



**Hong Kong Association for  
Testing, Inspection and Certification Ltd.  
Professional Certification Scheme for Testing Personnel**

**CC02  
CERTIFICATION HANDBOOK  
CONSTRUCTION MATERIALS TESTING**

First Issue  
Issued by Hong Kong Association for  
Testing, Inspection and Certification Limited

Secretariat  
G.P.O. Box 471, HONG KONG

This document is the property of HONG KONG Association of Testing, Inspection and Certification Limited. It shall not be reproduced in whole or in part without the written approval of the Chairperson of HKTIC.



## **Table of Content**

Section	Section Title	Page
	Foreword	
1	General	1
2	Scope of Certification	1
3	Eligibility for Certification	1
4	Examination Procedure	5
5	Application Procedure for Certification/Examination and Fees	9
6	Appeals	13
7	Obligations	15
Appendix 1	Examination Syllabus and Specimen Questions for Certified Testing Technician	16
Appendix 2	Examination Syllabus and Specimen Questions for Certified Testing Professional	19
Appendix 3	Training Courses approved by the Certification Board	23
Appendix 4	Guidelines for Counting Continuing Professional Development Unit (CPDU)	25
Appendix 5	Sub-categories of Construction Materials Testing	27
Appendix 6	List of equipment required for each sub-category of Construction Materials Testing	29
Appendix 7	References	31



## FOREWORD

The Certification Scheme for Testing Personnel (CSTP) 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 scheme is developed under HKTIC and managed by the Certification Board (CB), which is responsible for the granting, reviewing and revising the personnel certification titles and requirements in accordance to the prevailing demand of the testing industries served by the scheme. The Certification Board, in turn, may appoint specialist Working Committees as it deems necessary to oversee specific parts of the scheme.

The sole criteria for certification of personnel engaged in construction materials testing are given in this 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 HKTIC or any other groups or associations.

The benefits of certification include:

1. recognition and prestige for the individual and creation of a competitive advantage over non-certified individuals in the same field;
2. enhanced employment opportunities;
3. establishment of a professional standard for individuals in a particular testing field;
4. assistance to employers in making more informed recruitment decisions;
5. a more productive and highly trained workforce for employers;
6. enhanced professional impression on customers;
7. assistance to clients in making informed decisions about qualified providers;
8. protection of the general public from using incompetent and unfit practitioners; and
9. assurance of the general public of the accuracy and validity of testing results..



## **Requirements of Certification of Personnel Engaged in Construction Materials Testing**

### **1. General**

- 1.1. This document prescribes procedures by which personnel may be examined and, if successful, certified for construction materials testing.

### **2. Scope of Certification**

- 2.1. The levels of certification available are

- 2.1.1. Certified Testing Technician and;
- 2.1.2. Certified Testing Professional.

- 2.2. The scope of certification

Certification of construction materials testing is sub-divided into four sub-categories:

- 2.2.1. Building diagnosis tests (BD);
- 2.2.2. Construction material tests (CM);
- 2.2.3. Foundation tests (FD); and
- 2.2.4. Welding nondestructive tests (NDT)

### **3. Eligibility for certification**

- 3.1. Candidates shall have a combination of education, training and experience adequate to ensure that they have the potential to understand the principles and procedures of the applicable methods.

- 3.2. Academic qualification and experience

- 3.2.1. Certified Testing Technician (CTT) other than welding nondestructive testing (NDT)

- (a) The candidate shall have

- a diploma in science or engineering or equivalent with no less than two years of relevant testing experience; or
- 10 years of relevant testing experience; or
- any other qualifications and experience deemed as equivalent.



### 3.2.2. Certified Testing Technician (CTT) for NDT

- (a) Level 2 status in ultrasonic testing or magnetic particle testing and any one of visual examination, radiographic testing or liquid penetrant testing
  - i) under the American Society for Nondestructive Testing (ACCP-ASNT); or
  - ii) the Personnel Certification for Nondestructive Testing (PCN) by the British Institute of Non-Destructive Testing (BINDT); or
- (b) other equivalent qualification and experience.

### 3.2.3. Certified Testing Professional (CTP) other than NDT (any one of the requirements (a) to (c)).

- (a) The candidate shall have a bachelor's degree in science or engineering or equivalent and with no less than three years of relevant experience.
- (b) Candidate without a degree shall
  - have been certified as Certified Testing Technician by the Certification Board and have no less than five years of relevant supervisory experience post certification as CTT, or
  - have no less than 15 years of relevant experience of which 5 years shall be at a managerial position.
- (c) Candidates shall have any other qualifications and experience deemed as equivalent.

