2 interpret and classify results in any one specimen tested shall result in failure of the examination specimen and consequently subsequent failure of the PCN certification examination element.

8.6.7.4. For the RT level 2 practical element, the initial candidate shall complete the following:

- a) Testing two castings using either X-Ray or gamma ray radiation sources or both. The specimens shall be selected by the examiner from light and/or dense metals appropriate to the category of certification sought. Testing shall be in accordance with techniques/NDT instructions - one provided by the AQB and one to be generated by the candidate. It is acceptable for the AQB to accept images created using a minimum of one exposure that is representative of each exposure arrangement within the testing technique for each specimen.
- b) Processing the resulting radiographs or images and reporting significant areas for further investigation detected in (a) above in a prescribed manner in accordance with the NDT instructions provided. Time allowed: 2 hours per sample. However, BINDT allows the AQB to extend this time period, if required, based upon the individual component complexity.

- c) Radiographic or Image Interpretation (as applicable). The candidate will be required to read, mark up (film) and report on a **minimum** of 10 radiographs or digital images representative of the categories of certification sought (the candidate will read and report on a **minimum** of 10 radiographs or digital images regardless of the categories attempted) - see table 1 below for further guidance. Time allowed: 3 hours.

- 8.6.7.5. The minimum pass mark for the practical part is 70% for each specimen tested. The candidate must achieve 70% or greater for each specimen. Failure in any specimen shall result in the failure of the whole of this practical testing element. 10 Radiographs or digital images (minimum) in Item (c) above equate to one specimen. Therefore, the candidate must achieve 70% or greater for each radiograph or image attempted to pass this part of the practical examination. Failure on the interpretation of any one image shall mean failure in the interpretation part of the practical element.
- 8.6.7.6. The specimens tested shall reflect the material types required (Light or dense metals or a combination of both) and utilise the radiation source types required (X-ray or gamma ray or both).
- 8.6.7.7. Candidates who fail the full RT level 2 practical examination, at level 2, for reasons other than the interpretation part of the practical examination may be awarded the limited interpretation certification relevant to the sector and materials attempted. They must have successfully passed the General and Specific written examination elements and the written instruction element to qualify for the limited certification.

Table 2: Guidance on number of images required for image interpretation

Category	Minimum number of images		
	Light metal images	Dense metal images	Light & Dense metal images (Combined)
Film interpretation	10	10	10 (5 Light & 5 Dense)
Digital Image Interpretation	10	10	10 (5 Light & 5 Dense)
Film & Digital image (Combined)	10 film images (radiographs) PLUS 10 digital images	10 film images (radiographs) PLUS 10 digital images	10 film images (5 Light & 5 Dense) PLUS 10 digital images (5 Light & 5 Dense)

- 8.6.8. **PCN Practical - RT Level 2 LIMITED - image interpretation only - initial examination (Welds OR Castings)**
- 8.6.8.1. PCN offers direct certification to Image interpretation at level 2 under the permitted RT Limited certification defined in BS EN ISO 9712:2022 table F5.
- 8.6.8.2. Certification options available are as follows:
- RT Film interpretation (RT-FI) – Level 2 Limited
 - Welds (Light or dense metals or both combined)
 - Castings (Light or dense metals or both combined)

- RT Digital image interpretation (RT-DI) – Level 2 Limited
 - Welds (Light or dense metals or both combined)
 - Castings ((Light or dense metals or both combined)
- RT Film and Digital image interpretation (RT-FDI) – Level 2 Limited
 - Welds (Light or dense metals or both combined)
 - Castings ((Light or dense metals or both combined)

8.6.8.3. Candidates for direct access to RT image interpretation shall complete the full theoretical training course for RT and CRT as applicable to the certification sought.

8.6.8.4. The examination elements required to be attempted by candidates for direct access to RT image interpretation shall be as follows:

- a) The General RT theory examination element. A score of 70% or greater is required to pass this element.
- b) The Specific Conventional RT or Computed RT theory examination element, as applicable to the technique certification sought. A score of 70% or greater is required, in each paper attempted, to pass this element.
- c) The image interpretation part of the practical element as applicable to the technique certification sought (as detailed in table 1 previous). A score of 70% or greater is required, for each image interpreted, to pass this element.
- d) Written instruction element as applicable to image interpretation process. A score of 70% or greater is required to pass this element.

8.6.8.5. In order to pass the examination, the candidate must successfully pass each examination element.

8.7. NDT INSTRUCTION WRITING ELEMENT – LEVEL 2 CANDIDATES:

8.7.1. Candidates for Level 2 certification shall be required to draft a detailed written NDT Instruction for one of the specimens tested during the practical examination. The specimen shall be selected by the AQB. Candidates attempting direct certification under the limited scope options detailed in table 1 (Film and/or Digital image interpretation) shall produce a written instruction based upon the relevant image interpretation process.

8.7.2. This shall be an open book examination where candidates are provided with the relevant standard, code, or specification, together with a copy of PCN24/CP25 which provides guidance on the content required to be included within the written instruction, this includes the examination element marking scheme for correct allocation of marks.

8.7.3. For the Written Instruction element, the allowed time shall not be less than 60 minutes and not exceed 120 minutes. The actual time permitted shall be advised by the AQB based upon the complexity of the written instruction required.

