Document IoRW 13703/4/04

Summary of requirements applicable to Rail Welder Training Organisations seeking approval under the Certification Scheme for Welder Training Organisations

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INTRODUCTION

Rail welder training organisations in the UK are required to achieve approval under the Certification Scheme for Welder Training Organisations, operated by TWI Certification Ltd. The criteria for certification are described in the latest editions of:

Document No CSWTO-1-02, Requirements for the Certification of Welder Training Organisations.

These requirements include the competence of instructors and the criteria for this are given in:

Document No CSWIP-WInst-1-91, Requirements for the Certification of Welding Instructors and Specialist Welding Instructors; and in

Document No CSWIP-WI-1-91 Registration Scheme for Visual Welding Inspectors, Welding Inspectors, Senior Welding Inspectors, Welding Instructors and Welding Supervisors.

There is also a self-audit check list to assist training organisations in establishing compliance:

Document No CSWTO-2-02: Requirements for the Certification of Welder Training Organisations. Self Audit requirements and records.

This guidance document extracts criteria from the above documents that are relevant to rail welding. In cases of doubt, the documents referenced above contain the definitive criteria. They are available free of charge from TWI Certification Ltd at the address below.

This document is in two parts: Part 1 deals with rail welder training organisations and Part 2 deals with rail welding instructors.

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PART 1: CERTIFICATION SCHEME FOR WELDER TRAINING ORGANISATIONS FOR RAIL WELDING

OBJECTIVES

The Scheme has the following objectives:

- To develop and maintain criteria which define the requirements for the certification of competent welder training organisations.

- To establish procedures for the assessment of applicants in accordance with the requirements and to admit organisations that meet the requirements within identified limits of scope.

- To issue certificates to approved training organisations.

This document establishes the requirements for a competent rail welder training organisation and covers the following matters:

1 DEFINITIONS

Training Organisation: The company or other body certified under this scheme. Such certification may include one or more Training Establishments.

Training Establishment: The training locations of the certified organisations which are included in the scope of certification, and which may use the logo and certification statement.

Scope of Certification: The location(s) of the Training Establishments, the range of processes and materials and the training capacity for which the Training Organisation is granted certification.

The Welding Register: A Register of vocational competencies maintained by TWI Certification Ltd.

Examiner: A person responsible for the conduct and control of welder, welding operator and welder assistant qualification tests.

2 ASSESSMENT OF TRAINING ORGANISATIONS FOR CERTIFICATION

Assessment for certification shall be carried out by TWI Certification Ltd on behalf of the CSWTO Management Committee in accordance with this document, and shall comprise both a review of the application documentation and an on-site audit of Training Establishments. Certification shall be for a period of five years subject to satisfactory annual surveillance and shall be re-assessed by audit approximately three months before the end of the five year period. Successful assessment will result in renewal of Certification for a further period of five years.

Certification of each Training Organisation shall be granted for a specific scope, as defined in Clause 3 below. Where a Training Organisation has more than one Training Establishment, assessment shall be made and certification granted on an Establishment by Establishment basis. This may also require separate assessment/audit of some aspects of the Training Organisation where this is remote from the Establishment(s).

2.1 The Audit Team

As a minimum, the Audit Team shall be composed of a Lead Assessor approved by the Management Committee. The Committee may nominate other Assessors to the Team where their presence is considered necessary because of the size of the Training Organisation or the nature of the training provided.

2.2 Application for Certification

Training Organisations wishing to gain certification shall apply to TWI Certification Ltd using the standard application form, and enclosing the application fee.

2.3 Documentation

The application shall be accompanied by two sets of the following documentation:

a) General description of the functions, organisation and management of the Training Organisation, including Training Establishments to be covered.
b) The Control Manual.
c) Application form.
d) Outline training programmes (course profiles) for the range of approval sought.

e) Appropriate public domain supporting documentation and literature.
f) Detailed CVs of all training staff, including authenticated current approval certificates.

2.4 Documentation review

The Lead Assessor will review the documentation and draw the applicant's attention to any significant non-compliances. The application will not be processed until all non-compliances have been resolved.

2.5 The audit visit(s)

The arrangements for the audit visit will be made by the Lead Assessor in consultation with all interested parties.

The Lead Assessor, in consultation with any other Team members, will review the application and prepare for the audit before the audit commences. At the end of the audit they will agree on the terms of the report and its conclusions. Any non-compliances or observations shall be documented and disclosed to the applicant on conclusion of the audit, and a time scale for their resolution agreed.

The audit may include the conduct of examinations for instructors who have applied for certification, see section 6 of Part 2.

The applicant shall make all relevant facilities available to the Audit Team, and provide access to a senior manager responsible for training when required.

2.6 Reporting

The Lead Assessor, in consultation with any other Team members, shall produce a report for approval by the Management Committee within three weeks. Wherever possible, reports are to be submitted to the applicant within six weeks of the audit.

The applicant shall have right of appeal to the CSWTO Management Committee if dissatisfied, and ultimately to the Certification Management Board itself. The decision of the Board shall be final.

2.7 Certification

If the Management Committee approves a recommendation for certification, a certificate shall be issued by TWI Certification Ltd.

3 SCOPE OF APPROVAL

3.1 The Training Organisation shall be certified following successful assessment, for a specific scope of training defined by:

a) Location of approved Training Establishments. Approval for training at workplace sites away from approved Training Establishments requires a satisfactory site visit by the Audit Team during which welder training is witnessed and audited.

b) Processes for which equipment is available or, in the case of specialised equipment, is made available in accordance with the arrangements specified under subcontracting in the Control Manual.

c) Groups of rail materials and welding processes for which training personnel have demonstrated competence.