### 3.2.4. Certified Testing Professional (CTP) for NDT

- (b) Level 3 status in ultrasonic testing or magnetic particle testing and any one of visual examination, radiographic testing or liquid penetrant testing
  - i) under the American Society for Nondestructive Testing (ACCP-ASNT); or
  - ii) the Personnel Certification for Nondestructive Testing (PCN) by the British Institute of Non-Destructive Testing (BINDT); or
- (b) any other equivalent qualification and experience.



### 3.3. Training

#### 3.3.1. Certified Testing Technician

- (a) provide certificates of achievement (satisfactory results in end-of-course evaluation) in training courses approved by the Certification Board in respective competence requirements; or
- (b) obtain satisfactory results in certification examinations as arranged by the Certification Board.

Details of approved training courses are available on [www.hktic.org](http://www.hktic.org).

#### 3.3.2. Certified Testing Professional

- (a) any one of the following:
  - (i) provide certificates of achievement (satisfactory results in end-of-course evaluation) in training courses approved by the Certification Board in respective competence requirements; or
  - (ii) obtain satisfactory results in certification scheme examinations as arranged by the Certification Board;
  - (iii) have no less than 15 years of relevant experience, of which 5 years shall be at managerial position; or
  - (iv) HOKLAS signatory with not less than 8 years of relevant experience and the scope of signatory approval covering the major measurement techniques or methods as stipulated in as stipulated in this Certification Handbook for the sub-category the certification is being sought; and
- (b) obtain satisfactory results in professional assessment by interview.

Details of approved training courses are available on [www.hktic.org](http://www.hktic.org).

### 3.4. Competence requirements for Certified Testing Technician

#### 3.4.1. General requirements

- Understanding of ISO/IEC 17025
- Laboratory safety
- Integrity management



#### 3.4.2. Technical requirements

- Understanding basic laboratory techniques
- Knowledge of equipment usage

### 3.5. Competence requirements for Certified Testing Professional

#### 3.5.1. Management requirements

- Management skills
- Integrity management

#### 3.5.2. Quality requirements

- Laboratory management in compliance with ISO/IEC 17025
  - Statistical treatments of data and quality control requirement
- Laboratory safety

#### 3.5.3. Technical requirements

- Estimations of measurement uncertainty
- Interpretation of results and reporting requirements
- Requirements of equipment calibration
- Principles of laboratory techniques employed in testing



#### **4. Examination Procedure**

4.1. A candidate who can provide certificates of achievement in training courses in all competence requirements may be exempted from examinations.

4.2. Partial exemption for examinations is not allowed.

4.3. No exemption is permitted for professional assessment by interview for Certified Testing Professional candidates.

4.4. Examinations consists of

4.4.1. Written examination; and/or

4.4.2. Professional assessment by interview (for Certified Testing Professionals only).

4.5. Candidates must satisfy the examiner(s) in all parts. Details of the examination format follow the syllabus and specimen examination questions as given in Appendices 1 and 2 respectively.

4.6. Types of questions

4.6.1. Multiple choice questions

4.6.2. Short answer questions

4.6.3. Open-ended questions

4.7. Examination for Certified Testing Technician

The examination will comprise the following:

4.7.1. General

- multiple-choice questions
- short answer questions

4.7.2. Technical

- multiple-choice questions
- short answer questions

4.7.3. Time length of examination

- Written examination – 2 hours





#### 4.7.4. Weighting of each topic

<u>Topics</u>	<u>Weighting (%)</u>
a) Understanding ISO/IEC 17025	10
b) Laboratory safety	10
c) Integrity management	10
d) Understanding basic laboratory techniques	45
e) Equipment usage	25

Weighing of each topic shall not deviate from the pre-set percentage by more than 5%.

#### 4.7.5. Marking system

- Model answer shall be set for each multiple choice questions. Marks will be given for correct answers and half of the mark will be deducted for each wrong answer.
- Suggested answers shall be set and marks should be allocated according to key points of answers for short questions. Marks for each key point should be pre-set. Marks would be given to answers with meanings which match the suggested answers as judged by the marker.

#### 4.7.6. Passing mark

- The passing mark for each section shall not be less than 40% and the overall passing mark is 60%.

#### 4.8. Examination for Certified Testing Professional

The examination will comprise the following:

##### 4.8.1. Management requirements

- Multiple choice questions
- Short answer questions

##### 4.8.2. Quality requirements

- Multiple choice questions
- Short answer questions



- Open-ended question(s)

#### 4.8.3. Technical requirements

- Multiple choice questions
- Short questions
- Open-ended question(s)

#### 4.8.4. Professional assessment by interview

- The interview will cover all certification criteria and focus on underlying principles, limitations, quality control checks and reporting requirements of tests currently undertaken by the candidate.

