HOKLAS Supplementary Criteria No. 14

‘Electrical and Electronic Products’ and ‘Toys and Children’s Products’ Test Categories – Electrical Tests

0 Introduction

(a) This criteria document serves to clarify and supplement the requirements of ISO/IEC 17025: 2017 for the accreditation of laboratories performing electrical safety tests, product performance tests, EMC tests and telecommunications equipment tests under the test category of ‘Electrical and Electronic Products’ and electrical tests under the test category ‘Toys and Children’s Products’. This criteria document should be read in conjunction with ISO/IEC 17025: 2017, HKAS Policy Document No. 1 and other relevant criteria documents.

(b) Laboratories shall comply with all specific requirements of the test standards in addition to the requirements specified in this document.

1 Scope

(No additional explanation)

2 Normative references

(No additional explanation)

3 Terms and definitions

(a) The terms and definitions given in ISO/IEC Guide 99 and ISO 9000 are applicable to this document.

(b) The term “shall” is used throughout this document to indicate those provisions which are mandatory. The term “should” is used to indicate guidance which, although not mandatory, is provided by HKAS as a recognised means of meeting the requirements.

4 General requirements

(No additional explanation)

5 Structural requirements

(a) The management of the laboratory shall include at least a member with in-depth knowledge of and hands-on experience in electrical safety tests, product performance tests, EMC tests and telecommunications equipment tests for electrical and electronic products and electrical tests for toys and children's products within the scope of accreditation/application. He/she shall be responsible for the technical operation of the laboratory with respect to those tests.

6 Resource requirements

6.1 General

(No additional explanation)

6.2 Personnel

(a) Each test operator shall have sufficient technical knowledge and command of the language used for specifying the requirements in the test standards and/or regulations. He/she shall hold a higher diploma in electrical or electronic engineering or a higher qualification conferred by a recognised higher education institution in Hong Kong and shall have satisfactorily completed the prescribed training and authorisation process of the laboratory prior to conducting a test independently. If a test operator possesses equivalent academic qualification and related work experience, the laboratory shall provide evidence to substantiate that the qualification and experience of such test operator is complying with the requirements specified in this paragraph.

(b) Supervisory personnel and/or signatories of the laboratory who are responsible for test results, shall either hold at a higher diploma in electrical or electronic engineering and have at least five years of related work experience or hold a recognised degree in electrical or electronic engineering with at least three years of related work experience. If a supervisory person possesses equivalent academic qualification and related work experience, the laboratory shall provide evidence to substantiate that the qualification and experience of such person is complying with the requirements specified in this paragraph.

(c) Each laboratory shall nominate at least one supervisory person as the signatory for a specific test. The nominated signatory shall have at least six months of supervisory experience in the testing area(s) for which signatory approval is being sought.

(d) If a test operator or supervisory person does not possess the minimum academic qualifications mentioned in Clauses 6.2 (a) or 6.2 (b) respectively but has extensive work experience in his/her responsible testing area, the laboratory shall demonstrate through records, which contain full details of the employment and related experience, that the concerned test operator or supervisory person has the required technical competence to discharge their responsibilities during the assessment.

(e) The training program for new testing operator shall at least cover the following areas as far as applicable:

i. Safety in testing laboratories;

ii. Principles and practice of basic safety, EMC and/or telecommunication equipment tests, including factors that may affect test results and precautions to be taken for minimising such effects;

iii. Understanding related test standards and terminology;

iv. Principles, limitations and operation of common measuring equipment and the criteria for selection of measurement equipment, including the method for selecting an appropriate instrument for performing a specific test;

v. Principles of measurement methods and the criteria for selection of measurement methods;

vi. Preparation of test items, pre-conditioning requirements and specific testing conditions;

vii. Understanding equipment calibration and verification, and metrological traceability;

viii. Understanding measurement uncertainty;

ix. Recording of test details and results;

x. Drawing conclusion based on test results;

xi. Principles of common electrical and electronic components, such as various types of motors, insulation, antennas, switches, electronic components including semiconductor devices, transformers, fuses and means of electrical connections (i.e. different types of connectors, size of wires, etc.), and how they affect safety, EMC and telecommunication performance;

xii. Different versions and amendments of test standards including normative references and how amendments should be applied. For two part standards, e.g. IEC 60335 series, how amendments to the part one standard should be applied to the relevant part two standard;

xiii. Common regulations governing consumer products for EMC issue and telecommunications equipment around the world;

xiv. Understanding laboratory management system.

(f) Where necessary, the laboratory shall provide refresher training on infrequently performed tests to test operators.

(g) The laboratory should keep a competence record listing each test that a person is competent to perform or supervise.