8.7.4. Permissible extension to examination times are detailed in PCN24/GEN section 8.2.

8.7.5. Mark required to pass: $\geq 70\%$.

9. GRADING PCN LEVEL 1 AND LEVEL 2 EXAMINATIONS:

- 9.1. The general theory, specific theory, practical testing (*and for Level 2 candidates the written NDT instruction writing*) examination elements shall be graded independently of each other. Candidates shall obtain a minimum grade of $\geq 70\%$ for each individual examination element required to be attempted for the certification sought. Each part (specimen) of the practical examination require a minimum of 70% for a pass, this includes the image interpretation part for RT. Failure to achieve 70% for any practical examination part shall result in failure of the whole practical examination element.
- 9.2. Practical examinations shall be graded according to PCN24/CP22 using the related mandatory marking schemes.
- 9.3. The NDT instruction writing element shall be graded in accordance with PCN24/CP25 and completion of form CP24/CP25/F01 by the examiner.
- 9.4. In the image interpretation part of the practical element, all PCN candidates shall be required to detect and report upon those discontinuities/defects classified as mandatory to detect according to the AQB specimen master document. Those candidates who fail to detect and report upon a discontinuity/defect classified as mandatory shall fail the specimen tested and subsequently fail the PCN practical element certification examination.
- 9.5. In addition to detecting and reporting upon those defects classified as mandatory to detect, PCN Level 2 candidates shall evaluate all discontinuities against an appropriate code, standard, or written instruction, thus enabling the candidate to interpret and classify their findings within a written NDT report.
- 9.6. Examiners should exercise their own judgement, feel, and experience when deducting marks where false calls, and or incorrect defect positioning/sizing have been made by the candidate, marks deducted shall be dependent upon the severity of the false call and/or incorrect defect positioning/sizing.
- 9.7. Where conventional pre-prepared paper-based examinations are used the AQB examiner shall be responsible for grading the examination by comparison with model answers.
- 9.8. E-assessment systems that automatically score a candidates response against stored data and grade the completed written examination according to developed algorithms may also be used where the AQB has been authorised to operate such systems by BINDT.
- 9.9. Each correct response for the general and specific written theory examinations scores 1 mark.
- 9.10. The total number of marks allocated to each examination element being the sum of the marks obtained expressed as a percentage of the marks available.
- 9.11. The marks for individual examination elements and, for the overall PCN examination (all examination elements combined) shall be expressed as a percentage (%) of the total marks available.
- 9.12. Marks required to pass for each individual practical specimen tested: $\geq 70\%$.
- 9.13. Marks required to pass for each examination element: $\geq 70\%$.
- 9.14. **Level 1 Candidates**
 - 9.14.1. Level 1 candidates shall obtain a minimum grade of 70 % for each examination element attempted general, specific, practical testing of specimens.
 - 9.14.2. For the practical examination element, a minimum grade of $\geq 70\%$ shall be obtained for each specimen tested.
 - 9.14.3. Grading of practical examination elements shall be in accordance with: PCN24/CP22.

- 9.14.4. Candidates shall be required to detect all discontinuities/flaws classified as mandatory to detect. Candidates who fail to detect and report a mandatory discontinuity/flaw shall fail the specimen tested and shall subsequently fail the PCN practical certification examination.

9.15. Level 2 Candidates

- 9.15.1. Level 2 candidates shall obtain a minimum grade of ≥ 70 % for each examination element attempted (general, specific, practical testing, and NDT instruction writing).
- 9.15.2. For the practical examination element, a minimum grade of ≥ 70 % shall be obtained for each specimen tested and for the image interpretation part of the practical.
- 9.15.3. When testing specimens candidates are required to implement a test technique that proves capable of detecting all or any areas of concern contained within the AQB's master records.
- 9.15.4. For the image interpretation of the practical element, candidates shall evaluate all discontinuities/flaws detected against an appropriate code, standard, procedure, or written NDT instruction. Candidates who fail to report a mandatory discontinuity/flaw shall fail the specimen tested and shall subsequently fail the PCN certification examination.
- 9.15.5. Grading of practical examination elements shall be in accordance with: PCN24/CP22.
- 9.15.6. The NDT instruction writing element shall be graded separately in accordance with: PCN24/GEN Annex D Table D.2.

10. PCN EXAMINATION REQUIREMENTS FOR LEVEL 3 CERTIFICATION

10.1. General

- 10.1.1. Candidates for Level 3 certification shall successfully complete with a grade of ≥ 70 % the practical examination element for Level 2 certification (unless 10.1.2 applies) in the relevant sector and method excluding the requirement to draft a detailed written NDT instruction.
- 10.1.2. Candidates who hold current valid Level 2 certification acceptable to PCN in the same NDT method and product sector are exempt from the need to pass a Level 2 practical examination. This exemption is only valid for the product sectors covered by the industrial sector concerned and, in any other circumstances, the relevant sector is the sector in which the candidate seeks Level 3 certification.

