

## **Certification Processes for **NDT** Operatives, Equipment and Facilities used for inspecting Rail Vehicles**

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### **Synopsis**

This Standard mandates the requirements for the certification of operatives, equipment and facilities used to undertake non-destructive **testing** of safety-critical components on rail vehicles. Particular requirements for the non-destructive **testing** of axles are set out.

### **Submitted by**

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## Certification Processes for **NDT** Operatives, Equipment and Facilities used for inspecting Rail Vehicles

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### Issue record

Issue	Date	Comments
One	May 1994	Original document Superseded MT/311
Two	December 1995	Replaces issue one Now includes section covering approval of <b>NDT</b> procedures
Three	February 2003	Replaces issue two Includes MPI requirements previously in GM/RT2451

Revisions have not been marked by a vertical black line in this issue because the document has been revised throughout.

# Certification Processes for **NDT** Operatives, Equipment and Facilities used for inspecting Rail Vehicles

Railway Group Standard  
GM/RT2005  
Issue Three  
Date June 2003

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## Part 1 General information

### 1.1 Scope of Railway Group Standards

- 1.1.1 The overall scope of Railway Group Standards, and specifically of the controlled infrastructure (as used in this Railway Group Standard), is set out in Appendix A of [GA/RT6001](#). The specific scope of this Railway Group Standard is set out in Part 2.

### 1.2 General responsibilities

- 1.2.1 Railway Group Standards are mandatory on all members of the Railway Group and apply to all relevant activities that fall into the scope of each individual's Railway Safety Case. If any of those activities are performed by a contractor, the contractor's obligation in respect of Railway Group Standards is determined by the terms of the contract between the respective parties. Where a contractor is a duty holder of a Railway Safety Case, then Railway Group Standards apply directly to the activities described in its Railway Safety Case.
- 1.2.2 The Railway Group comprises Rail Safety and Standards Board Limited, the infrastructure controller and the train and station operators who hold Railway Safety Cases for operation on or related to the controlled infrastructure (as set out in [GA/RT6001](#)).
- 1.2.3 Rail Safety and Standards Board Limited is known as RSSB.
- 1.2.4 Under the Railways (Safety Case) Regulations 2000, the duty holder (as defined in those Regulations) is responsible for ensuring that the requirements of Railway Group Standards are complied with. Contractual arrangements (including a lease at a station) do not of themselves relieve the duty holder of its obligations under those Regulations.

### 1.3 General compliance date

- 1.3.1 This Railway Group Standard comes into force and shall be complied with from 2 August 2003, except as specified in Part 2.
- 1.3.2 After the compliance dates, Railway Group members shall not deviate from the requirements set out in this Railway Group Standard. Where it is considered not reasonably practicable to comply with the requirements, authorisation not to comply shall be sought in accordance with [GA/RT6001](#), [GA/RT6004](#) or [GA/RT6006](#).

### 1.4 Health and safety responsibilities

- 1.4.1 In issuing this Railway Group Standard, RSSB makes no warranties, express or implied, that compliance with all or any documents published by RSSB is sufficient on its own to ensure safe systems of work or operation. Each user is reminded of its own responsibilities to ensure health and safety at work and its individual duties under health and safety legislation.

### 1.5 Technical content

- 1.5.1 The technical content of this Railway Group Standard has been approved by:

Haydn Peers, Principal Traction and Rolling Stock Engineer, RSSB

- 1.5.2 Enquiries should be directed to RSSB – Tel. 020 7904 7518.

### 1.6 Supply

- 1.6.1 Controlled and uncontrolled copies of this Railway Group Standard may be obtained from the Industry Safety Liaison Department, Rail Safety and Standards Board, Evergreen House, 160 Euston Road, London NW1 2DX.

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## Part 2 Application of this document

### 2.1 Purpose

- 2.1.1 This Standard mandates the requirements for the certification of operatives, equipment and facilities used to undertake non-destructive **testing** of safety-critical components on rail vehicles. Particular requirements for the non-destructive **testing** of axles are set out.

### 2.2 To whom these requirements apply

- 2.2.1 This Railway Group Standard contains requirements that are applicable to the duty holders of the train operator category of Railway Safety Case.

### 2.3 Application – infrastructure controller

- 2.3.1 There are no requirements applicable to the infrastructure controller.