See Appendix 1 for rail materials and process groupings.

d) Capacity for training at each training establishment will be limited by the space and resources available. Where excess demand for a specific process beyond the availability of existing equipment is to be met by hiring additional equipment, this practice shall be undertaken under controlled arrangements specified under subcontracting in the Control Manual.

Notes

- Instructors may only carry out training within the scope of their authorisation as defined in Appendix 1.

- After initial assessment, changes in scope will be self-assessed according to the rules in Document CSWTO-1-02 and TWI Certification Ltd shall be notified so that provisional approval can be given for the new categories. The notification procedure is summarised below, and the revised scope will be checked at annual surveillance.

e) It is implicit that all training and tests are carried out in accordance with approved or agreed welding process manuals and procedures.

3.2 Certified training organisations wishing to amend their scope of training between surveillance audits shall proceed as follows:

a) Complete 'Change of Scope' notification form for increase in scope of activities. Where relevant, the CVs of instructors, their certificates of welding capability, course programmes and course notes, are to be attached.

The form shall be authenticated[*] and signed by a member of the institute of at least IncMWeldI status who is independent of the Training Organisation.

[*]Authentication shall provide an assurance that the activities covered by the increased scope are carried out in accordance with all relevant aspects of the Control Manual.

b) The completed form and attachments is to be sent, preferably by recorded delivery, to TWI Certification Ltd.

c) Any decrease in scope, for example, the loss of an instructor, must be notified by letter to TWI Certification Ltd.

d) The Certified Training Organisation will be sent a letter indicating the provisional approval that has been granted.

e) Verification that the training activities and training areas given provisional approval by this procedure are satisfactory will be carried out during the next surveillance visit. Following a satisfactory visit and the resolution of any non-conformities, TWI Certification Ltd will inform the Management Committee who will authorise if satisfied the revised scope of training. A revised Scope of Approval will be issued by TWI Certification Ltd.

4 PREMISES AND FACILITIES

4.1 Training shall be carried out in a designated area separate from any manufacturing facility. It shall contain individual welding areas, a lecture room and offices, and shall have close access to washing/toilet facilities, and cloakroom/lockers. Messing arrangements, which must include as a minimum a rest room having facilities for heating food and supply of hot and cold drinks shall be available at the Training Establishment.

4.2 Enclosed training areas shall be constructed in accordance with good building practice and shall be maintained in good condition. The minimum indoor headroom should not be less than 2.5m. Where training is for welders who will operate in the open at sites, external training areas may be designated but equipment is to be available to protect the trainee from adverse or inclement weather conditions. External training areas, e.g., stillages, shall be maintained in good condition.

4.3 Noisy equipment, such as air compressors, shall be located outside the main training area.

4.4 For workshop training facilities, the workshop temperature should be within the range 13-30C and the level of illumination shall be 300 lux for general background lighting in the workshop with 500 lux local lighting provided for inspection activities. On open sites, the general level of lighting shall be adequate for welding and associated activities but shall be augmented with lights and torches to achieve 500 lux in locations where inspection activities are being performed.

4.5 There shall be adequate general ventilation in workshop areas, and effective local fume extraction in the welding areas as appropriate to the welding process(es) used.

4.6 Compressed air lines, gas lines, and power conduits shall be identified and shall follow national colours where these are defined, eg, BS1710:1984.

4.7 Gases shall be stored in accordance with the relevant Acts and Regulations where these apply. In the absence of such Regulations, good practice with respect to personal health and safety and the avoidance of fire risk shall be adopted.

4.8 The training establishment shall be laid out to give unobstructed access to all machinery and working areas. All exit doors shall be clearly marked.

4.9 Student attendance shall be recorded.

4.10 Where appropriate, a suitably screened and ventilated area shall be set aside for heavy grinding and gouging operations on workpieces.

4.11 First aid facilities shall be designated in case of injury or illness.

4.12 The training establishment shall be kept in a clean, tidy condition, and gangways shall be kept clear of obstructions.

4.13 Where applicable to the welding process(es) used. For arc welding, booths shall be provided, having a minimum floor area appropriate to the process and specimens concerned, and entry to the booths shall be designed for easy access and to prevent the escape of arc radiation. Arc welding booths shall contain a storage area for consumables and tools and auxiliary low voltage supply. A mains isolation switch shall be accessible.

Aluminothermic welding areas shall conform to the requirements of the rail authority and shall contain a mixture of different rail profiles, sleepers and fastening types.

4.14 A quiet lecture room shall be provided of a size to provide each trainee with at least 1.5m^2 of floor area. It shall be equipped with tables and chairs, chalk or white board (or flip chart), visual aids, and wall space for the display of wall charts.

4.15 Adequate and secure facilities shall be provided for the administrative and record functions required by the Training Organisation.

4.16 If required by contract or through Regulation, provision shall be made for workplace simulated conditions.

5 TRAINING ON CLIENTS' SITES

For specific competencies, welder training may be carried out at clients' sites, where the facilities may be less satisfactory for training purposes than those at a Training Establishment. The Training Organisation must take special care in these circumstances, and ensure that the training is carried out in accordance with this document. The matters shown below must be appropriately covered in the Control Manual.

a) Instructors will not commence training unless the initial and final craft or other standards have been defined and they are qualified in accordance with these requirements to deal with the identified training need.

b) All plant, systems and equipment at the training site are in a safe and well maintained condition.

c) Correct protective clothing is worn.

d) All courses (involving hands-on training) must contain a safety briefing given by the Instructor and/or a competent member of the site staff.

e) The training environment must include areas/rooms independent of production.

f) Instructor student ratio must reflect the problems imposed by environmental and other considerations, and must be reduced accordingly to maintain good Instructor/trainee supervision.

g) Lecture room facilities, if applicable, shall offer a reasonably quiet environment and shall contain adequate means for the use of visual aids.

h) Adequate time must be allowed for conducting the training course.

i) When conducting welder approval tests, the Instructor must strictly enforce the criteria detailed in the specification or standard.

