# PCN24/GEN/APP/WI

# Specific PCN requirements for the certification of personnel for weld inspection

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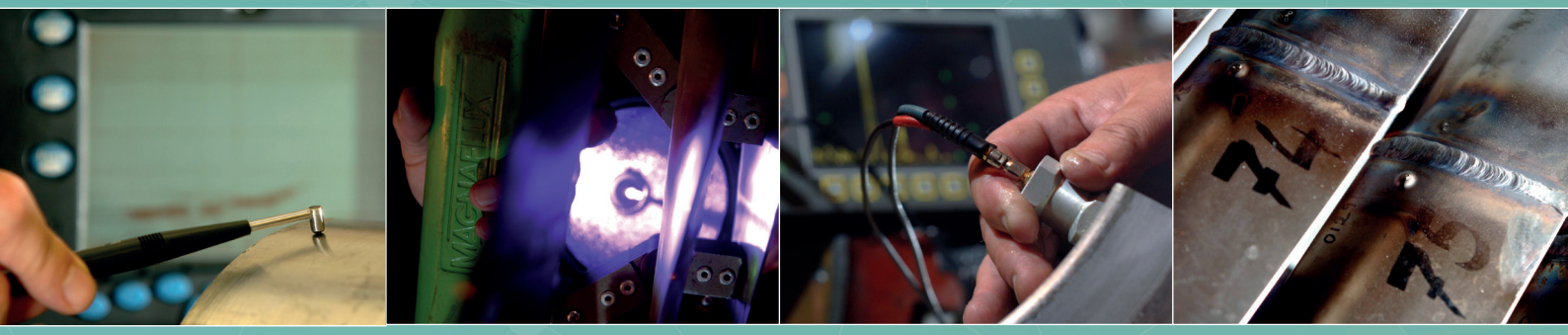
A division of BINDT THE BRITISH INSTITUTE OF NON-DESTRUCTIVE TESTING



Certification issued in accordance with this document meets the requirements of:

- PCN Appendix document: PCN24/WI
- BS EN ISO 17637.

## Contents



*The British Institute of Non-Destructive Testing is an accredited Certification Body offering personnel and quality management systems assessment and certification against criteria set out in international and European standards through the PCN Certification Scheme.*

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# 1. Scope

This document prescribes the specific requirements and procedures by which personnel may be examined and, where successful, issued with PCN certification for the visual testing of fusion-welded joints at the required level for the certification sought.

PCN Weld Inspection (WI) certification issued in accordance with this document (PCN24/GEN/APP/WI) complies with the requirements of BS EN ISO 17637 – Non-destructive testing of welds – Visual testing of fusion-welded joints.

***Note:*** *The examination requirements detailed herein have been produced in accordance with the spirit of BS EN ISO 9712 for training and examinations and BINDT's PCN standardised certification system for certification, known as PCN24.*

*PCN24 details in full PCN's preexamination requirements for training, requirements for practical industrial experience pre- or post-PCN examination, PCN examination requirements, renewal and recertification of existing certification and, in addition, the requirements bestowed upon the employer in regards to authorising the PCN certificate holder to operate on the employer's or the employer's customers product or plant.*

# 2. Certification available

2.1 PCN WI Level 1

2.2 PCN WI Level 2

2.3 PCN WI Level 3.

# 3. Document references

This document includes specific references and incorporates the requirements of the following:

3.1 The requirements for certification.

3.2 The PCN-approved training and examination syllabus for PCN24/WI certification.

3.3 Confirmation that PCN24/WI certification has been developed to provide a certification experience in accordance with the spirit of the training, examination and practical industrial experience requirements (where possible) referenced within BS EN ISO 9712.

3.3.1 However, it should be noted that, although PCN24/WI cannot be seen as being fully compliant with BS EN ISO 9712, the approach to this document's formatting and structure has been adopted to ensure that the PCN welding inspector candidate's training and examination experience meets all those best-practice requirements adopted by BINDT and which are utilised within its trademark PCN Certification Scheme for certification issued in accordance with BS EN ISO 9712.

3.4 Full details on BINDT's Personal Certification Scheme, which encompasses all the requirements for non-destructive testing issued in accordance with BS EN ISO 9712:2022, can be found within PCN24/GEN, which provides a general overview of the PCN Certification Scheme.

3.5 Certification offered herein makes reference to specific references within BS EN ISO 17637 – Non-destructive testing of welds – Visual testing of fusion-welded joints, AND much of Annex B within ISO 14731:2006 – Welding coordination – Tasks and responsibilities.

3.6 It is intended through publication of this document to provide all aspirant PCN24/WI candidates and PCN24/WI certificate holders with information appropriate to their certification requirements. Where additional information or advice is required on any certification matter that has not been referenced within this document, please contact the BINDT Certification Services Department at:

3.6.1 Tel: +44 (0)1604 438300; or

3.6.2 Email: pcn@bindt.org

3.7 Copies of all PCN certification requirements documents are available to download free of charge from:

3.7.1 www.bindt.org

## 4. Employer responsibilities

4.1 IMPORTANT: candidates and employers shall ensure that they are conversant with the responsibilities ascribed to both candidate and employer and that it is the employer's duty to issue PCN-certified employees with the 'authority to operate' before PCN certificate holders carry out WI tasks on behalf of the employer or the employer's customers.

4.2 See PCN24/GEN – Section 5.5.

## 5. Eligibility for examination

5.1 PCN Level 1 candidates will have successfully completed a BINDT-approved course of training for welding inspection covering the approved syllabus requirements for Level 1 certification, the duration of which shall not be less than three days.

5.2 PCN WI Level 2 candidates will have successfully completed a BINDT-approved course of training for welding inspection covering the approved syllabus requirements for Level 2 certification, the duration of which shall not be less than seven days.