#### 4.8.5. Time length of examinations

- Written examination – 3 hours
- Professional assessment by interview – 30 to 50 minutes

#### 4.8.6. Weighting for each topic

<u>Topics</u>	<u>Weighting (%)</u>
a) Management requirements	10
b) Integrity management	10
c) Laboratory management in compliance with ISO/IEC 17025	15
d) Laboratory safety	5
e) Estimation of measurement uncertainty	10
f) Interpretation of results and reporting requirements	10
g) Requirements of equipment calibration	15
h) Principles of measurement methods	25

Weighting of each topic shall not deviate from the pre-set percentage by more than 5%.

#### 4.8.7. Marking system

- The same marking system as Section 4.7.5 shall apply. The marking system for open-ended questions shall be the same as that for short questions.



#### 4.8.8. Passing Mark

- The passing mark for each section shall not be less than 40% and the overall passing mark is 60% for each of the written examination and of the interview.
- A candidate must pass both the written examination and the interview.



## 5. Application Procedure for Certification/Examination and Fees

### 5.1. Application form

5.1.1. Applications must be made on the appropriate application form which is available at [www.hktic.org](http://www.hktic.org).

5.1.2. Application form asks for specific details of experience and training and must be signed confirming that these details are correct and supported by such other documents as may be necessary to confirm that the candidate is eligible for examination.

5.1.3. No applications can be confirmed or examination dates issued until receipt of a correctly completed application form and the full fees. In the event of false statements being discovered any certificate awarded as a result of the test will be revoked and declared null and void.

### 5.2. Application and examination fees

5.2.1. The fee structure is as follows:

Level	Type of application/examination	Fee (H.K. \$)
CTT	Initial and upgrade application	300
	Examination (written), if applicable <sup>Note</sup>	500
	Annual subscription fee	500
CTP	Initial and upgrade application	500
	Examination (written), if applicable <sup>Note</sup>	500
	Examination (professional assessment)	1000
	Annual subscription fee	500

Note:

Written examination can be exempted under the following conditions by:

- achieving certificate of achievement (satisfactory results in end-of-course evaluation) in approved training courses for all competence requirements; or
- fulfilling the academic requirements and having no less than 15 years of relevant experience, of which 5 years shall be at a managerial position for testing professionals.



5.3. Initial certification, certification upgrade and extension of certification of new category

5.3.1. Candidates who are seeking certification for the first time or for those wishing to upgrade or extend their certification credential can go to website [www.hktic.org](http://www.hktic.org) and download an application form and Handbook for the test category to be certified.

5.3.2. The candidate shall submit payment, completed application form and documentation consisting of :

- Academic qualifications;
- Certificate of achievements in appropriate training courses; and
- Any other relevant records

5.3.3. The application is reviewed and evaluated by the Programme Officer for confirmation of acceptance at the requested level of certification. The candidate is notified of the decision and/or date and time of examination where applicable.

5.3.4. The Certification Board may grant certification to Testing Technicians directly without examination on condition that they fulfill the academic and training criteria as stipulated in clauses 3.2.1 and 3.3.1.

5.3.5. The Certification Board may recommend that a candidate seeks certification at an alternate level, or terminate the certification process after reviewing the documents submitted. The application fee would not be refunded.

5.3.6. The examiners involved are independent and do not respond to questions from candidate. The Programme Officer provides the information about the certification process to the candidate and answers any questions he/she may have.

5.3.7. The Certification Board makes the decisions on awarding a pass or fail based primarily upon the recommendation of the examiners.

5.3.8. A candidate applying for Certified Testing Professional is advised to take and pass the written examination before applying for professional assessment by interview.

5.3.9. All certified personnel will be registered in databases and presented as public information on their respective websites. The candidate is notified of the result of the



certification procedure within 30 calendar days after the examination or submission of application. They are entitled to use the designation as CTP or CTT.

#### 5.4. Re-certification

5.4.1. Candidates are required to re-certify after the period of certification validity, which is normally 3 years from the date of issue of the certificate, has expired.

5.4.2. The re-certification process is different from the first certification process. It concentrates on the continuing professional development (CPD) of the individual that has taken part in since the last certification or re-certification. Similar to first certification, candidate shall visit the website and download the application form and shall submit payment and completed documentation, consisting of

- Application form for re-certification
- Working experience in the past 3 years and
- Records of Continuing Professional Development (form for recording of CPDU is available on website [www.hktic.org](http://www.hktic.org))

5.4.3. The Programme Secretariat will review the records of CPD to determine whether the re-certification candidate fulfils the CPD requirements for his/her level.

