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Further information concerning the content of PCN documents is available from the PCN Scheme Manager at the above address.

CERTIFICATION OF PERSONNEL FOR LIQUID PENETRANT TESTING IN THE PRE & IN-SERVICE INSPECTION SECTOR

ASSOCIATED DOCUMENTS:

Appendix Z1 to PCN/GEN (examination syllabus compendium)

Appendix Z2 to PCN/GEN (specimen examination questions compendium)

CONTENTS

CONTENTS	1
1. SCOPE.....	2
2. EXAMINATION CONTENT.....	2
3. CERTIFICATION AVAILABLE.....	3
4. RENEWAL AND RECERTIFICATION.....	3
5. SUPPLEMENTARY EXAMINATIONS	3
6. GRADING	3
7. REFERENCE LITERATURE	4



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.



1. SCOPE

This document prescribes the specific requirements and procedures by which personnel may be examined and, if successful, certificated for the Liquid Penetrant testing of General Engineering Materials and Components. Requirements contained in this document are supplementary to those contained in the current edition of PCN General Requirements for PCN Qualification and Certification of NDT Personnel.

2. EXAMINATION CONTENT

The examination format is described in PCN General Requirements. This Appendix amplifies the provisions of that document only where necessary.

2.1 Level 1

Except where exemptions apply (refer to PCN General Requirements), all candidates will be required to attempt an examination comprised of the following parts:

2.1.1 General theory of the Liquid Penetrant NDT method.

2.1.2 Sector Specific Theory of the application of the Liquid Penetrant NDT method to general engineering products including basic production processes and associated defects.

2.1.3 Sector Specific Practical examination comprising:

- (i) preparation of testing systems for use (this may involve system sensitivity and control checks).
- (ii) testing three samples (selected by the examiner) in accordance with NDT instructions provided.
- (iii) reporting test results in a prescribed manner in accordance with the NDT instructions provided.

The total time allowed for the practical examination is three hours. The minimum pass mark for the practical part is 70% in each sample tested.

2.2 Level 2

Except where exemptions apply (refer to PCN General Requirements), all candidates will be required to attempt an examination comprised of the following parts:

2.2.1 General Theory of the Liquid Penetrant NDT method.

2.2.2 Sector Specific Theory of the application of the Liquid Penetrant NDT method to the testing of general engineering products, including questions on the basic casting, forging and welding processes and associated defects.

2.2.3 Sector Specific Practical examination comprising:

- (i) preparation of testing systems for use (this may involve system sensitivity and control checks).
- (ii) testing three samples (selected by the examiner from castings, welds and wrought products, according to the certification sought - see Clause 3.2), in accordance with NDT procedures or instructions (two to be provided by the test centre and one to be generated by the candidate – see (iv) below) which will give, where appropriate, sensitivity levels and reporting thresholds.
- (iii) reporting test results in a prescribed manner on proforma report sheets
- (iv) preparation of a detailed NDT instruction (suitable for level 1 personnel to follow) for the testing of one of the above samples to a provided procedure, code, standard or specification, and prove the instruction by application.

The total time allowed for the sector specific practical examination is four hours. The minimum pass mark is 70% in each sample tested,

2.3 Level 3

Except where exemptions apply (refer to PCN General Requirements), all candidates will be required to attempt an examination comprising a Basic examination and a Main Method examination. Information on the content and grading of PCN level 3 examinations is provided in PCN General Requirements for Certification of Personnel engaged in Non-Destructive Testing.

Level 3 candidates who do not hold PCN level 2 certification for Liquid Penetrant Testing will be required to successfully complete the examination described in [Clause 2.2.3 \(excepting clause \(iv\)\)](#).

3. CERTIFICATION AVAILABLE

3.1 **Level 1** Liquid Penetrant Testing (Dye penetrant and/or fluorescent penetrant) of general engineering materials, components and fabrications in the pre and in-service inspection multi-sector.

3.2 **Level 2** Liquid Penetrant Testing (Dye penetrant and/or fluorescent penetrant) of general engineering materials, components and fabrications in the pre and in-service inspection multi-sector.

Alternatively, Level 1 and Level 2 candidates may apply for single sector certification covering for one **(only)** of the following groups:

3.2.1 Castings

3.2.2 Welds

3.2.3 Wrought Products

3.3 Level 3 Liquid Penetrant Testing of general engineering materials, components and fabrications in the pre and in-service inspection multi-sector.

Candidates who achieve an overall score of 80% or more for Level 1, 2 and 3 examinations shall be awarded with the distinction level 'D' (refer to PCN GEN – Grading of Examinations).