6 WELDING AND RELATED EQUIPMENT

Welding plant and equipment shall be fit for its purpose complying with the appropriate standards or specifications.

All plant and equipment, including inspection and test equipment, shall be maintained in a serviceable condition. Measuring instruments used for process control and inspection and test shall be calibrated, in accordance with the Control Manual. Any deviations shall be recorded and prominently displayed on the equipment.

Each welding station shall be provided with adequate tools for the process(es) used.

7 STORAGE AND HANDLING OF MATERIALS AND CONSUMABLES

A system of stock control and recoding for base materials shall operate.

Workplace material shall be clean and stored in a dry, well ventilated area in appropriate racking, with easy access for handling. It shall be clearly identified to avoid incorrect material being selected.

Welding consumables, portions and other consumable items shall be clearly identified and stored in accordance with manufacturers' recommendations. Baking facilities and holding ovens/quivers for those electrodes and fluxes that require baking or drying shall be available. Damaged and/or unidentified items shall be discarded.

The methods used for storage, identification and handling of base materials, welding consumables, portions and other consumable items shall be documented in the control manual.

8 PERSONNEL

8.1 General

The Training Organisation and each Training Establishment shall be managed by a competent person having qualifications and experience commensurate with the activities and shall have routine access to a source of welding technology represented by an engineer of at least IncMWeldI level and with welding knowledge equivalent to CSWIP Welding Inspector. This matter shall be covered in the Control Manual.

At initial certification, the organisation must have at least one full time instructor with Registered Master Welder Instructor status. The remaining instructors may be Registered Master Welder Instructors, Certified Welding Instructors or Certified Specialist Welding Instructors. Training organisations are encouraged to have at least two Registered Master Welder Instructors.

The team of Instructors must collectively possess welder approval certificates covering the range of training for which approval is being sought or has been granted.

8.2 Authorisation of Instructors

As a minimum, instructors shall be certified and/or registered under CSWIP as Registered Master Welder Instructor, Certified Welding Instructor or Certified Specialist Welding Instructor, see Part 2.

In certain industrial sectors, e.g. training of rail welders, additional criteria to those specified in Document CSWIP-WInst-1-91 may be applied. Training organisations seeking CSWTO certification who operate in these areas must satisfy the additional industry requirements that apply and their instructors shall be authorised by any relevant industry authorisation body. Maintenance of authorisation may require renewals at more frequent intervals than those specified in Document CSWIP-WInst-1-91 and require more extensive assessments.

9 QUALITY MANAGEMENT

The Training Organisation shall prepare and implement a Control manual to cover the application of elements listed in Appendix 2 and described in Sections 3 and 12 of Document CSWTO-01-02. Clauses containing the words ‘must’ or ‘shall’ are mandatory and have to be addressed. It is expected that Training Organisations will also address clauses containing the word ‘should’ and are to explain why in their Control Manual if they do not.

Document CSWTO-1-02 does not define a Quality Management System but recognises that there are some aspects of a QMS that are necessary. These are the following and the Training Organisation is required to implement and maintain a management system embracing these aspects to support the training activities described in its Control Manual.

a) Control of documents and records
b) Resource provision
c) Training, assessment and qualification of Training Organisation personnel
d) Assessment and qualification of training processes
e) Determination of training process requirements
f) Technical and management review of training process characteristics
g) Training course planning
h) Selection of subcontractors including contract instructors
i) Monitoring and measurement of course performance
j) Assessing Training Organisation performance
k) Control of non-conformances
l) Corrective and preventive action
m) Internal audit, assessment and review

These features of a Quality Management System need only apply to the particular activities of the Training Organisation. Guidance on the development and implementation of methods to address these features is given in ISO 9004: 2009.

10 QUALIFICATION TESTING

The conduct and witnessing of qualification tests by an Examiner shall be in accordance with the requirements of the relevant standard, client, or nominated third party authority. If the Examiner is a member of the Training Organisation’s staff, the Training Organisation shall ensure that current issues of relevant standards, client specifications and third party authority regulations used in the conduct of welder, welding operator and welding assistant qualification tests are held by the organisation and made available to the Examiner at the appropriate Training Establishments or site locations.

It is the responsibility of the Examiner to:

(i) Ensure the material grade, material dimensions, joint preparation, welding position and any other criteria required by the test are in accordance with the requirements before the test commences.
(ii) Verify the name and any other means of identification of the person and record these details.
(iii) Establish that the person carrying out the test understands the test requirements and is familiar with what he or she has to do.
(iv) Record all necessary data relating to the test and prepare and issue a test record detailing all relevant information required by the standard, specification or regulation.
(v) Ensure that the weld is made by the nominated person.
(vi) Ensure that the completed test piece is adequately identified and the positions where test pieces are to be extracted are properly marked and, where appropriate, identified.
(vii) Arrange for all required inspections and tests. Mechanical tests and NDT should be carried out by accredited laboratories.
(viii) Assess the results of inspections and tests and establish if the candidate has been successful.
(ix) Where the candidate fails, arrange a re-test if this is required, following the procedure as detailed above.
(x) Generate all necessary records and authorise the issue of certificates.

11 TRAINING COURSES

Flexibility to meet customer needs is an inherent feature of welder training, but Training Organisations must maintain documentation to demonstrate that all training courses are established in a systematic and competent manner and meet expectations.

