



**CERTIFICATION SCHEME FOR PERSONNEL**

## **DOCUMENT NO. CSWIP-WS-1-90**

### **Requirements for the Certification of Welding Supervisors**

4th Edition March 2016

Issued under the authority of the Governing Board for Certification  
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## FOREWORD

The Certification Scheme for Personnel (CSWIP) is a comprehensive scheme which provides for the examination and certification of individuals seeking to demonstrate their knowledge and/or competence in their field of operation. The scope of CSWIP includes all levels of Welding Inspectors, Welding Supervisors, Welding Instructors, Welding Examiners, Welding Quality Control Co-ordinators, Heat Treatment Operatives, Cathodic Inspection Personnel, Plant Inspectors, Underwater Inspectors, Plastic Welders and NDT personnel.

CSWIP is managed by the Certification Management Board, which acts as the Governing Board for Certification, in keeping with the requirements of the industries served by the scheme. The Certification Management Board, in turn, appoints specialist Management Committees to oversee specific parts of the scheme. All CSWIP Boards and Committees comprise member representatives of relevant industrial and other interests. TWI Certification Ltd is accredited by UKAS to BS EN ISO/IEC 17024 for certification of personnel.

TWI Certification Ltd understands the importance of impartiality in carrying out its certification activities, managing conflict of interest and ensuring the objectivity of all its certification activities, in accordance with BS EN ISO/IEC 17024.

The requirements governing the Registration of Welding Supervisors are detailed in a separate document. Success in the appropriate CSWIP certification examination is one of the prerequisites of Registration.

Registration is strongly recommended as it helps to satisfy the CSWIP certificate renewal requirements, see Clause 3.5.1

## 1. ACCESS TO CERTIFICATION

Access to certification schemes is not improperly restricted. The sole criteria for certification are given in the document (and any subsequent amendments) and no other criteria will be applied. Certification is not conditional on the candidate applying for other services or membership from TWI Certification Ltd, its parent, or any other groups or associations.

### 1.1. Objectives

The manufacture of safe, cost-effective welded products and structures is critically dependent on the control exercised in fabrication to ensure that welding and related operations are correctly and safely carried out. The supervision of welding is a key feature of welded product manufacture and welded fabrication and it is most important that those supervising welding operations have attained the level of competence necessary to supervise the work correctly.

Moreover, the employment of welding personnel with appropriate competence is a requirement of BS EN ISO 3834<sup>(2)</sup> and BS EN 1090-1<sup>(3)</sup>, which are set to control the levels of quality control in welded products

As such, competence assurance of welding supervisors will provide customers of welded products with confidence that essential welding-related tasks are supervised by personnel with appropriate knowledge, skills and experience.

### 1.2. Scope

Manufacturers and fabricators of welded products across all industry sectors make use of the welding supervisor role to supervise essential welding-related tasks for control of product

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<sup>(2)</sup> BS EN ISO 3834: 2005: Quality Requirements for Fusion Welding of Metallic Materials

<sup>(3)</sup> BS EN 1090: 2009:A1: 2011 Execution of Stainless Steel and Aluminium Structures, Requirements for conformity assessment of structural components

quality. Welding supervisors are expected to know the variables that influence welding quality and to understand how monitoring and control of welders and welded production can realise the required level of product quality. Welding supervisors are also required to know the welding variables that influence productivity and understand how selection of essential variables can affect welding speed and cost.

This CSWIP Welding Supervisor certification scheme defines the minimum standard for welding supervisor competence in the essential welding related tasks in Appendix 1. CSWIP Welding Supervisor certification is intended for personnel who have relevant experience in welding supervision, and who have attained a minimum level of knowledge and skill as evidenced by examination. This document provides the procedure for competence assessment and certification, and the requirements for access to assessment, including the necessary level of prior training, education and experience. The CSWIP Welding Supervisor certificate provides the individual with an internationally recognised mark of competence in the role and responsibilities defined in this scheme document.

### **1.3. Responsibilities**

The CSWIP Welding Supervisor is a person responsible for the shop floor (or site) planning, implementation and supervision of welding activities, for the direction of the welding workforce, and for controlling the manufacture by welding in accordance with specified instructions.

