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HOKLAS Supplementary Criteria No. 36

Construction Materials Test Category – Supplementary Accreditation Requirements

1 INTRODUCTION

- 1.1 This criteria document serves to clarify and supplement the requirements of ISO/IEC 17025: 2017 and HOKLAS SC-33 and provides supplementary accreditation requirements of tests in the following test areas under the test category of Construction Materials:

Concrete cube tests

Steel reinforcement bar tests

Non-destructive tests (NDTs) on welds

Site tests – sand replacement tests, tensile and/or shear load tests of structural fixings, and pull-off tests.

- 1.2 The purpose of implementing these supplementary accreditation requirements is to strengthen supervision and tighten control when conducting the concerned tests. It will also help laboratories gather information for planning, monitoring and reviewing of their work capacities.

2 SUPPLEMENTARY REQUIREMENTS

- 2.1 Monitoring of workload against laboratory's testing capacity

2.1.1 A laboratory shall estimate its capacities for tests within the test areas mentioned in 1.1 above. The capacities should be expressed in term of number of tests that it can perform over a period of time. Such estimates shall be reviewed and, if necessary, revised whenever there are changes to the availability of resources or other relevant factors.

2.1.2 The capacity of a laboratory in performing a certain test depends on a multitude of factors, such as availability of operators, supervisors, testing equipment, report checkers and reviewers, site conditions, laboratory environment, test method used and many others. When estimating the capacity at any given time, laboratory management shall consider the effect of competition for limited resources between different activities and make adjustments where warranted. It is unlikely that a laboratory can perform all its tests at peak capacities at the same time because the tests may compete with one another for the use of the same group of operators, same

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sets of equipment or the same space. Therefore, the capacity of a laboratory in performing a certain test at any particular time will depend on the combination of other activities that the laboratory is performing at the same time. The laboratory shall also examine its entire system and identify the bottlenecks which limit its capacity. In cases where customer's requirements have significant impact on the workflow, such as requiring the laboratory to keep duplicate records or submit preliminary test results/reports within short period of time, the laboratory shall take these requirements into account when estimating the capacity. Since the estimated capacity is for the purpose of monitoring of workload, it shall be an achievable figure rather than a theoretical peak value. HKAS assessment teams shall take into consideration the above factors and the evidence provided by the laboratory when evaluating whether the capacity estimates of a laboratory are reasonable and realistic.

- 2.1.3 A laboratory shall have a system to ascertain that it has the required capacity before accepting a request/contract. If a new request/contract will lead to significant increase in workload for a particular test, the laboratory shall carefully examine the requirements of the contract/request and review if the laboratory has adequate resources and an operation system suitable for accepting such request/contract. The laboratory shall keep records of the review.
- 2.1.4 For site tests, a laboratory shall confirm with the customers the testing method/standards and estimated quantities before assigning testing operators to carry out the tests. The purpose is to ensure that sufficient resources are allocated to carry out the tests properly. The job assignment shall be carried out by HOKLAS approved signatories or suitably qualified supervisors.
- 2.1.5 Approved signatories or supervisory staff shall ensure that the work capacity is not exceeded on a day-to-day basis. If the actual amount of work completed is higher than the capacity, the approved signatory shall provide justification that the quality of test results has not been compromised before signing the test reports. The justification shall be recorded and relevant supporting evidence shall be kept.
- 2.1.6 For the purpose of monitoring workload of NDTs on welds, relevant records of time spent on site/workshop by the testing operators shall be kept and, such records shall be preferably endorsed by the customer's resident site representative. If a mix of different types of tests is required to be conducted by a test operator during the same visit, sufficient time shall be allocated for all the tests. In general, it is inappropriate to assume that two or more tests can be conducted concurrently unless there are clear justifications. The approved signatory for the report of such site tests shall ensure that the quantities of tests conducted by individual operators do not

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exceed the capacity before signing the test reports. The specific recommendations on maximum work capacities for testing operators performing the tests on site and in workshop are given in the Appendix of this document.