### 2.4 Application – station operator

- 2.4.1 There are no requirements applicable to station operators.

### 2.5 Application – train operator

#### 2.5.1 Scope

- 2.5.1.1 The requirements of this document apply to all work that affects non-destructive **testing** of safety-critical components on vehicles.
- 2.5.1.2 None of the requirements of this Railway Group Standard are within the scope of Vehicle Acceptance Body approval.
- 2.5.1.3 Action to bring existing certification of operatives, equipment and facilities into compliance with the requirements of this document is not required until re-certification falls due.

#### 2.5.2 Exceptions from scope

- 2.5.2.1 There are no exceptions from the scope specified in clause 2.5.1 for train operators.

#### 2.5.3 Exceptions to general compliance date

- 2.5.3.1 There are no exceptions to the general compliance date specified in clause 1.3.1 for train operators.

### 2.6 Application – RSSB

- 2.6.1 There are no requirements applicable to RSSB.

### 2.7 Document management

#### 2.7.1 Superseded documents

- 2.7.1.1 The following Railway Group documents are superseded, either in whole or in part as indicated:

Superseded documents:	Sections superseded	Date when sections are superseded
GM/RT2005, issue 2, December 1995 Certification Processes for <b>NDT</b> Operatives, Equipment & Facilities Used for Inspecting Rail Vehicles	All	2 August 2003

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Superseded documents:	Sections superseded	Date when sections are superseded
GM/RT2451, issue 1, May 1999 Magnetic Particle Inspection	B5 and B6	2 August 2003

2.7.1.2 The remainder of GM/RT2451 is superseded by [GM/RT2466](#) (due to be published at the same time as GM/RT2005) therefore GM/RT2451 ceases to be in force and is withdrawn as of 2 August 2003.

### 2.7.2 Related requirements in other documents

2.7.2.1 There are no known related requirements in other Railway Group documents at the time of publication.

### 2.7.3 Supporting documents

2.7.3.1 There are no Railway Group documents supporting this Railway Group Standard.

## 2.8 Definitions

### Certification body

A qualified body with authority to issue certificates and administer procedures for **NDT** personnel according to the requirements of BS EN473 and EN 45013 that has been accredited by a nationally recognised body.

### Duty holder

The Railway Group member having responsibilities under its Railway Safety Case.

### Facility

For the purposes of this document only, any depot, workshop, location or mobile apparatus regularly used to undertake non-destructive **testing** of safety-critical components fitted to railway vehicles.

### Level 1

For the purposes of this document only, level 1 is the category of qualification that an individual has demonstrated competence to be certificated at that level by an organisation accredited to issue level 1 certification in accordance with BS EN 473 and EN 45013.

### Level 2

For the purposes of this document only, level 2 is the category of qualification that an individual has demonstrated competence to be certificated at that level by an organisation accredited to issue level 2 certification in accordance with BS EN 473 and EN 45013.

### Level 3

For the purposes of this document only, level 3 is the category of qualification that an individual has demonstrated competence to be certificated at that level by an organisation accredited to issue level 3 certification in accordance with BS EN 473 and EN 45013.

### Non-destructive **testing**

Non-destructive **testing** (**NDT**) is the method of **testing** materials for fitness for purpose without causing them harm.

### Procedure

An approved document that specifies the method to be applied for a specific **testing** regime, including the equipment, calibration requirements, areas to be examined, orientation of the component and the pass/fail criteria.

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## **Railway Group member**

Railway Group members (RGM) are infrastructure controller(s), train and station operators who hold Railway Safety Cases for operation on, or related to, the controlled infrastructure (as set out in [GA/RT6001](#)) and RSSB.

## **Safety-critical component**

A component or vehicle part that is capable of imparting risk to the controlled infrastructure.

## **Semi-automatic process (for **NDT**)**

A **NDT** process that once commenced will complete the examination of the component without intervention from the operator.

## **Technically competent authority**

A company, or person, having proven competence in a particular technology or process and able to act in an independent and impartial manner. With relation to this document there is to be at least one member of staff certificated to level 3 in the appropriate **NDT** method.

