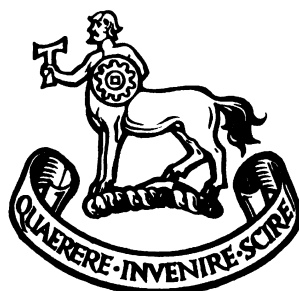


# The British Institute of Non-Destructive Testing

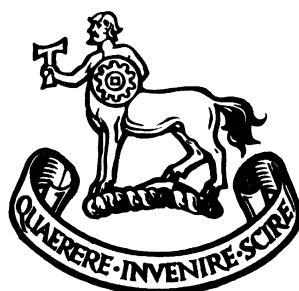


## Accreditation of NDT Training Organisations

### Contents

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# The British Institute of Non-Destructive Testing



## Part I Accreditation and Validation

### Contents

1. Introduction
2. Accreditation and Validation
3. Procedure
4. Validity
5. Extensions
6. Renewal

# 1. Introduction

**1.1** In the interests of improving and maintaining the general standard of Non-Destructive Testing (NDT) training in the United Kingdom, and where requested elsewhere, the British Institute of Non-Destructive Testing has produced guidelines which define the minimum requirements for the structured training of NDT practitioners (See part II), together with a scheme outlined herein under which such training may be assessed and accredited. It is the intention that the gaining of Accreditation by a commercial trainer offering courses to external clients should be seen as a testimony to the quality of its overall system.

All information and documentation accrued by the BINDT Compliance Manager, the Accreditation Panel and any auditor whilst conducting Accreditation or validation business shall be treated as commercial in confidence and not disclosed to any other parties.

**1.2** A system diagram which outlines the accreditation process is shown on page 6.

**1.3** This document is intended to be used by organisations wishing to provide Industry with an assured quality of training in NDT.

**1.4** It has been developed out of a perceived need for a method by which accreditation can be given to those offering excellence in training.

**1.5** It is recommended that NDT Personnel Certification Schemes should make use of accredited training when stipulating their requirements for examination eligibility.

## 2. Accreditation and Validation

**2.1** At the request of the Training Organisation, the Institute will, upon receipt of a correctly completed application and the published current fee (available upon request from the institute), appoint a suitably qualified auditor(s) to visit the Training Organisation for audit purposes.

**2.2** Assessment will comprise three phases:

- 2.2.1 A review of the application and supporting material supplied.
- 2.2.2 Evaluation of the quality management system, quality procedures and facilities of the establishment to be accredited. (An audit checklist is included in this document as Part IV).
- 2.2.3 Assessment of modules for training course validation.

**2.3** The authority to grant accreditation and validation rests entirely with the BINDT MQ&E Committee's Accreditation Panel. The Panel shall not be obliged to give reasons for withholding accreditation or validation though, wherever practicable, the maximum assistance will be given to Training Organisations before re-assessment.

**2.4** If the Panel considers that the Training Organisation and associated course modules comply with the minimum requirements, accreditation by the Institute will follow.

**2.5** An Accredited Training Organisation (ATO) will be entitled to display the British Institute of Non-Destructive Testing Accreditation Logo (as shown on the title page of this document).

### **3. Procedure**

**3.1** The Training Organisation seeking accreditation will apply on the relevant form, examples of which are included in Part III, which is to be submitted together with specified supporting documentation. Copies of application forms may be obtained separately from the Institute.

**3.2** Subject to satisfactory review of the documentation supplied, an audit visit will be arranged.

**3.3** After the visit, the audit team, comprising suitably trained and/or qualified personnel, will make a report and recommendation to the Accreditation Panel, who may then authorise accreditation.

**3.4** In the event of accreditation being withheld because of failure to comply with all or part of the minimum requirements, the Training Organisation will be requested to submit to re-audit within 3 calendar months of the original audit in order to demonstrate conformance in areas previously found unsatisfactory. Failure to do so will result in the need to re-apply as an initial applicant.

**3.5** Accredited Training Organisations will be subject to periodic surveillance and reassessment to ensure they continue to comply with the minimum requirements of the Accreditation Document.

**3.6** Surveillance visits will normally be carried out on an annual basis by the Auditors appointed by the BINDT Compliance Manager who will examine the general operation of the system and examine in detail specific aspects of the training operation.

**3.7** Reassessment carried out every three years will include a comprehensive audit of the complete quality arrangements and training facilities.

**3.8** Training Course modules may be submitted for validation by providing a completed form ACC/2 for each course, together with a complete set of course notes (with supporting literature if necessary) and the relevant fee. The purpose of course validation is to ensure that the specified objectives of the course are met and that the course satisfies the requirements of the certification scheme with which it is aligned (if any).

**3.9** Training Courses need not necessarily be aligned with a certification scheme but in all cases the purpose and objectives of the course must be clearly stated.

**3.10** Courses are in general validated for Training Organisations that have gained Accreditation under the Institute's Accreditation Scheme. Such courses are usually conducted on a commercial basis and are readily available to the public. Where courses are run as in-house training on a non-commercial basis or as client specific, the Accreditation Panel may be willing to validate the course modules as separate entities, without the need for full Accreditation.

## 4. Validity

**4.1** Accreditation given under the scheme shall have validity of three years subject to the maintenance of proper standards.

**4.2** A system to deal with complaints from students and/or employers of students will be operated by the Institute and accreditation may be withdrawn at any time in the approved period if, upon investigation, non-conformances are judged by the Accreditation Panel to warrant it.

**4.3** A system to record any complaints received shall also be operated by the Training Organisation and complaint records must be available for examination during the renewal audit/surveillance visit.

**4.4** Should major changes occur in Accredited Training Organisation policy, personnel, documentation, facilities or operating procedure, which may affect the validity of accreditation, the British Institute of Non-Destructive Testing must be informed immediately. Failure to do so may result in a refusal to renew accreditation.

**4.5** Due to business fluctuations there may be periods during which training courses are not run, particularly at smaller Training Organisations. If no courses are held during a 12 month period then the BINDT Compliance Manager must be advised of the situation. Every effort will be made to ensure that accredited status is maintained, but checks may be necessary prior to the next course being conducted to ensure that the training facility has in fact become fully operational.

## 5. Extensions

**5.1** Validation of additional course modules, subsequent to the initial visit, may or may not require a further audit. A copy of the curriculum and course notes, a list of equipment, specimens, instructor qualifications and a correctly completed application for extension (See Part III), together with the current published fee, should be forwarded to the BINDT Compliance Manager.

**5.2** Where the Organisation undertakes validated training at locations remote from its base, the Organisation shall notify the BINDT Compliance Manager of these locations. The Training Organisation Coordinator shall be responsible for ensuring that the requirements of part II are met in their entirety at all remote locations. If 12 or more advertised training events are carried out at a remote training location in any twelve month period the training coordinator shall notify the BINDT compliance manager and the remote training centre will routinely be expected to apply to be an ATO under the criteria laid down in this document.