#### 5.5. Continuing Professional Development (CPD)

5.5.1. The Continuing Professional Development programme supports the ongoing educational and professional development of individuals who have attained the certification. The purpose of the CPD program is to:

- enhance ongoing professional development;
- encourage and recognize individualized learning opportunities;
- maintain the value and recognition of the certification; and
- provide a vehicle for attaining and recording professional development activities.

5.5.2. In order to satisfy the CPD programme and maintain an active certification status, candidate must accrue and report a minimum of 30 and 60 Continuing Professional Development Units (CPDUs) during each three-year certification cycle for Certified Testing Technician and Certified Testing Professional respectively. A Certified Testing Technician can accrue the necessary CPDUs by participating in any one or more activities as listed in Appendix 4. A Certified Testing Professional shall



participate in at least two activities. The number of CPDUs accrued for one activity shall not be less than 30 in case the Professional attends only two activities. The expiry date of validity is shown on the certificate.

#### 5.5.3. Continuing Professional Development Units (CPDUs)

- The Continuing Professional Development Units (CPDUs) is the measuring unit used to quantify approved learning and professional service activities. Typically, one CPDU is earned for every one hour spent in a planned, structured learning experience or activity. There is a range of opportunities available to candidates to acquire CPDUs through training/education programmes and professional activities covering seminar, industrial discussion group, symposium, training course, etc. Appendix 4 gives guidelines for counting CPDUs.

#### 5.6. Cancellations, Rescheduling, No Shows

- 5.6.1. If candidate needs to cancel or reschedule an interview or an examination, he/she must do so no later than 48 hours before the scheduled appointment.
- 5.6.2. If he/she fails to notify the appropriate party within the specified time period and/or fails to meet a scheduled examination appointment, he/she forfeits the full certification fee and will have to pay the full certification fee in order to schedule another interview or examination.
- 5.6.3. There are times when extenuating circumstances (e.g. medical emergency, death in immediate family, illness in immediate family) may prevent a candidate from meeting a scheduled interview or examination appointment, resulting in a no show. Should such a situation arise, the candidate will be asked to provide explanations along with supporting documentation (e.g. accident report, medical documentation, death certificate). If he/she does not make contact within 72 hours following a missed appointment, fees will apply in order to schedule a new appointment. All claims will be reviewed on a case-by-case basis. The candidate is allowed a maximum of one year, from the date of application is approved, to apply for re-examination.



## 6. Appeals

6.1. As a policy, the Certification Board has a procedure for considering appeals against the decisions at the end of each stage of the certification cycle.

### 6.2. Written examination recheck

6.2.1. The marks awarded for a particular section may be subject to a recheck. A recheck is carried out to ensure that there have been no arithmetical or clerical errors, that the marks awarded are appropriate and that all the marks to which the candidate is entitled have been included in the final total.

### 6.3. Professional assessment Review

6.3.1. The grounds for such review must clearly identify the element or elements of the assessment for which the review is sought. It must also specify the grounds on which the review is sought and must contain all information, which the candidate requests to be taken into account in the review.

6.3.2. The grounds for a review are:

- The regulations have not been properly implemented.
- The regulations do not adequately cover the candidate's case.
- Compassionate or medical circumstances related to the candidate's assessment situation, which were made known by the candidate in writing.
- Significant performance related information which the candidate believes was not considered by the examiners.

### 6.4. Appeal for a written examination recheck

6.4.1. A request for a recheck must be received no later than 10 working days after the date of posting of the examination results.

6.4.2. Only a written request for a recheck will be considered.

6.4.3. A fee, as stipulated in the Schedule of Fees, will be charged, which must be included in the request for a recheck. Such fee is non-refundable.

### 6.5. Appeal for a professional assessment review

6.5.1. A request for a review must be received no later than 10 working days after the date of posting of the assessment results.





- 6.5.2. Only a written request will be considered.
- 6.5.3. As the result of the appeal needs to be ratified by the Certification Board, it may take some time before the candidate is notified of the decision.
- 6.5.4. The fee for the professional assessment review is as set forth in the Schedule of Fees. Such fee is non-refundable.
- 6.6. An appeal form for appeal of written examination and professional assessment is available on website [www.hktic.org](http://www.hktic.org).



