



CERTIFICATION SCHEME FOR PERSONNEL

DOCUMENT NO. CSWIP – PI -11 – 01

Requirements for the Certification of Plant Inspectors (Plant Integrity Management)

Categories of Certification:

Supplementary modules x 2
Plant Inspector Level 1
Plant Inspector Level 2
Plant Inspector Level 3

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Issued under the authority of the Governing Board for Certification

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CSWIP is administered by TWI Certification Ltd
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FOREWORD

The Certification Scheme for Personnel (CSWIP) is a comprehensive scheme that 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 Welding Inspectors, Welding Supervisors, Welding Instructors, Welding Quality Control Co-ordinators, Visual Offshore Inspectors, Plant Inspectors, Underwater Inspection Personnel 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 parts of the scheme. All CSWIP Boards and Committees are comprised of member representatives from relevant industrial sectors and other interests.

This document covers CSWIP Plant Inspector at three levels of certification (Level 1, Level 2 and Level 3).

ACCESS TO CERTIFICATION

Access to certification schemes is not improperly restricted. The sole criteria for certification are as given in the appropriate 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 group or associations.

1 GENERAL

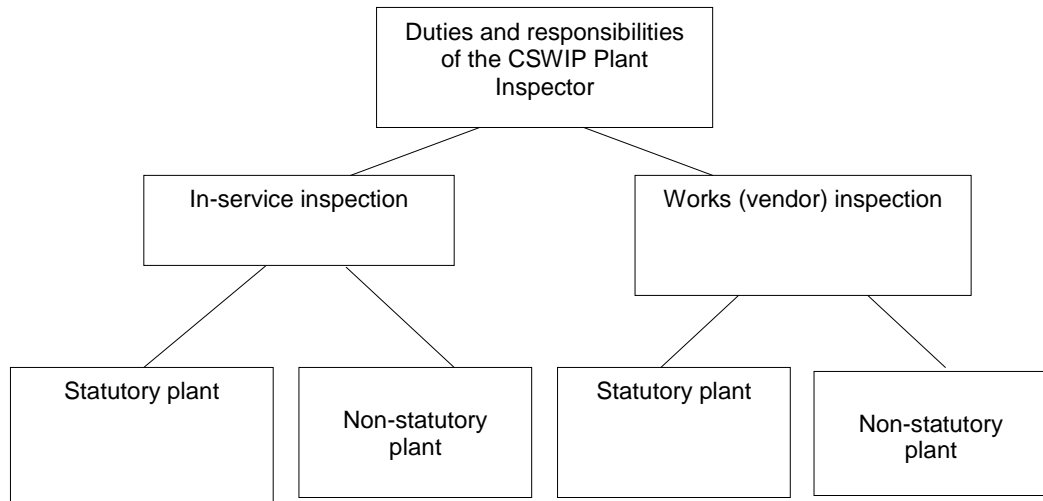
Given the increasing demands of integrated asset management within process plant and the increasing complexity of plant systems themselves and the legislative background in the EU and overseas, it is recognised that a need exists for a formal Plant Inspector certification scheme. To be effective, a certification scheme needs to ensure that plant inspectors have sufficient training and practical experience before being adjudged competent to perform statutory or non-statutory inspections on engineering plant.

TWI Certification Ltd has responded to this need by offering a formal Plant Inspection certification scheme. The certification scheme is regulated by the Certification Management Board of TWI Certification Ltd.

CSWIP Plant Inspector certification is seen as conferring renewable international certification at three levels (Level 1, Level 2 and Level 3).

The scheme will add value to plant integrity management by being applicable to both 'works' and in-service inspection. It will cover both statutory and non-statutory equipment and be universal i.e. not tied to one specific plant inspection code. Equally, it is recognised that there will be some sector-specific and plant-specific topics covered at the appropriate level and depth (e.g. for power generation, offshore and chemical process/refineries sectors). The scheme allows for increasing specialisation at Level 2 and Level 3, with Level 1 as the entry level. Training and competence assessment for the inspection of statutory plant (pressure, piping and above ground storage tank) and Plant Integrity Management (FFS, RBI and Damage Mechanism) are given special significance by the addition of being able to select a suitable range of modules at Levels 2 and 3. Fig 1 shows the general scope of the scheme.