11.1 General

Each Training Organisation is required to adopt a quality policy for its training activities. The application of this policy within the organisation should impact on the aspects listed below.

- Appraising trainee potential and identifying his or her individual needs,
- Establishing reliable systems within the Training Establishment that allow individual trainee needs to be achieved in the most effective and efficient manner,
- The adoption and development by the Training Organisation of a culture that puts trainee attainment at the apex of the organisation’s aspirations,
- Adopting training methods that enable trainees to achieve their potential,
- Evaluating the effectiveness of the training methods applied,
- Assessing the effectiveness of trainee assessment and monitoring methods used,
- Ensuring that trainees are properly guided and supported,

- Evaluating the effectiveness of leaders and managers in raising achievement and supporting all trainees.

11.2 Training Methods

Welding is a craft skill and cannot be taught in a classroom. It requires practical demonstration and time for practice. The Training Organisation shall state in its Control Manual how its training methods are selected. The following aspects need to be considered:

- practical demonstrations
- private practice
- supervised practice
- classroom instruction
- private study
- instructor trainee ratios

11.3 Training Programmes

A structured programme of practical and theoretical work must be prepared for each course. Such programmes must be supported by appropriate session notes, qualified welding procedures and visual aids as described below.

The course programme gives details of session times, breaks and session activities. It may include information about session locations, instructors and session scopes and objectives. Programmes may also be designed to record individual trainee attendance and progress.

Where applicable, training programmes and training materials must comply with criteria issued by the national rail authority.

11.4 Training Material

11.4.1 Instructor Session Notes

Instructor session notes are to be prepared for each session or training activity. The notes should cover the following aspects.

- session or activity objectives and how they are to be measured
- main headings of session or activity and, as a minimum, a summary of what has to be covered under each heading
- the training aids to be used
- guidance on gaining course participation, if appropriate

11.4.2 Training Aids

Training aids may be in the form of:

- samples, eg, welds, sections, defects, mechanical test pieces

- videos
- overheads
- electronic data projection
- slides

Training aids should be uniquely numbered and controlled.

11.4.3 **Handouts**

Handouts should be available for trainees. In some cases, session notes or overheads may be used as course handouts. In others, more detailed instruction notes may be necessary. Welding procedure specifications or welding instructions should be treated as course handouts.

11.5 **Practical Sessions**

Adequate time should be allocated for practical sessions. These may include demonstrations, supervised training where good practice is encouraged and weaknesses corrected as well as private practice.

Wherever possible, welding training activities shall be in accordance with documented instructions or welding procedure specifications. Evaluations of trainee practical skills are to be carried out to a welding procedure specification or instructions based on a welding procedure specification. There should be adequate evidence held by the Training Establishment to demonstrate that the welding procedure specifications used for training and assessment are achievable.

11.6 **Trainee Progression**

Trainee progression in acquiring new skill is to be periodically assessed and monitored. Trainee performance is to be recorded and discussed at suitable times in the course with the trainees.

11.7 **Course Appraisal**

At the completion of each course, an appraisal is to be carried out and any weaknesses corrected. The assessment should normally include input from course members and course instructors and involve senior management.

12 **SAFETY**

The training area, all equipment and facilities therein, and working practices shall conform to the recommendations in TWI publication ‘Health and Safety in Welding’ or to an equivalent publication acceptable to TWI Certification Ltd.

All trainees must receive instruction in safe working practice before starting work in the practical training area. Appropriate safety clothing and equipment shall be worn and the Training Organisation shall ensure that it is in good condition.

13 USE OF LOGO AND CERTIFICATION STATEMENT

Training Establishments which are part of the Certification Scheme for Welder Training Organisations, may use the scheme logo and the words ‘Approved Welder Training Establishment.’

Certified training organisations may use the scheme logo and the words ‘Certified Welder Training Organisation.’ In addition, they may use the words ‘Approved Welder Training Establishment’ linked to the location, e.g. ‘Approved Welder Training Establishments in London, Glasgow and Aberdeen.’

14 RIGHTS AND OBLIGATIONS

Certified training organisations shall have the following rights:

a) To receive a Certificate and to use the scheme logo and words ‘Approved Welder Training Establishment.’

b) To use for each Training Establishment the scheme logo and statement ‘Approved Welder Training Establishment.’

c) To have an entry in a published directory of Certified Welder Training Organisations.

And the following obligations:

d) To operate in accordance with the scheme requirements.

e) To keep in touch with trends and developments in welding appropriate to their scope and inform TWI Certification Ltd of any changes which may affect their scope of certification.

f) To establish and maintain a complaints procedure to deal with complaints from trainees or their employees.

15 FEES

The fee structure for certification shall be fixed by the Management Committee so as to cover operating costs. There will be a fee for each Certified Training Organisation and an additional fee for each approved Training Establishment.

The charges for assessment and surveillance shall also be agreed by the Management Committee. Where Training Organisations provide training at sites away from a Training Establishment, additional visits are included in assessment and surveillance programmes to witness and audit at site.

Details of current fees are given in a separate document which is available on request from TWI Certification Ltd, see Introduction page.