- 2.1.7 A laboratory shall have a contingency plan in place to cater for short-term surge of workload in excess of its normal capacity. The contingency plan may include deployment of additional working and supervisory resources, rejection of test requests and subcontracting of testing work. The laboratory shall ensure that the contingency plan is understood and implemented by appropriate personnel. The laboratory shall also keep records of actions taken to deal with the short-term surge of workload according to the contingency plan.
- 2.1.8 Laboratory management shall perform “capacity audit” at interval not exceeding 3 months to make sure that the operation teams are allowed to conduct the work at a reasonable pace and in a suitable manner without compromising its quality and accuracy. The “capacity audit” shall examine:
- (i) whether the laboratory’s estimate of testing capacity has been properly established and maintained,
 - (ii) whether the laboratory has implemented an effective system to ascertain that it has the required capacity before accepting test requests,
 - (iii) whether the supervisory staff has controlled the workload within the capacity on a day-to-day basis, and
 - (iv) in case when work load exceeded the normal capacity, whether the excess workload was handled according to the contingency plan.

Records of such audits shall be kept. Capacity audits shall be included in internal audit programme and performed by trained auditors who are independent of the work being audited.

2.2 Strengthening of supervision

- 2.2.1 Laboratory management shall structure its organisation and provide sufficient manpower to ensure effective supervision. The detailed supervisory responsibility of each supervisory staff member shall be documented.
- 2.2.2 Supervisors have the responsibility to ensure that laboratory operation has been properly conducted. He or she shall ensure, among others:
- (i) the test methods have been properly selected,
 - (ii) the laboratory has the required resources to conduct the tests,

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- (iii) the operators assigned to carried out the tests are competent,
- (iv) the tests, including sample handling and preconditioning, have been conducted in accordance with relevant documented procedures,
- (v) adequate technical support has been provided to the operators,
- (vi) the test observations have been properly recorded,
- (vii) all calculations and result interpretations have been properly made,
- (viii) test results have been properly reported,
- (ix) all necessary QC and QA activities have been performed and their results are satisfactory,
- (x) effective corrective actions have been made against identified discrepancies,
- (xi) necessary preventive actions have been implemented and any other work as required to ensure the proper functioning of the laboratory and the quality of the test results have been carried out.

The supervisor shall also ensure that the staff members under his or her supervision are working under suitable conditions which allow them to discharge their duties properly and not subject to undue pressure which may compromise the quality of their work, e.g. unreasonable deadlines and long working hours/overtimes, unbearable working environments, etc.

- 2.2.3 Adequacy of supervision will be emphasised in HKAS assessments and laboratory management will be required to justify their supervision arrangement and to demonstrate that supervisory staff members have been allowed sufficient time in their work schedule to carry out their supervisory duties, including those works outside normal working hours (i.e. at night time, public holidays, etc).
- 2.2.4 Supervision is of particular importance for work performed on site remote from the laboratory, e.g., in the Mainland. Laboratory management shall implement a system where HOKLAS approved signatories or other suitably qualified supervisors will conduct frequent unannounced on-site visits to check the work of on-site staff. The frequency of unannounced on-site visits shall be based on the quantities of site tests conducted. As a minimum, every on-site testing operator shall be checked at least once a year. For new on-site testing operator, the first unannounced on-site visit shall be conducted within three months after he/she has been deployed to perform site tests. Records of such checks and findings shall be kept.
- 2.2.5 HOKLAS approved signatories have the responsibility to ensure the adequacy of results they signed. They have to ensure that the work they are about to sign has been performed properly and in accordance with accreditation criteria. In addition to ensuring that the operators are fully trained and competent, approved signatories shall conduct on-site observation of how operators perform their work and review test and other records at sufficiently short intervals.

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- 2.2.6 Accredited laboratories shall keep records of absence from Hong Kong for their approved signatories. Justification shall be provided if an approved signatory signed a report or certificate for tests carried out during his or her absence from Hong Kong Special Administrative Region.
- 2.2.7 During an assessment, approved signatories will be asked to produce evidence that they have properly discharged their responsibilities. The signatory status of signatories will be revoked by HKAS if there is insufficient evidence that they have done so. Their performance in term of their effectiveness in assuring the correctness of results included in endorsed reports and certificates they have signed will also be considered when determining whether their signatory status should be continued.
- 2.3 Secure means of recording test results to prevent falsification
- 2.3.1 It is the responsibility of laboratory management to implement a result recording system which does not allow falsification of results or capable of detecting falsification of results.
- 2.3.2 Keeping redundant data to allow verification of other data is a possible means of detecting result falsification.
- 2.3.3 For concrete cube compressive strength tests, automatic means shall be utilised to record essential test information, including sample identification, machine identification, test date and time, pacer rate and the maximum load. Printed hardcopies or properly controlled and protected computer records containing the above information and the corresponding test results shall be kept. This requirement also applies to compressive strength tests on other materials such as concrete core, mortar cube, blocks and bricks and dimension stones.
- 2.3.4 For reinforcement steel bar tensile strength tests, automatic means shall be utilised to record essential test information, including sample identification, machine identification, test date and time, stress/strain rate, yield strengths and the tensile strength. Printed hardcopies or properly controlled and protected computer records containing the above information and corresponding test results shall be kept. This requirement also applies to tensile strength tests on other materials such as structural steel and 7-wire strand.
- 2.3.5 For NDTs on welds and site tests mentioned in clause 1.1, high resolution digital visual records shall be taken before and after tests. These may be in the form of photographs or videos such that the location and identification of the joint/test specimen, condition of the joint/test specimen and the result yielding stage of the test are recorded. The digital photographs and videos