The CSWIP Welding Supervisor is expected to control the following essential welding-related aspects to ensure that technical, health, safety and environmental requirements of welded production:

- Welding personnel
- Equipment
- Production planning
- Welding procedure specifications
- Work instructions
- Welding consumables
- Materials
- Inspection and testing before welding
- Inspection and testing during welding
- Inspection and testing after welding
- Post-weld heat treatment
- Non-conformance and corrective actions
- Calibration and validation of measuring, inspection and testing equipment
- Identification and traceability
- Quality records

It remains the responsibility of the employer to determine that the welding supervisor is capable of undertaking all allocated responsibilities.

### **1.4. Requirements prior to taking a certification test**

Job responsibilities and experience criteria for examination eligibility as given below are strictly adhered to and enforced.

Candidates must have the following as a minimum:

- a) Hold a current valid CSWIP Welding Inspector

or

- b) Hold a current valid Certified European/International Welding Specialist
- or
- c) Hold a current valid CSWIP Welding Instructor
- or
- d) Three years authenticated experience with responsibility for welding coordination

## **1.5. Training**

All candidates (with the exception of mature candidates, see Section 1.6) must attend a CSWIP approved course of training, details are given in Appendix 2.

## **1.6. Mature candidate entry requirements**

Direct entry to the CSWIP Welding Supervisor examination is available for applicants holding the following minimum levels of certification and experience in welding supervision:

CSWIP Welding Inspector for at least two years

or

CSWIP Welding Instructor for at least two years

or

CSWIP Welding Examiner for at least two years

or

Certified European/International Welding Specialist for at least two years

And at least one year of experience in supervising the following essential welding-related tasks given in Appendix 1.

## **2. Examination procedure**

The candidate is not required to demonstrate their knowledge of every aspect of welding processes only the processes that are applicable. It is therefore appropriate to test their understanding of fabrication related aspects only and certification shall require the successful completion of an approved training course (Appendix 2).

Exemption from the welding technology elements of the course (but not the examination) may be granted to holders of a recognised Level 3 (QCF) qualification in welding and fabrication or the E/IWS diploma.

### **2.1. The Examination**

The multiple-choice questions are used to test the candidate's knowledge of the welding technology identified in the examination syllabus. (Appendix 1).

### **2.1.1. General Written Examination**

Candidates will be required to take:

- 60 multiple choice question paper
- Time allowed 90 minutes
- Pass mark 70%.

### **2.1.2. Specific Written Examination**

Candidates can be examined on the following welding processes:

- MMA Manual Metal Arc (111)
- MAG Metal Active Gas welding (135, 136, and 138)
- SAW Submerged Arc Welding (121 and 125)
- MIG Metal Inert Gas welding (131)
- TIG Tungsten Inert Gas welding (141).

For each welding process to be covered by the certification, candidates will sit a specific written examination consisting of the following:

- 20 multiple choice question paper on the specific welding process
- Time allowed 30 minutes
- Pass mark 70%

## **2.2. Application for Examination and Fees**

Candidates will be required to submit an application form, 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, education and training and must be signed to the effect that these details are correct.

In the event of a false statement being discovered on forms any examination undertaken will be declared null and void. A certificate is automatically invalidated if there are any outstanding examination fees in respect of that certificate.

Candidates proved to have cheated, or found to have attempted to remove or found to have removed examination material in a CSWIP examination will not be accepted as a candidate for any CSWIP examination for a minimum period of five years from the date of the examination where cheating, attempt to remove or removal of examination material, was established to have taken place.

Examinations may be taken at any one of a number of Test Centres in the UK and overseas. Lists are available on request.

## **3. Certification**

### **3.1. 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.

### **3.2. 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.

### **3.3. 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. If the retest is failed, the candidate must return to Initial status.

### **3.4. Period of validity**

The certificate is valid for five years from the date of completion of the initial examination and may be renewed for a further five years on application, provided evidence is produced in accordance with Clause 3.5.1. 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; and
- 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.

### **3.5. Renewal**

#### **3.5.1. Five year renewal**

In order for the certificate 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 supervision
- ii) providing evidence that the holder has kept up to date in welding technology.

One way of satisfying Part (ii) is by Registration as a Welding Supervisor, see separate document. Part (i) can be satisfied by submitting a log sheet of relevant work activity covering the period of validity of the certificate. Requests for the appropriate documentation should be sent to TWI Certification Ltd details are provided at the end of this document.

The certificate will not be renewed without further test if a substantiated complaint is notified by the Governing Board during the period of its validity. Further instruction and retest may then be required.