Fig 1: Overall scope of scheme



It is recognised that personnel considering this scheme will come from the main disciplines of plant operation, non-destructive testing and mechanical inspection. It is also likely to draw candidates who are suitably experienced and qualified with related quality assurance and quality control backgrounds.

The scheme is designed to suit plant inspectors working for commercial works (vendor) inspection organisations, independent third party inspection organisations, classification societies and insurance companies. Special consideration is given to the responsibility and competence requirements of inspectors working in a statutory 'Competent Person' role under the PSSRs, or as a 'user inspectorate' in power, petrochemical or offshore plant.

1.1 Entry Requirements for Level 1

1.1.1 Direct Entry to Level 1

Candidates shall hold a minimum of a valid CSWIP Visual Welding Inspector certificate (Level 1), a current EN 473/ISO 9712 Level 2¹ in Ultrasonic testing and one other method, which must be either Radiographic inspection/Interpretation, or Liquid Penetrant Inspection or Magnetic Particle Inspection.

Or

Candidates shall have obtained a minimum of five years verified work experience in plant inspection.

1.1.2 Use of Supplementary Modules

Candidates unable to meet the requirements of 1.1.1 shall:

Hold a CSWIP Visual Inspector 3.0	Valid EN 473/ISO 9712 Ultrasonic Inspector	One other valid EN473/ISO 9712 as listed in 1.1.1 RT/RI.PT/MT	Takes Supplementary Module S1	Takes Supplementary Module S2
✓	X	X	X	✓
X	✓	✓	✓	X
X	X	X	✓	✓

¹ (SNT-TC-1A may be accepted but will require a review of the training and experience by the examiner)

1.2 Entry Requirements for Level 2

1.2.1 Direct Entry Requirements for Level 2

Candidates shall hold a current Plant Inspector Level 1

1.2.2 Mature Candidate Route

A mature candidate route is available for candidates who hold a minimum of a HNC in a relevant engineering subject or Incorporated Engineer with an appropriate Professional body and have a minimum of five years experience in plant inspection covering the disciplines listed in Section 2.1.

Candidates with the appropriate academic qualification but without the requirements listed in Section 1.1 Point 1 (i) and/or (ii) shall successfully complete supplementary modules S1/S2 as appropriate.

In addition to the above requirements, in order to be eligible to attend Plant Inspector Level 2 modules candidates shall successfully complete Module 1 (Part A).

1.3 Entry Requirements for Level 3

Candidates for Level 3 must hold Level 1 and 2 and successfully complete a further two additional modules from the seven available, listed in Section 2.4, making a total of six modules.

2 SCOPE

For Levels 1, 2 and 3, assessment comprises theory and case study examinations appropriate to the level. Candidates shall demonstrate the necessary combination of theoretical, practical ability and experience required by plant inspectors.

Examinations are conducted only by TWI Certification Ltd Authorised Examining Bodies. The present requirements are intended to meet the majority of users' needs for the practical inspection of engineering plant and to provide industry with an assured minimum standard of proficiency.

Examinations are designed to test the candidate's grasp of the wide subject matter of plant inspection and his/her understanding of the technical and procedural aspects of the plant inspectors' role. The examination procedure involves a combination of written, multiple choice descriptive and case study questions at all levels.

2.1 Level 1 Personnel

An inspector certified to Plant Inspector Level 1 has a wide-ranging basic knowledge of technical issues relating to works (vendor) and in-service inspection of plant. The inspector will be able to perform straightforward unsupervised inspections in accordance with an inspection and test plan (ITP) for new equipment or a written scheme of examination (WSE) for in-service equipment which is not subject to statutory requirements (PED, PSSRs, etc). The inspector will be able to choose the inspection method, liaise with technicians performing the test, and provide clear reports, with recommendations, for final assessment by others. The inspector will be capable of making basic subjective judgements on routine - inspection results but will require assistance when dealing with more technically complex situations.