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## Part 3 Requirements

### 3.1 Role of certification bodies

#### 3.1.1 Issue of certificates

3.1.1.1 Certificates shall only be issued by certification bodies.

#### 3.1.2 Accredited procedures

3.1.2.1 Certification bodies shall have accredited procedures to issue certification in one or more of the following areas:

- a) certificate of competence - operatives, in one or more of the following areas:
  - i) eddy current **testing**
  - ii) penetrant **testing**
  - iii) magnetic particle **testing**
  - iv) ultrasonic **testing**, general
  - v) ultrasonic **testing** of railway axles
  - vi) radiographic **testing**
  - vii) alternating current field measurement
- b) certificate of approval – facilities used for non-destructive **testing**
- c) certificate of approval – **NDT** equipment.

#### 3.1.3 Audit of training and examination programmes

3.1.3.1 The certification body shall audit the training and examination programmes of all establishments who undertake such training and examination on its behalf.

#### 3.1.4 **NDT** operator competence

3.1.4.1 Certificates of competence shall only be issued to applicants who have satisfied the requirements of section 3.2 of this document and BS EN 473. The certificate shall explicitly identify which **NDT** method is applicable.

#### 3.1.5 Additional requirements for certification body

3.1.5.1 The certification body shall undertake the following:

- a) issue of type approval certificates to manufacturers in accordance with section 3.3
- b) approval of **NDT** procedures in accordance with section 3.4
- c) issue of certificates of approval for facilities in accordance with section 3.5.

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### 3.2 Certification of operatives

#### 3.2.1 Ultrasonic testing of railway wheelset axles – training

3.2.1.1 Operatives who undertake the ultrasonic testing of railway wheelset axles shall undergo a course of training covering the relevant methods and successfully pass an examination in accordance with BS EN 473 at an examination centre approved by a certification body.

3.2.1.2 The recognised certification body in the UK for ultrasonic axle testing is PCN, a subsidiary of the British Institute for Non-Destructive Testing.

#### 3.2.2 Ultrasonic testing of railway wheelset axles – training programme

3.2.2.1 Training programmes for operatives covering non-destructive testing of railway axles shall include the following minimum requirements:

- a) calibration procedures
- b) axle familiarisation
- c) \*classical trajectories
- d) \*trace pattern prediction
- e) axle scanning techniques.

See clause 3.2.3.1 for explanation of \*.

3.2.2.2 The training programme covering both practical and theory for level 1 applicants shall be a minimum of 80 hours.

#### 3.2.3 Ultrasonic testing of railway wheelset axles – specialist testing equipment training

3.2.3.1 The elements identified with an asterisk in clause 3.2.2.1 are not required for personnel exclusively operating semi-automated procedures which do not require the operative to interpret the test results and the training programme may be of reduced duration. The certificate of competence (railway axles) issued to such personnel shall clearly indicate the limited scope.

3.2.3.2 Where the operator of specialist semi-automatic axle testing equipment has a level 1 or level 2 qualification in ultrasonic axle testing, it is permissible for the training programme to be job specific in accordance with SNT-TC-1A and approved by an independent technically competent authority (see also section 3.3 for equipments requirements).

3.2.3.3 The training for operators of semi-automatic equipment shall be to a scheme approved by an independent technically competent authority.

#### 3.2.4 Ultrasonic testing of railway wheelset axles – reassessment of newly qualified operatives

3.2.4.1 Within three months of gaining a certificate of competence in testing railway axles, new certificate holders shall be reassessed to ensure that they are correctly interpreting the techniques and documentation.

3.2.4.2 Reassessment, for the purpose of implementation of this document, shall be a practical 'on site' evaluation of an operative's ability to carry out axle testing to the required standard.

3.2.4.3 Operators holding a level 1 certificate shall be reassessed by personnel certificated to level 2 or 3. Operators holding a level 2 certificate shall be reassessed by personnel certificated to level 3. The reassessor shall be qualified in the appropriate technique.

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## 3.2.5 **Ultrasonic testing of railway wheelset axles – validity of certification and maintenance of competence**

3.2.5.1 **NDT** operatives shall maintain their competence in the ultrasonic testing of railway axles and undertake re-certification at the following frequency:

- a) operatives undertaking a minimum of 40 hours **axle testing** in each four-week period – certification is valid for two years.
- b) operatives undertaking a minimum of 20 hours **axle testing** in each four-week period – certification is valid for one year.
- c) operatives undertaking a minimum of 10 hours **axle testing** in each four-week period using semi-automated techniques where the operative is not required to interpret the results of the tests – certification is valid for two years.