## 7. **Obligations**

7.1. All certified personnel shall at all times:-

7.1.1. commit to abide with the Regulations as set for the CSTP scheme;

7.1.2. pay the fees and charges as determined by the Certification Board;

7.1.3. represent honestly and truthfully to any person concerned that he/she is only certified for activities stated in the scope of certification;

7.1.4. endeavour to ensure that the certification granted by the Certification Board is not used in a misleading manner; and

7.1.5. maintain complete integrity and impartiality in all circumstances.

7.2. Details of regulations are given in the document CSTP01 “Regulations - Certification Scheme for Testing Personnel”.



## APPENDIX 1:

### **Examination syllabus and specimen questions for Certified Testing Technician**

Any aspect of the syllabus may be included in the written examinations or professional assessments. The level of knowledge required by the candidates varies according to the topic. To ensure comprehension by all parties, the following terms have been selected to demonstrate an increasing level of knowledge.

#### **Definitions**

**Outline Knowledge:** The candidate must be familiar with the subject in outline terms. He/She should know that the topic exists and what it is applied to. In the context of methods/techniques the candidate would be expected to know "what it is, what it does" but would not be expected to know the finer points of application of the technique.

**Knowledge:** The candidate must have a working knowledge of the subject and be able to apply it.

**Detailed Knowledge:** The candidate must have a depth of knowledge sufficient to enable him/her to exercise judgment.

#### **Types of questions**

For all multiple-choice questions candidates are required to tick or otherwise indicate the correct answer in the space provided.

Candidates are expected to give a few words, a phrase or a sentence as answers for short answer questions in the space provided.

Candidates are required to explain in depth for open-ended questions.

### **1. Examination syllabus of Certified Testing Technician**

#### **1.1. General requirements (outline knowledge)**

##### **1.1.1. Understanding of ISO/IEC 17025**

- Document control
- Technical records
- Environmental conditions



- Equipment calibration requirements
- Sample handling such as storage conditions, etc.
- Quality control requirement

1.1.2. Laboratory safety (knowledge)

- General laboratory and site safety precaution
- Handling of contaminated sample and radioactive equipment, etc.
- Personal protection in handling samples and equipment
- Measures in using large and heavy equipment in the laboratory and construction site

1.1.3. Integrity management (detailed knowledge)

- Prevention of Bribery Ordinance, Cap. 201
  - Corruption
  - Advantages
- Confidentiality and proprietary right
- Outside Employment
- Use of Company Assets
- Conflict of Interest
- PCSTP01 “Regulations – Professional Certification Scheme of Testing Personnel”
  - Code of ethics in general
  - Code of ethics in relation to employer
  - Code of ethics in relation to public
  - Obligation of Certified Testing Personnel
  - Use of Certification symbol and claim of certification status

1.2. Technical requirements (knowledge)

1.2.1. Understanding on test standard and measurement techniques

- Types of construction materials, outline knowledge on their usage and properties
- Temperature and tolerance for sampling and testing
- Sample maximum holding time
- Site sampling technique
- Sample conditioning requirement
- Checking and verification before testing
- Recording of test results
- Knowledge of measurement techniques one of the sub-category as given in Appendix 5



1.2.2. Equipment usage (knowledge)

- Concept of calibration and performance checks
- Knowledge on general equipment and specific equipment of one of the sub-category as given in Appendix 6

**2. Specimen examination questions**

2.1. According to CS1:2010, the slump test is applicable to concrete with a slump value up to

- (a) 100 mm
- (b) 125 mm
- (c) 150 mm
- (d) 160 mm
- (e) 175 mm

2.2. Which of the following documents should be controlled? (answers can be more than 1 choice)

- a. Quality manual
- b. Correction factors obtained from calibration
- c. Clients specifications
- d. Test report

2.3. Give the temperature and tolerance for curing tank of concrete cubes.

Temperature is \_\_\_\_\_°C and the tolerance is \_\_\_\_\_°C .



## APPENDIX 2:

### **Examination syllabus and specimen questions for Certified Testing Professional**

#### **1. Competence requirements of Certified Testing Professional**

##### 1.1. Management requirements (Detailed Knowledge)

- 1.1.1. Manager's Basic Functions
- 1.1.2. Time Management
- 1.1.3. Communication in Your Workplace
- 1.1.4. Team Building – Basic understanding of concepts
- 1.1.5. Delegation and Management of Generation Y

##### 1.2. Quality requirements

##### 1.2.1. Laboratory Management in compliance with ISO/IEC 17025 (Detailed Knowledge in the following aspects)

- Document control
- Review of contract
- Subcontracting
- Verification of critical consumables
- Difference between correction and corrective actions and control of non-conforming work
- Preventive actions
- Preventive actions
- Technical records – test result, verification records, etc.
- Environmental and sample conditioning requirement
- Traceability (equipment)
- Sub-sampling requirements
- Sample identification and integrity within the laboratory
- Quality assurance procedures and plan
  - Method verification
    - Minimum method verification in compliance with specifications as stipulated in test standards
    - Participation in proficiency testing programme, interlaboratory comparison programme
    - Verification of continuing competence
    - Development and preparation of test procedures in meeting the specifications of test standard