10.2. Basic Examination Element (Level 3)

- 10.2.1. Written examination to assess the candidate's knowledge of the basic subjects using at least the number of multiple-choice examination questions shown in Table 2 herein. Approved and centrally issued examination papers are retained within the PCN data base which is accessible to AQB's. The AQB may submit new examination papers to BINDT/PCN for approval, prior to use, should the need arise.
- 10.2.2. The basic exam shall be passed first, the result will remain valid provided the first main method examination is passed within five years after passing the basic examination.
- 10.2.3. Candidates already holding a valid Level 3 main method certificate are exempt from the need to retake the basic examination for further level 3 examinations.
- 10.2.4. The total time allowed for this examination element is 3.5 hours.
- 10.2.5. Mark required to pass: ≥ 70 % for each examination Item/Part's A, B, and C (this includes ≥ 70 % average for any methods attempted in part C).

Table 2: minimum required number of basic examination element questions for Level 3

Item/Part	Subject	Number of questions
A	Technical knowledge in materials science and process technology. Time allowed: 2 minutes per question – Total examination Time 60 minutes.	30
B	Knowledge of the certification body's qualification and certification system based on PCN24/GEN. This may be an open-book examination. Time allowed: 3 minutes per question – Total examination Time 30 minutes.	10
C	General knowledge of at least four methods as required for Level 2 and chosen by the candidate from the methods given in BE EN ISO:9712 Table 1. These four methods for each test method shall include at least one volumetric method (UT or RT). Time allowed: 2 minutes per question – Examination Time 120 minutes.	15 for each test method (Total 60)
For item C: The BINDT and PCN may adjust the number of questions per method for methods impacted by evolving technology, increasing methods and techniques being added.		

10.3. Main Method Examination (Level 3)

- 10.3.1. Written examination to assess the candidate's knowledge of the main method subject using a number of multiple-choice questions (*see Table 3*). Approved and centrally issued examination papers are retained within the PCN data base which is accessible to AQB's. The AQB may submit new examination papers to BINDT/PCN for approval, prior to use, should the need arise.

Table 3: Minimum required number of main method examination element questions

Item/Part	Subject	Questions
D	Level 3 knowledge relating to the test method applied. Closed book written examination covering the general theory of the method for certification sought. Time allowed: 2 minutes per question – Examination time 60 minutes.	30
E	Application of the NDT method in the sector concerned, including the applicable codes, standards, specifications, and procedures. This shall be an open-book examination in relation to codes, standards, specifications provided by the AQB's examiner. Time allowed: 3 minutes per question – Examination time 60 minutes.	20
F	Drafting of one or more NDT procedures in the relevant sector. The applicable codes, standards, specifications, and other procedures shall be available to the candidate. For a candidate who has already drafted an NDT procedure in a successfully passed Level 3 examination, BINDT may replace the drafting of a procedure with the critical analysis of an existing NDT procedure covering the relevant method and sector and containing errors and/or omissions. Time allowed: 6 hours maximum per procedure; pass mark: 70%	N/A

10.4. Grading of Level 3 Examinations

- 10.4.1. The grading of the Level 3 Basic, and Level 3 main method examinations shall be done sequentially and independently.
- 10.4.2. To be eligible for Level 3 certification, candidates shall pass both the basic and main method examinations with a score of $\geq 70\%$ for each examination Part/Item.
- 10.4.3. For examination Parts A, B, and C of the Basic examination, and Parts D and E of the main method examination, the following requirements apply. When conventional pre-prepared paper-based examinations are used, an examiner shall be responsible for the grading of examinations by comparing the replies given by the candidate against those answers approved by BINDT/PCN.
- 10.4.4. Each correct response scores 1 mark, the mark attributed to the examination Parts/Items is the sum of the marks obtained which shall then be expressed as a percentage (%) of the marks available.
- 10.4.5. Where conventional pre-prepared paper-based examinations are used, the AQB examiner shall be responsible for grading the examination by comparison with model answers.
- 10.4.6. E-assessment systems that automatically score a candidate's response against stored data and grade the completed written examination according to developed algorithms may also be used where the AQB has been authorised to use E-assessment systems by BINDT.
- 10.4.7. Candidates shall obtain a minimum grade of 70 % in each of the parts D, E, and F.
- 10.4.8. Examiners shall provide a copy of PCN24/CP25 to candidates for use when producing a written procedure. The written procedure will then be graded in accordance with the requirements within PCN24/CP25, and by the completion of form CP24/CP25/F02 by the examiner.
- 10.4.9. Level 3 candidates who do not hold appropriate Level 2 certification shall pass a relevant Level 2 practical examination except that they need not draft a written NDT instruction.
- 10.4.10. Successful PCN Level 3 candidates may also be issued Level 2 certification in the same NDT method and sector without further examination provided the relevant PCN Level 2 practical examination was passed in order to gain Level 3 certification. Resultant Level 2 certification issued as a result will be valid only for those categories in which success in the practical examination was achieved and will expire on the same date as the related Level 3 certification. Candidates seeking the issue of a PCN Level 2 certificate under the procedure defined in this clause shall submit their request and appropriate payment using form PCN24/PSL/70 (Request for L2 issue to L3 holder).

11. SUPPLEMENTARY EXAMINATIONS

- 11.1. A certified Level 1 or Level 2 individual changing industry or product sector and / or adding another sector for the same NDT method shall be required to take sector specific and practical examination elements for the new product sector.
- 11.2. Candidates for Level 2 certification shall be required to draft a written NDT instruction for the new sector.
- 11.3. Already certified Level 3 individuals changing or adding another industry or product sector for the same NDT method, shall be required to attempt sector specific items E and F of the main method examination element only (see Table 3).
- 11.4. It is mandatory for additional practical industrial experience to be demonstrated in accordance with BS EN ISO:9712 requirements listed below at a) and b).