3.2.5.2 Reassessment, for the purpose of implementation of this document, shall be a practical 'on site' evaluation of an operator's ability to carry out **axle testing** to the required standard. Level 1 certificate holders shall be reassessed by personnel certificated to Level 2 or 3. Level 2 certificate holders shall be reassessed by personnel certificated to Level 3. The reassessor shall be qualified in the appropriate technique.

3.2.5.3 The four-week period identified in clause 3.2.5.1a), b) and c) above excludes periods of absence of less than one month.

## 3.2.5 **Ultrasonic testing of railway wheelset axles – re-certification periodicity**

3.2.6.1 Operatives shall have their certificates renewed or re-certificated at periods of five years maximum in accordance with BS EN 473.

## 3.2.6 **Railway wheelset axle testing by other techniques – training programme**

3.2.7.1 The training programmes for **NDT** operatives that test railway axles, by other than ultrasonic testing, shall include the following minimum requirements:

- a) compliance in accordance with BS EN 473
- b) calibration procedures appropriate to the technique
- c) **axle** familiarisation
- d) defect and scanning techniques appropriate to the technique.

## 3.2.7 **Axle testing by other techniques – certification of operatives**

3.2.8.1 The certification of operatives shall be in accordance with BS EN 473.

## 3.2.8 **Operatives testing other components**

3.2.9.1 The operatives that test components other than railway **wheelset** axles shall either be trained and certificated in accordance with EN 45013 and BS EN 473 by an organisation accredited by a nationally recognised body or in accordance with the American Society of Non-Destructive Testing (ASNT) scheme. In this instance the qualification levels shall be as indicated below:

- a) level 1 – alternatively the holder of a level 1 certificate issued by the ASNT level 3 certificate holder, within a written practice following the guidelines published in SNT-TC-1A
- b) level 2 – alternatively the holder of a level 2 certificate issued by an ASNT level 3 certificate holder, within a written practice following the guidelines published in SNT-TC-1A
- c) level 3 – alternatively the holder of a level 3 certificate issued by the ASNT.

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3.2.9.2 The validity of certificates shall be in accordance with BS EN 473.

### 3.2.9 Auditable records

3.2.10.1 Auditable records shall be maintained of **NDT** operatives' qualifications to demonstrate that competence is being maintained in accordance with the requirements of this document.

## 3.3 Certification of equipment

### 3.3.1 **NDT** equipment assessment and approval

3.3.1.1 **NDT** equipment shall be approved by a technically competent authority and issued with a certificate of type approval after satisfactory assessment to the standards required by BS EN 45012. The certificate shall clearly state the make, model and modification level of the **NDT** equipment and identify the scope of application of the equipment.

3.3.1.2 Where equipment is approved to a national standard (BS or EN) then such approval documentation shall satisfy the certification requirements of this document.

3.3.1.3 **NDT** equipment shall be assessed and issued with a type approval certificate for the conditions identified below:

- a) new equipment
- b) existing equipment that has been modified or changed.

3.3.1.4 The assessment shall define the approval processes that are to be satisfied to demonstrate the equipment functions in accordance with its requirements. The capability for detecting required defect sizes and, where required, locations, shall be defined by a technically competent authority, the defect size shall be consistent with the component design requirements. The assessments shall be undertaken on a representative sample with real defects, where possible, or simulated defects of the appropriate size, taking consideration of the limitations of using simulated defects.

3.3.1.5 In addition, ultrasonic **testing** equipment shall be assessed in accordance with the requirements of BS EN 12668.

3.3.1.6 The means of indicating the presence of a defect shall be clear and unambiguous. Defect identification shall incorporate a means of identifying the location of the defect in the component.

3.3.1.7 The equipment shall be assessed in all applications, environments and situations where it has the potential to be used in service.

3.3.1.8 The equipment shall be suitable for the environment in which it will be operated. Portable equipment shall be packaged in appropriate enclosures and provided with adequate carrying facilities.

3.3.1.9 The test equipment and any part that comes into contact with the component being tested shall not damage the component.

3.3.1.10 The calibration and periodic checks shall be approved by the technically competent authority as being adequate for the equipment application.

3.3.1.11 The equipment employed in semi-automatic processes shall provide results that will not require interpretation by a trained operator.