2.2 Level 2 Personnel

An inspector certified to Plant Inspector Level 2 would be capable of carrying out all duties for which a level 1 inspector is qualified but is able to add a deeper level of technical understanding and interpretation. The inspector also has a wider scope of knowledge relating to pressure equipment and their manufacturing and test procedure. A Level 2 inspector can make more detailed comparison of inspection results with code/defect acceptance criteria and justify conclusions using code calculations.

In cases where corrosion and other in-service defects are found, the inspector is able to allocate severity levels and contribute input to a risk-based-inspection (RBI) scheme, if applicable.

2.3 Level 3 Personnel

An inspector certified to Plant Inspector Level 3 would be capable of carrying out full supervision of an inspection operation and staff; establishing techniques and procedures; interpreting codes, standards, specifications and procedures; and recommending particular test methods, techniques and procedures to be used. The inspector shall be deemed to have the competence to interpret and evaluate results in accordance with existing codes, standards and specifications and have sufficient practical technical background to select methods and establish techniques and to assist in establishing acceptance criteria where none are otherwise available. The inspector will also be able to assume responsibility for a 'user inspector' operation and demonstrate a clear and justified view of the subject of risk.

2.4 Available Modules for Level 2 and Level 3

2.4.1 Module 2 - Damage Mechanism Assessment for RBI and FFS, based on API RP 571

- a) Common damage mechanisms in oil and gas production, refining and manufacturing processes and where they can be found
- b) Key process parameters affecting damage mechanisms
- c) Prevention and control of damage mechanisms
- d) Most appropriate inspection and non-destructive testing methods

2.4.2 Module 3 - RBI Based on API PR 580 and ASME

- a) Risk based inspection in accordance with API RP 581, API RP 580 and ASME
- b) Reasons for implementing risk based inspection
- c) Benefits of using risk based inspection
- d) Practical planning and implementation of RBI
- e) Preparing inspection plans

2.4.3 Module 4 - FFS Assessment based on API 579-1 and ASME FFS-1 2007

- a) Introduction to fitness-for-service (FSS)
- b) Material properties and API 579 annexes
- c) Stress analysis for FFS
- d) Identification of damage mechanisms for FFS:
- e) Interaction with other assessment procedures

2.4.4 Module 5 – Weld Repair of Pressure Equipment and Piping

- a) Selecting an appropriate repair method
- b) Life of weld repair
- c) Type of equipment and industry
- d) Codes and standards to make weld repairs or alterations
- e) Use of weld procedures and welder qualifications

2.4.5 Module 6 – Pressure Vessel Inspection based on API 510

- a) Extensive overview of API 510 "Body of Knowledge"
- b) Pressure vessel materials and fabrication
- c) Corrosion allowances, inspection and degradation mechanisms
- d) Remaining life calculations
- e) Static head pressure calculations

2.4.6 Module 7 – Piping Inspection based on API 570

- a) Extensive overview of API 570 "Body of Knowledge"

- b) ASME welding requirements for pressure piping
- c) Corrosion allowances, inspection and degradation mechanisms
- d) Remaining life calculations

2.4.7 Module 8 – Aboveground Tank Inspector based on API 653

- a) Extensive overview of API 653 “Body of Knowledge”
- b) Review of ASME welding requirements for storage tanks section IX and API 650
- c) AMSE NDT principles of Section V
- d) Review of API 653 inspection, repair, alteration and construction of tanks.

3 ELIGIBILITY FOR COURSE AND EXAMINATION

Candidates shall have a combination of education, training and documented experience adequate to ensure that they have the potential to understand the technical and procedural issues of the applicable level as given in Section 1.

3.1 Level 1 award requirements

The minimum requirements for award of a Level 1 qualification are as follows:

- 3.1.1 Meets the entry requirements listed in Section 1.1. plus
- 3.1.2 Successfully completes an approved Plant Inspector Level 1 training course and the CSWIP examinations.

3.2 Level 2 award requirements

- 3.2.1 Meets the entry requirements listed in Section 1.2 plus
- 3.2.2 Successfully completes four Plant Inspector training modules and the CSWIP examinations.