- a) BS EN ISO 9712 at 7.3.3.2 confirms that a certified Level 1, 2 or 3 adding an additional method may be permitted a reduction of required experience of 25 % for that additional method.
- b) BS EN ISO 9712 at 7.3.3.3: Requires a certified Level 1, 2 or 3 individual changing product sectors or adding another product sector or technique for the same NDT method to gain additional experience of at least 25 % of the experience required in Table 3; and this shall never be less than 15 days in duration.

12. RE-EXAMINATION

- 12.1. A candidate who fails one or more elements of an examination (i.e., general, specific, practical, written instruction, procedure writing etc.) may retake the failed examination element no more than twice:
- 12.2. The re-examination shall only take place after a minimum time period of one month from the date of the original failed examination. This minimum period may be reduced if further training acceptable to the certification body has been satisfactorily completed. (See PCN24/GEN).
- 12.3. Any re-examination attempt must take place no later than two years after the initial examination.
- 12.4. A candidate failing the two allowable re-examinations on one or more elements shall complete further training, acceptable to BINDT, and shall then be required to retake all certification examination elements as per the process for initial certification.
- 12.5. It should be noted that for the RT level 2 practical examination element, the practical testing of specimens and the image interpretation form separate parts of the overall practical examination element. Candidates are permitted to re-sit the failed part only, should they pass one or the other initially.

13. RENEWAL AND RECERTIFICATION

- 13.1. BINDT/PCN issues certificates at issue 01 or issue 02. Issue 01 certificates are issued after initial examination or after a 5-year or 10-year recertification by examination. Issue 02 certificates are issued following the recertification of an issue 01 certificate by claimed points in accordance with Annex C of this document and BINDT document PCN24/CP16.
- 13.2. Revalidation of issue 01 certificates is deemed to be a "Renewal". Revalidation of issue 02 PCN certificates is deemed to be "Recertification".
- 13.3. For Level 1 & level 2 applicants the renewal/recertification examination shall consist of the practical element detailed below and additionally, for level 2, the completion of the written instruction element.
- 13.4. **Levels 1 and 2 (5-Year renewal of Issue 01 certificates by claimed points)**
 - 13.4.1. Prior to the completion of the period of validity following certification and recertification, renewal of certification, for a further period, shall be by application to BINDT/PCN using form PCN24/CP16. The applicant is required to provide the following:
 - Completed PCN24/CP16 form.
 - Documentary evidence of a satisfactory near vision acuity examination taken within the preceding 12 months.
 - Documentary evidence of a satisfactory colour vision and/or grey scale perception examination taken within the preceding 60 months.

- Verifiable documentary evidence of continued satisfactory work activity without significant interruption in the method and sector for which certificate renewal is sought. See Annex C for guidance on claiming renewal by points.

13.5. Levels 1 & 2 - renewal of issue 01 or issue 02 certificates by re-examination).

- 13.5.1. The PCN certificate holder shall apply by submission of a completed PCN24/PSL57A form directly to the AQB.
- 13.5.2. For renewal or recertification examinations the candidate shall achieve a pass grade of 70% for each specimen attempted (and for Level 2, the written instruction). Candidates who fail to achieve a pass grade of 70% for each specimen attempted and/or the written instruction (at level 2) are allowed 2 re-tests of the failed element which shall consist of the practical testing element and/or written instruction element of the examination (at level 2) depending upon the individual elements failed.
- 13.5.3. For Renewal examinations (issue 01 certificates) the practical element shall be as follows (minimum):
- For renewal certification in the welds sector, the candidate will test only three specimens from the product sector concerned, and for level 2, read, interpret and report on three radiographs from each metal group in which they hold certification.
 - For renewal certification in the castings sector, the candidate will test two specimens from the product sector concerned, and read, interpret and, for level 2, report on three radiographs from each metal group in which they hold certification.
- 13.5.4. For Recertification examinations (issue 02 certificates) the practical element shall be the same as for initial examination.
- 13.5.5. Any retest of the practical testing element shall require the candidate to re-attempt the full practical element equivalent to that attempted during the failed renewal or recertification examination. The retests shall take place after 7 days and within 6 months of the initial date of the failed renewal or recertification examination.

Note 1: Level 3 certificate holders renewing their level 2 practical certification in support of their level 3 certificate need not complete a written instruction as part of the recertification process.

- 13.5.6. In the event of final failure in a renewal or recertification examination, BINDT will immediately cancel the certificate concerned, issuing a new record of certification that no longer shows the competence concerned, and sending this with an explanatory letter to the certificate holder requesting the return of the superseded record of certification which is a mandatory requirement. The cancellation of the certificate will not affect the eligibility of the candidate to attempt the 2 permitted retests within 6 months.
- 13.5.7. In the event of failure in the 2 allowable retests, the certificate shall not be revalidated and, to regain certification for that level, sector and method, the candidate shall apply for certification as an initial candidate. For level 1 and 2 no examination exemptions shall be awarded by virtue of any other valid/recognised certification held.