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## 3.4 Approval and use of **NDT** procedures

### 3.4.1 Non-destructive **testing** of rail vehicle components

3.4.1.1 All **NDT** of rail vehicle components shall be in accordance with an approved **NDT** procedure.

### 3.4.2 Qualification of author

3.4.2.1 **NDT** procedures shall be prepared by personnel who are qualified to level 2 or level 3 in the appropriate method.

### 3.4.3 **NDT** procedure scope

3.4.3.1 An analysis shall be undertaken to determine the minimum required detectable defect size. This shall take into account the frequency of inspection and the expected stress levels within the component being inspected.

3.4.3.2 The train operator shall ensure the areas of the components to be tested, the defect levels to be detected, the rejection criteria and periodicities of inspection are defined. Any limitations of the methods to be used shall be identified.

### 3.4.4 Requirements for **NDT** procedures

3.4.4.1 **NDT** procedures shall include, as a minimum, the following:

- a) scope
- b) definitions
- c) references
- d) health and safety information / precautions
- e) personnel requirements
- f) equipment requirements
- g) equipment control calibration
- h) surface preparation method
- i) method of **testing**
- j) acceptance criteria
- k) reporting
- l) post-test cleaning and control of residual effect, including, for example, demagnetisation.
- m) post-test surface protection.

3.4.4.2 **NDT** procedures for axles shall include the requirements set out in [GM/RT2466](#).

### 3.4.5 Validation personnel

3.4.5.1 Validation and approval of the **NDT** procedure shall be performed by personnel qualified to level 3 in the proposed **NDT** technique, as defined by BS EN 473.

3.4.5.2 The person approving the procedure shall not be the author of the procedure.

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### 3.4.6 Validation procedure

3.4.6.1 The **NDT** procedures shall be validated and approved by personnel in accordance with clause 3.4.5.1 and in accordance with auditable procedures that incorporate the requirements of clauses 3.4.7.1 to 3.4.7.5 inclusive.

### 3.4.7 Validation process

3.4.7.1 A validation process shall be undertaken to check that the defect sizes specified can be detected in the areas defined using the processes in the documented procedure.

3.4.7.2 The validation process shall be undertaken using the equipment, facilities and methods defined in the procedure.

3.4.7.3 Validation shall be undertaken on a full-size representative test piece.

3.4.7.4 The validation of ultrasonic **axle** procedures shall use a full-size test piece that includes all components being fitted that have an effect on the ultrasonic signals, such as wheels, gear wheels and **axle** mounted brake discs.

3.4.7.5 Where a **NDT** procedure uses an earlier procedure as its basis, the validation can be restricted solely to the technical justification of the effects of the changes made. The evidence used shall be formally documented and retained for future scrutiny.

### 3.4.8 Endorsement of procedures

3.4.8.1 The validated procedure shall be endorsed to state that it has been approved by a technically competent authority.

## 3.5 Approval of facilities undertaking **NDT** inspections of safety-critical components

### 3.5.1 Qualification

3.5.1.1 Facilities that support the use of **NDT** equipment provided at a site, or **NDT** equipment that is used at more than one location, shall be approved by an organisation accredited by a nationally recognised body and have a certificate of approval issued to the standard required by BS EN 45012.

3.5.1.2 Before a certificate is issued for a facility, the applicant organisation shall demonstrate the capability to undertake the procedures for which approval is sought.

3.5.1.3 The scope of approval shall include use of, and compliance with, approved procedures, qualified operatives and certificated equipment.

3.5.1.4 The assessment shall include a special process audit of the **NDT** facilities by a competent technical authority **NDT** specialist in the applicable technique.

3.5.1.5 An assessment by an independent assessor shall be completed at least every two years to re-certify the facility.

## 3.6 Approval and use of new **NDT** techniques

### 3.6.1 Approval

3.6.1.1 New **NDT** techniques that are to be applied to safety-critical components shall be approved by a technically competent authority that shall include the requirements set out in Appendix A, as a minimum.

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## 3.6.2 Training

3.6.2.1 The training and certification programmes for operatives of new techniques shall be defined and included as part of the approval submission.