3.3 Level 3 Award requirements

- 3.3.1 Meets the entry requirements listed in Section 1.3 plus
- 3.3.2 Successfully completes six Plant Inspector training modules and the CSWIP examinations.

3.4 Vision requirements

The candidate shall provide documented evidence of satisfactory vision in accordance with the following requirements:

- a) Near vision shall permit reading a minimum of Jaeger number 1 or equivalent type and size letters (e.g. Times Roman N4), at not less than 30 cm on a standard Jaeger test chart for near vision, in at least one eye, corrected or uncorrected;
- b) Colour vision should be sufficient that the candidate can distinguish and differentiate contrast between the colours used in the inspection methods at the level of familiarity required in the certification being sought.

The evidence must be in the form of a certificate issued by a medically recognised person within the previous 24 months, covering all of the above points.

With all of the above eligibility requirements the onus is on the candidate to provide the necessary evidence prior to the examination. An examination appointment will not be confirmed until the evidence has been received. Subsequent to certification, tests of visual acuity shall be carried out annually.

3.5 Training

All candidates must attend a CSWIP approved course of training at the appropriate Level prior to examination. Details of such courses are available on request.

4 Application for Examination and Fees

Candidates will be required to submit an application form and CV. All 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.

In the event of a false statement being discovered on any submitted document, 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, attempting to remove or removal of examination material, was established to have taken place.

Examinations may be taken at Test Centres approved in the United Kingdom and overseas for the CSWIP Plant Inspector certification scheme. Lists of approved examination centres are available on request.

5 EXAMINATION CONTENT

The examinations comprise multiple-choice and narrative questions. The time allowed for narrative answer questions is specified in the examination paper presented to the candidate. All examination components have a pass mark of 70%.

5.1 Level 1

Level 1 examination for Module 1 Part A and B consist of two examination papers.

- a) Paper 1 is of 115 minutes duration and comprises 75 multiple choice questions.
- b) Paper 2 is a written paper of 1½ hours duration and comprises an extended case study using a combination of documentation extracts, photographs and real-life plant inspection situations. This paper tests the technical knowledge and decision-making skills of candidates in a realistic scenario.

The passmark for examinations is 70%.

5.2 Levels 2 and 3

The Level 2 examination consists of four of the following seven available modular examinations: The Level 3 examination consists of six of the following seven available modular examinations.

5.2.1 Module 2 – Damage Mechanism Assessment for RBI and FFS based on written practice API 571

- a) Paper 1 consists of 30 multiple-choice questions, time allowed 45 minutes
- b) Paper 2 – essay question based around real life situations, three case studies. time allowed 60 minutes (Open book – API 571).

5.2.2 Module 3 – RBI based on written practice for API 580/581 and ASME

- a) Paper 1 consists of 20 multiple-choice questions, time allowed 30 minutes
- b) Paper 2 three case studies questions based around real life plant activities – Time allowed 60 minutes (Open book API 580/581).

5.2.3 Module 4 – FFS based on API 579-1/ASME FFS-1:2007

- a) Paper 1 consists of 50 multiple-choice questions, time allowed 120 minute (Open book API 571).

5.2.4 Module 5 – Weld repair of pressure equipment and piping

- a) Paper 1 consists of 20 multiple-choice questions, time allowed 30 minutes

5.2.5 Module 6 – Pressure vessel inspection based on API 510

- a) Paper 1 – 75 multiple choice questions, time allowed 150 minutes (Open book API 510)

5.2.6 Module 7 Piping Inspector based on API 570

- a) Paper 1 – 75 multiple choice questions, time allowed 150 minutes (Open book API 570)

5.2.7 Module 8 Aboveground Tank Inspector based on API 653

- a) Paper 1 – 75 multiple choice questions, time allowed 150 minutes (Open book API 653)

6 Certification

6.1 Results Notices

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

6.2 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 damaged will only be issued after extensive enquiries.

6.3 Unsuccessful Candidates

Candidates who fail to obtain a pass on any module paper may take one retest on those parts of the examination in which success was not achieved. The retest must be completed within one year of the initial module test; otherwise candidates will have to repeat the complete examination.