- Statistical treatments of data and quality control requirement (detailed knowledge)
  - Basic statistics such as student-t test, Q test, normal distribution and standard deviation

1.2.2. Laboratory safety (knowledge)

- General laboratory safety precaution
- Use of large testing machine and chamber
- Safe handling of chemicals
- Use of radioactive materials

2.3.1. Integrity management (detailed knowledge)

- Prevention of Bribery Ordinance, Cap. 201
  - Corruption
  - Advantages
- Confidentiality and proprietary right
- Outside Employment
- Use of Company Assets
- Conflict of Interest
- PCSTP01 “Regulations – Professional Certification Scheme of Testing Personnel”
  - Code of ethics in general
  - Code of ethics in relation to employer
  - Code of ethics in relation to public
  - Obligation of Certified Testing Personnel
  - Use of Certification symbol and claim of certification status

1.3. Technical requirements (knowledge)

1.3.1. Estimation of measurement uncertainty

- ISO GUM approach
- Factors affecting measurement uncertainty
- Reporting of uncertainty and compliance

1.3.2. Interpretation of results and reporting requirements (detailed knowledge)

- Number of significant figures
- Conditions of sample to be reported
- Reporting format as specified in test standards



### 1.3.3. Test and legislation requirements (detailed knowledge)

- Requirements of standards
  - Hong Kong Construction Standard, e.g. CS 1 and CS 2, etc
  - Hong Kong Government Works Department Specifications
  - Buildings Department Code of Practices
  - Hong Kong Concrete Institute test method, e.g. TM 1, TM 2 and TM 3, etc
  - Chinese Standard, e.g. GB, GB/T, etc
  - British Standard, e.g. BS
  - American Standard, e.g. ASTM, API, AWS, ANSI/UL, ANSI/NSF
  - Japanese Standard, e.g. JIS
  - Australian Standard, e.g. AS
  - European Norm, e.g. EN
  - International Standard, e.g. ISO, IEC, etc.
- Principle of tests of one sub-category as given in Appendix 5

### 1.3.4. Equipment calibration

- General and specific equipment of one of the sub-category as given in Appendix 6





**Professional assessment syllabus on sector specific tests (only for testing professional)**

1. Principles of test procedures and measurement techniques

- 1.1 Scope and limitation of the test
- 1.2 Critical parameters to be monitored
- 1.3 Expected range of results
- 1.4 Legislation requirements

2 Requirements of standards

- 2.1 Reporting requirements
- 2.2 Conditioning
- 2.3 Sample size and sample preparation

**2. Specimen examination questions**

- 2.1. Define checking, validation, verification, interlaboratory comparison and round robin proficiency testing ?
- 2.2. What is the mechanism operated at the moment for traceability to international physical standards and to certified reference materials?
- 2.3. List two nondestructive testing methods used for detecting leakage of water from upper floor or identifying delamination of tiles at the external wall of a building and briefly describe the expected image results and their interpretation for further investigation.



## APPENDIX 3

### **Training courses approved by the Certification Board**

Before 1 January 2012, candidate attending the courses as listed below is deemed to satisfy the competence requirements shown.

#### 1. Certified Testing Technician

Competence requirements	Course Name	Training Provider
ISO/IEC 17025	Laboratory Management	HKAS/HKTIC/IVE
Laboratory Safety	Laboratory Safety	HKTIC/VTC/OSHC/Labour Department

#### 2. Certified Testing Professional

Competence requirements	Course Name	Training Provider
ISO/IEC 17025	Laboratory Management for organizations implementing ISO/IEC 17025:2005	HKAS/HKTIC
Laboratory Safety	Laboratory Safety	HKTIC/VTC/OSHC/Labour Department
Measurement uncertainty	Guide to Expression of Uncertainty of Measurement	HKAS/HKTIC/SPACE

HKTIC – Hong Kong testing, Inspection and Certification Limited

HKAS – Hong Kong Accreditation Services

VTC – Vocational training Council

IVE – Hong Kong Institute of Vocation Education

OSHC - Occupational Safety and Health Council

As commence from 1 January 2012, candidate is required to obtain certificates of achievement (satisfactory results in end-of-course evaluation) in the following approved courses in meeting the competence criteria. Lists of training organizations and training courses are available on the Scheme website [www.hktic.org](http://www.hktic.org).



