

Certification Standard: Welding Inspection

Issued under the Authority of the
Certification Board for Inspection Personnel (CBIP), New Zealand

1. Introduction	3
2. Scope.....	3
3. Certification Process	3
4. Pre-Requisites for Discipline Recognition	4
4.1 CWI Qualifications.....	4
4.2 CWI Training.....	4
4.3 CWI Experience	4
4.4 SWI Qualifications	4
4.5 SWI Training	4
4.6 SWI Experience	5
4.7 Referee Statement.....	5
5. Competency Requirements for Certification.....	5
6. Examinations.....	8
6.1 CWI Discipline Recognition	8
6.2 CWI Paper A: Standards and codes.....	8
6.3 CWI Paper B: Principles of welding.....	8
6.4 CWI Paper C: Welding inspection	8
6.5 SWI Discipline Recognition.....	9
6.6 Technical content of examinations.....	9
6.7 CWI Recertification examination	9
6.8 SWI Recertification examination.....	10

1. Introduction

Please read this Certification Standard: Welding Inspection (CS Welding Inspection) in conjunction with CBIP's Certification Standard: General Requirements (CS General). Together, these Certification Standards define the requirements for the issue of discipline recognition to Welding Inspectors and Senior Welding Inspectors performing and/or controlling welding inspection of equipment or structures.

CBIP's requirements for a Competence Certificate are detailed in the CS General and include that a Welding Inspector must hold a relevant discipline recognition before they can hold a Competence Certificate.

2. Scope

CS Welding Inspection covers the qualifications, training, experience, and examination requirements for the issue of a discipline recognition to Welding Inspectors performing welding inspections of pressure equipment, structures or any other fabricated items requiring joining by welding.

Discipline recognitions granted under CS Welding Inspection are:

Certified Welding Inspector (CWI)

- Welding procedures, standards, codes, specifications, drawings, mechanical testing, destructive and non-destructive testing (NDT), quality assurance procedures and reporting.
- Fundamental principles of welding processes, welding fabrication, as-built packages, NDT methods, mechanical properties of materials, heat treatment, and duties as detailed in Section 5, Table 1.
- Application of welding inspection knowledge including interpretation and causes of weld discontinuity, symbols, welding procedures and drawings, welding fabrication, as-built packages, and on-the-job calculations.

Senior Welding Inspector (SWI)

- Advanced level of the CWI. See section 4.4.

3. Certification Process

Candidates seeking a discipline recognition must meet the requirements of the CS General and the CS Welding Inspection for either CWI or SWI.

4. Pre-Requisites for Discipline Recognition

Candidates will have qualifications, training and experience which demonstrates understanding of welding, including welding materials, equipment, and testing.

CWI Discipline Recognition

4.1 CWI Qualifications

Candidates will either:

- a) have a welding qualification; or
- b) be able to demonstrate the competency requirements of Section 5, Table 1.

Applications will include evidence of qualifications.

4.2 CWI Training

Candidates will undertake training in welding sufficient for them to demonstrate the requirements of CS Welding Inspection Section 5, Table 1. Training will include both knowledge requirements and practical inspection training.

4.3 CWI Experience

Candidates will have a minimum of three years' experience in a field relating to welding inspection. The experience shall include:

- i. inspection, including in-service inspection, and
- ii. a range of welds and materials, and
- iii. documentation of results sufficient to demonstrate competence in the requirements of CS Welding Inspection Section 5, Table 1.

Note: Related fields to welding inspection can be considered as fabrication involving welding, in-service welding repairs, welding supervision or weld engineering.

SWI Discipline Recognition

4.4 SWI Qualifications

Candidates will:

- a) have held a Certified Welding Inspector Competence Certificate for a minimum of five years; and
- b) be able to demonstrate the competency requirements in Section 5, Table 2.

Applications will include evidence of qualifications.

4.5 SWI Training

Candidates will undertake training in welding sufficient for them to demonstrate requirements of CS Welding Inspection Section 5, Table 2.

Training will include knowledge requirements and practical inspection training.