4. RENEWAL AND RECERTIFICATION

4.1 The general rules for level 1 and level 2 renewal and recertification are fully described in PCN document CP16, and the rules for level 3 recertification are detailed in PCN document CP17.

4.2 Level 1 and Level 2 certificate holders seeking recertification will be required to undertake the practical examination described above for their level.

5. SUPPLEMENTARY EXAMINATIONS

5.1 Candidates holding certification in one product sector who wish to add another single sector will be required to pass a further practical examination comprising the testing of 3 samples selected by the examiner as representative of the single sector sought.

Candidates should note that this will result in 2 separate certificates being held and will need to be maintained separately.

5.2 Candidates holding certification in one product sector who apply for certification in the multi-sector (all product sectors) will be required to pass a further practical examination comprising the testing of three samples selected by the examiner as representative of the additional sectors sought (see Clause 3.2 above). Level two candidates attempting supplementary examination will not be required to produce a written instruction (Clause 2.2.3 (iv)).

5.3 Candidates who wish to add another category to their existing certification/scope will be required to pass a further practical exam testing samples within the existing sector selected from the new category/scope sought (i.e. dye penetrant or fluorescent penetrant).

6. GRADING

General information on the grading of examinations will be as specified in the current edition of PCN General Requirements, and information on the grading of practical examinations is provided in PCN document CP22.

7. REFERENCE LITERATURE

Essential Reading

- ❑ BS EN ISO 3452-1: Non-destructive testing. Penetrant Testing. General principles.
- ❑ BS EN ISO 23277: Non-destructive testing of welds. Penetrant testing of welds. Acceptance levels
- ❑ BS EN 1330-1: Non-destructive testing –Terminology – Part 1 List of general terms
- ❑ BS EN 1330-2: Non-destructive testing – Terminology – Part 2: Terms common to the non-destructive testing methods
- ❑ BS EN ISO 3059 : Non-destructive testing. Penetrant testing and magnetic particle testing. Viewing conditions.
- ❑ BS EN ISO 3452-2 Non-destructive testing. Penetrant testing. Testing of penetrant materials
- ❑ BS EN ISO 3452-3 Non-destructive testing. Penetrant testing. Reference test blocks
- ❑ BS EN ISO 3452-4 Non-destructive testing. Penetrant testing. Equipment
- ❑ BS EN ISO 12706 Non-destructive testing – Terminology – Terms used in penetrant testing
- ❑ QPL 25135: Qualified Products List.
- ❑ MIL-I-25135: Inspection Materials, Penetrants.
- ❑ ASTM E1417 Standard practice for Liquid Penetrant examination.
- ❑ Product Technology Classroom Training Handbook. Obtainable from Certification Services Division, The British Institute of Non-Destructive Testing, Newton Building, St George's Avenue, Northampton NN2 6JB.
- ❑ Training Course Notes. PCN requires candidates to have attended an approved course of training. Accredited Training Establishments are required to provide trainees with an up-to-date set of training course notes. These are considered essential reading.

REFERENCE LITERATURE

Recommended Reading

- ❑ Air Registration Board, Civil Aircraft Inspection Procedure BL/10-9 (Aluminium Test Blocks).
- ❑ Penetrant Testing: A practical guide. D Lovejoy. Chapman & Hall, 1991.
- ❑ Principles of Penetrants. C. E. Betz, Magnaflux Corp., Chicago 1969.
- ❑ Basic Metallurgy for Non-Destructive Testing. Edited by J L Taylor. The British Institute of Non-Destructive Testing, Newton Building, St George's Avenue, Northampton NN2 6JB.
- ❑ Materials and Processes for NDT Technology, ASNT, 1985.
- ❑ Liquid Penetrant Testing Classroom Training Book, ASNT, 1977.
- ❑ Liquid Penetrant Testing programmed instruction book, ASNT, 1977.
- ❑ Question and Answer Book, Levels 1, 2 and 3, Liquid Penetrant Testing, ASNT, 1980.
- ❑ Level 3 Study Guide, Liquid Penetrant Testing, ASNT, 1980.
- ❑ NDT Handbook, second edition, volume 2 Liquid Penetrant Testing (1982), ASNT.
- ❑ Liquid Penetrant Testing, Student Package, ASNT.
- ❑ Liquid Penetrant Testing, Instructor Package (overheads for training) ASNT.

NOTE. Some of the above are available only in reference libraries. For information on sources of the above recommended reading contact The British Institute of Non-Destructive Testing, Newton Building, St George's Avenue, Northampton NN2 6JB.