13.6. Level 3 (5-Year renewal)

- 13.6.1. The procedure for renewal and recertification of PCN level 3 certificates is detailed in PCN document PCN24/CP16.
- 13.6.2. The PCN certificate holder shall apply by submission of a completed PCN24/PSL57A form directly to the AQB (for renewal by examination) and directly to BINDT (for renewal by points).

- 13.6.3. For all level 3 renewals/recertifications, the individual may decide between the examination or credit system for recertification. If the credit system is chosen and requires submission of employer's documents or access to an employer's premises, the individual shall provide to the certification body a written statement of approval from the employer.
- 13.6.4. In both cases (written examination or credit system), the individual shall either provide appropriate documented evidence, acceptable to the certification body, of his/her continued practical competence in the method or pass a Level 2 practical examination, as specified, except for the drafting of NDT instructions.
- 13.6.5. A candidate who does not meet the requirements of the level 3 recertification by the structured credit system (PCN24/CP16) shall recertify by examination. In the event of failure at the first attempt at recertification by examination, only 1 retest of the recertification examination shall be allowed within 12 months of the date of application for recertification via the PCN24/PSL57A form.
- 13.6.6. For candidates who proceed directly to the recertification exam process. In the event of failure in the 2 allowable retests, the certificate shall not be revalidated and, to regain certification for that level, sector and method, the candidate shall apply for certification as an initial candidate. For level 3 the candidate shall be required to achieve success in the appropriate main method examination.

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ANNEX A.

PRACTICAL TESTING AND SPECIMEN REQUIREMENTS FOR USE IN PCN (RT) TRAINING, AND EXAMINATIONS.

1 ANNEX A SCOPE:

Annex A provides the requirements against which PCN examination specimens will be configured/manufactured, tested, and mastered, as well as providing guidance for the number and type of specimens to be held by BINDT Authorised Qualifying Bodies (AQB) conducting PCN examinations in the RT method.

This document annex has been prepared to ensure that a set of robust baseline standards for PCN practical examination specimens are in place, thus allowing BINDT to demonstrate to PCN candidates consistency within PCN practical testing examinations, this annex should also be read in conjunction with PCN24/CP09.

Where practical specimens do not meet the minimum criteria specified herein, AQBs are requested to contact BINDT's certification manager who will advise accordingly. Specifications herein detail such criteria as specimen design and the inclusion of relevant manufacturing, and or in-service defects which could be expected to be present within an industry, or product sector product which is subsequently required to be tested using the RT method. Specimen production takes into account requirements within:

DD CEN/TS 15053:2005: Non-destructive testing — Recommendations for discontinuities-types in test specimens for examination.

PCN examination specimens shall be tested and mastered by qualified persons prior to first use and, be subject to further periodic review and verification in accordance with the AQBs specimen review procedure.

1.1 Guidelines for discontinuity types within examination specimens can be found in:

- a) DD CEN/TS 15053:2005: Non-destructive testing — Recommendations for discontinuity-types in test specimens for examination.

1.2 Discontinuity:

- 1.2.1 For the purpose of this document, and when making reference to the word "Discontinuity" we are referring to any interruption in the normal physical structure or configuration of the part or product under test such as cracks, laps, seams, inclusions, or porosity etc., We also acknowledge that a discontinuity is not necessarily a defect until it has been identified, defined, evaluated, and classified as being so against a code, industrial standard, written instruction or work procedure.
 - 1.2.2 As such the reader shall be aware of use of the word "discontinuity" and by application of a code, standard or procedure a discontinuity could therefore be classified as a defect.
-

SECTION	TABLE 1A – ANNEX A CONTENT	PAGE NUMBER
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2 ASSOCIATED DOCUMENTS:

- 2.1 **PCN24/GEN:** General requirements for the qualification and PCN certification of NDT personnel.
- 2.2 **DD CEN/TS 15053:2005:** Non-destructive testing — Recommendations for discontinuities-types in test specimens for examination.
- 2.3 **PCN24/CP09:** Requirements for BINDT Authorised Qualifying Bodies.

3 DEFINITIONS.

- 3.1 **Examination specimen:** May be genuine materials or components or manufactured, used to test the ability of a PCN candidate. BS EN ISO 9712 defines the specimen as:
 - a) A sample used in practical examinations, possibly including radiographs and data sets, which is representative of products typically tested in the applicable sector.

Note: A specimen can include more than one area or volume to be tested.
- 3.2 **Test area:** That area of a specimen, either the whole or just a part, which is to be tested by the candidate during the practical examination element.

4. QUANTITY OF EXAMINATION SPECIMENS TO BE HELD BY THE AQB / AEC

- 4.1 BINDT requires that the minimum number of examination specimens to be held by a BINDT AQB, used for PCN certification examination purposes shall be sufficient for the number of candidates attempting practical examinations during any given examination session.
- 4.2 Minimum specimen numbers relevant to single sector or multisector examinations are given within Table 2A which is based upon a maximum number of six candidates being present during any practical examination session. Should the AQB conduct practical examinations for a number of candidates exceeding six, then the minimum number of specimens required shall be raised pro-rata.
- 4.3 The AQB shall retain and maintain a sufficient quantity of practical examination specimens for each NDT method, technique, and product sector for the certification examinations they provide.