PART 1: APPENDIX 1: SCOPE OF APPROVAL - RAIL WELDING PROCESSES/PRODUCTS/MATERIALS

	Group A Rail Steels	Group B Rail Steels	Group C Rail Steels	Other Rail Steels
MMA				
MIG/MAG and related				
Tubular cored wire				
Aluminothermic process 1				
Aluminothermic process 2				
Flash butt				

The categories of materials detailed in the above table comply with the groups of materials given in Network Rail Standard NR/L2/TRK/0032. The categories are as follows:

Group A rail steels:
R200
R220 (Normal grade)
R260 (Wear-resisting Grade A)
UIC 700
UIC 900A
AREA 900A
UIC Grade A

Group B rail steels:
R260Mn (Wear-resisting Grade B)
R320Cr (110kg/mm^2 Cr)
90kg/mm^2
UIC Grade B

Group C rail steels:
R350HT
HT (340-370)

Other rail steels:
High Performance (HP)
400MHH (R370CrHT)

PART 1: APPENDIX 2: THE CONTROL MANUAL

The Control Manual shall cover the following matters. Additionally, it may cover the quality management elements listed in Section 8. Where information is subject to periodic or regular change, that information may be held separately and its location referenced in the Control Manual.

1 A quality policy statement.

2 General description of the facilities, location, organisation and management of the Training Organisation and its Training Establishment(s); legal status.

3 Names, qualifications and experience of staff; recruitment policy, staff structure, access to source of welding technology. Job functions and job specifications of staff; student-staff ratio. Contingency plans to deal with unplanned instructor absences.

4 Subcontractor control procedures.

5 Safety policy; implementation; safety officer, first aid facilities; emergency procedures.

6 Administration; procedure, trainee records, confidentiality; facilities, systems.

7 Procedure for management and control of site operations.

8 Internal audit procedure for the CSWTO scheme.

9 Complaints procedure.

10 Workshop facilities; nature of construction; cleaning, maintenance, safety, illumination, ventilation, temperature control; access control. Welding stations, construction, size, access, maintenance, fume extraction. Electrical installation; power supplies, maintenance. Heavy grinding area; location; ventilation and dust extraction, cleaning, maintenance. Handling and lifting equipment, maintenance, safety.

11 Lecture room facilities; nature of construction, area, capacity, noise level and control, cleaning, maintenance, safety, illumination, visual aids, ventilation, temperature control, seating, tables.

12 Welding equipment; purchase, replacement, checking, calibration, maintenance, safety.

13 Consumables and parent materials; purchase, stock levels, control, recording, identification, storage, shelf life, issue procedure, control in training area.

14 Preparation of material; cleaning, cutting, machining.

15 Welding procedure specifications for training; preparation, validation, approval, control, change procedure.

16 Power and hand tools; purchase, maintenance, issue, safety.

17 Qualification testing; location, work piece preparation, identification, issue, control, welding procedure specifications, issue of consumables, instruction to candidates, supervision, witnessing, documentation; welding equipment, calibration, maintenance, certification, issue of certificates.

18 Testing; equipment calibration, maintenance, witnessing; assessment of results, subcontract procedures.

19 Training methods, training programmes; preparation, validation, change control, interfacing with customer needs.

20 Lecture notes and visual aids; preparation, sourcing validation, change control.

PART 2: CERTIFICATION OF WELDING INSTRUCTORS AND SPECIALIST WELDING INSTRUCTORS FOR RAIL WELDING

1 OBJECTIVES

The manufacture of safe, cost-effective welding is critically dependent on the skill of individual welders. In order to ensure welders are properly trained and instructed, a scheme for qualifying welding instructors is essential. As well as bringing benefits to the trainee, it also provides nationally recognised status for the instructor and the training organisation employing him/her.

2 SCOPE

The scheme identifies personnel who have relevant experience in welding instruction, a high level of welding skill and who have attained a minimum level of knowledge. This document provides the procedures by which certification is sought and the requirements for the approval of the related training course.

3 CATEGORIES OF CERTIFICATION AND DEFINITIONS

There are two categories of certification as defined below:

3.1 Certified Welding Instructor

A Certified Welding Instructor is a person responsible for the initial assessment and instruction in the safe and correct practical welding skills required by the trainee to meet his/her or the sponsor's specification. The instructor has duties in supervising trainees, course planning, course delivery, inspection and testing of weldments and in trainees' record keeping. A Certified Welding Instructor is eligible for Registration as a Master Welder Instructor, see Appendix 1.

3.2 Certified Specialist Welding Instructor

A Certified Specialist Welding Instructor is a person whose welding qualifications may not be sufficient to satisfy the requirements for Welding Instructor although the person can provide safe and correct practical training within his welding capabilities in one or more of the following areas:

a) assisting a Welding Instructor when course numbers exceed practical limits of instructor/trainee levels,

b) providing specialist training courses within their competency.

c) undertaking welder competency assessments within their competency under the overall supervision of a Welding Instructor.

A Certified Specialist Welding Instructor is not eligible to be Registered as a Master Welding Instructor.

4 SKILL REQUIREMENTS

Instructors are required to provide proof of their welding skill through the successful completion of welder qualification tests to an acceptable standard.[1]

4.1 Certified Welding Instructor

To become a Certified Welding Instructor, qualifications must be held in three combinations of processes and materials, that is, any three of the boxes in the table shown below

Rail processes/products/materials (see Part 1, Appendix 1 for grouping system definition)

	Group A Rail Steels	Group B Rail Steels	Group C Rail Steels	Other Rail Steels
MMA				
MIG/MAG and related				
Tubular cored wire				
Aluminothermic process 1				
Aluminothermic process 2				
Flash butt				

Qualifications may be held in one welding process used on a range of materials, one material for a range of processes or any combination.

4.2 Certified Specialist Welding Instructor

Qualifications must be held in at least one process/material combination from the boxes in the table above.

[1] Network Rail Standard NR/L2/TRK/0032 and 0132

5 KNOWLEDGE REQUIREMENTS

5.1 Welding Technology

Candidates for Certified Welding Instructor and Certified Specialist Welding Instructor must demonstrate knowledge in the processes on which they give instruction. A typical description of the required knowledge base for rail welding instructors is given in Appendix 2. Candidates are expected to provide evidence of training covering the appropriate knowledge base.