1. Certified Testing Technician: candidate should attend the quality and ethics courses and any one of the following technical courses on specifications of test standard and use of equipment

Competence requirements	Course Name	Duration (hours)
Quality requirement	Understanding ISO/IEC 17025 and laboratory safety	9 hours
Integrity requirements	Ethics	3 hours
Technical requirements Basic laboratory technique and use of equipment	Building diagnostics	15 hours
	Construction materials - All steel and metallic	8 hours
	Construction materials - Soil and rock	15 hours
	Construction materials - Concrete, bituminous, sediment materials	15 hours
	Foundation	8 hours
	Welding NDT	4 hours

2. Certified Testing Professional

Competence requirements	Course Name	Duration (hours)
Management skills	Comprehensive management	14
ISO/IEC 17025 Statistical treatment of data and quality control requirement	Laboratory management	15
Safety	Laboratory safety	6
Measurement uncertainty	ISO GUM	21
Technical requirements and equipment calibration	Specifications of construction material testing and equipment calibration	8 hours



## APPENDIX 4

### Guidelines for counting Continuing Professional Development Unit (CPDU)

Activities	CPDUs
Training course, seminar or workshop on relevant topics (Internal training and workshops on relevant topics are also counted <sup>Note1</sup> )	1 CPDU for candidate attending workshops or seminars which involve each contact hour.
Author or co-author of an article published in a refereed journal	30 CPDUs per article (author) 20 CPDUs per article (co-author)
Author or co-author of an article published in a non-refereed journal	15 CPDUs per article (author) 10 CPDUs per article (co-author)
Lecturer/Speaker on relevant topics at a conference, seminar or formal course.	10 CPDUs per activity
Member or moderator on relevant topics at a conference, symposium, workshop or formal course.	5 CPDUs per activity
Author or co-author of textbook on relevant field	40 CPDUs (author) 20 CPDUs (co-author)
Developer of content for a testing learning courseware.	10 CPDUs per new course
Board or committee member of testing or certification organization	20 CPDUs (board)per annum 10 CPDUs (committee) per annum
Development of new international/regional test standard	30 CPDUs
Verification and implementation of new international/regional test standard <sup>Note2</sup>	10CPDUs
Development of new accredited in-house method (limited to 3 developers) <sup>Note3</sup>	15 CPDUs
Technical visit	1 CPDU per each visit hour



Remarks:

- Note 1: Internal training should be organized in similar structure as external training with training materials, assessment and attendance or assessment certificate.
- Note 2: Organization should maintain evidence in support of competence in performing the tests including documentation (test procedures), satisfactory results in proficiency testing activities (proficiency testing programme, interlaboratory comparison programmes or verification by certified matrix reference materials).
- Note 3: Accreditation should be granted by HKAS (Hong Kong Accreditation Services) or accreditation body having MRA (mutual recognition agreement) with HKAS.



## APPENDIX 5

### Sub-categories of construction materials testing

- 1 Building diagnosis
  - 1.1 infrared thermography
  - 1.2 radar wave
  - 1.3 covermeter
  - 1.4 carbonation
  - 1.5 half cell potential measurement
  - 1.6 concrete resistivity
  - 1.7 pundit test
  - 1.8 pull-off test
  - 1.9 rebond mammer test
  - 1.10 water leakage test
- 2 Construction materials tests
  - 2.1 Types of materials
    - 2.1.1 Soil and rock
    - 2.1.2 Concrete, bituminous and sediment materials
      - Aggregate
      - Admixture
      - Bituminous
      - Block and brick
      - Cement, FPA, GGBS
      - Concrete
      - Grout & mortar
    - 2.1.3 All steel and metallic
  - 2.2 Types of tests
    - 2.2.1 Abrasion
    - 2.2.2 Compression, flexure, impact and tensile
    - 2.2.3 Density
    - 2.2.4 Hardness
    - 2.2.5 Deformation test
    - 2.2.6 Curing
    - 2.2.7 Water absorption



- 2.2.8 Particle size distribution
- 2.2.9 Skid resistance
- 2.2.10 Classification tests
- 2.2.11 Triaxial & direct shear tests
- 2.2.12 In-situ density tests
  
- 3 Foundation
  - 3.1 Sonic Logging Test (SOLT)
  - 3.2 Pile Integrity Test (PIT)
  - 3.3 Pile Dynamic Test (PDA)
  - 3.4 Static Loading Test (SLT)
  - 3.5 Plate Loading Test (PLT)
  - 3.6 Ultrasonic Echo Sounder Test (UEST)
  