- 4.4 The minimum quantity of practical physical examination specimens available shall be such that no candidate, in any given examination session, is presented with any of the same examination specimens used by any other candidates within that same examination session.
- 4.5 The AQB shall ensure that the minimum quantity of examination specimens, retained at the AQB is sufficient to ensure that no candidates are presented with any of the same specimens at the next re-examination or re-certification event.
- 4.6 The AQB shall confirm within their QMS the maximum number of candidates allowed within each individual examination session per NDT method.
- 4.7 ***The AQB shall maintain traceable records to allow BINDT to establish verification and compliance with the clauses at 4.1 through 4.7 during scheduled BINDT audits.***
- 4.8 The minimum physical number of PCN specimens to be held shall be as per Table 2A (Samples for Testing) and Table 3A (Images for Interpretation).
- 4.9 **NOTE 1:** A single specimen may contain a number of test areas, however each test area shall be uniquely identified and here shall be no overlap with other identified specimen test areas.

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PCN EXAMINATION AND PRACTICAL SPECIMEN REQUIREMENTS FOR RADIOGRAPHIC TESTING (RT) AT PCN LEVELS 1, 2, and 3

PCN24/AQB/REQ/RT

Issue 02

Issue date: 01/May/2024

Implementation: 01/Jul/2024

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Table 2A:		Minimum number of examination specimens to be held by the AQB.
Group / category of specimen		Specimen numbers. Minimum requirement.
SINGLE SECTOR for RT-FR, RT-CR, RT-DR, and RT-CT		
Welds	The minimum number of welds from each category shall be: A minimum of five dense metal plate butt welds, five dense metal pipe butt welds, five light metal plate butt welds, five light metal pipe butt welds shall be included. At least 25% of the dense metal welds shall be at least 20mm penetrated thickness and at least 50% of the dense metal welds shall be at least 10mm penetrated thickness The range of welds held shall be appropriate to allow all weld radiography techniques to be demonstrated as deemed necessary during any given examination	Total - 30
Castings	The minimum number of castings from each category shall be: A minimum of twelve dense metal castings and twelve light metal castings. At least 25% of the dense metal castings shall have sections at least 20mm thick, and at least 50% of the dense metal castings shall have sections at least 10mm thick.	Total - 24
MULTI-SECTOR (CASTINGS, WELDS, AND WROUGHT PRODUCTS)		
AQBs offering multi-sector qualifications shall hold all the quantities of samples listed for individual sectors listed above.		Total - 78

Note: AQBs need not offer the full range of single sector examinations but shall state their scope within their written QMS.

NOTE: A large single specimen may contain a number of independently identified test areas with no overlap.

Table 3A: Minimum Number of Films/Images for Radiographic Interpretation to be held by the AQB.		
AQB's offering RT-FR require the following minimum quantities of films.		
AQB's offering RT-DR, RT-CR or RT-CT require the following minimum quantities of digital images.		
Welds	Radiographic Images for interpretation a minimum of 60 total comprising the following as a minimum (The remaining 20 may be any type): • 10 dense metal plate butt welds • 10 dense metal pipe butt welds • 10 light metal plate butt welds • 10 light metal pipe butt welds	Total - 60
Castings	Radiographic Images for interpretation a minimum of: • 30 dense metal castings • 30 light metal castings shall be included.	Total - 60

Note 1: AQB's offering qualifications in RT-DR or RT-CR may use images produced by RT-DR, RT-CR or by digitally scanned film radiographs in accordance with BS EN ISO 14096-1:2020 Class DA (or above) (except as specified in Note 2 below).

Note 2: All images to be interpreted for RT-DR or RT-CR shall have a minimum bit depth of 12 bits and be in either DICOM or TIFF format.

4.10 ADDITIONAL AQB / AEC SPECIMEN REQUIREMENTS:

- 4.11 The AQB shall be responsible for ensuring that the number of specimens held by an AEC, or available on the day of any PCN examination event, is sufficient to ensure that no candidate, in that examination event is presented with any of the same examination specimens used by any other candidates during that same examination event.
- 4.12 The AQB in conjunction with the AEC shall ensure that a sufficient number of specimens are available to verify that no candidates are presented with any of the same specimens at the next re-examination or re-certification event.
- 4.13 Where examination specimens are the property of the AQB and stored at an AEC location, the AQB SHALL have a rotation plan in place, the rotation plan shall be documented within the AQB's Quality Management System QMS and made available to BINDT for review where requested.
- 4.14 Where the specimens are the property of the AEC, the AEC shall relinquish control of the specimens to the AQB who shall assume all responsibilities associated with the specimens.