5.3 Aspirant PCN Level 2 candidates may wish to engage in a period of self-study prior to attending the approved training organisation (ATO) for scheduled training. Where the candidate elects to self-study prior to attending the ATO, a minimum of two days (14 hours) of self-study time will be required to have been successfully completed prior to commencement of in-person, face-to-face, tutor-led ATO training. Candidates who wish to exercise this option should liaise directly with the ATO of choice for additional information regarding matters and to fully understand the procedures the ATO has in place for the acceptance of self-study candidates prior to the commencement of tutor-led training.

5.4 In all instances where the self-study option has been chosen by the candidate, the ATO shall supply all materials required for distance learning; material may be printed/online/blended, depending on the ATO's scope of approval.

5.5 Candidates will be provided with access to ATO assistance by means of all available proprietary communication channels, such as email/telephone/Zoom/Microsoft Teams calls, where required throughout the period of self-study.

5.6 PCN WI Level 3 candidates will have successfully completed a BINDT-approved course of training for welding inspection covering the approved syllabus requirements for Level 3 certification.

5.7 Those PCN WI Level 3 candidates who currently hold valid PCN Radiographic Interpretation (RI) certification or other welding RI certification issued in accordance with the requirements of BS EN ISO 9712 by a Certification Body listed on the European Federation for Non-Destructive Testing (EFNDT) or International Committee for Non-Destructive Testing (ICNDT) Mutual Recognition Agreement Schedule 2 will be required to successfully complete a BINDT-approved course of training covering the syllabus requirements for Level 3 certification (but which excludes the requirement for RI interpretation training). The duration of this shall not be less than five days.

5.8 Those PCN Level 3 WI candidates who do not hold RI certification shall be required to have successfully completed a BINDT-approved course of training covering the syllabus requirements for Level 3 certification, which shall include training for RI. The duration of this shall not be less than six days.

5.9 Those previously qualified WI candidates who have suffered a significant interruption in their continuity for carrying out welding inspection tasks (see PCN24/GEN) will be required to undertake further refresher training as determined by the ATO/Authorised Qualifying Body (AQB) and/or BINDT. The period of refresher training will ensure that the candidate is aware of any changes to industrial standards/welding inspection codes and/or procedures/PCN syllabus training requirements for the level of certification sought. The period of refresher training recommended by the ATO/AQB will be confirmed to the candidate in writing after bespoke gap analysis by the ATO/AQB has been carried out on the candidate's past employment history for WI. This will ensure that they meet current minimum PCN standards in preparation for attempting all required PCN WI examination elements.

## 6. Vision requirements

6.1 BS EN ISO 9712 and PCN requirements for acuity of vision and colour perception shall be carried out at least every 12 months for acuity of vision and not exceeding five years for colour perception; requirements shall be verified by the employer. The qualifications of those administering the vision tests are fully defined in PCN documents PCN24/GEN and, in addition, PCN document PCN24/PSL44, which includes typical generic forms for use by employers and optometrists to record the results of vision testing outcomes.

# 7. Examination content

7.1 PCN examinations are designed to assess the candidate's level and understanding of their theoretical knowledge and practical competencies associated with the WI process.

7.2 The specific syllabus content herein for PCN WI provides candidates with guidance on the specific knowledge requirements for successful completion of the PCN WI examination.

Where candidates are required to demonstrate their theoretical knowledge of both the general- and specific-based theory for WI, it is typical that candidates will be required to answer multiple-choice type questions. All multiple-choice general and specific theory-based written examination questions shall consist of a main question body of text and a choice of four possible answers, with one answer being correct and the three remaining answers being incorrect or incomplete.

PCN practical WI examination specimens are required to contain a representative sample set of those typical discontinuities/welding imperfections implanted during the welds production process or which might manifest during the welds fatigue/operational lifecycle and which the candidate shall be expected to comment on.

## 7.3 PCN24/WI Level 1 theoretical examination element

7.3.1 30 multiple-choice questions, including questions on basic welding theory, weld inspection processes and procedures and specific knowledge of materials and processes/product technology used within the scope for welding.

7.3.2 Time allowed: 60 minutes (two minutes per multiple-choice question).

7.3.3 Mark required to pass: ≥70%.

## 7.4 PCN24/WI Level 1 practical testing examination element

7.4.1 Candidates will be required to successfully demonstrate their ability during an examination to carry out the following defined tasks, comprising:

7.4.2 Assessment and reporting of a weld fit-up to a specified welding procedure specification (WPS).

7.4.3 Time allowed: 30 minutes.

7.4.4 Mark required to pass: ≥70%.

7.4.5 Assessment and report of a completed fillet weld:

7.4.6 The size and position of all identified defects/discontinuities shall be marked in relation to an identified datum on *pro-forma* report sheets supplied to the candidate by the examination centre.

7.4.7 Time allowed: 1 hour.

7.4.8 Mark required to pass: ≥70%.

7.4.9 Assessment and report of a completed plate weld:

7.4.10 The size and position of all identified defects/discontinuities shall be marked in relation to an identified datum on *pro-forma* report sheet supplied to the candidate by the examination centre.

7.4.11 Time allowed: 1 hour.

7.4.12 Mark required to pass: ≥70%.

7.4.13 ***NOTE:*** *One of the of the practical weld specimens to be tested (fillet or plate) will be manufactured from aluminium.*

## 7.5 PCN24/WI Level 2 theoretical examination element

7.5.1 Those candidates who require direct access to Level 2 PCN24/WI certification must, in addition to the requirements for Level 2 certification, complete the practical testing requirements referenced for Level 1 certification.

7.5.2 Candidates will, in addition, attempt a 30-multiple-choice-question theory paper at the relevant level for the certification sought. The paper will include questions on general welding theory, weld inspection processes and procedures and questions to confirm the candidate's specific knowledge of materials and processes/product technology used within the scope of welding.

7.5.3 Time allowed: 1 hour (two minutes per multiple-choice question).

7.5.4 Mark required to pass: ≥70%.

## 7.6 PCN24/WI Level 2 narrative examination questions

7.6.1 PCN Level 2 WI examinations include the requirement for candidates to demonstrate success within a narrative examination.