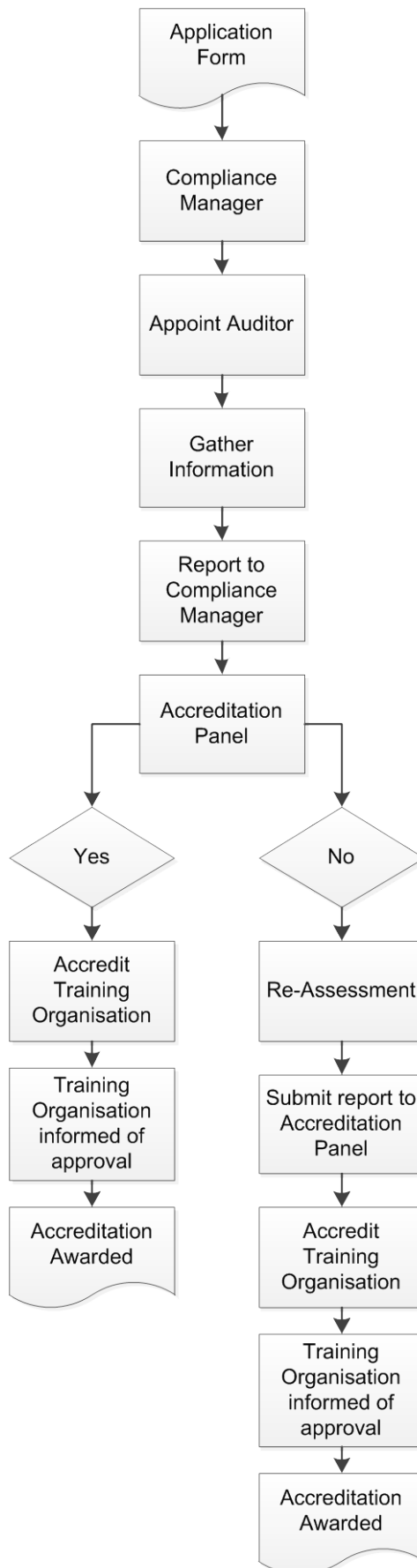
*Note; The above clause may be wavered under certain circumstances such as, a remote training organisation under the control of an established accredited training organisation and using approved training notes, equipment, QMS and procedures. This authorization will be under the control of the accreditation panel.*

## 6. Renewal

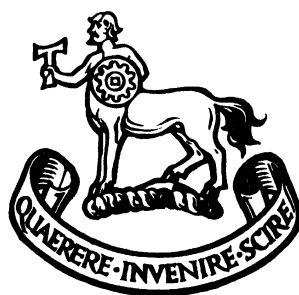
Accreditation may be renewed, subject to a satisfactory surveillance visit, on an annual basis following the receipt of a correctly completed application for renewal (See part III), together with the current published fee.

# Accreditation of Training

## Figure 1. System Diagram



# The British Institute of Non-Destructive Testing



## Part II Minimum Requirements for the Structured Training of Non-Destructive Testing Practitioners

### Contents

<p><b>1. Foreword</b></p>	<p><b>6. Training Staff</b></p> <p>6.1 Certification</p> <p>6.2 Qualifications</p> <p>6.3 Experience</p> <p>6.4 Updating</p>
<p><b>2. Scope</b></p>	
<p><b>3. Quality Management System</b></p>	<p><b>7. Records</b></p> <p>7.1 Students Records</p> <p>7.2 Staff</p> <p>7.3 NDT Equipment</p> <p>7.4 Specimens</p> <p>7.5 COSHH</p>
<p><b>4. Management</b></p> <p>4.1 Responsibility</p> <p>4.2 Resource Management</p> <p>4.3 Service Realisation</p> <p>4.4 Measurement, Analysis and Improvement.</p> <p>4.5 Student Induction</p> <p>4.6 Student Assessment</p> <p>4.7 Counselling</p> <p>4.8 Curriculum</p> <p>4.9 Course Notes</p>	
<p><b>5. Facilities</b></p> <p>5.1 The Training Environment</p> <p>5.2 Resources</p> <p>5.3 Equipment</p> <p>5.4 Specimens</p> <p>5.5 Library</p>	<p><b>Appendix 1 – Equipment requirements</b></p> <p><b>Appendix 2 – Specimen requirements</b></p>

# Minimum Requirements for the Structured Training of Non-Destructive Testing Practitioners

## 1. Foreword

This document is based upon CEN Technical Report 25108:2006, which is implemented within the British Institute of Non-Destructive Testing Accreditation Scheme for Training Organisations wishing to provide industry with an assured quality of tuition in the main NDT methods.

## 2. Scope

This generic Operations Manual establishes the minimum requirements for the structured training of NDT practitioners to ensure eligibility in PCN NDT personnel certification examinations.

## 3. Quality Management System

The Training Organisation shall adopt and implement a suitable quality management system. This shall be based upon ISO 9001:2008, as the training syllabus and methodology is externally imposed. The management system shall be controlled and periodically reviewed according to the stipulations in the quality manual.

All staff within the applicant Training Organisation shall be made aware of their specific responsibilities and method of working. These shall be published in a quality manual which includes an organisational chart.

Responsibilities and methods of working shall be defined by job title, and staff shall be allocated job titles in their terms of reference, which in turn refer them to the Quality Manual.

Procedures defined within the quality manual shall encompass all staff functions within the Training Organisation and shall include arrangements for control of documentation and calibration of test equipment, together with laboratory instructions to control specified processes.

Training Organisation staff shall be conversant with relevant procedures defined in the manual and shall sign a record indicate that they have read and understood the document.

## 4. Management

### 4.1 Responsibility

Senior Management shall be involved with, and show commitment to, the successful operation of the Quality Management system.

The Training Organisation shall have a co-ordinator who is responsible for the overall management of the Training Operations, and for setting up and maintaining a Documented Quality Management System satisfying the criteria contained within ISO 9001:2008 and this document.

### 4.2 Resource Management

Training Organisation management shall:

- 4.2.1 Determine the necessary competence for personnel performing work affecting the quality of NDT training;
- 4.2.2 Provide training or take other actions to satisfy these needs;
- 4.2.3 Evaluate the competence of the Trainer (Particularly where the competence of the individual has been achieved by additional appropriate education, training, skills and/or experience);
- 4.2.4 Ensure the adequacy of equipment and facilities needed by the business to carry out NDT Training;
- 4.2.5 Ensure that the work environment meets Statutory, Regulatory, BINDT and Customer requirements.

### 4.3 Service Realisation

Training Organisation management shall plan service realisation from the point where the customer asks for training through to delivery of training. In so doing, management shall identify key processes and how these processes interact with one another.

#### 4.4 Measurement, Analysis and Improvement

Training Organisation management shall:

- 4.4.1 Monitor and measure customer satisfaction.
- 4.4.2 Commission internal audits at not less than 12 month intervals.
- 4.4.3 Check processes associated with the delivery of training, ensuring that it is delivered in an effective manner which meets the customer's requirements.
- 4.4.4 Ensure that Non-Conformances are controlled and dealt with appropriately.

The above points will provide data. This data shall be analysed in order to identify improvements to management systems and processes.

Finally, Training Organisations management shall implement and monitor improvements.

This should form the basis of the annual management review meeting.

#### 4.5 Student Induction

A system of student induction shall be in place such that, upon acceptance of an application for enrolment, the Training Organisation will issue to the enrolled student, or his sponsor, clear and unambiguous instructions in accordance with the following:

- 4.5.1 Course fees and method of payment which shall show all that is included in the fees. There shall be no *hidden extras* and a schedule of course fees shall be made freely available upon request.
- 4.5.2 Dates and times of attendance for the course, which shall include clear instructions concerning the location of the Training Organisation.
- 4.5.3 Transport, accommodation and catering arrangements, where applicable.
- 4.5.4 The relevant safety requirements pertaining to the Training Organisation as a whole or the particular course for which the student is enrolled.