- 4 Welding nondestructive tests
  - 4.1 Ultrasonic testing (UT)
  - 4.2 Magnetic Particle testing (MT)
  - 4.3 Liquid Penetrant testing (PT)
  - 4.4 Radiographic testing (RT)
  - 4.5 Visual Examination (VE)



## APPENDIX 6

### List of equipment required for each sub-category

- 1 General
  - 1.1 Balance and mass
  - 1.2 Length measuring device
  - 1.3 Linear displacement measuring devices
  - 1.4 Pressure gauge and related calibrator
  - 1.5 Temperature measuring device
  - 1.6 Sieve
  - 1.7 Compression, impact and tensile tester
  - 1.8 Torque wrench
  - 1.9 Time measuring devices
  - 1.10 Condition chamber
  - 1.11 Curing tank
  - 1.12 Oven
- 2 Building diagnostics
  - 2.1 infrared thermography
  - 2.2 radar
- 3 Construction materials
  - 3.1 Abrasion machine
  - 3.2 Accelerated polishing machine
  - 3.3 Vacuum gauge
  - 3.4 Shear tester
  - 3.5 Point Load tester
  - 3.6 Nuclear density gauge
  - 3.7 Volumetric measurement devices
  - 3.8 Rammers and hammers
  - 3.9 Tachometer
  - 3.10 Marshall testing machine
  - 3.11 Fineness testing apparatus
  - 3.12 Chloride ion penetration tester
  - 3.13 Compacting factor apparatus
  - 3.14 Creep Testing apparatus





3.15 Flow cone and table

3.16 Anchor bolt pull out and proof load tester

3.17 Bending tester

3.18 Extensometer

3.19 Hardness tester

4 Foundation

4.1 Accelerometer

4.2 Strain gauge

4.3 Oscilloscope or cathode ray tube or frequency analyzer and standard

4.4 Sonic logger

5 Non destructive tests

5.1 Ultrasonic probe

5.2 Ultrasonic flaw detector

5.3 UV /white light meter

5.4 magnetic yokes

5.5 X-ray equipment

5.6 Radiograph

5.7 Image quality indicator

5.8 Radiograph survey meter



## APPENDIX 7

### References

1. *ISO/IEC 17025:2005* General requirements for the competence of testing and calibration laboratories
2. *HKTIC CSTP01* Regulations Certification Scheme for Testing Personnel
3. *ISO 5725-3: 1994* Accuracy (trueness and precision) of measurement methods and results Part 3 – Intermediate measure of the precision of a standard measurement method
4. *ISO/IEC 98* Guide to Uncertainty in Measurement
5. *HOKLAS Supplementary Criteria No. 15* Construction Materials Test Category – Accreditation of Non-destructive Tests for Welding of Steel and Metal
6. *HOKLAS Supplementary Criteria No. 16* Construction Materials Test Category – Accreditation of Foundation Tests
7. *HOKLAS Supplementary Criteria No. 17* Construction Materials Test Category – Accreditation of Building Components and Related Tests
8. *HOKLAS Supplementary Criteria No. 18* Construction Materials Test Category – Accreditation of Soil and Rock Testing
9. *GUIDEBOOKS FROM LABOUR DEPARTMENT OF HKSAR*
  - 9.1. A brief guide to first aid
  - 9.2. A brief guide to the Occupational Safety and Health Ordinance
  - 9.3. A brief guide to the Occupational Safety and Health Regulation
  - 9.4. Code of practice on safety management
  - 9.5. Guidelines for good occupational hygiene practice in a workplace
  - 9.6. Hazards during chemicals in use and safety guidelines
10. *Standards in relation to laboratory safety*
  - 10.1. *BS 7258* Laboratory fume cupboards



10.2. AS 2444 Portable fire extinguishers and fire blankets - Selection and location

10.3. AS/NZS 2243.8 Fume cupboards

10.4. AS/NZS 2243.10 Storage of chemicals

主辦機構

Organised by



香港測驗認證協會有限公司

**Hong Kong Association for Testing, Inspection and  
Certification Ltd.**

"Any opinions, findings, conclusions or recommendations expressed in this material/event (or by members of the Project team) do not reflect the views of the Government of the Hong Kong Special Administrative Region, Trade and Industry Department or the Vetting Committee for the SME Development Fund."

“在此刊物上／活動內（或項目小組成員）表達的任何意見、研究成果、結論或建議，並不代表香港特別行政區政府、工業貿易署及中小企業發展支援基金評審委員會的觀點。”

「中小企業發展支援基金」撥款資助

Funded by SME Development Fund



工業貿易署

Trade and Industry Department