Renewal must take place not later than 21 days after the date of expiry. 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 after a lapse of six calendar months from the date of expiry shown on the certificate and late renewal will be subject to a special fee.

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\* As a guide, 'reasonable continuity' in any given five year period means that absences from work for which the certificate was granted should not exceed one year in one or several periods

### 3.5.2. Ten year recertification

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 6.5.1. Requests for the appropriate documentation should be sent to TWI Certification Ltd.

The 10 year examination will consist of a multi choice written paper.

One retest within six 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.

### 3.6. Complaints and Appeals

An aggrieved party in a dispute which considers itself to have reasonable grounds for questioning the competency of a CSWIP qualified person may petition the Governing Board for non-renewal of the certificate. Such a petition must be accompanied by all relevant facts, and if in the opinion of the Board an adequate case has been presented, a full investigation of the circumstances under dispute will be initiated. If the petition is substantiated to the satisfaction of the Board, the certificate will not be renewed without further test.

Appeals against failure to certify or against non-renewal of the certificate may be made by the inspector or the employer upon application in writing to the Governing Board.

## 4. Records

TWI Certification Ltd maintains records of successful and unsuccessful candidates. These records are accessible to the Governing Board or its nominees at all reasonable times.

## 5. ADDRESSES

For further general information contact:

TWI Certification Ltd	Phone:	+44 (0) 1223 899000
Granta Park	Fax :	+44 (0) 1223 894219
Great Abington	Email:	twicertification@twi.co.uk
Cambridge CB21 6AL		

[www.cswip.com](http://www.cswip.com)

For specific information on examinations and arranging for them to be carried out, contact the approved Examining Body:

TWI Training and Examinations	Phone:	+44 (0) 1223 899500
Granta Park	Fax:	+44 (0) 1223 891630
Great Abington	Email:	trainexam@twi.co.uk
Cambridge CB21 6AL		

[www.twitraining.com](http://www.twitraining.com)



**CERTIFICATION SCHEME FOR PERSONNEL**

**CERTIFICATION OF WELDING SUPERVISORS**

**APPENDICES TO DOCUMENT NO CSWIP-WS-1-90**



## Appendix 1 Essential Welding Related Tasks

1. Preparation of the product standard to be used, together with any supplementary requirements;
2. Preparation of the capability to meet the prescribed requirements.
3. Control of the parent material(s) specification and welded joint properties;
4. Control of the joint location with relation to the design requirements;
5. Control of the quality and acceptance requirements for welds;
6. Control the location, accessibility and sequence of welds, including accessibility for inspection and non-destructive testing;
7. Control of batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content, permanent backing, use of peening, surface finish, weld profile;
8. Control of the dimensions and details of joint preparation and completed weld.
9. Control of the qualification of welders and welding operators.
10. Preparation of welding and associated equipment; auxiliaries and equipment supply, identification and handling;
11. Control of personal protective equipment and other safety equipment, directly associated with the applicable manufacturing process;
12. Control of equipment maintenance, verification and validation.
13. Preparation of the appropriate procedure specifications for welding and allied processes;
14. Control of the sequence in which the welds are to be made;
15. Control of the working conditions for welding, including the environment;
16. Control of the allocation of qualified personnel;
17. Preparation of equipment for preheating and post-heat treatment, including temperature indicators;
18. Preparation for any production test.
19. Control of the qualification of welding personnel, including the method and range of qualification required by the welding procedure specification.
20. Control of welding procedure specifications and preparation of work instructions.
21. Control of the storage, handling and traceability of welding consumables and preparation for use.
22. Control of the storage, handling and traceability of parent material, and preparation for use.
23. Control of the suitability and validity of welders' and welding operators' qualification certificates;
24. Control of joint preparation, fit-up, jiggling and tacking;
25. Control of the essential welding parameters (e.g. welding current, arc voltage and travel speed);
26. Control of the preheating/interpass temperature, cleaning of runs and layers of weld metal, and back gouging;
27. Control of the welding sequence;
28. Control of inspection and testing;
29. Control of post-weld heat treatment.
30. Control of non-conforming products, corrective actions, weld repairs, identification and re-assessment of repaired welds.
31. Control of the calibration and validation of equipment.
32. Control of the traceability of welding procedure specifications, welders and welding equipment to specific welds;
33. Preparation and maintenance of quality, safety and environmental records.