(h) Colour vision defects may prevent people from properly conducting electrical safety test. The laboratory shall ensure that the validity of test results is not affected by such vision defect.

6.3 Facilities and environmental conditions

(a) The humidity of the laboratory outside working hours should not be overlooked. Certain measuring instruments, e.g. test probes, pins and gauges, may easily be damaged under prolonged exposure to an uncontrolled, e.g. high humidity, environment. To protect the instruments, the laboratory shall maintain the humidity of the testing locations within the manufacturer’s specified range at all times.

(b) The laboratory may refer to IEC 60068-1: 2013 Section 4 for a general description on standard atmospheric conditions for measurements and tests.

(c) It is preferable to use continuous monitoring and recording device such as a thermohygrograph to monitor the environmental conditions of testing locations. Where a manual device is used, the frequency of taking readings shall be sufficient to detect any deviation from the required

environmental conditions.

(d) Although laboratory safety is not a mandatory requirement of ISO/IEC 17025: 2017, the laboratory is reminded to ensure electrical safety at all times.

(e) When the laboratory performs testing at sites or facilities outside its permanent control (e.g. using EMC test chamber of other laboratories or shared facilities), the laboratory shall ensure that the following requirements are fulfilled:

i. The testing sites or facilities are located within Hong Kong;

ii. There is a valid service agreement allowing the laboratory to access and to use the testing sites or facilities for performing the tests;

iii. The testing sites or facilities are in conformity with all applicable HOKLAS accreditation criteria and test standard requirements. The laboratory shall keep corresponding verification records and a copy of associated document proof;

iv. The testing sites or facilities are specified in the scope of accreditation as approved by HKAS.

Note: The above requirements are not applicable for on-site testing, which are explicitly indicated in the HOKLAS scope of accreditation.

6.4 Equipment

(a) Each laboratory shall assign at least one supervisory person to be responsible for ensuring that its equipment is properly calibrated or verified against the test standard’s requirements.

(b) Upon completion of calibration or verification, the responsible person shall evaluate the equipment’s calibration or verification results against a set of documented criteria to determine whether the equipment is still acceptable for performing specific tests.

(c) When the effectiveness of testing chambers or enclosures has significant contribution to the measurement uncertainty for testing results, the laboratory shall establish a programme to verify the performance of these chambers or enclosures against specified limits regularly.

(d) For software used for testing which allows user to update its stored variable, e.g. calibration factors of connection cables, or alter its setting parameter, the laboratory shall establish procedures to ensure the correctness of these variable and parameter before testing.

(e) When the laboratory performs testing using testing equipment outside its permanent control, it shall ensure that test standard requirement specified for the equipment shall be compiled with and the test equipment are working in acceptable condition during handover. The laboratory shall keep corresponding verification records and a copy of associated document proof.

6.5 Metrological traceability

(a) If a laboratory establishes metrological traceability of measurement results through its in-house calibrations, the competence of personnel performing in-house calibrations, the associated reference standards, related calibration procedures, the evaluation of measurement uncertainty for each calibration activity and the corresponding calibration records will be assessed by HKAS assessment team. HKAS Executive may require the laboratory to provide the in-house calibration procedures and related technical records to HKAS assessment team for assessment.

7 Process requirements

7.1 Review of requests, tenders and contracts

(a) When the test item has to be modified from its normal operation condition to facilitate testing operation, e.g. operating in test mode, or connecting external wires for tapping internal circuits, etc., and/or be operated with special auxiliary equipment to be provided by the customer, e.g. telecommunications network simulator for mobile phone, details of such modification and auxiliary equipment shall be agreed with the customer and recorded in sufficient information to ensure the test can be repeated.

(b) Where multiple test items (e.g. of different design or construction) of a specific product are submitted by a customer for testing, the laboratory shall perform tests for all test items unless it can demonstrate how to select certain representative test item(s) to obtain reliable test results for all the test items.

(c) Upon the failure of certain test item(s) to demonstrate conformity with the test requirements, a customer resubmits the test item(s), i.e. the retest item(s), for testing, the laboratory shall in general repeat all the required tests in the test standard. In case only selected tests in lieu of all tests of the test standard will be carried out, the laboratory shall ensure that the customer has provided the information which shows all modifications made to the retest item(s) so that the laboratory can determine the specific tests to be repeated on the retest item(s).

7.2 Selection, verification and validation of methods

(a) Each laboratory shall ensure that all test standards which are shown in the scope of activities accredited or seeking accreditation including all normative references mentioned in those standards are readily available to its personnel.

(b) In most cases, testing of an electrical or electronic product may involve a large number of test standards which have different versions and amendments. The laboratory shall implement a system to ensure that appropriate version and amendment of each test standard is used.

