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PCN/GEN APPENDIX C3.A ISSUE 5 Rev C

CERTIFICATION OF PERSONNEL FOR ELECTROMAGNETIC TESTING OF WELDS USING EDDY CURRENT TECHNIQUES

ASSOCIATED DOCUMENTS:

- Annex Z1 to PCN/GEN (examination syllabus compendium)
- Annex Z2 to PCN/GEN (example examination questions)

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SPECIFIC REQUIREMENTS FOR THE CERTIFICATION OF PERSONNEL IN ELECTROMAGNETIC TESTING OF WELDS USING EDDY CURRENT TECHNIQUES

1. SCOPE

1.1 This document prescribes the specific requirements and procedures by which personnel may be examined and, if successful, certificated for the Electromagnetic Testing of Welds using Eddy Current techniques. Requirements contained in this document are supplementary to those contained in the current edition of PCN General Requirements for the Certification of Personnel engaged in Non-Destructive Testing.

1.2 Candidates are encouraged to bring their own equipment including probes, but test centre equipment may be hired subject to availability. The candidate's attention is drawn to Clauses 2.1.3 (i) and 2.2.3 (i) on calibration; extra time will be allowed in examination part (i) for candidates hiring test centre equipment.

1.3 Additional periods of training, over and above those specified by PCN, may be required for personnel engaged in non-destructive testing on offshore structures.

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 comprising the following:

2.1.1 General Theory of the Eddy Current method.

2.1.2 Sector Specific Theory of the application of the Eddy Current method in the testing of Welds including basic weld production processes and associated defects.

2.1.3 Sector Specific Practical examination comprising:

- (i) calibration/set up of equipment.
- (ii) examination of one block containing machined defects. Testing three variable geometry welds selected from plate, pipe and tee, in accordance with NDT instructions provided. The welds will be uncoated or will have standard non-metallic coating only.
- (iii) reporting the results in a prescribed manner in accordance with the NDT instructions provided.

The total time allowed for the practical examination is 4½ 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 comprising the following:

2.2.1 General Theory of the appropriate Eddy Current method.

2.2.2 Sector Specific Theory of the application of the Eddy Current method in the testing of Welds, including basic welding processes and associated defects.

2.2.3 Sector Specific Practical examination comprising:

- (i) setting up and checking of test equipment, plus oral examination to a prepared checklist.
- (ii) examination of 3 variable geometry welds selected from plate, pipe, "T", "Y" cruciform and gusset plate.

- (iii) reporting the results in a prescribed manner in accordance with the NDT instructions provided. This will include any calculations necessary for inspection sensitivities.
- (iv) preparation of a detailed NDT Instruction, suitable for a level 1 certificated individual to follow, involving the testing of one of the above samples, selected by the examiner, to a provided procedure, standard or specification.

The total time allowed for the practical examination is 6 hours. The minimum pass mark for the practical part is 70% in each sample tested.

NOTE: *Typical defects which candidates will be expected to locate and characterise will include a selection from but may not be limited to:*

- (i) *surface breaking defects;*
- (ii) *flat and curved surface discontinuities;*
- (iii) *parent material and weld defects originating from the welding process;*
- (iv) *in-service defects, including corrosion, stress corrosion cracking and fatigue cracking.*

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 certification for the eddy current testing of welds will be required to successfully complete the examination described in Clause 2.2.3 (excepting sub-clause (iv)) using at least two electromagnetic testing techniques. This examination part may require demonstration of the ability to provide direction to a remote probe handler.

3. CERTIFICATION AVAILABLE

3.1 Level 1

3.1.1 Single frequency Eddy Current Testing of Welds.

3.2 Level 2

3.2.1 Single frequency Eddy Current Testing of Welds.

3.3 Level 3 Eddy Current Testing of Welds.

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 renewal and 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. GRADING

General information on the grading of examinations will be as specified in the current edition of PCN General Requirements for Certification of Personnel engaged in Non-Destructive Testing, and information on the grading of practical examinations is provided in PCN document CP22.

REFERENCE LITERATURE

Essential Reading

- BS EN 1330-1: Non-Destructive Testing - Terminology - General terms.

- ❑ BS EN 1330-2 : Non-Destructive Testing - Terminology - Common terms for NDT methods.
- ❑ BS EN 1330-5: Non-Destructive Testing - Terminology - Terms used in eddy current testing.
- ❑ BS EN 1711 : Non-Destructive examination of welds - Eddy current examination by phase discrimination (when issued).
- ❑ PCN Classroom Training Handbook - Product Technology. Obtainable from the Certification Services Division, The British Institute of Non-Destructive Testing, Midsummer House, Riverside Way, Bedford Road, NN1 5NX.
- ❑ 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

- ❑ Basic Metallurgy for Non-Destructive Testing, Edited by J L Taylor: Midsummer House, Riverside Way, Bedford Road, NN1 5NX.
- ❑ Metals handbook (volume 17, ninth edition) : Non-destructive evaluation and quality control (published by the American Society of Metals, available through ASNT).
- ❑ Materials and Processes for NDT Technology. ASNT.
- ❑ Eddy Current Testing, Classroom Training Handbook (CT-6-5): ASNT.
- ❑ Eddy Current Testing, Programmed Instruction Handbook (P1-4-5): ASNT.
- ❑ Non-Destructive Testing Handbook, Volume 4 - Eddy Current 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 in reference libraries. For information on sources of recommended reading contact The British Institute of Non-Destructive Testing, Midsummer House, Riverside Way, Bedford Road, NN1 5NX.