*NOTE. Where necessary students attending courses involving practical radiography are to be registered as classified radiation workers prior to the commencement of training and are to wear radiation monitoring devices at all times during the course.*

- 4.5.5 Personal Protective Equipment (PPE) required for students attending the training course, and whether this is provided by the Training Organisation, or whether the student must provide his own PPE.
- 4.5.6 NDT equipment provided by the Training Organisation for use by students during the training course, and whether the student may optionally provide/use their own NDT equipment.
- 4.5.7 Textbooks essential to the training course, and whether these are provided by the Training Organisation or the student.
- 4.5.8 The name and telephone number of a contact at the Training Organisation from whom additional information may be obtained if required.

#### 4.6 Student Assessment

In all cases a system of student assessment shall monitor the progress and learning of individual students on a daily basis.

Where the training course is intended to provide the employer of NDT personnel with essential information required for qualification and certification under, for example, SNT-TC-1A, students shall undertake written and practical final examinations, and shall be issued with a uniquely numbered certificate (traceable to the student records required in paragraph 7.1) of successful completion of NDT training. See Annex A (page 13).

For training courses intended to qualify NDT personnel for examination eligibility in a third party certification system in compliance with, for example, EN 473, training course final examinations may be replaced by a programme of controlled, documented continual assessment. Satisfactory completion of the course may be demonstrated either by comprehensive records of daily progress assessments or success in an end of course examination.

Whenever end of course examinations are employed, they shall not be set, invigilated or marked by the instructor responsible for the course in which the student is enrolled, and steps shall be taken to prevent collaboration or collusion during examinations. A documented system shall be in place to ensure that specimens used during end of course examinations have not been accessible (or have been used as practical assessment specimens) to the student during the course.

#### **4.7 Counseling**

A system of counseling shall be provided for the benefit of students who fail to reach the required minimum standard during daily progress assessments or in the end of course assessment.

#### **4.8 Curriculum**

The Training Organisation shall publish and make freely available upon request the curriculum upon which each course is based. If the course concerned is aligned with a recognised certification examination, e.g. PCN, the curriculum shall reflect the published syllabus pertaining to that examination.

The curriculum shall be reviewed annually (as a minimum) and revised, if necessary, in the light of scientific, industrial and technological developments in the NDT method concerned, or where a change occurs in the syllabus of the certification examination with which the course is aligned.

#### **4.9 Course Notes**

The Training Organisation shall maintain a master set of course notes, reviewed annually and revised if necessary in the light of changes to the curriculum and bearing a revision date, to ensure a consistency between courses in the event of staff changes.

The Training Organisation shall provide each enrolled student with a comprehensive set of appropriate course notes, these being hard copies of the master, the cost of which shall be included in the course fees.

*NOTE: Externally published and controlled classroom training handbooks may supplement but not be a substitute for the Training Organisation's own course notes.*

### **5. Facilities**

The facilities within the Training Organisation shall meet the minimum requirements defined in this section.

#### **5.1 The Training Environment**

The premises used for training shall comply with the latest issue of all relevant legislation, e.g. in the UK the Health and Safety at Work Act, COSHH Regulations and where applicable, Ionising Radiation Regulations.

Appropriate safety notices shall be displayed in a location accessible to all students. Relevant safety data sheets shall be on hand at the point of use of potentially hazardous equipment or processes.

#### **5.2 Resources**

Classrooms and practical facilities shall be well lit and ventilated and there shall be adequate provision of teaching aids such as blackboards/whiteboards or flip charts, overhead and/or slide projectors, computer generated presentations and video equipment appropriate to the course.

#### **5.3 Equipment**

Sufficient NDT equipment, such as instruments, accessories and calibration blocks, shall be available to cover the full range of NDT techniques within each of the NDT methods being taught (except where the range of NDT techniques is limited by industry or product sector applications), and to occupy all of the students on the course concerned (Appendix 1 refers).

Adequate Personal Protective Equipment such as protective eye glasses, gloves, coveralls, etc., should also be available to students.

#### **5.4 Specimens**

Training specimens shall be available in sufficient quantity and complexity to cover the full range of applications encompassed by the course curriculum (Appendix 2 refers). Specimens should also be available containing real defects representative of those found in industry. Separate specimens shall be used for training and examinations and there shall be provision for secure storage of examination specimens.

## **5.5 Library**

The Training Organisation shall maintain an up to date library of NDT Standards relevant to the method being taught. Students shall be made aware of the existence of these Standards and educated in their use.

Relevant certification scheme documents shall be made available for the use of students.

## **6. Training Staff**

The Training Organisation's management structure shall include a Course Coordinator (however named) with overall responsibility for the technical operation of the training facilities and for ensuring that the British Institute of Non-Destructive Testing requirements are met.

The training facility shall have sufficient instructors to ensure that as a minimum, one tutor is present throughout each per course in line with the specific approved documentation requirements.

### **6.1 Certification**

A key member of staff who has involvement in the day to day running of the training organisation shall have overall responsibility for each training discipline and is required to hold equal or higher level certification than that to which the course is aligned.

### **6.2 Qualifications**

Training Organisations shall employ a minimum of one staff member formally trained in instructional techniques. This employee should then disseminate this training to all training staff.

### **6.3 Experience**

Training Instructors shall have knowledge of materials science and product technology, and have documented experience of current industrial applications of the NDT methods that they are authorised to teach.

### **6.4 Updating**

Training Organisations staff shall be kept up to date with current industrial procedures and practices, and the Organisation shall document how this is achieved.

## **7. Records (general)**

There shall be a system for maintaining and reviewing the current state of all records held within the Training Organisation. Such records are to be kept in a secure location and treated with confidentiality.

### **7.1 Student records**

Records shall be raised and maintained for each enrolled student for a period of not less than six years and shall include, as a minimum;

- 7.1.1 Date(s) of enrolment and completion of training;
- 7.1.2 Course on which enrolled;
- 7.1.3 Instructors and auditors involved;
- 7.1.4 Records of daily progress assessments; this should include a log of specimens tested during the course with the instructor's comments.
- 7.1.5 Final examination result(s) attained (where appropriate), including a copy of the completed examination paper(s);
- 7.1.6 Details of specimens (including identification numbers) and equipment used by the student in any final examination;
- 7.1.7 A certificate of successful training course completion, including a data sheet necessary for employers implementing a second party qualification system such as SNT-TC-1A (details of the content of certificates and data sheets is provided at Annex A, page 13 to this manual).

## **7.2 Staff**

Records shall be raised, updated and maintained for not less than six years concerning staff:

7.2.1 Experience;

7.2.2 Qualifications;

7.2.3 Certification;

7.2.4 Formal training and updating.

## **7.3 NDT Equipment**

The Training Organisation shall maintain a fully documented system for the maintenance and calibration of NDT Equipment.

*NOTE: Calibration of equipment used solely for training purposes is not required by this scheme to be traceable to a National Standard, except where personal safety is affected, i.e., in the case of equipment generating, emitting or monitoring ionizing radiations.*

## **7.4 Specimens**

The Training Organisation shall maintain a fully documented system for the unique identification of each training and examination specimen. This shall include a master record of the position and extent of all defects relevant to the NDT technique for which it is to be used.