Rail welding instructors will be deemed to have satisfied the welding technology knowledge requirements (but not clause 5.2 or the examinations detailed below) if they:

1) Hold current Sentinel cards covering the process in which certification as an instructor is sought, or

2) Were previously recognised as rail welding instructors under the pre-existing BR system.

5.2 Instruction techniques

In addition to satisfying the above, candidates must also demonstrate skill in instruction techniques as evidenced by successful completion of a relevant course[*] or through documented and authenticated instructor experience. Candidates submitting evidence of past experience must include detailed information of the courses they have been associated with as an instructor in the previous three years including: the candidate's role, course title, programme, content and duration. Evaluation of the candidate's performance in the course should be included.

Applicants who have successfully attended a recognised course on instructional techniques, such as those offered by City & Guilds, BTEC, ARTS or RTAS, will be deemed to have satisfied this clause.

6 THE EXAMINATION

Written part – Certified Welding Instructors only

A multiple-choice question and narrative answer examination is designed to test the candidate's knowledge of the welding technology identified in the training syllabus, see Appendix 2.

[*] Holders of TDLB units D32 or D33 (A1/A2) are deemed to satisfy this requirement.

Practical part - Certified Welding Instructors and Specialist Welding Instructors

Candidates are required to demonstrate their competence in instructional techniques by:

a) Producing a rail weld with a verbal commentary in the presence of an examiner or invigilator
b) Running a classroom session including a minimum of 20 minutes verbal communication.

In addition, the Specialist Welding Instructor must undergo an oral examination.

Examinations may be conducted during the audit of a training organisation under the scheme described in Part 1 of this document.

7 REQUIRED EXPERIENCE

Candidates for Welding Instructor must have a practical welding background as a welder[2], welding operator or welding instructor and must have a minimum of five years relevant welding experience. In exceptional cases, a candidate with experience as a welder in industry may be accepted for certification with a shorter period of experience, but not less than three years, if he or she can demonstrate a competence that would be expected in a mature candidate with five or more years' practical experience.

Candidates for Specialist Welding Instructor must have practical welding background with at least one year as a welder or welding operator, in industry or in a welder training school.

8 INSTRUCTORS' RESPONSIBILITIES

Applicants for certification as Welding Instructor will be expected to demonstrate responsibilities and capability in all of the items listed below:

a) **Supervisory**

Discipline and control of trainees**
Ordering of materials*
Preventative maintenance of equipment**
General housekeeping**
Counselling trainees.*

b) **Course planning**

Preparation of training programme*
Preparation for weld test/assessment*

[2] Five years' experience as a welding instructor is acceptable in lieu of experience as a welder

Writing course notes and hand outs.*

c) **Course delivery**

Safety and related subjects**
Instructing trainees to the syllabus requirements**
Lectures and shop talks to support practical training**
Practical demonstrations**
Reading of drawings**
Instruction in repair procedures.**

d) **Inspection and testing**

Testing to recognised standards or industry specifications as appropriate**
Inspection of trainee test pieces.**

e **Record keeping**

Measurement and recording of trainee competence**
Logging trainee progress**
Written reports.*

Applicants for certification as Specialist Welding Instructor will be expected to demonstrate knowledge and understanding of all those items in the above lists marked with a single asterisk* and to demonstrate capability in those items marked with two asterisks.**

9 APPLICATION FOR EXAMINATION AND FEES

Candidates will be required to submit an application form and a CV. All the information requested must be on these forms. No applications can be considered confirmed until receipt of correctly completed documents. Application forms ask for specific details of experience and training and must be signed to the effect that these details are correct

10 CERTIFICATION

10.1 Results Notices

All candidates will be sent a results notice. This notice will also be sent to the organisation paying the examination fee, if not paid by the candidate.

10.2 Successful candidates

Two copies of a certificate of proficiency will be issued to the organisation or person that pays the examination fees. Duplicate certificates to replace those lost or destroyed will be issued only after extensive enquiries.

10.3 Unsuccessful candidates

Candidates who fail to obtain a certificate may attempt one retest of those parts of the examination in which success was not achieved. The retest must be completed within one year of the initial test, otherwise candidates will have to repeat the complete examination. Candidates who fail the retest revert to initial status.

10.4 Period of validity

The certificate is valid for five years from the date of completion of the initial test and may be renewed for a further five years on application, provided evidence is produced in accordance with Clause 10.5.1. Certificates are only valid provided:

a) they are within date.
b) they are on standard cream CSWIP paper bearing the CSWIP logo in black on gold signed by an officer of CSWIP and embossed with the CSWIP stamp.
c) they have been signed by the individual to whom the certificate is awarded.
d) they are accompanied by a valid official CSWIP identity card.

Photocopies are unauthorised by CSWIP and should only be used for internal administrative purposes.

For rail welding instructors certification may be limited to an initial period of two years. At the two year point, instructors will need to demonstrate skill in the processes for which they wish to be certified either via a Sentinel qualification or by completing the appropriate skill test.

10.5 Renewal

10.5.1 Five year renewal

In order for the certificate for Welding Instructor or Specialist Welding Instructor to be renewed after five years, the holder has to demonstrate that he/she has maintained his/her competence by:

i) providing evidence of continuous work activity in welding instruction
ii) providing evidence that the holder has kept up to date in welding technology.

One way of satisfying Part (ii) for a Welding Instructor is by Registration as a Master Welder Instructor – see Appendix 1. Registration includes membership of the Welding & Joining Society.

Specialist Welding Instructors may find it helpful to join The Welding & Joining Society.

