



**CERTIFICATION BOARD FOR INSPECTON PERSONNEL**

**Standard of Proficiency  
for the Certification of  
Crane Inspectors**

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# **STANDARD OF PROFICIENCY FOR THE CERTIFICATION OF CRANE INSPECTORS**

## **FOREWORD**

This Standard of Proficiency defines the requirements for the issue of certificates of competence to inspectors performing inspection of cranes within the scope of the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways Regulations) 1999.

These regulations require equipment inspectors performing inspection of cranes to hold a certificate of competence. Certificates of competence also provide a basis for International Accreditation New Zealand to approve inspectors as signatories of inspection bodies.

Certification and re-certification in accordance with this standard confirms the qualifications, training, and experience of crane inspectors.

The qualifications described by this Standard of Proficiency have been prepared for registration at level 6, on the NZQA framework.

This standard of proficiency must be read in conjunction with the *General Section - Standards of Proficiency for the Certification of Inspectors*.

## **1. SCOPE AND GENERAL**

### **1.1. Scope**

This Standard of Proficiency covers the certification of inspectors performing new-construction and in-service inspection of cranes.

### **1.2. Certificates of competence**

The certificates of competence which may be granted are:

- (a) Crane Inspector: Category A (CI: Cat A)
- (b) Crane Inspector: Category B (CI: Cat B)
- (c) Crane Inspector: Category C (CI: Cat C)

## **2. CERTIFICATION PROCESS**

Candidates seeking certification shall satisfy the requirements of Section 3 of the *General Section – Standards of Proficiency for the Certification of Inspectors*, for their particular crane inspection discipline, by completing:

- (a) The *Pre-Requisite Training, Qualifications and Experience* in 3 below, and
- (b) The examination(s) in 4 below for any one or more of:
  - CI: Cat A certificate of competence
  - CI: Cat B certificate of competence
  - CI: Cat C certificate of competence

### **3. PRE-REQUISITE TRAINING, QUALIFICATIONS AND EXPERIENCE**

Candidates shall complete the following training, qualifications and experience and include with their *Application for Certification* the documentation described in Section 5 of the *General Section - Standards of Proficiency for the Certification of Inspectors*.

#### **3.1. Crane inspectors' certificates of competence**

Candidates shall:

- (a) Hold current CBIP Certified Welding Inspector or Senior Welding Inspector certification, and
- (b) Have a total of six credit points for *Training, Qualifications and Experience* accumulated as described in 3.1.1 and 3.1.2 below or, other industrial experience as described in 3.1.3 below:

##### **3.1.1. Training and qualifications (4 credit points maximum)**

1 credit point maximum from any of the following:

- Successfully completing an independently assessed and verified CBIP recognised course in crane inspection
- A CBIP recognised Certificate in Welding Engineering.

2 credit points maximum from any of the following:

- An approved diploma in engineering from a CBIP recognised training establishment.
- Approved 1<sup>st</sup> Class Marine Engineer's Certificate.
- Bachelor Degree in relevant Technology or Science.
- New Zealand Certificate in Engineering or equivalent e.g. Higher National Certificate in Engineering.

3 credit points maximum from any of the following:

- Approved 1<sup>st</sup> Class Marine Engineer's Certificate with steam endorsement
- Bachelor Degree in Engineering
- Higher National Diploma in Engineering
- Masters Degree in relevant Technology or Science

##### **3.1.2. Experience (4 credit points maximum)**

1 credit point for each year of fully documented experience as listed below:

- In the, operation, maintenance, inspection or fabrication of cranes whilst in a position of responsibility, which in the opinion of the CBIP is both appropriate and relevant.

##### **3.1.3. Other industrial experience**

Instead of the above credit point assessment, candidates may submit information on other similar industrial experience they have had to the CBIP. The CBIP will advise whether this experience satisfies the pre requisite training, qualifications and experience for entry to the certification process.

## 4. EXAMINATIONS

The Module 1 examination paper<sup>1</sup> is common to all categories of crane inspector discipline. It is recommended that candidates complete this paper before taking Module 2, 3 or 4 papers.

### 4.1. Module 1 – General Paper

This module is common to all categories of crane inspector discipline and covers:

(a) General topics from the *Health and Safety in Employment (Pressure equipment, cranes and passenger ropeways) Regulations 1999*, the *Approved code of practice for cranes*.

Fabrication, wire ropes, hooks, repairs and alterations, operating, maintenance and incident records.

### 4.2. Cat A certificate of competence

The examinations for a Cat A certificate of competence are comprised of the following papers:

- Module 1: General Paper
- Module 2: Category A Cranes

#### 4.2.1. Module 2

This module covers the following cranes:

- (a) Overhead travelling cranes,
- (b) Goliath and semi-goliath cranes and
- (c) Monorail cranes.