7.6.2 The narrative examination element is designed to further assess the candidate's knowledge, understanding and comprehension of key syllabus and core competency requirements, which can be found within this document in Annex A and, in addition, the WI Syllabus document.

7.6.3 The narrative examination element will require candidates to select and provide written responses/answers to four questions. The four questions shall be selected by the candidate from a list of six questions provided to candidates by the examination centre. The questions will cover the requirements for knowledge of specific welding technologies.

7.6.4 Time allowed: 90 minutes.

7.6.5 Mark required to pass: ≥70% for each question answered.

## 7.7 PCN24/WI Level 2 practical examination element

7.7.1 One of the weld specimens shall be constructed in aluminium.

7.7.2 Acceptance/reject criteria for the weld specimens to be tested shall be based upon:

7.7.2.1 *BS EN ISO 5817 – Category 'B' for carbon welds.*

7.7.2.2 *BS EN ISO 10042 – Category 'B' for aluminium welds.*

7.7.3 The examination element has been designed to test the candidate's practical competence and shall comprise the following parts:

7.7.4 Assessment and reporting of a weld fit-up to a specified WPS (see 7.4.2): *where the candidate holds current/valid WI certification at Level 1, this part of the examination would be exempt.*

7.7.5 Time allowed: 30 minutes.

7.7.6 Mark required to pass: ≥70%.

7.7.7 Assessment and reporting on a completed fillet weld (see 7.4.5): *where the candidate holds current/valid WI certification at Level 1, this part of the examination would be exempt.*

7.7.8 Acceptance criteria shall be provided to the candidate by the examination centre.

7.7.9 Time allowed: 1 hour.

7.7.10 Mark required to pass: ≥70%.

7.7.11 Assessment and reporting on a completed plate weld (see 7.4.9): *where the candidate holds current/valid WI certification at Level 1, this part of the examination would be exempt.*

7.7.12 Acceptance criteria shall be provided to the candidate by the examination centre.

7.7.13 Time allowed: 80 minutes.

7.7.14 Mark required to pass: ≥70%.

7.7.15 Assessment and reporting on a completed pipe weld: the size, position and classification of all identified defects/discontinuities shall be marked in relation to an identified datum on *pro-forma* report sheets supplied to the candidate by the examination centre.

7.7.16 Acceptance criteria shall be provided to the candidate by the examination centre to meet the requirements at 7.7.2.1 for the inspection of carbon welds.

7.7.17 Time allowed: 80 minutes.

7.7.18 Mark required to pass: ≥70%.

7.7.19 Candidates shall report on two specimens that have been subjected to destructive testing (see below).

7.7.20 Each specimen tested shall be different in form, *ie* no two examination specimens will be from the same category. *Pro-forma* reporting sheets will be provided to the candidate by the examination centre.

7.7.21 All defects/discontinuities will be marked up, classified and sized; their position will be referenced against an identified datum.

7.7.22 The two practical specimens for testing shall be selected by the examination centre from the following specimen categories; no two specimens for testing shall be from the same category:

7.7.22.1 Weld macroscopic test specimen.

7.7.22.2 Specimen having undergone bend testing.

7.7.22.3 Specimen exhibiting weld fillet fracturing.

7.7.23 Time allowed: 30 minutes.

7.7.24 Mark required to pass: ≥70%.

## 7.8 PCN24/WI Level 3

7.8.1 Candidates not holding valid BINDT-recognised weld inspector certification will be required to successfully complete the weld inspection Level 2 examination prior to attempting the examination for weld inspection Level 3.

## 7.9 PCN24/WI Level 3 theoretical examination

7.9.1 Candidates shall attempt a theory paper containing 30 multiple-choice questions. The paper will include questions on welding theory, quality assurance processes and procedures, knowledge of materials and processes/product technology and, in addition, questions confirming the candidate's basic (Level 1) knowledge of the non-destructive testing methods they may encounter as part of their daily work duties. It is expected that the requirement for NDT knowledge would be limited to having a basic understanding of NDT requirements at Level 1 rather than an in-depth knowledge as a qualified Level 2 BS EN ISO 9712 certificate holder.

7.9.2 Time allowed: 1 hour (two minutes per multiple-choice question).

7.9.3 Mark required to pass: ≥70%.

7.9.4 As in PCN WI Level 2 examinations, PCN Level 3 WI examinations also include the requirement for candidates to demonstrate success within a narrative examination, but at the knowledge level required for Level 3 certification.

7.9.5 The narrative examination is designed to further assess the candidate's knowledge, understanding and comprehension of all key core competency requirements, which can be found in Annex A and in addition within the WI Syllabus document.

7.9.6 The narrative examination shall require candidates to select and provide detailed written responses to four questions.

7.9.7 The four questions shall be selected by the candidate from a list of six possible questions provided to them by the examination centre; the questions will cover welding technology requirements and quality assurance processes.

7.9.8 Time allowed: 1 hour.

7.9.9 Mark required to pass: ≥70% for each question answered.

## 7.10 Practical examination element – Level 3

7.10.1 The practical examination element shall not include the use of plastic examination specimens. The examination will comprise the following parts:

7.10.2 **Hydro test:** candidates will review, comment upon and sign off a hydro-test release pack.

7.10.2.1 The pack will contain all the required NDT reports and procedures associated with the hydro test deployed.

7.10.2.2 Time allowed: 120 minutes.

7.10.2.3 Mark required to pass: ≥70%.

7.10.3 **Testing of weld specimens:** candidates will inspect two defective welded specimens.

7.10.3.1 Individual specimens will exhibit failures/fractures that may be associated with typical welding processes.

7.10.3.2 Each individual examination specimen will contain different defects/discontinuities to the other specimen provided to the candidate by the examination centre for testing.

7.10.3.3 Candidates will document their findings on *pro-forma* reports provided to them by the examination centre. All defects and their associated fracture mechanics will be classified in relation to those defects/discontinuities found.