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shall include information on the times and dates when they are taken. Where the location of the test is important, GPS records or other records which allow accurate identification of the test sites shall also be kept.

- 2.3.6 For sand replacement tests, the test locations can be endorsed by the customer's resident site representative instead of taking high resolution digital visual records.
- 2.3.7 An approved signatory shall review the records mentioned in 2.3.2 to 2.3.6 above, whenever applicable, together with the worksheet and other technical records, and satisfy himself that the tests have been properly conducted before signing the test reports.
- 2.3.8 All computer records generated during testing and the digital photographs and videos are important technical records. The laboratory shall have procedures to protect and back-up these electronic records and to prevent unauthorised access and amendment.
- 2.4 Freedom from undue pressure
 - 2.4.1 It is the responsibility of the laboratory management to protect its operators from undue pressure intending to affect test results. A laboratory shall have documented arrangement to do so. During an assessment, the arrangement and records of implementation will be critically examined.
 - 2.4.2 A laboratory shall implement the following measures where appropriate:
 - (i) issuing code of conduct to on-site staff. Assistance for drawing up and implementing a suitable code of conduct may be obtained from the Advisory Services Group of ICAC,
 - (ii) signing of an impartiality statement with the customer at the beginning of a testing contract,
 - (iii) asking the resident site representatives of the customer to sign to acknowledge having read a document setting out the relationship between the on-site staff of the laboratory and the representatives of the customers before performing any site tests. The document may state that any undue pressure exerted on the operator intending to affect test results may be reported to the police or ICAC. Alternatively, the laboratory may include a pre-printed confirmation statement expressing the laboratory policy towards actions against undue pressure in the site work for the resident site representative of the customer to sign,
 - (iv) provision for reporting of undue pressure to laboratory top management,
 - (v) frequent rotation of on-site operators,

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- (vi) unannounced on-site visits by supervisors,
- (vii) periodic interview of on-site operators,
- (viii) periodic seeking of feedback from customers,
- (ix) documented punitive actions for breaching the code of conduct.

The laboratory may also use other inhibitive or encouragement means to ensure the proper performance and reporting of tests.

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Appendix

Recommended Maximum Work Capacities for Nondestructive Tests on Welds

Test Method	Recommended Maximum Work Capacity for Tests conducted on Site ^(Notes 1 & 3)	Recommended Maximum Work Capacity for Tests conducted in Workshop ^(Notes 2 & 3)
Visual Examination	<u>120</u> m per operator per 8 working hours	<u>170</u> m per operator per 8 working hours
Ultrasonic Testing	<u>30</u> m per operator per 8 working hours	<u>45</u> m per operator per 8 working hours
Magnetic Particle Inspection	<u>90</u> m per operator per 8 working hours	<u>120</u> m per operator per 8 working hours
Penetrant Testing	<u>30</u> m per operator per 8 working hours	<u>50</u> m per operator per 8 working hours

Notes:

- (1) The “working hours” refers to normal working hours **ON SITE**, including the time for record filling and all the preparation works prior to testing, but excluding the time for travelling to sites, meals, etc.
- (2) The “working hours” refers to normal working hours in **WORKSHOP**, including the time for record filling and all the preparation works prior to testing, but excluding the time for meals, etc.
- (3) The work capacities are derived based on the past NDT experience conducted under **NORMAL** environment on construction sites and in workshops respectively. Special circumstances, such as special joint configurations and client’s requirements, have not been taken into account when deriving these work capacities.