### 4.3. Cat B certificate of competence

The examinations for a Cat B certificate of competence are comprised of the following papers:

- Module 1: General Paper
- Module 3: Category B Cranes

#### 4.3.1. Module 3

This module covers the following cranes:

- (a) Tower cranes
- (b) Self erecting tower cranes

### 4.4. Cat C certificate of competence

The examinations for a Cat C certificate of competence are comprised of the following papers:

- Module 1: General Paper
- Module 4: Category C Cranes

#### 4.4.1. Module 4

This module covers the following cranes:

- (a) Mobile cranes
- (b) Truck mounted cranes

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<sup>1</sup>Module 1 is common to all categories of cranes. A re-examination for this module is not required where candidates take examinations for additional categories of crane inspection during the period of certification applicable to their pre-ceding certificate of competence as a crane inspector.

#### **4.5. Technical content of examinations**

The examinations will include questions on the following aspects of crane inspection for both new-construction and in-service inspection:

- (a) Approval of inspection and test plans and preparation/approval of any specific inspection procedures required.
- (b) Witnessing and verifying tests including mechanical testing of welding procedures during fabrication, repairs and in-service inspection.
- (c) Understanding and recognising the types and causes of deterioration and defects.
  - (a) Inspection of repairs and alterations.
  - (b) Interpretation and evaluation of inspection results.
  - (c) Reporting results of inspection.
  - (d) Recommendations on future inspection periods, and on the remaining life of the equipment, based on the records of the amount and type of usage.

The examination questions in the General paper will be relevant to all cranes and those in the Category A, B and C papers will generally be specific to the particular category of crane for which the candidate is being examined.

#### **4.6. Recertification**

The recertification exam will comprise one paper for each category of crane based on the General Paper and Modules 2, 3 or 4 as appropriate.

#### **4.7 Sample Questions**

Sample questions for the examination papers are given in Appendix A.

#### **4.8 Knowledge requirements**

The knowledge requirements underlying the examination for the general paper and all categories of crane inspection are given in Appendix B.

#### **4.9 Recognition of overseas qualifications and exemptions**

The CBIP will consider applications for exemptions from the Category A, B and C examination papers.

There will be no exemptions from the Module 1 General Paper; it is a compulsory examination for all candidates.

Application for recognition of overseas equipment inspection qualifications and exemptions from examination papers shall be made in accordance with the *General Section – Certification of Inspectors*.

#### **4.10 Extension of certification to other categories of cranes**

CBIP will consider application from crane inspectors for an extension of existing certificates of competence to cover special categories of cranes such as:

- (a) Vehicle mounted truck loader cranes
- (b) Scotch and guy derrick cranes
- (c) Container cranes

Applications for extensions of certificates of competence shall be made in accordance with Appendix C.

## **APPENDIX A**

### **Sample Examination Questions (Informative)**

Under construction

#### **Examination Format:**

All module examination papers are open book. Candidates should bring with them an unmarked copy of what ever references they wish to bring from Appendix A1.

The examinations questions are in a multi-choice format, on the subject matter given in the competency and knowledge requirements for the relevant module.

Sample questions

General Paper

Category A

Category B

Category C

## **APPENDIX B**

### **Outline of Knowledge Requirements (Informative)**

#### **B.1 Introduction**

It is an important factor in the safe and reliable operation of any crane, to ensure mechanical integrity, reliability, safety and fitness for purpose and service. It is therefore essential that the inspectors who perform the inspection functions have the necessary knowledge to be competent in the inspections that they perform in order to provide value to the client and recommend to the Inspection Body that a certificate of inspection be issued.

#### **B.2. General Requirements**

##### **B2.1 Introduction**

The following sub-sections define the core requirements to guide candidates on the extent of knowledge required in order to be prepared for both the examinations and their future work.

##### **B2.2 Process operation**

It is essential that the inspector understands the operation of the equipment in order to identify where and what damage/degradation mechanisms are expected and consequently where to concentrate the Inspection effort.

##### **B2.3 Metallurgical and corrosion degradation mechanisms**

The inspector must understand the equipment operational conditions and underlying reasons that dictate materials selection and the interpretation of the relevant standards and codes of practice in respect to material selection.

##### **B2.4 Metallurgy and Welding**

Welding knowledge is taken as a prerequisite by means of the candidate having to have done the CWI Certification prior to doing the crane certification. As a minimum, the inspector must understand:

- (a) The criteria that dictate the selection of materials.
- (b) Mechanical testing and acceptance criteria for materials and weldments.
- (c) The relationship between metal properties and the phenomena of fatigue, ductile and brittle fracture and embrittlement.
- (d) Knowledge of fundamentals of composition and structures of metallic materials and their responses to heat treatment both during manufacturing and welding.

- (e) The codes and standards that pertain to welding procedures, welder qualifications and associated consumables.
- (f) the various forms of welding techniques as well as the QA and QC procedures that apply to the common welding processes i.e. SMAW, GMAW, FCAW, GTAW, SAW.

### **B2.5 Inspection techniques and NDT**

The inspector must have an understanding of the applicability, safety and accuracy of various methods and inspection techniques (invasive and non-invasive) used to detect manufacturing defects or degradation mechanisms in all types of cranes and their service conditions. Appropriate techniques used and commonly applied include visual and other NDT techniques.