7.10.3.4 Time allowed: 80 minutes (40 minutes per specimen inspected).

7.10.3.5 Mark required to pass: ≥70% per specimen inspected.

7.10.4 **Knowledge of WI fabrication symbols:** this examination element is designed to confirm the candidate's knowledge and understanding of welding fabrication drawing symbols in accordance with BS EN ISO 2553.

7.10.5 Candidates will review and report upon a minimum of 30 welding fabrication symbols.

7.10.6 Time allowed: 45 minutes.

7.10.7 Mark required to pass: ≥70%.

7.10.8 **Radiographic interpretation:** candidates will review, mark up and comment upon a minimum of six weld radiographs.

7.10.9 A minimum of one light and one dense radiograph shall be present within the pack of six weld radiographs; all other radiographs shall be supplied at the examination centre's discretion from light, dense or a mixture of light and dense radiographs for review.

7.10.10 The examination requires candidates to comment on radiographic film density and sensitivity achieved within the areas of interest.

7.10.11 Welds will typically have been produced using manual metal arc (MMA), metal inert gas (MIG), tungsten inert gas (TIG) or any other standard welding technology; however, this list is not exhaustive.

7.10.12 Candidates who hold PCN (or other accepted BS EN ISO 9712) certification for the radiographic interpretation of welds will be exempt from this examination part.

7.10.13 Time allowed: 90 minutes (1.5 hours).

7.10.14 Mark required to pass: ≥70%.

## 8. Examination grading

8.1 The practical examination element shall involve applying the test to prescribed specimens, recording (and, for Level 2 candidates, interpreting) the resulting information to the degree required and reporting the results in the required format.

8.2 All examinations shall be conducted in examination centres approved and monitored by BINDT, either directly or through an AQB.

8.3 All practical examinations shall have been invigilated by a PCN examiner or by one or more trained and authorised invigilators placed under the examiner's control.

8.4 Each specimen shall be uniquely identified by the AQB.

8.5 Specimens shall be weld sector-specific and shall contain only those discontinuities representative of defects likely to occur during manufacturing or in service life.

8.6 Defects/discontinuities may be naturally occurring and/or artificially implanted.

8.7 Not all specimens to be radiographically interpreted need to contain discontinuities, as candidates are only required to comment upon the image film density, sensitivity and suitability for viewing by suitably qualified Level 2 certificated RI persons.

8.8 Each specimen *(excepting RI film images for comment)* shall contain one or more discontinuities that could typically occur during or after an appropriate welding process has been deployed.

8.9 All practical examinations are designed to test the candidate's ability to record and, at Level 2 and/or 3, to analyse the resultant information to the degree required according to the specific code, standard or specification for use.

8.10 To be successful, candidates are required to achieve a minimum grade of ≥70% in all relevant examination parts and for each individual practical examination specimen tested.

8.11 **Theoretical examination element grading:** all theoretical examinations shall be graded independently/separately.

8.12 To be eligible for certification, the candidate shall obtain a minimum grade of ≥70% for each examination element and for each examination part within the examination element; this shall be in addition to meeting the requirements for practical industrial experience and acuity of vision/colour perception prior to certification.

## 9. Re-examination (retest)

9.1 A candidate who fails in an examination element, theoretical or practical, during an initial examination may be re-examined a maximum of two times in order to achieve the required pass grade of ≥70%, provided the re-examination takes place no sooner than 30 days after the original examination and no later than one year after the original examination date. The exception to the 30-day rule is where further training has been delivered to the candidate by the ATO/AQB to address those areas of weakness identified during the initial examination.

9.2 Those candidates who fail all permitted re-examinations and who still wish to pursue PCN certification shall return to initial candidate status and shall attempt a further examination to include all examination elements as per the requirements for initial certification (see PCN24/GEN).

9.3 A candidate whose examination results have not been accepted for reasons of fraud or unethical behaviour shall wait at least 12 months before re-applying for examination or as per the punitive measures administered by the appropriate reviewing panel. Further guidance may be found within BINDT document PCN24/CP21.

## 10. Eligibility for certification

10.1 Practical industrial experience for PCN WI shall be documented and supplied to the AQB for review using PCN24/PSL30 procedures.

10.2 **PCN Level 1 WI:** candidates shall have successfully completed a PCN examination for weld inspection at Level 1 and furthermore:

10.2.1 Accrued a minimum of one month's practical industrial experience, gained under qualified supervision acceptable to BINDT and covering work at Level 1.

10.3 **PCN Level 2 WI:** candidates shall have successfully completed a PCN examination for welding inspection at Level 2 and furthermore:

10.3.1 Accrued a minimum of 12 months' practical industrial experience under qualified supervision acceptable to BINDT as a weld inspection engineer at Level 2 (certificated or uncertificated) carrying out those work activities listed in Annex A or:

10.3.2 Be able to provide verifiable evidence of having been a welding instructor or welding foreperson/supervisor for a minimum of 12 months or:

10.3.3 Be able to provide verifiable evidence of having been trained through a structured training programme such as a welding technician or welding craftsperson within a recognised formal apprenticeship scheme for a minimum of 24 months and, in addition, have a minimum of 12 months' practical industrial experience gained under qualified supervision acceptable to BINDT as a certificated or uncertificated welding inspector carrying out those work activities listed in Annex A at the level required for PCN Level 2 WI certification.

10.4 **PCN Level 3 WI:** candidates will have successfully completed a PCN examination for weld inspection Level 3 and, in addition:

10.4.1 Have held BINDT-recognised weld inspector Level 2 certification for at least two years, or:

10.4.2 Provide verifiable evidence of having typical job responsibilities of a weld inspection Level 3 for at least five years.

## 11. Validity of certification/renewal and recertification

11.1 BINDT/PCN issues certificates at issue 01 or issue 02. Issue 01 certificates are issued after initial examination or after a five-year or ten-year recertification by examination. Issue 02 certificates are issued following the recertification of an issue 01 certificate by claimed points in accordance with PCN24/GEN Annex C and BINDT document PCN24/CP16.