## **7.5 Control of Substances Hazardous to Health (COSHH)**

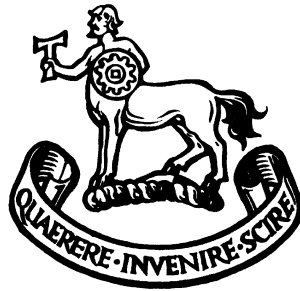
Disposal of chemicals used in the operation of training courses shall be carried out in accordance with applicable national regulations (see clause 5.1). A disposal register shall be maintained.

## Annex A – Training Certificates and Data Sheets

This annex provides guidance on the data to be provided by the Training Organisation

Data relating to qualification examinations	Data relating to training provided
Training Organisation name and address	Training Organisation name and address
Training Organisation status with respect to BINDT accreditation	Training Organisation status with respect to BINDT accreditation
Candidate's full name	Trainee's full name
Employer's name and address	Employer's name and address
NDT method	NDT method
NDT Level	NDT Level
Specific NDT technique(s) used in practical examination(s)	Duration of training in hours
	Training syllabus covered by course (e.g. reference to PCN syllabus, or to employer's written practice)
Applicable standard(s), e.g. BS EN 4179 : 2009	
Unique number of datasheet	
Date of issue of datasheet	Date of issue of datasheet
Date of completion of examination	Date of completion of training course
Reference to specifications(s) covered by specific examination	Reference to specifications covered in specific elements of training
Examination part(s) set	
Individual grades obtained (General, Specific & Practical)	
Overall grade awarded (and weighting applied, if appropriate), including Pass or Fail	Assessment results
Statement of limitations (where appropriate)	
Name of examiner	Name and signature of tutor
Signature of examiner	
Document control of sheet/report/certificate	Document control of sheet/report/certificate

# The British Institute of Non-Destructive Testing



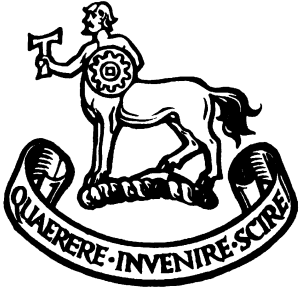
## Part III Specimen Forms

### Contents

1. Form ACC/1 – Application for British Institute of NDT Accreditation
2. Form ACC/2 – NDT Training Course Questionnaire
3. Form ACC/3 – Application for Extension of Scope of British Institute of NDT Accreditation
4. Form ACC/4 – Application for Annual Renewal of British Institute of NDT Accreditation

Copies of all forms contained within this Annex are available separately from the Institute or from the BINDT website [www.bindt.org](http://www.bindt.org)

# Application for British Institute of NDT Accreditation



This is an application for Accreditation by the Institute of the Training Organisation named below, the Quality System of which has been reviewed against, and is believed to comply with, the Institute's published Minimum Requirements for the Structured Training of Non-Destructive Testing Practitioners. **This application must be accompanied by at least one completed course questionnaire (Form ACC/2).**

It is requested that, upon acceptance of this application, the Institute arranges an appointment to audit this Training Organisation against its published Minimum Requirements for the Structured Training of NDT Practitioners.

The current applicant fee of £ \_\_\_\_\_ is enclosed herewith and I/we undertake to remit to the Institute the current published audit fee of £ \_\_\_\_\_ prior to the audit visit (Cheques should be made payable to the British Institute of NDT).

Training Organisation:.....

Address.....

.....

Telephone: ..... Fax: .....

Email: .....

Title(s) of NDT course(s) to be validated. (Course questionnaires are required for each course to be validated).

.....

.....

.....

.....

The Training Organisation quality systems and the above courses are believed to comply with the Institute's requirements for accreditation.

Coordinator's signature:.....Date of application:.....

Print Name:.....

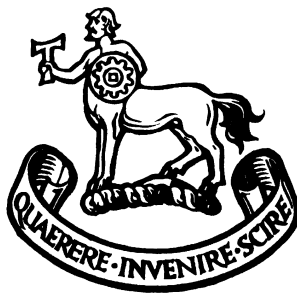
All information provided will be treated as commercial in confidence and only divulged to the members of the MQ&E Committee Accreditation Panel or its nominees.

Documents to be submitted with this application:

- (i) A completed course questionnaire (Form ACC/2) for each course to be validated
- (ii) Training Organisation course curricula.
- (iii) Students course notes for each course to be validated.
- (iv) Typical end of course student assessment report.
- (v) Controlled copy of Training Organisation Quality Manual.

Please return this form with the current application fee to The BINDT Compliance Manager, British Institute of NDT, The Newton Building, St. Georges Avenue, Northampton, NN2 6JB.

# NDT Training Course Questionnaire



One questionnaire to be completed in full for each course to be validated under the British Institute of Non-Destructive Testing's NDT Training Accreditation Scheme and attached to the application for Accreditation (Form ACC/1).

Name of NDT Training Organisation:.....

## GENERAL

1. Title of course and reference number (if applicable):
2. With which certification examination(s), if any, is the course aligned: (if none, state objectives)
3. Overall duration of the course in working days:
4. Amount of formal instruction in hours:
5. Amount of practical and tutorial in hours:
6. What, if any, are the course entry requirements, ie, qualifications and experience:
7. How long has the course been available in its present form:
8. If it is a new course, what experience do you have in running similar courses:
9. Does the course involve a mandatory examination or assessment: YES/NO (Delete as applicable)
10. Is a certificate or written evidence of progress issued to:
  - a) the student? YES/NO (Delete as applicable)
  - b) the employer? YES/NO (Delete as applicable)
11. Please give details of course literature issued to the student:

a) before the course:

b) during the course:

12. Name of responsible course instructor:

13. Is he/she engaged full time during the course: YES/NO (Delete as applicable)

14. Instructor's professional qualifications and/or valid certification:

15. Instructor's relevant industrial experience:

16. Details of formal training in lecturing (with dates):

17. Details of other relevant staff involved in this course.

Name of instructor:

Is he/she engaged full time during the course: YES/NO (Delete as applicable)

Relevant industrial experience:

Details of formal training in lecturing (with dates):

## **FACILITIES AND EQUIPMENT**

18. General description of premises for:

a) Lectures:

b) Practical:

19. Capacity (students):

20. Details of equipment for this course:

21. Policy on equipment calibration:

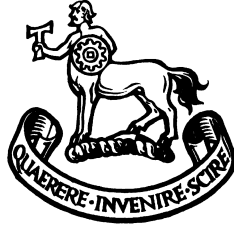
22. Details of available calibration blocks for this course:

23. Details of practical specimen's representative of the range necessary to cover the requirements of the certification scheme (where applicable) with which the course is aligned:

24. Is this course ever conducted outside the premises to be audited? YES/NO (Delete as applicable) (if yes, give details)



# Application for Annual Renewal of British Institute of NDT Accreditation



This form is to be used by British Institute of Non-Destructive Testing Accredited Training Organisations when applying for annual renewal of Accreditation by the Institute.

Accreditation will expire on the anniversary of the date that it was awarded and the application for renewal must reach the Secretariat of the Institute before expiry for renewal to take place. Failure to renew before this anniversary may result in any subsequent application being considered as an initial application.