## 3.6.3 Implementation

3.6.3.1 Before use of a new **NDT** technique, the following shall be in place:

- a) procedures to implement the new techniques in accordance with section 3.4
- b) certification of operatives in accordance with section 3.2
- c) certification of equipment in accordance with section 3.3
- d) approval of facilities in accordance with section 3.5.

## Appendix A Approval of new NDT techniques

(The content of this Appendix is mandatory)

### A.1 Defects

- A.1.1 The length, depth, shape / profile and orientation of the defect that the equipment can identify in test samples shall be declared. The defect of the specified size shall be identified in a full-size representative test piece.
- A.1.2 The equipment shall be evaluated on components in the condition that the test will routinely be applied.
- A.1.3 The system shall be able to clearly identify the location of defects in the components.
- A.1.4 Any limiting conditions of the component being tested that restrict the application of the process and achievement of identifying the declared defects shall be defined.
- A.1.5 The materials to which the technique is to be applied shall be identified and any limitations associated with the conditions or surface coatings declared.

### A.2 Demonstration

- A.2.1 The system shall be proven to identify a defect of known dimensions introduced into a component. The defect size shall be confirmed using an existing proven NDT technique.
- A.2.2 Blind trials shall be undertaken to identify defects in component parts that have previously been rejected by a proven technique. Where the new technique has greater sensitivity (defect size) than the comparison technique, then all defects identified by the comparison technique shall be detected by the new technique.

### A.3 Repeatability / probability

- A.3.1 The process / technique shall be proven to a declared probability level in determining the defect size and location in varying conditions, including:
  - a) different period of use
  - b) different operators
  - c) locations
  - d) orientation of application
  - e) variation in the components
  - f) environmental conditions within the declared limitations of the technique.

This list is not exhaustive.

- A.3.2 Blind trials shall be undertaken to compare the probability of detection (POD) of the new technique with that of an established one. Where a POD is claimed that is greater than the comparison technique, a different technique shall be used to verify defects identified by the new technique but not by the previous.
- A.3.3 The results of testing shall be consistent; the indications for a specific defect shall not vary for different test scenarios.

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## A.4 Calibration

A.4.1 Calibration processes for the equipment shall be clearly identified and easily applied by the operator.

## A.5 Ease of use

A.5.1 The test equipment shall be capable of being set up by an operator or, where the equipment is portable, assembled and set up.

A.5.2 Indications of defects shall be clearly presented and capable of being interpreted.

A.5.3 The results shall be clearly presented and easily interpreted.

A.5.4 Where the test results are presented in a form that do not require interpretation the output shall clearly specify the results.

A.5.5 Where the operator is required to interpret the test results, then sufficient clear instructions shall be provided to permit the operator to interpret the results correctly.

A.5.6 The application of the process and analysis of outputs shall take into consideration human factors, including, for example, ease of use, risk of fatigue and interpretation of results.

A.5.7 The equipment shall be suitable for the environment in which it will be operated. Portable equipment shall be packaged in appropriate enclosures and provided with adequate carrying facilities.

A.5.8 The test equipment and any part that comes into contact with the component being tested shall not damage the component.

## A.6 Materials

A.6.1 Where materials are used that have the potential to be hazardous, then suitable warnings and protection shall be identified.

## A.7 Expertise

A.7.1 The operator knowledge and skills required to successfully operate the system shall be commensurate with those required for existing **NDT** techniques.

## A.8 Report

A.8.1 The test results and demonstrations shall be summarised in a report which documents the evidence gathered.

## References

The Catalogue of Railway Group Standards and the Railway Group Standards CD-ROM give the current issue number and status of documents published by RSSB.

### Documents referenced in the text

#### Railway Group Standards

- [GA/RT6001](#) Railway Group Standards Change Procedures
- [GA/RT6004](#) Temporary Non-Compliance with Railway Group Standards
- [GA/RT6006](#) Derogations from Railway Group Standards
- [GM/RT2466](#) Railway Wheelsets (due to be published at the same time as this document)

#### Other references

- BS EN 473** Non-destructive **testing** – qualifications and certification of **NDT** personnel – general principles
- BS EN 45012** General criteria for certification bodies operating quality system certification
- EN 45013** General criteria for certification bodies operating certification of personnel
- BS EN 12688** Non-destructive **testing** – characterisation and verification of ultrasonic examination equipment
- SNT-TC-1A** Recommended practice for personnel qualification and certification in non-destructive **testing**