11.2 Levels 1 and 2 (five-year renewal of issue 01 certificates by claimed points) 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:

11.2.1 A completed PCN24/CP16 form.

11.2.2 Documentary evidence of a satisfactory near-vision acuity examination taken within the preceding 12 months. See PCN24/PSL44.

11.2.3 Documentary evidence of a satisfactory colour perception and/or greyscale perception examination taken within the preceding 60 months. See PCN24/PSL44.

11.2.4 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 and PCN24/GEN for 'significant interruption'.

11.3 For Levels 1 and 2 (renewal of issue 01 or issue 02 certificates by re-examination), the PCN certificate holder shall apply by submission of a completed PCN24/PSL57A WI form directly to the AQB.

11.4 For recertification examinations, the candidate shall achieve a pass grade of 70% for each examination element and examination part attempted. Candidates who fail to achieve a pass grade of 70% for each examination element and part attempted are allowed two retests of the failed examination element.

11.5 **For Level 1 PCN WI:** recertification examination candidates shall attempt the full practical testing examination, to include all constituent practical testing parts applicable for Level 1 certification.

11.6 **For Level 2 PCN WI:** recertification examination candidates shall attempt the 30-question multiple-choice written theory paper covering those syllabus points relevant to the scope of certification and, in addition, candidates shall assess and report on a completed plate weld.

11.7 **For Level 3 PCN WI:** recertification examination candidates shall attempt the 30-question multiple-choice written theory paper covering those syllabus points relevant to the scope of certification and, in addition, candidates shall assess and report on a completed plate weld.

11.7.1 In addition to the above PCN Level 3 WI recertification examination, candidates will be required to interpret and report on a total of four radiographs/radiographic images relevant to the scope of the certification. Images shall include a minimum of one light and one dense weld radiograph from within the specimen pack of four radiographs.

11.7.2 Those candidates who hold current in-date BS EN ISO 9712 certification for the radiographic testing of welds or RI of welds shall be exempt of the need to interpret the four radiographs as part of their recertification examination experience.

11.7.3 PCN WI examination retests shall be dependent upon the failed examination element, which will require candidates to re-attempt the failed element(s) equivalent to that attempted during the recertification examination. The retests shall take place after seven days and within six months of the initial date of the initial failed recertification examination.

11.7.4 In the event of failure in a recertification examination, BINDT will immediately cancel the certificate concerned and issue a new record of certification that no longer shows the competence concerned. BINDT will send confirmation and an explanatory letter to the certificate holder requesting the return of the superseded record of certification. It is a mandatory requirement for candidates to return the cancelled certificate to PCN; however, the cancellation of the certificate will not affect the eligibility of the candidate to attempt the two permitted retests within six months.

11.7.5 In the event of failure in the two allowable retests, the certificate shall not be revalidated. To regain certification, the candidate shall apply for certification as an initial candidate. No further examination exemptions shall be awarded, even by virtue of other valid/recognised certification being held.

11.8 **Level 3 (five-year renewal):** the procedure for renewal and recertification of PCN Level 3 certificates is given in PCN24/CP16.

11.8.1 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).

11.8.2 For all Level 3 renewal/recertifications, the individual may decide between attempting the specific PCN examination element or by application of the structured credit system for recertification. Where the structured credit system is chosen, which may require 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 providing any such access required.

11.8.3 In both cases (written examination or structured credit system), the individual shall either provide appropriate documented evidence, acceptable to the Certification Body, of their continued practical competence in the method for WI or pass the relevant PCN WI Level 2 practical examination specified herein for Level 3 certification.

11.8.4 Those candidates who do not meet the requirements for Level 3 recertification by the structured credit system (see PCN24/CP16) shall recertify by examination.

11.8.5 In the event of failure during the first recertification by examination, only one retest of the failed recertification examination will be allowed. This shall take place within 12 months of the date of the failed recertification examination (see PCN24/PSL57C).

11.8.6 For candidates who proceed directly to the recertification examination process, and in the event of failure in the two allowable retests, the certificate shall not be revalidated; to regain certification, the candidate shall apply for certification as an initial candidate.

# 12. PCN WI transition from other bodies

12.1 Holders of current valid weld inspection certification issued by other Certification Bodies (recognised by BINDT) *(see EFNDT/ICNDT MRA Schedule 2)* who are seeking to gain PCN certification for weld inspection at an equivalent level will be required to be successful in the following PCN examination elements for PCN WI.

12.2 **For Level 2 PCN WI certification:**

12.2.1 Candidates shall attempt a 30-multiple-choice specific question paper at the relevant level for certification sought. The paper will include questions on general welding theory, weld inspection processes and procedures and questions to confirm the candidate's specific knowledge of materials and processes/product technology used within the scope of welding.

12.2.2 Candidates shall assess and report on a completed pipe weld. The size, position and classification of all identified defects/discontinuities shall be marked in relation to an identified datum on *pro-forma* report sheets supplied to the candidate by the AQB examiner. The weld shall be assessed in accordance with BS EN ISO 5187 Category B requirements.

12.3 **For Level 3 PCN WI certification:**

12.3.1 Candidates shall attempt a 30 multiple-choice specific theory question paper at Level 3. The paper will include questions on welding theory, quality assurance processes and procedures and knowledge of materials and processes/product technology. In addition, questions confirming the candidate's basic (Level 1) knowledge of the NDT methods a PCN Level 3 WI may encounter as part of their daily work duties will be included. It is expected that the requirement for NDT knowledge would be limited to having an understanding of those NDT requirements a qualified Level 2 BS EN ISO 9712 certificate holder may be called in to complete.

12.3.2 Assess and report on a completed pipe weld. The size, position and classification of all identified defects/discontinuities shall be marked in relation to an identified datum on *pro-forma* report sheets supplied to the candidate by the AQB examiner. The weld shall be assessed in accordance with BS EN ISO 5187 Category B requirements.