Part (i) can be satisfied either by the employer signing the reverse of the certificate or, if the holder has had a number of different jobs, by submitting a log sheet of relevant work activity covering the period of validity of the certificate. Rail welding instructors are required to maintain logs of training activities.

Renewal must take place not later than 21 days after the date of expiry of the certificate. It is the certificate holder's responsibility to ensure that renewal takes place at the appropriate time**.** Only under extreme circumstances will certificates be renewed up to a maximum of six calendar months from the date of expiry shown on the certificate and late renewal will be subject to a special fee.

10.5.2 **Ten year renewal**

Welding Instructor and Specialist Welding Instructor certificates are renewed beyond ten years from the initial examination (or from a previous ten year renewal) by the holder successfully completing a renewal examination prior to the expiry of the certificate in addition to the renewal procedure given in Clause 10.5.1.

The 10 year examination will consist of the following:

Multi choice written paper.

The initial practical examination.

One retest, within 4 months of the 10 year renewal examination, will be allowed.

Failure at the retest point will mean that the candidate **must** take the full course and initial examination again to regain the qualification.

PART 2: APPENDIX 1:

REGISTRATION SCHEME REQUIREMENTS FOR RAIL WELDING INSTRUCTORS

FOREWORD

Registration is open to all those who currently hold a CSWIP Welding Instructor Certificate and who have held responsibilities commensurate with their CSWIP qualification for the prescribed number of years.

Certificate holders are encouraged to register as it provides an inexpensive way of gaining access to a number of exclusive services and benefits which will help them in their day to day work in structuring their continuing professional development (CPD) and in developing their careers. Registration is renewable annually and is a mark of current competence; it will therefore be of benefit when CSWIP certificates are presented for renewal.

Registration does not <u>replace</u> the CSWIP certificate and registrants will need to continue to ensure that they maintain the validity of their certificate.

1 BENEFITS OF REGISTRATION

Credibility

Registration provides a clear statement of capability in the registrant's area of activity based on an independent assessment of his/her CV and current responsibilities. It brings status, credibility and mobility. Registrants can obtain stamped and countersigned copies of their authenticated CVs for a nominal fee. This type of validation of CVs is now often required by employers as it ensures the information is accurate.

Registrants receive a free personalised rubber stamp indicating their qualifications. This provides a convenient way of confirming the Registrant's status when signing documents, reports, etc.

Registrants are reminded of when their CSWIP qualification is due for renewal and they also get a discount on the fee.

Membership

All registrants who are not already Professional Members of The Welding Institute (TWI) or members of The Institute of Rail Welding (IoRW) are automatically elected to Membership of The Welding & Joining Society (WJS) without further application. This provides a convenient mechanism for registrants to involve themselves in the welding community. The services from TWI/WJS include:

- information and library services
- discounts on training courses, seminars and publications

- local branch programmes: technical meetings, works visits and social events
- national technical groups providing a forum for discussion on specific subjects
- free issues of two journals: Connect published by TWI and the technical journal of the Professional Division.
- A dedicated web site for members: www.twiprofessional.com.

Reading TWI/WJS journals and attending meetings/courses facilitates fulfilment of the CPD requirements for renewing registration, see Section 3, and CSWIP certification.

Registrants are bound by the Institute's Rules of Professional Conduct, see Section 4, which conform to the general principles extant in the engineering profession.

Career Development Record

A specially designed CSWIP Log Book is provided free of charge to registrants. This contains sections on training, qualifications and work activity and completing the record regularly will greatly ease the process of renewal of CSWIP certification. It is also a clear and professional record of your achievements to assist future career promotion prospects.

Titles

Registrants are awarded the title Registered Master Welder Instructor. A certificate and registration card is issued to all registrants to confirm their title.

2 REQUIREMENTS OF REGISTRATION

Welding Instructors

Applicants must have a CSWIP Welding Instructor's certificate and must have had three years of experience and current responsibilities in the areas of work given in Doc: CSWIP-WInst-1-91. These include:

Initial assessment and instruction in the safe and correct practical welding skills required by the trainee to meet his/her or the sponsor's specification; the supervision of trainees, course planning, course delivery, inspection and testing of weldments and trainees' record keeping.

3 MAINTAINING REGISTRATION

Registration is valid for one year and is maintained by payment of an annual fee and is also reviewed at intervals of three years. At the review point, certificate holders must provide evidence of continuity of employment and Continuing Professional Development (CPD) for which a form is provided.

Registrants are strongly encouraged to maintain a log of their CPD activities in accordance with TWI and Engineering Council recommendations.

4 THE WELDING INSTITUTE RULES OF PROFESSIONAL CONDUCT

(The masculine gender is used throughout for convenience only).

1 When discharging his professional duties, a member:

a) Should satisfy himself as to their scope, obtaining in advance any necessary clarification or confirmation and shall not accept professional obligations which he believes he has not sufficient competence or authority to perform.

b) Shall accept responsibility for all work carried out by him, or under his supervision or direction, and shall take all reasonable steps to ensure that persons working under his authority are competent to carry out the tasks assigned to them and that they accept responsibility for work done under the authority delegated to them.

c) Shall, when asked for professional advice, give an opinion that is objective and reliable to the best of his ability.

d) Shall, if his professional advice is not accepted, take all reasonable steps to ensure that the person who overrules or disregards his advice is aware of the possible consequences.

2 Except when legally authorised in the national or public interest, a member shall not do anything or permit anything under his authority to be done, of which the probable and involuntary consequences would, in his professional judgement, endanger human life or safety, expose valuable property to the risk of destruction or serious damage, or needlessly pollute the environment.