(c) Each laboratory shall have a mechanism to monitor the release of a new or revised test standard and to implement the new or revised standard accordingly. If only an electronic version of the test standards including the standard amendment sheets is used, the laboratory shall demonstrate how its test operators can get a holistic view of the amended test standards at the test locations.

(d) Many national and international standards specify similar tests. However, the detailed requirements may vary. If a test standard does not specify the detailed test procedures, the laboratory should prepare step-by-step test procedures as well as work sheets for its test operators.

(e) Where there are ambiguities in the test standard such that there are various ways to perform a test to achieve the required performance, the laboratory shall document the appropriate way to perform the test.

(f) It is common for electrical safety test standard to specify component tests to other test standards. If the laboratory is not competent to perform these tests according to the electrical safety test standards, the laboratory shall have documented procedures for reviewing and accepting component test reports or certificates issued by a competent product certification body. Otherwise, the component tests shall be excluded from its scope of accreditation.

(g) If a laboratory is seeking accreditation for compliance testing to legislation, accreditation is normally granted only on the following conditions:

i. If the compliance test method is specified in legislation, the laboratory shall use such test method.

ii. If compliance test method is not specified in legislation, the laboratory shall obtain formal approval from the corresponding regulatory authority for using either a relevant test standard (e.g. ISO, IEC, EN), or an in-house test method which is developed and properly validated by the laboratory.

7.3 Sampling

(No additional explanation)

7.4 Handling of test items

(a) Modification of the test item and special auxiliary equipment to facilitate testing as agreed with the customer shall be verified when the test item is received.

(b) The test item disposal system should be designed to protect the confidentiality of customer information. Before a test item is disposed of, it shall be destroyed to an extent such that the customer information will not be disclosed during the disposal process.

7.5 Technical records

(a) Pro-forma worksheets should be designed for recording the original observations and test results. A clear instruction such as the number of significant figures to be used for recording numerical test results should be given. Space should be provided for showing the exact location of the test item on which an electrical safety test was performed and for recording the EMC testing setup showing the connection of testing equipment and the test item and their relative positions.

(b) When more than one test item are used for performing different tests as specified in a test standard, the record shall indicate clearly which test item was used for performing a specific test.

(c) The date of submission of a retest item and specific tests performed for the retest item shall be clearly recorded.

(d) If a HOKLAS endorsed test report or certificate is issued as a certificate of safety compliance for an electrical product under the Electrical Products (Safety) Regulation, the relevant test records, including raw data, calculations and test reports shall be kept for at least 7 years.

7.6 Evaluation of measurement uncertainty

(a) Each laboratory shall have a procedure for evaluation of measurement uncertainty for all tests which have numerical results. In general, the measurement uncertainty shall be evaluated in accordance with ISO/IEC Guide 98-3.

7.7 Ensuring the validity of results

(a) Each laboratory shall participate in adequate and representative proficiency testing activities, which include proficiency testing scheme or interlaboratory comparison, at least once every four years for each test technique, e.g. power measurement, temperature measurement, creepage distance and clearance measurement for electrical safety tests; and conducted emission power measurement, disturbance power measurement and harmonics measurement for EMC tests. Where practicable, at least one of the participating laboratories shall have been accredited for the tests performed under an interlaboratory comparison.

(b) Each laboratory shall have a documented procedure for rectifying unsatisfactory performance in its proficiency testing activities. All findings in connection with the unsatisfactory performance shall be recorded.

(c) Each laboratory shall implement a periodic checking system to ensure that each test procedure or instruction is correct and adequate. This may be implemented through repeated measurements of a sample of known characteristics by different test operators. Where any discrepancy is detected, the test procedure or instruction shall be amended and test operators shall be informed to implement the changes. The checking system will be assessed during HKAS assessments.

(d) Each laboratory shall implement a mechanism for reviewing its reported results to ensure the validity of the results and the person who is assigned to review the results (‘the reviewer’) shall not be directly involved in performing the tests. In addition, the reviewer, who should preferably at supervisory level, shall have the required competence to perform the review.

Sufficient technical records shall be provided to the reviewer for conducting the review.

7.8 Reporting of results

(a) Details of modification of the test item and special auxiliary equipment to facilitate testing as agreed with the customer shall be included in test report. The customer or the laboratory who arranges the modification and provides the auxiliary equipment shall be identified.

(b) The laboratory shall have documented procedures for determining and reporting decision rules for reporting statements of conformity. The laboratory may refer to ILAC-G8 to develop its procedure for determining a test sample's conformity with a numerical specification.

(c) When a statement of conformity to a specification or standard has to be reported but an unambiguous conclusion of compliance or noncompliance cannot be drawn based on the agreed decision rules, the laboratory shall include the measurement result together with the uncertainty of measurement in the test report.

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)