12.4 **Transition to higher-level certification:**

12.5 For holders of current valid weld inspection certification issued by other Certification Bodies (recognised by BINDT) *(see EFNDT/ICNDT MRA Schedule 2)* who are seeking to gain PCN WI certification at a higher level than is currently held, candidates will be required to be successful in the initial PCN examination for the certification sought.

# ANNEX A – CORE COMPETENCIES

## 1 – INTRODUCTION

Welding inspection is a fundamental process used within the manufacturing of fabricated products to ensure the product's consistent performance and reliability. The purpose of this document (Annex A) is to communicate to employers, candidates, PCN ATOs and PCN AQBs the core competencies/skills required by PCN WI personnel to ensure candidates, PCN certificate holders and employers are fully aware of the requirements for WI certification at each certification level:

1.1 PCN24/WI Level 1

1.2 PCN24/WI Level 2

1.3 PCN24/WI Level 3.

Annex A, in conjunction with PCN24/WI and the associated PCN24/WI Syllabus document has been generated by an industry-led PCN WI Working Group made up from a cohort of personnel/experts working in the field of welding inspection, quality assurance and quality control.

## 2 – PCN24/WI COMPETENCIES

2.1 **Level 1 Welding Inspector:**

2.1.1 Level 1 PCN24/WI certification is aimed at all prospective welding inspectors coming into welding inspection for the first time who will be required to carry out WI duties within a defined but limited scope of work and who will be supervised by a certified Level 2 or Level 3 welding inspector whilst carrying out their duties.

2.1.2 Level 1 inspectors shall have a basic understanding of the subjects allocated to WI processes, shall be able to perform all basic WI tasks required and be able to report results in an approved manner as required by the employer or the employer's customers.

2.1.3 Persons certified at Level 1 will have the capability to assess and visually accept or reject welded joints; however, Level 1 weld inspectors often may have had limited exposure before and during welding activities and, as a result, will report their findings to Level 2 or Level 3 certified persons for sentencing.

2.1.4 A significant part of this level concentrates on aspects related to the visual testing of welds in accordance with BS EN ISO 17637 requirements.

2.2 **Level 2 Welding Inspector:**

2.2.1 Level 2 PCN24/WI certification provides a broader scope of duties, core competencies and certification privileges compared to those allocated to the Level 1 welding inspector. These include the ability for certified Level 2 persons to classify and sentence welded joints against a specification, code and/or welding procedure; competencies in excess of those allocated to Level 1 certified individuals.

2.2.2 It is a requirement that all Level 2 welding inspectors shall have intermediate knowledge of all those subjects listed within the PCN24/WI Syllabus and shall be able to perform all of the tasks allocated to the Level 2 welding inspector, such as reporting and interpreting welding inspection results, ultimately to provide sentencing criteria within a written report provided to the customer and Level 3 welding inspector for additional peer review.

2.2.3 The PCN24/WI Syllabus at Level 2 reflects the increased scope of work, placing greater emphasis on the pre-weld inspection of joints and their correct fit-up against the welding code/procedure/specification in use allied to the visual testing of welded joints.

2.3 **Level 3 Welding Inspector:**

2.3.1 Level 3 inspectors shall have further knowledge of their subject, shall be able to coordinate and assume responsibility for the inspection process and report and interpret results, including providing an informed opinion on the results obtained to professional engineers.

2.3.2 The Level 3 Welding Inspector shall be able to perform and, more importantly, manage, supervise and, when required, coach both Level 1 and Level 2 welding inspectors as part of a continuous improvement philosophy.

2.3.3 They will also play a pivotal role in overseeing the correct application of NDT by competent inspection personnel involved in the project.

2.3.4 They will have a proven demonstrable ability to prepare inspection procedures and test plans and review and interpret welding procedures as required, whilst working closely with the welding engineer or welding coordinator.

2.3.5 They may often be required to be involved with the conduct of audits of vendors and/or those organisations providing services or materials to the project and shall ensure that the work performed and the records kept are in accordance with both the contract documentation and with the applicable standards and/or codes of practice deployed.

## 3 – TABLE A1

3.1 Table A1 below sets out and expands upon all those core competences for the three levels of PCN24/WI certification.

3.1.1 **Level 1:** inspectors shall have a basic understanding **(B)** of the subject, shall be able to perform all the basic tasks required and be able to report results in an approved manner.

3.1.2 **Level 2:** inspectors shall have intermediate knowledge **(I)** of the subject, shall be able to perform all of the tasks and be able to report and interpret results of the test undertaken.

3.1.3 **Level 3:** inspectors shall have further **(F)** knowledge of the subject, shall be able to coordinate and assume responsibility for the inspection process and report and interpret results, including providing an informed opinion of the results.

**Table A1. Core competences of the three levels of welding inspection personnel**

| 1 | Basic knowledge | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 1.1 | Preparation of reports | B | I | F |
| 1.2 | Understand and be able to communicate both orally and in writing using the correct technical terms | B | I | F |
| 1.3 | Basic use of weld inspection equipment | B | I | I |
| 1.4 | Basic welding equipment and set-up | B | I | I |
| 1.5 | Knowledge of welding-related standards and specifications | B | I | I |
| 1.6 | **Welding procedure:** | | | |
| | • Essential features of a WPS | B | I | F |
| | • Oversee a welder test under supervision | B | I | F |
| | • Oversee a welder test | | I | F |
| | • Oversee a WPS (WPQR) under supervision and witness mechanical testing | | I | F |
| | • Oversee a WPS (WPQR) and witness mechanical testing | | I | F |
| 1.7 | Design of reporting matrix and formats* | | | F |
| 1.8 | Understand fundamentals of the main welding and cutting processes used and recognise the main inspection points | B | I | F |
| 1.9 | **Weld imperfections:** | | | |
| | • An understanding of common welding imperfections and their key inspection points | B | I | F |
| | • Classification of imperfections and knowledge of their effect on the weld, including a basic understanding of their causes and avoidances | B | I | F |
| 1.10 | **Heat treatment:** | | | |
| | • Understand the difference between material heat treatment and welding heat treatments | B | I | F |
| | • Understand the need for pre-heat as required by the WPS and be able to monitor correctly (under supervision for Level 1) | B | I | F |
| | • Understand the need for post-weld heat treatment and be able to monitor correctly under supervision | B | I | F |
| | • Accept/reject heat treatment reports | | I | F |
| 1.11 | Understand the application and interpretation of weld symbols on drawings | B | I | F |
| 1.12 | Interpret engineering and welding drawings | B | I | F |
| 1.13 | Understand the fundamentals of the common NDT methods | B | B | F |