An audit prior to renewal will be required at 3 yearly intervals. Renewals on intervening years will be conditional on a satisfactory surveillance visit being conducted by the Compliance Manager or appointed auditor.

Name of Training Organisation.....

Address.....

.....

.....

Telephone number: ..... Fax.....

Email.....

Organisation co-ordinator.....

Have any changes occurred in Training Organisation management, staff, premises, documentation or validated courses since Accreditation was awarded or renewed? (state Yes or No): If Yes, please give details:

.....

.....

Please list courses currently validated by the Institute, giving reference numbers where applicable:

.....

.....

Please supply copies of any documentation changes.

Approximately how many individuals have been trained during the last 12 months?

Coordinator's signature:.....Date of application:.....

Print Name:.....

# BINDT Acc Doc V7 Part IV Audit Checklist

## Minimum Requirements for the Structured Training of Non-Destructive Testing Practitioners

### 1. Foreword

This document is based upon CEN Technical Report 25108:2006, which is implemented within the British Institute of Non-Destructive Testing Accreditation Scheme for Training Organisations wishing to provide industry with an assured quality of tuition in the main NDT methods.

### 2. Scope

This checklist replicates BINDT's Minimum Requirements for the Structured Training of NDT Practitioners, and provides auditors of Training Establishments with a mechanism for recording observations during audits. It also provides a useful checklist for Training Establishments preparing for audit by BINDT, as well as for internal auditing purposes.

Requirement	Evaluation/remarks
<b>3. Quality Management System</b>	
<b>3.1</b> The Training Organisation shall adopt and implement a suitable quality management system. This shall be based upon ISO 9001:2008, as the training syllabus and methodology is externally imposed. The management system shall be controlled and periodically reviewed according to the stipulations in the quality manual.	
<b>3.2</b> All staff within the applicant Training Organisation shall be made aware of their specific responsibilities and method of working. These shall be published in a quality manual which includes an organisational chart.	
<b>3.3</b> Responsibilities and methods of working shall be defined by job title, and staff shall be allocated job titles in their terms of reference, which in turn refer them to the Quality Manual.	
<b>3.4</b> Procedures defined within the quality manual shall encompass all staff functions within the Training Organisation and shall include arrangements for control of documentation and calibration of test equipment, together with laboratory instructions to control specified processes.	
<b>3.5</b> Training Organisation staff shall be conversant with relevant procedures defined in the manual and shall sign a record indicate that they have read and understood the document.	
<b>4. Management</b>	
<b>4.1 Responsibility</b>	
<b>4.1.1</b> Senior Management shall be involved with, and show commitment to, the successful operation of the Quality Management system.	
<b>4.1.2</b> The Training Organisation shall have a Coordinator who is responsible for the overall management of the Training Operations, and for setting up and maintaining a Documented Quality Management System satisfying the	

Requirement	Evaluation/remarks
criteria contained within ISO 9001:2008 and this document.	
<b>4.2 Resource Management</b> Training Organisation management shall:	
<b>4.2.1</b> Determine the necessary competence for personnel performing work affecting the quality of NDT training;	
<b>4.2.2</b> Provide training or take other actions to satisfy these needs;	
<b>4.2.3</b> Evaluate the competence of the trainer (Particularly where the competence of the individual has been achieved by additional appropriate education, training, skills and/or experience;	
<b>4.2.4</b> Ensure the adequacy of equipment and facilities needed by the business to carry out NDT Training;	
<b>4.2.5</b> Ensure that the work environment meets statutory, Regulatory, BINDT and customer requirements.	
<b>4.3 Service Realisation</b>	
Training Organisation management shall plan service realisation from the point where the customer asks for training through to delivery of training. In so doing, management shall identify key processes and how these processes interact with one another.	
<b>4.4 Measurement, Analysis and Improvement</b> Training Organisation management shall:	
<b>4.4.1</b> Monitor and measure customer satisfaction.	
<b>4.4.2</b> Commission internal audits at not less than 12 month intervals.	
<b>4.4.3</b> Check processes associated with the delivery of training, ensuring that it is delivered in an effective manner which meets the customer's requirements.	
<b>4.4.4</b> Ensure that Non-Conformances are controlled and dealt with appropriately.	
<b>4.4.5</b> The above points will provide data. This data shall be analysed in order to identify improvements to management systems and processes.	
<b>4.4.6</b> Training Organisation's management shall implement and monitor improvements. This should form the basis of the annual management review meeting.	

Requirement	Evaluation/remarks
<p><b>4.5 Student Induction</b></p> <p>A system of student induction shall be in place such that, upon acceptance of an application for enrolment, the Training Organisation will issue to the enrolled student, or his sponsor, clear and unambiguous instructions in accordance with the following:</p>	
<p><b>4.5.1</b> Course fees and method of payment which shall show all that is included in the fees. There shall be no <i>hidden extras</i> and a schedule of course fees shall be made freely available upon request.</p>	
<p><b>4.5.2</b> Dates and times of attendance for the course, which shall include clear instructions concerning the location of the Training Organisation.</p>	
<p><b>4.5.3</b> Transport, accommodation and catering arrangements, where applicable.</p>	
<p><b>4.5.4</b> The relevant safety requirements pertaining to the Training Organisation as a whole or the particular course for which the student is enrolled.</p>	
<p><i>NOTE. Where necessary students attending courses involving practical radiography are to be registered as classified radiation workers prior to the commencement of training and are to wear radiation monitoring devices at all times during the course.</i></p>	
<p><b>4.5.5</b> Personal Protective Equipment (PPE) required for students attending the training course, and whether this is provided by the Training Organisation, or whether the student must provide his own PPE.</p>	
<p><b>4.5.6</b> NDT equipment provided by the Training Organisation for use by students during the training course, and whether the student may optionally provide/use their own NDT equipment.</p>	
<p><b>4.5.7</b> Textbooks essential to the training course, and whether these are provided by the Training Organisation or the student.</p>	
<p><b>4.5.8</b> The name and telephone number of a contact at the Training Organisation from whom additional information may be obtained if required.</p>	
<p><b>4.6 Student Assessment</b></p>	
<p><b>4.6.1</b> In all cases a system of student assessment shall monitor the progress and learning of individual students on a daily basis.</p>	
<p><b>4.6.2</b> Where the training course is intended to provide the employer of NDT personnel with essential information required for qualification and certification under, for example, SNT-TC-1A, students shall undertake written and practical final examinations, and shall be issued with a uniquely numbered certificate (traceable to the student records required in paragraph 7.1) of successful completion of NDT training.</p>	