3 In his work, a member shall respect all relevant laws and statutory regulations.

4 In respect of his professional relationships with employers, colleagues or clients, a member:

a) Shall not maliciously or recklessly injure or attempt to injure, whether directly or indirectly, the professional reputation of another.

b) Shall disclose to his client or employer any benefits or interests that he may have in any matter in which he is engaged on their behalf.

c) Shall neither communicate to any person, nor publish any information or matter, not previously known by him or published in the public domain, which has been communicated to him in confidence by a

client or employer without the express authority of that client or employer.

5 A member shall ensure that he keeps up-to-date in the technology in which he practises. To this end, Members are encouraged to adopt a formal approach to Continuing Professional Development.

6 A member shall not solicit work in a misleading or unfair way as an independent adviser or consultant, either directly or by an agent, nor shall he improperly pay any person by commission or otherwise for the introduction of such work.

7 A member shall not be the medium of payments made on his employer's behalf unless so requested by his employer, nor shall he, in connection with work on which he is employed, place contracts or orders except with the authority of and on behalf of his employer.

8 A member working overseas shall observe these rules as far as they are applicable, but where there are recognised standards of professional conduct in the country in which he is employed, he may adhere to them.

9 A member shall be guilty of improper conduct if he is convicted by a competent tribunal of a criminal or civil offence which in the opinion of the Council of The Welding Institute renders him unfit to be a member.

10 If, in the opinion of Council, a member is precluded from performing his professional duties in a manner consistent with the standards of his profession, as a result of being adjudicated bankrupt or making a composition with his creditors, he may be deemed guilty of improper conduct.

PART 2: APPENDIX 2:

SPECIFIC KNOWLEDGE REQUIREMENTS FOR RAIL WELDING INSTRUCTORS

1 Codes and Standards

Terms, symbols and definitions for rail welding.
Network Rail Standards and Line Specifications that deal with rail welding.

2 Materials

Classification, properties and typical applications of steels used for track, including switches and crossings. The iron carbon diagram and the effect of cooling rate.
Rail grades and profiles in common use.

3 Welding technology

Description, characteristics and application of aluminothermic, arc welding and flash welding as applied to rails.

4 Welding equipment

Principles of operation of aluminothermic, arc welding, flash welding and ancillary equipment (e.g. cutting and heating).

5 Welding practice – aluminothermic welding

Aluminothermic welding processes

Content and use of process manuals.

Welding consumables (gases, portions, etc.) and their storage and selection.

Welding process variables and their effects.

Preheating
Reaction times.

Joint preparation

Rail marking
Cutting and aligning rails to the required standard and within specified tolerances
Taking rail wear into account
Selecting the correct moulds
Fitting and cutting moulds
Standard gap and wide gap welds
Protecting the weld area from inclement weather.

Preparation for welding
Basic track technology
Rail layout, ballasting, sleepers and clamping

Preheating the crucible

Fitting the crucible, slag, bowls etc.
Adding the portion
Special requirements for dissimilar metal welds.

Welding

Preheating the joint
Igniting the portion
Reaction time
Melting and pouring
Cooling time and use of mufflers as appropriate.

Post weld activities

Removal of runners and risers
Use of shearing tools to remove excess metal
Grinding the rail head to the required standard
Use of tensor equipment.
Welding inspection

Weld defects

Common weld defects: misalignment, poor shape, cavities, lack of fusion, etc.

6 Welding practice – arc welding

Use of manual metal arc and self shielded flux cored arc welding for repair and refurbishment of rails, switch blades and crossings.

Welding consumables and their storage and selection.

Welding equipment, power sources, wire feeders and torches, maintenance

Welding process variables and their effects

Current, voltage, travel speed, arc length, electrode angle, electrode stick-out, wire feed speed, polarity.

Joint preparation

Weld preparation requirements
Cleanliness of weld preparations.

Welding procedure specifications
Weld beads covering stringer beads, split weaves and weaves

Content, key role in quality assurance.

Weld defects.

Repair of welds.

7 Properties of welds

Properties of welds including: strength, toughness, hardness.
Effect of heat treatment, including preheating, and post-weld heat treatment.
Influence of heat input and cooling rate on the deposited weld metal and heat-affected zone.
Weldability – achieving acceptable weld quality with high carbon steels.
Influence of composition of rail steel and consumables on weld properties.
Dilution.
Hydrogen cracking (HAZ and weld).

8 Quality Assurance (QA)

Quality Management, ISO 9000 series of standards
Quality manual (or quality plan), ISO 3834/EN 729

Quality documentation for welding: welding procedure specifications (WPS), process manuals, welding procedure, approval records (WPAR), welder qualification and welder records.

Calibration of welding equipment and instruments.

9 Quality Control (QC)

Care and maintenance of equipment.

Requirements of inspection before, during and after welding; qualification of inspection personnel.

Checking performance and accuracy; calibration.

Methods of inspection and testing in accordance with the relevant application standards.

Acceptance criteria.

Visual: weld size, form and shape; undercut, overlap, surface.

Destructive: chemical analysis, tensile, bend, impact, nick-break, macro and hardness tests.

Non-destructive: visual, magnetic, penetrant, ultrasonic and radiographic inspection.

Detection and measurement of weld defects.

10 **Safety**

Identification of hazards and necessary action to eliminate or reduce hazards:

Examples of hazards:

Electric shock
Fire and explosion
Fumes
Cylinder handling
Welding arcs
Exothermic reactions.

Typical safety procedures:

Safety education
Eye, ear and skin protection
Storage of gases
First aid.
Storage of portions/ignitors

Statutory requirements: Health and Safety at Work Act regulations covering:

Workplace – Personal Track Safety
Provision and Use of Work Equipment
Manual Handling operations
Personal Protective Equipment at Work
Management of Health and Safety at Work
COSHH.