Candidates who are unsuccessful in the retest will be required to re-take the full approved course followed by the full examination.

6.4 Period of validity

The certificate is valid for five years from the date of completion of the final initial module examination and may be renewed for a further five years on application, provided evidence is produced in accordance with Clause 6.5.1. 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.

6.5 Renewal

6.5.1 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 satisfactory work activity without significant interruption during the previous five years in plant inspection; and
- ii) providing evidence that the holder has kept up to date in plant inspection.

If the certificate contains one or more endorsements, the endorsements can not be renewed unless the candidate firstly satisfies the renewal criteria for the basic certificate. If the basic certificate is renewed, in order to renew the endorsement(s) the holder must provide evidence in his/her log book of satisfactory work experience specific to the endorsement(s). If such evidence is not available, a written endorsement-specific examination will be required in order to renew the endorsement. The examination will consist of a multi-choice paper related to the endorsement syllabus and any relevant document revisions that have occurred since the previous examination.

Official CSWIP log books must be used for this purpose.

Any previous certificate is invalidated upon issue of the five-year renewal certificate.

The certificate will not be renewed without further test if an authenticated complaint is received 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 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.

6.5.2 Ten year renewal procedure

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 made to TWI Certification Ltd.

The ten year renewal examination consists of a multi-choice paper related to the initial examination syllabus.

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 full initial examination again to regain the qualification.

* 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.

6.6 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.

7 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.

ADDRESSES

For further general information contact:

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

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Fax: +44 (0) 1223 891630
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GLOSSARY

WSE	Written Scheme of Examination
PED	Pressure Equipment Directive
PSSR	Pressure Systems Safety Regulations
ACOP	Approval Code of Practice
API	American Petroleum Institute
EEMUA	Engineering Equipment and Materials Users Association
RBI	Risk Based Inspection

CERTIFICATION SCHEME FOR PERSONNEL

Requirements for the Certification of Plant Inspectors

APPENDIX TO DOCUMENT CSWIP-11-01

Appendix 1: Outline Syllabus

Appendix 1 Outline Syllabus

Certification	Module	Examination
Visual Inspection OVI	Supplementary	Module S1
NDT Appreciation	Supplementary Appreciation of the four main NDT methods	Module S2
Plant Integrity Management (Plant Inspector Level 1)	Foundation Module 1 Rules/regulations and duties of the Plant Inspector	(Part A) Paper 1 – 75 multiple-choice questions Part 2 – case study
	Foundation Module 1 Inspection methods/codes and Standards	(Part B) Paper 1 – 75 multiple-choice questions Part 2 – case study
Plant Integrity Management r Level 2 and 3 Modules Four Modules for Level 2 Six Modules for Level 3	Module 2 Damage Mechanism Assessment for RBI and FFS (Based on API PP 571)	Paper 1 – 30 multiple-choice questions Paper 2 – case studies – Open Book API 571
	Module 3 Risk-based Inspection (RBI), based on API RP 580/581 and ASME	Paper 1 – 20 multiple-choice questions Paper 2 – Case studies – Open Book API 580/581
	Module 4 Fitness-for-Service (FFS) Assessment based on API 579-1/ASME FFS-1 2007	Paper 1 – 50 multiple-choice questions Open book – API 591
	Module 5 Weld Repair of Pressure Equipment and Piping (Based on International Codes and Standards)	Paper 1 – 20 multiple-choice questions

Certification	Module	Examination
	<p align="center">Module 6</p> <p>Pressure Vessel Inspector based on the RP for API 510 and Body of Knowledge</p>	<p>Paper 1 – 75 multiple-choice questions Open book – API 510</p>
	<p align="center">Module 7</p> <p>Piping Inspector based on the RP for API 570 and Body of Knowledge</p>	<p>Paper 1 – 75 multiple-choice questions Open book – API 570</p>
	<p align="center">Module 8</p> <p>Above Ground Tank Inspector based on API 653 and Body of Knowledge</p>	<p>Paper 1 – 75 multiple-choice questions Open book – API 653</p>