4.6 SWI Experience

Candidates will have a minimum of five years' experience in a field related to welding fabrication, in service welding repairs or similar. The experience will include:

- i. inspection, including in-service inspection, and
- ii. a range of welds and materials, and
- iii. documentation of results sufficient to demonstrate competence in the requirements of CS Welding Inspection Section 5, Table 2.

4.7 Referee Statement

Candidates will provide a Referee Statement sourced from CBIP's Website and signed by a suitable referee to verify that the candidate meets the knowledge and training requirements for a CWI/SWI.

5. Competency Requirements for Certification

To be certified as a CWI or SWI, candidates must demonstrate the competency and performance requirements as shown in Tables 1 and 2 respectively.

Table 1: Competencies and performance criteria for Welding Inspectors

Plan and prepare for inspection before welding.
a) Clearly understand the scope of inspection required, and the responsibilities of individuals and conditions for such inspection.
b) Use, interpret, and apply major national and international welding / fabrication standards, codes and specifications used in New Zealand and have a basic understanding of engineering critical assessment.
c) Verify that the welding / fabrication will be carried out in accordance with the design drawings, applicable procedures, codes, standards, specifications, and documents which may include the purchasers and inspection body requirements.
d) Verify that the design approval, if required, has been received and ensure that the inspection and test plans, programme requirements are reviewed, analysed, developed, and modified [if required] and approved.
e) Verify that the specified materials and welding consumables will be used.
f) Verify inspection programme, timing and any pre-welding and inspection regards forming, dimensions, fit-up, pre-weld non-destructive tests, weld preparation will be carried out in accordance with given requirements and procedures.
g) Verify that acceptable welding procedures and approved welders are employed for production.
h) Have an appreciation of common welding processes MMAW, GTAW, SAW, FCAW (both gas-shielded and non-gas shielded) and GMAW.

-
- i) Witness welder qualification and welding procedure qualification tests including the preparation and identification of materials.
 - j) Ensure materials are marked and/or stamped as required by the standards.
 - k) Ensure any required destructive tests or non-destructive tests are planned to be carried out to ensure compliance.
 - l) Prepare inspection reports that embrace the duties of a Welding Inspector.

Conduct inspection of welding.

- a) Maintain inspection records.
 - b) Ensure material identification is maintained.
 - c) Ensure the inspection requirements of the specification, code, standard, drawings or contract are followed, and a statement of confirmation is issued.
 - d) Ensure materials, welder qualifications and procedures, inspections and tests including destructive and non-destructive testing are recorded, are acceptable and documented and that copies are made available, as required to the manufacturer, purchaser and the Inspection Body or client.
 - e) Ensure that the welders and welding procedures comply with any specified pre-heat/PWHT, and inter-pass temperature requirements are met and maintained.
 - f) Ensure all materials and consumables are stored/handled correctly.
 - g) Ensure compliance with quality assurance and quality control procedures of the Inspection Body and controller/client.
 - h) Verify that cutting, forming, and machining of materials, tube expansion, blanking and protection of machined surfaces are correct and done to acceptable procedures.
 - i) Identify welding and material flaws and any non-conformance and assess corrective action.
 - j) Perform dimensional inspection of welded parts.
 - k) Ensure welding and assembly is correct.
 - l) Ensure any remedial or repair work is identified in writing and that corrective action is carried out.
 - m) Ensure bolting is correct.
 - n) Witness tests required by the code, standard or specification or inspection procedure.
 - o) Verify that any required heat treatment is conducted in accordance with suitable approved procedure, code, standard or specification requirements and is correctly documented.
 - p) Ensure any required destructive tests or non-destructive tests are carried out to ensure compliance.
 - q) Witness any required tests for compliance to code, standard or specification to acceptable procedures.
-

-
- r) Ensure any flange faces, weld preparations and any seal or mating faces are protected.
 - s) Ensure any required preservation treatment/protection is correct.
-

Report on inspection.

- a) Inspection records and reports are made and processed in accordance with documented procedures.
 - b) Ensure the inspection and test plan or required documentation is completed and signed by the inspector.
 - c) When performing inspections ensure that all contract conditions are reported upon at completion.
-

Table 2: Competencies and performance criteria for Senior Welding Inspectors

Plan and prepare for inspection, conduct inspection and report on inspection.