Requirement	Evaluation/remarks
<p><b>4.6.3</b> For training courses intended to qualify NDT personnel for examination eligibility in a third party certification system in compliance with, for example, EN 473, training course final examinations may be replaced by a programme of controlled, documented continual assessment. Satisfactory completion of the course may be demonstrated either by comprehensive records of daily progress assessments or success in an end of course examination.</p>	
<p><b>4.6.4</b> Whenever end of course examinations are employed, they shall not be set, invigilated or marked by the instructor responsible for the course in which the student is enrolled, and steps shall be taken to prevent collaboration or collusion during examinations. A documented system shall be in place to ensure that specimens used during end of course examinations have not been accessible (or have been used as practical assessment specimens) to the student during the course.</p>	
<p><b>4.7 Counselling</b></p> <p>A system of counselling shall be provided for the benefit of students who fail to reach the required minimum standard during daily progress assessments or in the end of course assessment.</p>	
<p><b>4.8 Curriculum</b></p>	
<p><b>4.8.1</b> The Training Organisation shall publish and make freely available upon request the curriculum upon which each course is based. If the course concerned is aligned with a recognised certification examination, e.g. PCN, the curriculum shall reflect the published syllabus pertaining to that examination.</p>	
<p><b>4.8.2</b> The curriculum shall be reviewed annually (as a minimum) and revised, if necessary, in the light of scientific, industrial and technological developments in the NDT method concerned, or where a change occurs in the syllabus of the certification examination with which the course is aligned.</p>	
<p><b>4.9 Course Notes</b></p>	
<p><b>4.9.1</b> The Training Organisation shall maintain a master set of course notes, reviewed annually and revised if necessary in the light of changes to the curriculum and bearing a revision date, to ensure a consistency between courses in the event of staff changes.</p>	
<p><b>4.9.2</b> The Training Organisation shall provide each enrolled student with a comprehensive set of appropriate course notes, these being hard copies of the master, the cost of which shall be included in the course fees.</p>	
<p><i>NOTE: Externally published and controlled classroom training handbooks may supplement but not be a substitute for the Training Organisation's own course notes.</i></p>	
<p><b>5. Facilities</b></p>	
<p><b>5.1 The Training Environment</b></p>	

Requirement	Evaluation/remarks
<p><b>5.1.1</b> The premises used for training shall comply with the latest issue of all relevant legislation, e.g. in the UK the Health and Safety at Work Act, COSHH Regulations and where applicable, Ionising Radiation Regulations.</p>	
<p><b>5.1.2</b> Appropriate safety notices shall be displayed in a location accessible to all students. Relevant safety data sheets shall be on hand at the point of use of potentially hazardous equipment or processes.</p>	
<p><b>5.2 Resources</b></p>	
<p>Classrooms and practical facilities shall be well lit and ventilated and there shall be adequate provision of teaching aids such as blackboards/whiteboards or flip charts, overhead and/or slide projectors, computer generated presentations and video equipment appropriate to the course.</p>	
<p><b>5.3 Equipment</b></p>	
<p><b>5.3.1</b> Sufficient NDT equipment, such as instruments, accessories and calibration blocks, shall be available to cover the full range of NDT techniques within each of the NDT methods being taught (except where the range of NDT techniques is limited by industry or product sector applications), and to occupy all of the students on the course concerned (Appendix 1 refers).</p>	
<p><b>5.3.2</b> Adequate Personal Protective Equipment such as protective eye glasses, gloves, coveralls, etc., should also be available to students.</p>	
<p><b>5.4 Specimens</b></p> <p>Training specimens shall be available in sufficient quantity and complexity to cover the full range of applications encompassed by the course curriculum (Appendix 2 refers). Specimens should also be available containing real defects representative of those found in industry. Separate specimens shall be used for training and examinations and there shall be provision for secure storage of examination specimens.</p>	
<p><b>5.5 Library</b></p>	
<p><b>5.5.1</b> The Training Organisation shall maintain an up to date library of NDT Standards relevant to the method being taught. Students shall be made aware of the existence of these Standards and educated in their use.</p>	
<p><b>5.5.2</b> Relevant certification scheme documents shall be made available for the use of students.</p>	
<p><b>6. Training Staff</b></p> <p>The Training Organisation's management structure shall include a Course Coordinator (however named) with overall responsibility for the technical operation of the training facilities and for ensuring that the British Institute of Non-Destructive Testing requirements are met.</p>	
<p>The training facility shall have sufficient instructors to ensure that as a minimum, one tutor is present throughout each per course in line with the specific</p>	

Requirement	Evaluation/remarks
approved documentation requirements.	
<p><b>6.1 Certification</b></p> <p>A key member of staff who has involvement in the day to day running of the training organisation shall have overall responsibility for each training discipline and is required to hold equal or higher level certification than that to which the course is aligned.</p>	
<p><b>6.2 Qualifications</b></p> <p>Training Organisation s shall employ a minimum of one staff member formally trained in instructional techniques. This employee should then disseminate this training to all training staff.</p>	
<p><b>6.3 Experience</b></p> <p>Training Instructors shall have knowledge of materials science and product technology, and have documented experience of current industrial applications of the NDT methods that they are authorised to teach.</p>	
<p><b>6.4 Updating</b></p> <p>Training Organisations staff shall be kept up to date with current industrial procedures and practices, and the Organisation shall document how this is achieved.</p>	
<p><b>7. Records (general)</b></p> <p>There shall be a system for maintaining and reviewing the current state of all records held within the Training Organisation. Such records are to be kept in a secure location and treated with confidentiality.</p>	
<p><b>7.1 Student records</b></p> <p>Records shall be raised and maintained for each enrolled student for a period of not less than six years and shall include, as a minimum;</p>	
<p><b>7.1.1</b> Date(s) of enrolment and completion of training;</p>	
<p><b>7.1.2</b> Course on which enrolled;</p>	
<p><b>7.1.3</b> Instructors and auditors involved;</p>	
<p><b>7.1.4</b> Records of daily progress assessments; This should include a log of specimens tested during the course with the instructor's comments.</p>	
<p><b>7.1.5</b> Final examination result(s) attained (where appropriate), including a copy of the completed examination paper(s);</p>	
<p><b>7.1.6</b> Details of specimens (including identification numbers) and equipment used by the student in any final examination;</p>	
<p><b>7.1.7</b> A certificate of successful training course completion, including a data sheet necessary for employers implementing a second party qualification system such as SNT-TC-1A (details of the content of certificates and data sheets is provided at Annex A, page</p>	

Requirement	Evaluation/remarks
13 to this manual).	
<b>7.2 Staff</b> Records shall be raised, updated and maintained for not less than six years concerning staff:	
7.2.1 Experience;	
7.2.2 Qualifications;	
7.2.3 Certification;	
7.2.4 Formal training and updating.	
<b>7.3 NDT Equipment</b> The Training Organisation shall maintain a fully documented system for the maintenance and calibration of NDT Equipment.	
<i>NOTE: Calibration of equipment used solely for training purposes is not required by this scheme to be traceable to a National Standard, except where personal safety is affected, i.e., in the case of equipment generating, emitting or monitoring ionizing radiations.</i>	
<b>7.4 Specimens</b> The Training Organisation shall maintain a fully documented system for the unique identification of each training and examination specimen. This shall include a master record of the position and extent of all defects relevant to the NDT technique for which it is to be used.	
<b>7.5 Control of Substances Hazardous to Health</b> Disposal of chemicals used in the operation of training courses shall be carried out in accordance with applicable national regulations (see clause 5.1). A disposal register shall be maintained.	

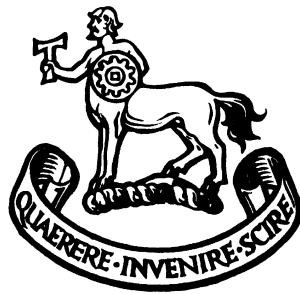
**Auditor signature:**

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**Date:**

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# The British Institute of Non-Destructive Testing



## Appendix 1 – Minimum equipment holdings for BINDT Accredited Training Organisations (ATO)

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### SCOPE

This document prescribes the minimum equipment holdings essential for the operation of a training organisation preparing candidates for third party certification.