- 4.15 Where the AEC expects the number of candidates in any given examination event to be in excess of 6, they shall notify the AQB who shall ensure that the minimum number of specimens available is sufficient to cater for the increased number, pro rata.
- 4.16 *The AQB and AEC shall maintain traceable records to allow BINDT to establish verification and compliance with clauses at 4.1 through 4.15 during scheduled BINDT audits.*

5 GENERAL PCN REQUIREMENTS FOR PRACTICAL SPECIMENS:

- 5.1 All specimens for testing shall provide suitable access for pre-NDT, line of sight general visual examination of the specimen test area by candidates prior to commencement of physical NDT.
- 5.2 Appropriate access for all required radiographic testing equipment shall be provided. Where candidates use their own digital detectors during RT-DR practical examinations, suitable facilities shall be provided to enable both connecting and power cables to access the RT facility.
- 5.3 It shall be noted that candidates are not required to hold VT certification and are not being examined on their ability to provide a VT report in accordance with PCN's certification scheme requirements for VT.
- 5.4 Naturally occurring or artificially implanted defects within specimens for a given category of certification shall be such that the ability of the candidate to detect an appropriate range of defects during testing can be established.
- 5.5 Candidates will be required to test specimens using appropriate radiographic technique(s) to ensure the coverage required by the AQB. The candidate shall produce images of an acceptable quality or comment accordingly.
- 5.6 The physical size of specimens tested will be limited only by the AQB's premises and on-site facilities available within the premises. It is acceptable for large specimens to contain multiple designated areas for testing by candidates where individual test areas have been designated with a unique and traceable identifier.
- 5.7 The RT techniques applied shall be capable of revealing any volumetric defects that may exist within a given test specimen as known to the AQB. (Note: Components containing volumetric defects are not mandatory for the image capturing part of the RT practical element).
- 5.8 Unless otherwise confirmed, specimens shall be free from loose products, dirt, grease, corrosion, and inappropriate protective finishes, and that the test surface presented to the candidate is in an appropriate condition for the radiographic technique selected for use to be deployed.
- 5.9 Level 2 Candidates will be required to select an appropriate NDT technique from within the NDT method.
- 5.10 Level 1 candidates will be provided with additional information confirming the NDT technique to be deployed.
- 5.11 Specimens used during PCN training scenarios shall not be used for PCN examination purposes.
- 5.12 The range of practical testing specimens held by an ATO or AQB shall be appropriate to the organisations scope of approval.
- 5.13 Weld interpretation images/radiographs shall include but not be limited to such defects and/or discontinuities as detailed in BS EN ISO 10675-1 or BS EN ISO 10675-2 as appropriate.
- 5.14 Casting interpretation images/radiographs shall include but not be limited to such defects and/or discontinuities as detailed in BS EN 12681-1 or BS EN 12681-2 as appropriate.

5.15 The range of specimen products required to be held will be dependent upon the organisations scope of approval, but may include:

- a) Castings (c)
 - b) wrought products (wp) – (For wall-loss and tangential radiography only)
 - c) Welds (w)
-

6 PCN EXAMINATION SPECIMEN RECORDS:

- 6.1 **AQB PRACTICAL SPECIMEN MASTERING AND RECORD RETENTION:** All examination specimens/images/radiographs requiring the candidate evaluation shall be evaluated independently by two persons holding appropriate certification. Where there is significant disagreement between the two evaluations concerning defect content, location and/or characterisation, the exercise shall be repeated until there is agreement in the result. From these separate evaluations, a master report shall be generated, the master report shall be signed by the AQB's Chief Examiner, and then at each periodic review in line with the AQB specimen master review procedure. See PCN24/CP09 for further details.
- 6.2 Independent test reports used to generate NDT master reports shall be retained as records and made available to BINDT where requested.
- 6.3 All defects and reportable discontinuities present within the examination specimen shall be recorded on the specimen master plot with the caveat that all specimens shall be tested in accordance with the written instructions given to candidates.
- 6.4 Master plots will include as a minimum, the following information:
- a) The name and logo of the AQB.
 - b) Reference to the AQB's NDT verification procedure within the method.
 - c) Details and qualifications of independent persons mastering the PCN examination specimen.
 - d) Details of the unique specimen identifier/number.
 - e) Detailed description of the specimen and the material properties of the specimen to be tested, i.e., Steel, Aluminium, etc.
 - f) Details of test parameters and process steps to be used during the mastering process which may be demonstrated by inclusion of requirements on each specimen master record, or by reference to a written NDT instruction.
 - g) Reference to acceptance/rejection criteria applied.
 - h) Discontinuity type(s) (linear/rounded) etc,
 - i) Defect position in relation to any given datum/reference point.
 - j) Defect dimensions and any accepted tolerances.
 - k) Defect orientation.
 - l) Signature and date of persons mastering the specimen.
 - m) Signature and date of chief examiner accepting the NDT master as a true reflection of specimen condition.

- 6.5 The master plot and evidence of the results supporting the validation test shall be placed on file in secure lockable storage and made available to BINDT for audit purposes when requested.
- 6.6 Records of all examination specimens are to be retained for a period of not less than eleven years after final use and shall not be disposed of without prior consent from BINDT.

7 SPECIFIC PCN REQUIREMENTS FOR CASTING SPECIMENS

7.1 REQUIREMENTS:

- 7.1.1 The range of casting specimens held by the ATO or AQB for testing may include but not be limited to specimens with the following characteristics/physical features from within the required industry sector for certification:
- a) Castings of cylindrical section (large and small diameters) which may also include nozzle or node junctions.
 - b) Castings with flanges.
 - c) Cast components / products exhibiting changes of section.
- 7.1.2 Specimens may contain naturally occurring flaws manifesting through in-service use, manufacturing defects, artificially induced/manufactured flaws.
- 7.1.3 Discontinuities such as those shown in Table 4A are typical.
- 7.1.4 Castings shall be of suitable complexity to test the candidates ability to confirm the existence of discontinuity without adding confusion or ambiguity.
- 7.1.5 Specimens shall provide sufficient access to be examined using conventional RT techniques.
- 7.1.6 When selecting castings to be tested, the time allocated to candidates to complete practical testing and the report writing process should be borne in mind. For those castings which exhibit increased complexity, additional time may be allocated by the AQB for the task to be completed where the AQB believes testing time may exceed 1 hour.
- 7.1.7 Large cast products may be subdivided for use as more than one test specimen; however, all test areas shall be uniquely marked to identify designated areas to be tested.
- 7.1.8 Typical cast specimens may include but not be limited to products manufactured using the following typical production processes, with varying surface roughness, defect content, type, and dimensions:
- a) Sand.
 - b) Die casting (pressure) (die).
 - c) Investment