| | | | | |
|---|---|---|---|---|
| 1.14 | Understand common steel types and their inspection points | B | I | F |
| 1.15 | Understand the fundamentals of weldability concepts | B | I | F |
| 1.16 | **Arc welding safety:** | | | |
| | • Appreciate common risk associated with welding and cutting in an engineering environment | B | I | F |
| **2** | **Inspection and testing** | **Level 1** | **Level 2** | **Level 3** |
| 2.1 | Perform visual testing of welds | B | I | F |
| 2.2 | Review weld inspection reports (accept/reject) | | I | F |
| 2.3 | **Devise weld inspection procedures:** | | | |
| | • Before welding | | I | F |
| | • During welding | | I | F |
| | • Post welding | | I | F |
| 2.4 | Verify NDT is in line with contract requirements | | | F |
| 2.5 | Review NDT inspection reports (accept/reject) | | | I |
| **3** | **Quality assurance** | **Level 1** | **Level 2** | **Level 3** |
| 3.1 | **Understand quality control documentation requirements:** | | | |
| | • Ensure all records are kept for the works/services provided as per the contract/ specification requirements | | | F |
| | • Ensure all documents are signed and approved for insertion into the final documentation and that the personnel carrying out the inspection are fully qualified for the work/service | | | F |
| 3.2 | **Review quality and inspection and test plans:** | | | |
| | • Work out an inspection schedule based on an inspection test plan (ITP) | | | F |
| | • Ensure all personnel are qualified for the task they are to perform | | | F |
| | • Ensure all NDT procedures are signed off by the relevant NDT Level 3 or as specified in the contract requirements | | | F |
| 3.3 | **Welder qualification test records:** | | | |
| | • Ensure that the welder qualification test record is kept up to date at all times | | I | F |
| | • Ensure that sufficiently qualified welders are available to cover all the WPSs on the contract | | | F |
| 3.4 | **Welding procedure specification:** | | | |
| | • Be able to understand the contents of a WPS | B | I | F |
| | • Ensure the WPS is valid and satisfies the range of qualification | B | I | F |
| | • Confirm that all WPSs have been approved and signed by the relevant welding engineer | | | F |
| | • Ensure that the WPS log is kept up to date at all times | | | F |
| | • Ensure that sufficient WPSs for the materials and positions in which they are to be performed are available at all times | | | F |
| 3.5 | **Perform routine assessment and audits:** | | | |
| | • Audit of vendors | | I | F |
| | • Audit of service suppliers | | I | F |
| | • Audit of contract materials | | I | F |
| | • Audit of welding consumable and storage facilities | | I | F |
| | • Audit of material documentation | | I | F |
| | • Audit of consumable documentation | | I | F |
| | • Issue and close out NCRs, where required | | | F |
| 3.6 | Design reporting formats and matrix documentation as required by the contract* | | | F |

| 4 | Contract documentation | Level 1 | Level 2 | Level 3 |
|---|---|---|---|---|
| 4.1 | **Review contract documentation:** | | | |
| | • Confirm all standards are available | | I | F |
| | • Confirm all material is in agreement with the contract specification | | I | F |
| | • Confirm all consumables are in compliance with the WPS | | I | F |
| 4.2 | **Final documentation:** | | | |
| | • Confirm all inspection points have been covered and reports signed off as 'accept' | | | F |
| | • Confirm that no NCRs are still outstanding | | | F |
| | • Confirm all contract documentation, reports, etc, are in line with the contract requirements and sign-off the final package | | | F |

***NOTE:** A Senior Level 3 Inspector should have a good understanding of computerised Office-based programs and can often be called upon to design reporting templates and formats for use in the field by inspection personnel. Word, Excel, PowerPoint, etc, are often utilised for this process.*

## 4 – RECOMMENDED READING LIST

**4.1 Application standard/specification**

4.1.1 The candidate (or employer) will be supplied/issued with an application standard or specification for use during the PCN welding inspector training and examinations programme at Levels 2 and 3. The standard/specification will be expected to be used/referenced within some of the examination elements as appropriate.

4.1.2 A clean, unmarked and up-to-date copy of the specification will be required for use during the PCN WI examination.

4.1.3 The examination specification will be supplied to the candidate by the examination centre's authorised examiner, as the specification will have been developed by the AQB for specific use during the examination.

**4.2 Training course notes**

4.2.1 BINDT requires candidates to have attended an approved course of training at one of BINDT's ATOs, where training establishments are required to provide candidates with an up-to-date set of approved training notes/course material, which are to be considered essential reading.

**4.3 Codes of practice, application standards and specifications**

4.3.1 **NGAS T/SP/P2:** Specification for pipeline construction.

4.3.2 **BS 4515-1:** Specification for welding of steel pipelines on land and offshore – Carbon and carbon manganese steel pipelines.

4.3.3 **BS 4515-2:** Specification for welding of steel pipelines on land and offshore – Part 2: Duplex stainless steel pipelines.

4.3.4 **PD 5500:** Specification for unfired fusion-welded pressure vessels.

4.3.5 **BS EN 1011-1:** Welding – Recommendations for welding metallic materials – General guidance for arc welding.

4.3.6 **BS EN 1011-2:** Welding – Recommendations for welding metallic materials – Arc welding of ferritic steels.