### GENERAL

The ATO shall hold sufficient relevant test equipment, probes, reference blocks, calibration blocks, etc., to provide for a stated number of students on any one training course.

Details of designated training equipment must be submitted to BINDT upon request.

The ATO shall, as far as practicable, maintain all such equipment in a serviceable condition and provide for its maintenance and overhaul as necessary.

Existing ATOs are to record any changes in equipment holdings to BINDT. If a significant reduction in equipment holdings is planned, this may result in a change in the scope of accreditation and must be notified beforehand.

## 1. Ultrasonic Testing

- 1.1 At least one analogue ultrasonic flaw detector and a full range of probes appropriate to the techniques to be trained, including any special purpose probes where required.
- 1.2 Calibration blocks and reference blocks appropriate to the techniques to be trained.

### Time of Flight Diffraction

- 1.3 TOFD data collection instrument, including specific connecting cables for data to be displayed on a computer.
- 1.4 Computer with compatible software to interact where necessary with the TOFD instrument and read the TOFD data.
- 1.5 TOFD scanner to include probe jig and line encoder.
- 1.6 A pair of 5 MHz transducers with matching wedges producing centre beam refracted angles of 45°, 60° and 70°.
- 1.7 BS 2704 type A2 or BS EN 12223 calibration block no. 1.
- 1.8 Connecting cables for all parts of the equipment.
- 1.9 Water-based couplant.

Where necessary the equipment may be loaned/hired by the equipment manufacturer or employer of students for use during training.

### Phased Array

- 1.10 Sufficient UT Phased Array (PA) data collection instruments, enabling data to be displayed on a computer, for the maximum number of students that the ATO will register for any one course
- 1.11 Computer(s) with compatible software to interact where necessary with the PA instrument(s) and read the acquired PA data.
- 1.12 PA scanner(s) to include probe jigs and line encoders
- 1.13 BS 2704 type A2 or BS EN 12223 calibration block no. 1
- 1.14 Connecting cables for all parts of the equipment
- 1.15 Water based couplant
- 1.16 Transducer sets for each PA instrument:

32 element 5 MHz	~0.6 mm pitch
32 element ~2.5 MHz	
64 element 5 MHz	~0.6 mm pitch
- 1.17 Appropriate wedges and adaptors

## 2. Radiography

- 2.1 At least one X-ray tube with a KV range appropriate to the materials to be tested.
- 2.2 For gamma radiography (where appropriate) an Iridium 192 source, with suitable container and projection mechanism.
- 2.3 An X-ray beam centering device.
- 2.4 A range of Image Quality Indicators (IQI).
- 2.5 Lead letters and numbers.
- 2.6 Blocking off compounds and liquids where appropriate.
- 2.7 Copper and lead filters where appropriate.
- 2.8 Densitometer.
- 2.9 Film viewers, including at least one high intensity viewer.
- 2.10 Radiation monitor.

- 2.11 Stepped blocks for making exposure curves.
- 2.12 Caliper or other device for measuring material thickness
- 2.13 Separate darkrooms for film processing and film preparation/viewing.
- 2.14 Viewing aids, such as magnifiers.
- 2.15 A manual or automatic processing unit incorporating thermostatically controlled developing tank, stop bath, rinsing, fixing and washing tanks.
- 2.16 Thermostatically controlled drying cabinet.
- 2.17 Viewer with wet film attachment.
- 2.18 Channel and clip type film hangers in the common sizes.
- 2.19 Lead and calcium tungstate screens in the common sizes.
- 2.20 Flexible and rigid type cassettes.
- 2.21 Darkroom timer.
- 2.22 Safelights.
- 2.23 Trimmer to accommodate largest size of films.

### **3. Eddy Current Testing**

#### **Wrought Products and Welds**

- 3.1 At least one standard single frequency impedance plane instrument and one analogue meter display instrument.
- 3.2 Where training incorporates bolt hole testing, one dynamic rotating probe assembly and compatible instrument.
- 3.3 Where training is offered for multi frequency boiler tube inspection, one dual frequency impedance plane instrument suitable for testing of the examination samples held.
- 3.4 Absolute and differentially wound standard and shielded pencil and spade probes, suitable for testing ferritic and austenitic steels and aluminium alloys.
- 3.5 A selection of encircling, internal, bolthole and comparative coil types.
- 3.6 Calibration blocks, appropriate to all probe and material types.
- 3.7 Where examination of specific components, ie. Automated/semi automated testing of steel tubes/condenser tubes, coils/probes and test equipment together with reference test pieces containing relevant holes/notches.

#### **Tube Testing**

- 3.8 One impedance plane, dual frequency two-channel flaw detector with the ability to mix channels manually. The flaw detector to carry a valid annual certificate of calibration.
- 3.9 One two-channel chart recorder having a minimum chart width of 50 mm, with a speed of between 25-50 mm/sec and a nominal 500 Hz frequency response.
- 3.10 Calibration tubes type A, B and D from draft inspection ESI 98-15 and produced in test sample material. Tubes to be 25 mm external diameter and 18 g thickness.
- 3.11 Eddy current probes of the air cored bobbin type. A minimum of one of each of:
  - 3.11.1 Diameter 20 mm minimum 24 kHz nominal frequency and differential mode.
  - 3.11.2 Diameter – appropriate to be a sliding fit through a plastic inlet insert and having a flexible (brush type) centring device. 24 kHz nominal and absolute.
- 3.12 Appropriate cabling.

#### **4. Magnetic Particle Testing (multi-sector)**

- 4.1 A 1,500 Amp bench or freestanding transformer with AC or DC output (and half wave rectified AC) with a current flow adapter and prods, magnetic flux flow adapter and an ink reservoir with feed.
- 4.2 AC/DC Electromagnetic Yokes with articulated legs and pole pieces.
- 4.3 Permanent magnets with pole piece adapters suitable for all applications.
- 4.4 Various rigid and flexible coils, threading bars etc.
- 4.5 Inspection area or Booth equipped with black out facilities for visible and UV(A) viewing of samples.
- 4.6 Independent or combined photometer & radiometer for measuring the intensity of visible and black light.
- 4.7 Demagnetising equipment.
- 4.8 Flux measuring and comparison gauges to BS recommendations.
- 4.9 Sutherland Flask or Crowe Receiver for measuring solid content of magnetic ink.
- 4.10 Powder dispensers
- 4.11 Supplies of detection media including non-fluorescent, fluorescent and dry powder.
- 4.12 Artificially or naturally cracked blocks/specimens for performance checking.

#### **5. Liquid Penetrant Testing (multi-sector)**

- 5.1 An effective component cleaning/degreasing facility for thorough cleaning of specimens.
- 5.2 A penetrant line comprising:
  - 5.3 Water washable penetrant tank
  - 5.4 Post emulsifiable penetrant tank
  - 5.5 Emulsifier tank
  - 5.6 Water rinsing station with spray nozzle
  - 5.7 Drying station
  - 5.8 Dust storm cabinet

#### **Aerosol liquid penetrant inspection kits comprising:**

- 5.9 Penetrant remover/degreaser
- 5.10 fluorescent penetrant
- 5.11 colour contrast dye penetrant
- 5.12 Developer
- 5.13 Inspection area or Booth equipped with black out facilities for visible and UV(A) viewing of samples.
- 5.14 Independent or combined photometer & radiometer for measuring the intensity of visible and black light.
- 5.15 Artificial flaws (TAM panel) or other means of process control of penetrant line.