7.2 CASTING SURFACE ROUGHNESS:

- 7.2.1 Surface roughness will be determined by the manufacturing process used to create the specimen. However, all specimens shall be free from loose products, dirt, grease, loose/flaking paint, corrosion deposits, and have a surface finish suitable for testing using the RT method.

7.3 CASTING DEFECT CONTENT:

7.3.1 By their nature castings may exhibit both planar and volumetric discontinuities resulting from manufacturing process anomalies.

7.4 CASTING DISCONTINUITIES - TYPICAL:

7.4.1 Typical casting discontinuities are detailed BS EN 12681-1 or BS EN 12681-2.

7.5 CASTING DEFECT DIMENSIONS:

7.5.1 Where available, defect threshold values may be referenced from appropriate industrial standards, where no industrial standards are available or no values are given, defect dimensions referenced herein shall be used.

- a) Where industry standards do not define the minimum size of discontinuity, the minimum longitudinal dimension of any reportable defect within a PCN examination casting specimen shall be at, or above the defect reporting threshold stated on the AQB master where specific requirements stated herein are deviated from.
- b) Linear discontinuities shall have a minimum length of 5mm.
- c) The character and extent of defects shall be such that they cannot be visually ascertained.
- d) Specimens may contain smaller discontinuities than those indicated but they should typically not be taken into consideration for examinations purposes, unless otherwise specifically referenced within written instructions provided to the candidate prior to commencement of the test.

7.6 GUIDELINES FOR TYPICAL CASTING DEFECTS FOR INCLUSION WITHIN PCN SPECIMENS:

7.6.1 Where cast specimens are manufactured and defects are artificially seeded within specimens, resultant defects may not conform precisely to quoted defect dimension requirements, however, their size, orientation and classification will be confirmed by the AQBs specimen mastering and validation process.

Table 4A TYPICAL CASTING DISCONTINUITIES			
Material	Manufacturing process	Planar discontinuities	Volumetric discontinuities
Ferrous Metals	- Sand casting - Investment casting	- Cracks - Hot tears - Inserts - Cold shuts - shrinkage	- Porosity - Sink - Collapsed core - Gas cavities - Inclusions - shrinkage
Non Ferrous Metals	- Sand casting - Investment casting - Die casting - pressure		

8 SPECIFIC PCN REQUIREMENTS FOR WELD SPECIMENS

8.1 REQUIREMENTS:

- 8.1.1 The range of weld specimens held by the ATO and/or AQB for testing using the RT method and an approved radiographic technique shall include specimens with the following characteristics.
- 8.1.2 All weld specimens shall provide sufficient access for the detectors used (film, IP plates or digital detectors), this shall include specimens where the cap remains in situ for testing.

8.2 WELD SPECIMEN SURFACE CONDITION:

- 8.2.1 A range of surface conditions which are typically found on a weld/welded product are to be included within the PCN examination, e.g., specimens with coatings, scale, surface roughness, dressed and undressed welds are to be considered.

8.3 SPECIMEN CONFIGURATION - PLATE AND PIPE BUTT WELDS:

- 8.3.1 Plate material shall have a minimum thickness of 3mm and a minimum test area length of 100mm.
- 8.3.2 Weld configuration may be either single or double sided and fully penetrated.
- 8.3.3 Pipe weld specimens shall have a minimum O/D of 9mm.

Table 6A TYPICAL WELD SPECIMEN DISCONTINUITIES			
Material	Manufacturing process	Planar Surface discontinuities	Volumetric discontinuities
Light and Dense metal plates	- MIG - MAG - TIG - MMA - SAW	- Cracks - Lack of fusion - Incomplete penetration	- Porosity - Undercut - Imperfect shape - Porosity - inclusions
Tubes and pipes			

PCN EXAMINATION AND PRACTICAL SPECIMEN REQUIREMENTS FOR RADIOGRAPHIC TESTING (RT) AT PCN LEVELS 1, 2, and 3

PCN24/AQB/REQ/RT

Issue 02

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Table of Document amendments: PCN/AQB/REQ/RT.			
Document status	Issue	Amendment details	Amendment Date:
01		New document to meet PCN24/GEN and BS EN ISO 9712:2022 requirements. Supersedes PCN GEN Appendix E2 and CP9 Annex B Appendix 5 which are now withdrawn.	Issue date 01/01/24 Implementation date 01/07/2024 Issued as issue 01 draft 03 pending official branding
02		Document up-issued due to wrong draft being circulated in error. Amendments as marked/ tracked following a further review	16-17/April/2024 Issue 02 dated 01/May/2024

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