HOKLAS Supplementary Criteria No. 16

Construction Materials Test Category – Accreditation of Foundation Tests

0 Introduction

(a) This document serves to clarify and supplement the requirements of ISO/IEC 17025:2017 and HKAS Policy Document No. 1 for accreditation of laboratories performing foundation tests under the test category of 'Construction Materials'. It shall be read in conjunction with the current issue of ISO/IEC 17025:2017 and other relevant criteria documents. The foundation tests include, but not limited to, the following methods:

- Sonic Logging Test (SOLT)
- Pile Integrity Test (PIT)
- Pile Dynamic Test (PDA)
- Static Loading Test (SLT)
- Plate Loading Test (PLT)
- Ultrasonic Echo Sounder Test (UEST)
- Rapid Loading Test (RLT)
- Base Loading Test (BLT)
- Instrumented Pile Load Test (IPL)

(b) In addition to the requirements stipulated in this document, an accredited laboratory shall comply with all specific requirements of the relevant test standards.

1 Scope

(No additional explanation)

2 Normative references

(No additional explanation)

3 Terms and definitions

(No additional explanation)

4 General requirements

(No additional explanation)

5 Structural requirements

(No additional explanation)

6 Resource requirements

6.1 General

(No additional explanation)

6.2 Personnel

6.2.1 An approved signatory with responsibility for the operation of the accredited laboratory on foundation tests shall fulfil the necessary competence requirements and have the technical knowledge to ensure that the test is performed in accordance with the test method(s) and HKAS requirements are met. A person holding a recognised engineering degree or an equivalent qualification in a relevant discipline (e.g. civil, geotechnical or structural) and having at least four years of relevant and accountable experience satisfies these requirements. Alternatively, a person with eight years of directly relevant technical and managerial experience may be considered acceptable in lieu of formal qualifications.

6.2.2 Testing operator shall normally be supervised by a suitably qualified supervisor having the necessary qualifications, experience and technical knowledge not less than that of the testing operator.

6.2.3 Testing operator shall have the necessary qualifications, experience and technical knowledge. A person holding a recognised technician certificate or equivalent technical qualification issued by a recognised technical institute and having at least 2 years of relevant experience satisfies these requirements. Alternatively, a person with four years of directly relevant technical testing experience may be considered acceptable in lieu of formal qualifications.

6.2.4 Each laboratory shall evaluate the technical competence of its testing operators for foundation tests and keeps a list of qualified operators who are permitted to perform the test(s) and sign the worksheets. Record of assessing the competence of the qualified operator(s) shall be kept and ready for examination during each HKAS assessment or upon request by HKAS.

6.3 Facilities and environmental conditions

(No additional explanation)

6.4 Equipment

6.4.1 General requirements on equipment calibrations are given in HOKLAS SC-02. Specific requirements on equipment calibration/verification for foundation tests are given in the Appendix of this document. These requirements shall be complied with unless overridden by more stringent requirements stipulated in the relevant test methods.

6.5 Metrological traceability

6.5.1 Where a laboratory has the necessary reference standard or reference material, suitably controlled environment and competent staff, it may perform in-house calibration/verification for its working equipment. Documented internal calibration/verification procedures shall be ready for examination during each HKAS assessment visit. HKAS Executive may require the laboratory to provide the calibration/verification procedures in the briefing notes to the assessment team.

6.6 Externally provided products and services

(No additional explanation)

7 Process requirements

7.1 Review of requests, tenders and contracts

(No additional explanation)

7.2 Selection, verification and validation methods

(No additional explanation)

7.3 Sampling

(No additional explanation)

7.4 Handling of test or calibration items

7.4.1 Piles to be tested shall be identified throughout the test and records on the traceability of test results shall be kept. Identification shall be such that the piles or ground areas specifically tested can be identified against test results. Sophisticated devices may be required such as a global positioning system (GPS) in accordance with a government specification or specific client's requirement.