## APPENDIX 2: SYLLABUS

Candidates will be expected to have knowledge of:

### 1. WELDING TECHNOLOGY

#### Welding and allied processes

- Description, characteristics and application of the following:
  - MMA Manual Metal Arc (111)
  - MAG Metal Active Gas welding (135, 136, and 138)
  - SAW Submerged Arc Welding (121 and 125)
  - MIG Metal Inert Gas welding (131)
  - TIG Tungsten Inert Gas welding (141).

#### Welding equipment

- Mechanisation and automation
- Principles of operation; principal components of power sources and their ancillary equipment
- Care and maintenance

#### Welding practice

- Welding consumables (electrodes, filler metals, fluxes, gases etc) and their selection:
  - Standards and classification
  - Storage, drying and baking
  - Hydrogen control
- Welding process variables and their effects:
  - current, voltage, travel speed, arc length, electrode angle, electrode stick-out, polarity, flow rates of shielding and purging gases.
- Joint preparation:
  - Weld preparation requirements and examples
  - Cleanliness of weld preparations.
- Welding procedure specifications (WPS):
  - Content of WPS and its key role in quality assurance.
- Control of distortion:
  - Factors influencing distortion, for example, joint preparation, fit-up, welding speed, welding process used, welding sequence, material thickness and the use of jigs and fixtures.
- Remedial action, for example approved heating or mechanical techniques.
- Preheat, interpass and post-weld heat treatment:
  - Methods of heating, measurement and control of temperatures.
- Weld defects:

- Common weld defects: misalignment, poor shape, undercut, excess penetration, slag, porosity, lack of fusion, lack of penetration.
- Repair of welds.

### **Properties of welded joints**

- Properties of welded joints including: strength, toughness, hardness, corrosion resistance
- Effect of heat treatment, including normalising, annealing, preheating, quench and tempering, solution treatment and post-weld heat treatment.
- Influence of heat input and cooling rate on the deposited weld metal and heat-affected zone
- Influence of composition of parent metal and consumables on weld properties
- Dilution
- Influence of restraint
- Weldability
- Hydrogen cracking (HAZ and weld), solidification cracking, reheat cracking, transverse cracking and lamellar tearing
- Modes of failure: eg brittle fracture and fatigue.

## **2 SUPERVISION, PRODUCTION AND PLANNING**

- Welding supervision practices

### **Codes and Standards**

- Terms, symbols and definitions in welding
- Standards for welding and fabrication
- Application standards
- Relation to contract specifications.

### **Planning and Production**

- Interpretation of drawings for fabrication
- Planning and control, eg:
  - Selection and layout of plant, handling of material
  - Selection and training of welders
  - Scheduling welding activities.
- Production targets.
- Productivity and performance

### **Materials of Construction**

Classification, properties and typical applications of steels, aluminium alloys and other engineering materials in common use. The elementary structure of metals and the effect of adding alloying elements.

## **3 QUALITY ASSURANCE AND CONTROL**

### **Quality assurance (QA):**

- Quality manual (or quality plan)
- Quality documentation for welding: welding procedure specifications (WPS), welding procedure qualification (WPQ), welder qualification and welding records
- Calibration of welding equipment and instruments

### **Quality Control (QC):**

- 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 standard:
  - Visual: weld size, form and shape; undercut, overlap, surface conditions
  - Destructive: chemical analysis, tensile, bend, impact, nick-break, CTOD, macro and hardness tests
  - Non-destructive: visual, magnetic, penetrant, ultrasonic and radiographic inspection; hydrostatic and proof testing.
  - Detection and measurement of weld defects.

## **4 SAFETY**

- Identification of hazards and necessary action
- Examples of hazards:
  - Electric shock
  - Fire and explosion
  - Fumes
  - Cylinder handling
  - Use of scaffolding
  - X and gamma radiation
  - Welding arcs.
- Typical safety procedures:
  - Safety education
  - Risk assessment
  - Ventilation and monitoring of the workplace
  - Eye, ear and skin protection
  - Storage of gases
  - First aid.
- Statutory requirements: Health and Safety at Work Act regulations covering:
  - Workplace
  - Provision and Use of Work Equipment
  - Manual Handling operations
  - Personal Protective Equipment at Work
  - Management of Health and Safety at Work.
  - COSHH