The Inspector must recognise the limitations of the various methods and techniques and take this into account when deciding on the values of that employed (i.e. it may be necessary to supplement the method or techniques used with another one to increase confidence). His knowledge of this subject should be such that he can converse with specialists in the field and evaluate the results of their examinations. Training in the methods and techniques of NDT is only required to create an awareness of NDT methods and their application; it is not required for inspectors to execute routine NDT activities. For these activities certified NDT technicians shall be used.

### **B2.6 Mechanical Maintenance**

The Inspector must be aware of the purpose, tasks and roles of the maintenance function. He should have a clear understanding of its routine and non-routine activities and constraints (work preparation, planning, financial considerations, expenditure control, impact of work volume generated by inspection, reliability, etc.).

The Inspector must be aware of the importance of routine maintenance in ensuring the equipment is kept in a safe condition and be capable of determining if the equipment is being maintained adequately, by referring to the Controller's maintenance and service records, and the manufacturer's instructions.

The Inspector must be capable of assessing the amount of use the equipment has been subjected to, from information provided by the Controller's records, to ensure that:

- a) Maintenance intervals are satisfactory, and
- b) The equipment is not being used outside of its design parameters including the design life.

### **B2.7 Design and manufacturing codes and standards, and methods of manufacturing, inspection and repair**

The inspector must have sound detailed knowledge and experience in the use of the codes and standards covering design, manufacturing and repair, to ensure compliance with the applicable norms. Familiarisation with the full range of

standards relevant to the various types of cranes covered by this standard is essential. The inspector must understand the fundamental principles within the standards sufficiently to resolve any conflict between them and to advise their client of their applicability.

It is not the intention that the inspector should be fully conversant with every aspect of every standard, but that the Technical Manager of Inspection Body (as defined in ISO 17020), employing the inspectors must be capable of providing detailed technical backup on request.

It is essential that the inspectors are fully aware with the requirements for the development, review and implementation of Inspection and Test Plans (ITP's)

### **B2.8 Special tools**

The inspector must be aware all of tools available to determine "fitness for purpose" of equipment (e.g. finite element analysis). He must recognise the limitations of the various tools and take this into account when deciding on the values of the methods and techniques employed (i.e. it may be necessary to supplement the method used with another one to increase confidence).

### **B2.9 Quality Assurance Systems**

The inspector must be aware of Quality Assurance and Quality Control concepts/systems e.g. ISO 9000 standards.

### **B2.10 Record keeping and report writing**

The inspector must be capable of preparing and maintaining accurate and proper records and reports of all relevant inspections to build up the necessary historic data to maintain the reliability of the equipment and also meet statutory requirements.

## **APPENDIX C**

### **Extension of Certificates of Competence (Informative)**

#### **C1 General**

Holders of certification for the following Special Categories are unaffected by the following requirements.

#### **C2 Vehicle Mounted Truck Loader Cranes**

The examination for the certification of vehicle mounted truck loader cranes will be included in the Cranes Cat C category. This will apply from December 2006 onwards.

In future Equipment Inspectors who apply for Cranes Cat C will be examined and certified for both mobile and vehicle mounted cranes. Separate certifications will not be available for mobile or vehicle mounted cranes.

An Equipment Inspector holding an existing Cat C Certification who wishes to be recognised for the “Special Category – Vehicle Mounted Truck Loader Cranes” may apply for category to be included in the existing certification subject to the satisfactory provision of the following documentation to CBIP:

- i. A completed application form and payment of the appropriate fee, and
- ii. Formal confirmation from IANZ that the accredited ISO 17020 management system under which the applicant operates has appropriate technical procedures for the inspection of vehicle mounted truck loader cranes, and
- iii. A minimum of five satisfactory inspection reports for vehicle mounted truck loader cranes completed during the previous three years.

#### **C3 Scotch and Guy Derrick cranes –**

An Equipment Inspector who wishes to be recognised for the “Special Category – Scotch and Guy Derrick Cranes” must be certified for Cranes Cat A and B.

He may then apply for recognition subject to the satisfactory provision of the following documentation to CBIP:

- iv. A completed application form and payment of the appropriate fee, and
- v. Formal confirmation from IANZ that the accredited ISO 17020 management system under which the applicant operates has appropriate technical procedures for the inspection of Scotch and Guy Derrick cranes, and
- vi. A minimum of five satisfactory inspection reports for Scotch and Guy Derrick cranes completed during the previous three years.

#### **C4 Container cranes**

An Equipment Inspector who wishes to be recognised for the “Special Category – Container Cranes” must be certified for Cranes Cat A and B.

He may then apply for recognition subject to the satisfactory provision of the following documentation to CBIP:

- vii. A completed application form and payment of the appropriate fee, and
- viii. Formal confirmation from IANZ that the accredited ISO 17020 management system under which the applicant operates has appropriate technical procedures for the inspection of container cranes, and
- ix. A minimum of five satisfactory inspection reports for container cranes completed during the previous three years.