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**PCN/GEN Appendix D2 Issue 7**

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

**CERTIFICATION OF PERSONNEL IN EDDY CURRENT TESTING OF WROUGHT PRODUCTS**

**ASSOCIATED DOCUMENTS:**

- Appendix Z1 to PCN/GEN (examination syllabus compendium)
- Appendix Z2 to PCN/GEN (specimen examination questions compendium)

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## 1. SCOPE

This document prescribes the specific requirements and procedures by which personnel may be examined and, if successful, certificated for the eddy current testing of wrought products and in-service wrought non-ferromagnetic tubing. It excludes certification of personnel engaged in the eddy current testing of in-service ferromagnetic tubing. Requirements contained in this document are supplementary to those contained in PCN General Requirements for Certification of Personnel engaged in Non-Destructive Testing.

## 2. EXAMINATION CONTENT

General information on examination content and time allowed for each written part is described in PCN General Requirements for Certification of Personnel engaged in Non-Destructive Testing. 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 Eddy Current NDT method.

2.1.2 Sector Specific Theory of the application of the Eddy Current NDT method to wrought products including basic production processes and associated defects.

2.1.3 Sector Specific Practical examination comprised of:

- (i) preparation and calibration of testing equipment for use (this may involve system sensitivity and control checks).
- (ii) surface testing of two variable geometry wrought products.
- (iii) reporting the results in a prescribed manner on proforma report sheets.

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

2.1.4 There is no PCN certification available at level 1 for the eddy current testing of wrought tubular products.

### 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 Eddy Current NDT method.

2.2.2 Sector Specific Theory of the application of the Eddy Current NDT method to the testing of wrought products, including questions on product technology and associated defects appropriate to the certification sought.

2.2.3 Sector Specific Practical examination comprising:

- (i) preparation and calibration of testing equipment for use (this may involve system sensitivity and control checks).
- (ii) testing 3 samples per category sought (selected by the examiner) in accordance with NDT procedures or instructions which will give, where appropriate, sensitivity levels and reporting thresholds.
- (iii) reporting test results in a prescribed manner on proforma report sheets.
- (iv) preparing 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.

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

The content of the Sector Specific theory and practical examinations outlined in Clauses 2.1 and 2.2 above will depend on the categories for which certification is sought (see Clause 3). Level 2 candidates may attempt either of categories 3.2.1(s) or 3.2.2(t).

### **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 the eddy current testing of wrought products will be required to successfully complete the examination described in Clause 2.2.3 except clause (iv).

## **3. CERTIFICATION AVAILABLE**

3.1 Level 1 Eddy Current Testing of General Wrought Products (Sector coding 5).

3.2 Level 2

3.2.1 Level 2 Eddy Current Testing of General Wrought Products (Sector coding 5) will also be awarded category 'x' for single frequency.

3.2.2 Level 2 Eddy Current Testing of Tubular Wrought Products (sector coding 5, Category Condenser tubes) will also be awarded category 'x' for single frequency.

3.2.3 Level 2 Eddy Current Testing of Tubular Wrought Products (sector coding 5, Category Condenser tubes) can also be awarded category 'y' for multiple frequency.

3.2.4 Level 2 Eddy Current Testing of Tubular Wrought Products (sector coding 5, Category Condenser tubes) can also be awarded category 'x' for single frequency & category 'y' for multiple frequency providing they have completed 3 samples for each category.

3.3 Level 3 Eddy Current Testing of Wrought Products.

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 certificate holders seeking recertification will be required to undertake the practical examination detailed at Clause 2.1.3 above.

4.3 Level 2 certificate holders seeking recertification will be required to undertake the practical examination detailed in Clause 2.2.3 above.

## **5. SUPPLEMENTARY EXAMINATION CONTENT**

Level 2 eddy current testing personnel wishing to extend their certification from level 2 3.2.1 sector coding 5 to level 2 3.2.2 category condenser tubes (or vice versa) will be required to undertake and pass sector specific theory and practical examination for that category.

## **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 12718: Non-destructive testing. Eddy current testing. Vocabulary
- ❑ BS EN ISO 10893-1: Non-destructive testing of steel tubes Automated electromagnetic testing of seamless and welded (except submerged arc-welded) steel tubes for the verification of hydraulic leak tightness
- ❑ BS EN ISO 10893-1: Non-destructive testing of steel tubes Automated electromagnetic testing of seamless and welded (except submerged arc-welded) steel tubes for the verification of hydraulic leak tightness
- ❑ BS EN ISO 10893-2: Non-destructive testing of steel tubes Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections
- ❑ BS EN 1971 -1: Copper and copper alloys. Eddy current test for measuring defects on seamless round copper and copper alloy tubes. Test with an encircling test coil on the outer surface
- ❑ ESI 98-15 – Automatic eddy current testing of steel and titanium tubes.

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.

### Recommended Reading

- ❑ BS M38: Guide to compilation of instructions and reports for the in-service Non-Destructive Testing of Aerospace Products.
- ❑ 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.
- ❑ American Society for Metals - 'Non-destructive Inspection and Quality Control: Metals Handbook' Vol II. Metals Park, Ohio.
- ❑ Materials and Processes for NDT Technology. ASNT.
- ❑ Eddy Current Testing, Classroom Training Handbook (CT-6-5): ASNT.
- ❑ Eddy Current Testing Programmed Instruction Handbook (PI-4-5): ASNT.
- ❑ Non-Destructive Testing Handbook, Volume 4 - Electromagnetic Testing. ASNT.
- ❑ Non-Destructive Testing (Second Edition 1991) by R Halmshaw. Edward Arnold.
- ❑ Non-Destructive Testing Handbook, First edition. Edited by R McMaster.
- ❑ ASNT Self Study Handbook (originally published by General Dynamics).
- ❑ ASNT Classroom Training Handbook (originally published by General Dynamics).
- ❑ ASNT Question and Answer Book.
- ❑ ASNT Level III Study Guide.
- ❑ ASNT Student Package.
- ❑ ASNT Instructor Package (overheads for training).

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.