4.3.7 **BS EN 1011-3:** Welding – Recommendations for welding metallic materials – Arc welding of stainless steels *(in conjunction with BS EN ISO 5817: Welding – Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) – Quality levels for imperfections).*

4.3.8 **BS EN 1011-4:** Welding – Recommendations for welding of metallic materials – Arc welding of aluminium and aluminium alloys.

4.3.9 **BS EN 1011-5:** Welding – Recommendations for welding of metallic materials– Welding of clad steel.

4.3.10 **BS EN 1011-6:** Welding – Recommendations for welding of metallic materials – Laser beam welding.

4.3.11 **BS EN 1011-7:** Welding – Recommendations for welding of metallic materials – Electron beam welding.

4.3.12 **BS EN 1011-8:** Welding – Recommendations for welding of metallic materials – Welding of cast irons.

4.3.13 **ASME VIII:** Boiler and Pressure Vessel Code VIII.

4.3.14 **AWS. D1.1** Structural Welding Code – Steel.

## 4.4 Other standards

### *4.4.1 General*

4.4.1.1 **BS 499-1:** Welding terms and symbols – Glossary for welding, brazing and thermal cutting.

4.4.1.2 **BS EN ISO 2553:** Welding and allied processes – Symbolic representation on drawings – Welded joints.

### *4.4.2 Qualification of welders and procedures*

4.4.2.1 **BS EN ISO 9606-1:** Qualification testing of welders – Fusion welding – Steels.

4.4.2.2 **BS EN ISO 9606-2:** Qualification test of welders – Fusion welding – Aluminium and aluminium alloys.

4.4.2.3 **BS EN ISO 9606-3:** Approval testing of welders – Fusion welding – Copper and copper alloys.

4.4.2.4 **BS EN ISO 9606-4:** Approval testing of welders – Fusion welding – Nickel and nickel alloys.

4.4.2.5 **BS EN ISO 9606-5:** Approval testing of welders – Fusion welding – Titanium and titanium alloys, zirconium and zirconium alloys.

4.4.2.6 **BS EN ISO 15614-1:** Specification and qualification of welding procedures for metallic materials – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys.

4.4.2.7 **BS EN ISO 15614-2:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 2: Arc welding of aluminium and its alloys.

4.4.2.8 **BS EN ISO 15614-3:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 3: Fusion welding of non-alloyed and low-alloyed cast irons.

4.4.2.9 **BS EN ISO 15614-4:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 4: Finishing welding of aluminium castings.

4.4.2.10 **BS EN ISO 15614-5:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 5: Arc welding of titanium, zirconium and their alloys.

4.4.2.11 **BS EN ISO 15614-6:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 6: Arc and gas welding of copper and its alloys.

4.4.2.12 **BS EN ISO 15614-7:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 7: Overlay welding.

4.4.2.13 **BS EN ISO 15614-8:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 8: Welding tubes to tube-plate joints.

4.4.2.14 **BS EN ISO 15614-10:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 10: Hyperbaric dry welding.

4.4.2.15 **BS EN ISO 15614-11:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 11: Electron and laser beam welding.

4.4.2.16 **BS EN ISO 15614-12:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 12: Spot, seam and projection welding.

4.4.2.17 **BS EN ISO 15614-13:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 13: Resistance butt and flash welding.

4.4.2.18 **BS EN ISO 15614-14:** Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 14: Laser-arc hybrid welding of steels, nickel and nickel alloys.

4.4.2.19 **ASME IX:** Welding and brazing qualifications.

### *4.4.3 Materials and weldability/welding consumables*

4.4.3.1 **BS EN ISO 2560:** Welding consumables – Covered electrodes for manual metal arc welding of non-alloy and fine grain steels – Classification.

4.4.3.2 **AWS A5.1:** Carbon steel electrodes for shielded metal arc welding.

### *4.4.4 Quality assurance, quality control and inspection*

4.4.4.1 **ISO 14731:2006**: Welding coordination – Tasks and responsibilities.

4.4.4.2 **BS EN ISO 17637:** Non-destructive testing of welds – Visual testing of fusion-welded joints.

4.4.4.3 **ISO 3834-2:2005:** Quality requirements for fusion welding of metallic materials – Part 2: Comprehensive quality requirements.

4.4.4.4 **ISO 3834-3:** Quality requirements for fusion welding of metallic materials – Part 3: Standard quality requirements.

4.4.4.5 **ISO 3834-4:** Quality requirements for fusion welding of metallic materials – Part 4: Elementary quality requirements.

4.4.4.6 **ISO 3834-5:** Quality requirements for fusion welding of metallic materials.

4.4.4.7 **BS EN ISO 9000:** Quality management systems – Fundamentals and vocabulary.

4.4.4.8 **BS EN ISO 9001:** Quality management systems – Requirements.

4.4.4.9 **BS EN ISO 9712:** Non-destructive testing – Qualification and certification of NDT personnel

4.4.4.10 **BS EN 10204:** Metallic Products – Types of inspection documents.

**4.5 Other reading sources**

4.5.1 S E Hughes, A Quick Guide to Welding and Weld Inspection, ASME, 2009. ISBN-13: 9780791859506.

4.5.2 PCN product technology blended learning module for new/initial PCN candidates (see BINDT website for details).

4.5.3 PCN Classroom Training Handbook on the Visual Non-Destructive Testing of Metallic Materials in General Engineering Use. Obtainable from the Certification Services Department, The British Institute of Non-Destructive Testing, Midsummer House, Riverside Way, Bedford Road, Northampton NN1 5NX.

**4.6 The internet**

4.6.1 The internet is always a good source of information.

4.6.2 The Swedish Welding Commission maintains an overview list of all the latest European and international standards for fusion welding. It can be found at: www.svets.se/overview

## 13. Change control record

| PCN24/GEN/APP/WI – Document issue and review status | | |
|---|---|---|
| **Document issue for review** | **Changes/amendments** | **Current document status** |
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