- a) Supervision and on-job training of Welding Inspectors and trainees.
 - b) Evaluate results of non-routine inspections, destructive and non-destructive tests in accordance with the relevant standard, code, or specification.
 - c) Assess the suitability of destructive, non-destructive testing methods and welding methods proposed or used.
 - d) Prepare appropriate written instructions, quality plans, inspection and test plans and specifications.
 - e) Verify the validity of personnel qualification and/or certification relevant to the welding and inspection.
 - f) Assist in establishing acceptance criteria where these are not available or appropriate.
 - g) Maintain comprehensive inspection records covering welding, inspection and testing and authorise issue of relevant certification regards welding.
 - h) Investigation and reporting of welding connected defects including trends and recommended rectification and/or improvement.
-

6. Examinations

6.1 CWI Discipline Recognition

The examinations for a CWI Discipline Recognition must be completed on the same day and in the order that follows:

- i. Paper A: Standards and codes
- ii. Paper B: Principles of welding
- iii. Paper C: Welding inspection

6.2 CWI Paper A: Standards and codes

This is an open-book examination.

Candidates may elect to use either ASME IX, AS/NZS 1554.1, AS 3992 or BS-EN ISO 15614-1 or other relevant standard/code.

Note: Application to use another standard / code must be made at least eight weeks prior to the date of application and be approved by CBIP.

The examination is comprised of:

- i. Twenty multi-choice questions on the elected standard/code, and
- ii. Visual inspection and reporting on a welded sample, and
- iii. Review and reporting on a radiograph or radiographs, and
- iv. Review, critique, and comment on a welding procedure specification.

6.3 CWI Paper B: Principles of welding

This is a closed-book examination comprised of:

- i. Fifty multi-choice questions, and
- ii. Two written questions from a selection of three.

6.4 CWI Paper C: Welding inspection

This is a closed-book examination comprised of:

- i. Fifty multi-choice questions, and
- ii. Two written questions from a selection of three.

6.5 SWI Discipline Recognition

The SWI examination is a closed book examination.

The examination will cover a more advanced level of welding inspection and process knowledge outlined for Papers A, B and C for the CWI examinations.

The examination is comprised of:

- i. Twenty general knowledge multi-choice questions.
- ii. Review, critique, and comment on a welding procedure specification.
- iii. Review and comment on two radiographs (Candidates holding a current radiographic interpreters Competence Certificate from CBIP or other equivalent qualification recognised by CBIP may be exempt from this part of the paper).
- iv. Scrutinising, assessing, and commenting on two NDT reports.
- v. Review and comment on an inspection and test plan for a welded fabrication.
- vi. Review and allocate welding symbols and processes to a fabricated item.

6.6 Technical content of examinations

Examinations will include questions on the following aspects of welding inspection for both new-construction and in-service inspection:

- i. Approval of inspection and test plans and preparation/approval of any specific inspection procedures required.
- ii. Witnessing and verifying tests including mechanical testing of welding procedures during fabrication, repairs, and in-service inspection.
- iii. Understanding and recognising the types and causes of deterioration and defects.
- iv. Inspection of repairs and alterations.
- v. Interpretation and evaluation of inspection results.
- vi. Reporting results of inspection.

6.7 CWI Recertification examination

The recertification examination for CWI is one paper with two sections:

- i. Section A - Closed book: Fifty multi-choice questions based on Papers B and C.
- ii. Section B - Open book: review and critique of a welding procedure specification to ASME IX, BS EN ISO 15614-1, AS/NZS 3992 or AS/NZS 1554.1.

6.8 SWI Recertification examination

The recertification examination for SWI is one paper comprising:

- i. Twenty general knowledge multi-choice questions
- ii. Review, critique, and comment on a welding procedure specification.
- iii. Review and comment on one radiograph (Candidates holding a current radiographic interpreters Competence Certificate may be exempt from this part of the paper)
- iv. Scrutinising, assessing, and commenting on one NDT report.
- v. Review and comment on an inspection and test plan (ITP) for a welded fabrication.