#### **6. Visual Testing**

- 6.1 Surface table (of suitable size for largest measurement).
- 6.2 V blocks.
- 6.3 Block mounted pointers/sensors.

- 6.4 In addition the following shall be provided in adequate quantities (dependent on the number of trainees)
- 6.5 Squares, rules, protractors.
- 6.6 Micrometers.
- 6.7 Verniers.
- 6.8 External calipers.
- 6.9 Dial reading bore gauge.
- 6.10 Hand magnifiers (X2, X5)
- 6.11 Lupes with metric scales no greater than X7.
- 6.12 Mirrors – various sizes up to 50 mm diameter with fixed and articulating heads.
- 6.13 Light sources – penlights, flashlights, bespoke sources to power intrascope and fibrescope.
- 6.14 Indirect viewer – either fibrescope or endoscope with forward and side viewing lenses.
- 6.15 Photometer.
- 6.16 Weld gauges, weld profiles, surface comparator.

## **7. Alternating Current Field Measurement**

- 7.1 At least one calibrated ACFM Crack Microgauge.
- 7.2 QFM Version 2.0 Real Time Data Acquisition and Analysis Software Program.
- 7.3 Laptop Computer, Colour Display, Windows 95 and TSC software installed.
- 7.4 A full range of ACFM probes appropriate to the tests to be conducted, including any special purpose probes where required.
- 7.5 Weld Check Block.

## **8. Rail Testing**

- 8.1 Portable ultrasonic flaw detector suitable for manual use and in conjunction with an 070 test rig.
- 8.2 Calibration blocks: CB91M, CB87M, Test Rail Section master block (STD2).
- 8.3 Rail test rig incorporating a combined laterally adjustable 070 probe array and automatic couplant.
- 8.4 Tandem probe rig (for testing alumino-thermic welds) incorporating 2 matched 2.5 MHz 45° single crystal probes.
- 8.5 A range of Railtrack approved single crystal probes:
  - 8.5.1 2.5 MHz 0° (40/058640)
  - 8.5.2 2.5 MHz 40° (40/058641)
  - 8.5.3 2.5 MHz 70° (40/058643)
  - 8.5.4 2.5 MHz 45° (40/058642)
  - 8.5.5 2 matched 2.5 MHz 45° (40/058642)
  - 8.5.6 4 MHz 70° miniature (82/998192)
- 8.6 A range of Railtrack approved double crystal probes:
  - 8.6.1 5 MHz 0° (40/058644)
- 8.7 Ancillary equipment: steel rules, couplant, wire brushes, scrapers etc.
- 8.8 Hand held permanent and electromagnetic yokes.

## 9. Railway Axles and Wheelsets

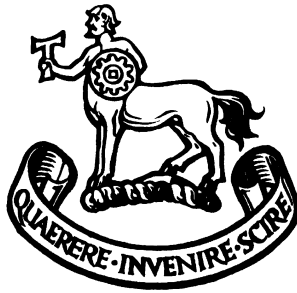
- 9.1 Approved mains or portable ultrasonic flaw detector (BR2000, BR77 or acceptable commercial alternative)
- 9.2 CB88M and CB88I calibration blocks
- 9.3 Reference block APT B1 (Drg No. GB/8312)
- 9.4 A range of compatible 2.5 Mhz rail vehicle axle testing probes:
  - 9.4.1 double crystal: 0°, 5°, 7.5°, 10°, 12.5°, 15°, 17.5°, 37° (hollow ground), 52° (hollow ground)
  - 9.4.2 double crystal horizontal ellipse: 5°, 7.5°, 10°, 12.5°, 15°, 17.5°
  - 9.4.3 single crystal: 37° and 52°, (hollow ground).

## 10. Weld Inspection

The following shall be provided in adequate quantities (dependent on the number of trainees or candidates)

- 10.1 Rules.
- 10.2 Hand magnifiers (X2, X5)
- 10.3 Lupes with metric scales no greater than X7.
- 10.4 Mirrors – various sizes up to 50 mm diameter with fixed and articulating heads.
- 10.5 Light sources – penlights, flashlights.
- 10.6 Weld gauges, weld profiles, surface comparator.

# The British Institute of Non-Destructive Testing



## Appendix 2 – Specimen Requirements

(The defect types shown in *italics* would be desirable additions to the basic requirements)

### 1. Weldments

Courses leading to certification examinations in NDT of welds shall include, as a minimum, samples exhibiting the following discontinuities in varying degrees of severity:

- 1.1 Excessive root penetration
- 1.2 Incomplete root penetration
- 1.3 Heat affected zone crack
- 1.4 Sidewall slag inclusion
- 1.5 Lack of sidewall fusion
- 1.6 Central crack in weld
- 1.7 Transverse crack in weld
- 1.8 Porosity (localised and uniform)
- 1.9 Lack of root fusion
- 1.10 *Solidification cracking*
- 1.11 *Lamellar tearing*
- 1.12 *Worm holes*
- 1.13 *Tungsten/Copper inclusions*

### 2. Castings

Courses leading to certification examinations in casting inspection are required to have, as a minimum, samples showing the following features in varying degrees of severity:

- 2.1 Gas porosity
- 2.2 Dross inclusion/porosity
- 2.3 Core blows
- 2.4 Misruns
- 2.5 Cold shuts
- 2.6 Shrink porosity
- 2.7 Hot tears
- 2.8 Core shifts

- 2.9 Segregation
- 2.10 Inclusions
- 2.11 Cracking
- 2.12 *Sponginess*
- 2.13 *Air Locks*
- 2.14 *Shrinkage cavities*
- 2.15 *Diffraction mottling*

### **3. Wrought Products**

Courses leading to certification examinations in inspecting wrought products are required to have, as a minimum, samples showing the following features in varying degrees of severity:

#### 3.1 Rolled products:

- 3.1.1 Rolling laps
- 3.1.2 Broken or burst corners
- 3.1.3 Inclusions
- 3.1.4 Piping

#### 3.2 Forgings:

- 3.2.1 Forging burst
- 3.2.2 Forging laps
- 3.2.3 Forging flash
- 3.2.4 *Hydrogen cracking*
- 3.2.5 *Voids*

#### 3.3 Incorrect heat treatment:

- 3.3.1 Reheating cracks
- 3.3.2 Cooling cracks

#### 3.4 Machining defects:

- 3.4.1 Grinding cracks
- 3.4.2 Surface tearing

### **4. Aerospace**

The aerospace industry utilizes all of the aforementioned product technologies and in addition, some others of a more specialised nature such as advanced composite structures, powdered metal components and super plastic formed metals.

NDT trainees from the aerospace industry, who are to be candidates for certification examinations, would be expected to have a general familiarity with the manufacturing defects outlined in paragraphs 1 to 3 above, though not to the same depth as specific product sector candidates.

In addition to those defects, Training Organisations should have a range of defects in components and structures upon which students will be trained and which should include the following:

- 4.1 Corrosion
- 4.2 Stress corrosion cracking
- 4.3 Fatigue cracking
- 4.4 Disbonds in bonded joints
- 4.5 Delaminations in laminated structures
- 4.6 Entrapped water freezing damage and other defects in honeycomb structure.