7.4.2 The method of identification shall be sufficiently permanent such that identification of tested piles for post-testing inspection by the client can be carried out.

7.5 Technical records

(No additional explanation)

7.6 Evaluation of measurement uncertainty

(No additional explanation)

7.7 Ensuring the validity of results

7.7.1 An applicant or accredited laboratory shall conform with the proficiency testing requirements as stipulated in HOKLAS SC-33.

7.7.2 Foundation testing is considered as a test area for the purpose of determining the proficiency testing activities required by HOKLAS SC-33.

7.8 Reporting of results

(No additional explanation)

7.9 Complaints

(No additional explanation)

7.10 Nonconforming work

(No additional explanation)

7.11 Control of data and information management

(No additional explanation)

8 Management system requirements

(No additional explanation)

APPENDIX

SPECIFIC CALIBRATION/VERIFICATION REQUIREMENTS

This appendix lists the specific calibration requirements for equipment of foundation tests.

Type of equipment	Maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Sonic Logging Test		
Oscilloscope or cathode ray tube (CRT) or frequency analyzer (Reference device for calibration of signal recording apparatus)	5 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Sonic logger signal recording apparatus (Check time base over the measuring range, e.g. 20 μs to 600 μs for sonic logger, check designated frequency for echo sounder)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02 or calibrate using reference oscilloscope, CRT, frequency analyzer or any reference measuring device
Sonic logger depth measuring device	1 year	Calibrate using a reference rule (weight of the equipment to be taken into account)
	Before test on site	Check against plumb-weighed measuring device
Plumb-weighed measuring tape	1 year	Calibrate using a reference rule (weight of the equipment to be taken into account)
Verification of sonic logger to known anomalies	3 months or every ten series of site testing, whichever is more stringent	Verify by means of known defects (e.g. voids, honeycombed, weak layers, sand lens, etc) in a concrete panel. The sonic path distance between two access tubes shall be practicably comparable to the maximum distance used for site testing

Type of equipment	Maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Pile Integrity Test		
Low-g Accelerometer		
(i) Reference	5 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
(ii) Working	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Load cell or load transducer (Housed in the instrumented hammer)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
PIT data logger and display unit (Check time base over the measuring range e.g. 20 to 450ms)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
PIT data logger coupled with the low-g accelerometer	Before test	Check the displayed signal against a bar of known length. The bar shall be composed of low stress wave velocity material.

Type of equipment	Maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Pile Dynamic Test		
High-g accelerometer		
(i) Reference	5 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
(ii) Working	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Multimeter (Reference)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Micrometer head (Reference)	4 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
PDA data display unit (Check time base over the measuring range e.g. 20 to 450ms)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
PDA strain gauge	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02 or calibrate using appropriate reference voltage and displacement devices.
PDA logger (Check accuracy of the digital conversion of acceleration into velocity)	1 year	Verify by means of hand calculation based on numerical integration of acceleration into velocity in appropriate finite intervals

Type of equipment	Maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Static Loading Test/Plate Loading Test Rapid Loading Test/Base Loading Test		
Reference load measuring device	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Force-measuring device (e.g. Load cell or load transducer)	Each time before a test or a series of tests on the same site. (Calibration after testing is required in some government specifications)	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Micrometer head or gauge block (Reference device)	4 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Displacement measuring device (i.e. LVDT, digimatic gauges, dial gauge, laser type or any transducer type devices)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02 or calibrate using appropriate reference device
	Before use	One-point check using a reference gauge block or any appropriate reference device
Settlement measuring device (Digital level with bar code staff, optical level with graduation staff, for checking the settlement of the reference beam for pile settlement measurement in a loading test)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
	Before use	Two pegs test for level. One point check for staff using appropriate reference device
Temperature measuring device (i.e. thermocouple or any transducer type)	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02

Type of equipment	Maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Instrumented Test		
Strain gauge (vibrating wire, optical sensor or any other types)	Before use	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02