Supplementary Requirements for Accreditation of Electrical Testing Laboratories

Foreword

This Philippine Accreditation Bureau Laboratory Accreditation Supplementary Requirements for Accreditation in the field of Electrical Testing was developed by the Laboratory Accreditation Technical Committee – Electrical Testing to provide specific criteria and guidelines in the field of electrical testing.

1 INTRODUCTION

All accredited and applicant laboratories conducting electrical testing are required to satisfy these supplementary requirements in addition to the general requirements for the competence of testing and calibration laboratories (PNS ISO/IEC 17025:2005 and PAB Guidance Documents). The numbering system of this Supplementary Requirement follows the numbering of PNS ISO/IEC 17025:2005.

Note: For the purpose of this document, the term electrical testing shall also include electronic testing.

2 AUTHORSHIP

This document was produced by the PAB LATC for Electrical Testing. It is based on deliberation by the group of stakeholders convened by the PAB.

3 DEFINITIONS

3.1 Least uncertainty of measurement: A measurement stated in the scope of accreditation and which represents the lowest uncertainties that a laboratory is permitted to report on endorsed documents. It is a realistic means for clients to select and compare accredited facilities' capabilities.

3.2 Artifact calibration: A calibration which consists of connecting the instrument with one or more reference devices such as a dc voltage reference and a standard resistor.

3.3 Type-testing: A test or series of tests made on a type test sample, for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard.

3.4 Type test sample: A sample consisting of one or more similar specimens submitted by manufacturer or responsible vendor for the purpose of type test.

3.5 Permanent Laboratory: A testing laboratory situated on a fixed location for a period expected to be greater than three years.

3.6 Site Laboratory: A testing laboratory facility set up in a dedicated area on-site for the duration of the testing activities but not for periods expected to exceed three years.

3.7 Field Testing (including sampling where it forms part of the documented testing procedure) performed by staff of a laboratory or organization outside of the premises or grounds on which the permanent laboratory or the organization's permanent base of headquarters is located.

On-site Testing are normally performed under two categories:

- By staff sent out on-site by an accredited, permanent laboratory
- By organizations that do not have a permanent laboratory

3.8 Field Laboratory: A testing laboratory facility set up in a dedicated area on-site for the duration of the testing activities but not for periods expected to exceed three years.

3.9 Mobile Laboratory: Fully equipped, self-contained, transportable testing laboratory capable of performing testing under controlled environmental conditions. (Note: Mobile laboratories

are subject to the same terms of accreditation as a site laboratory. Mobile laboratories left at one site for three years or more will be subject to the same terms of accreditation as a permanent laboratory.

4 MANAGEMENT REQUIREMENTS

4.1 Organization

4.1.2 To assure impartiality and that its personnel are free from any undue commercial, financial or other pressures which might influence their technical judgement, clear policies on the responsibilities of all laboratory personnel and its key staff shall be defined to avoid potential conflict of interests. If the laboratory wishes to be recognized as a third-party laboratory, it should not engage in any activities that may endanger the trust in its independence of judgement and integrity in relation to its testing or calibration activities.

4.2 Management System

Quality documentation shall include or reference approved signatories, scope of accreditation and the policy on the use of the PAB endorsement.

4.5 Subcontracting of Test and Calibration

4.5.1 A competent subcontractor is defined as an appropriately accredited PAB laboratory, a laboratory accredited by one of ILAC/ APLAC mutual recognition signatories or a laboratory that can demonstrate competence as verified by the applicant laboratory (i.e. to comply with the relevant requirements of ISO/IEC 17025 for the work in question). All results reported by the subcontractor shall be covered by an appropriate endorsed report.

4.5.4 The accreditation status of subcontractors should be regularly reviewed by the laboratory to ensure that it is updated.

Note: PAB LA can be contacted regarding any Information on accreditation status and scope of accreditation of its accredited laboratories.

4.12 Preventive Action

Preventive action is a proactive process to identify improvement opportunities, rather than a reaction to the identification of problems or complaints. Total quality management tools such as brainstorming, flowcharting, Pareto Charts etc. may assist this process.

Consideration should also be given to providing staff with a formal mechanism for contributing suggestions for improvement.

4.13 Control of Records

4.13.1 General

All records must include the identity of the person making the record and the date of such creation and for the person(s) checking data transcriptions and calculations and the date of such checking.

4.13.1.2 Unless otherwise prescribed by legislation or contractual obligations, retention times shall not be less than three years. For calibration records, retention times shall not be less than the maximum recalibration interval of the equipment, or three years, whichever is the longer period.

4.13.1.4 Test records that are created and/or retained on magnetic (e.g. computer disks) or photographic media (e.g. microfiche) shall be stored in a manner that protects them from hazards that degrade such media. Provision shall be made for the printing of such records when required.

4.13.2 Technical records

4.13.2.1 a) The records system must include a copy of each report and certificate that includes work covered by the scope of accreditation, or must allow one to be reproduced, including details such as the endorsement (if applicable) and identification of the person who authorized the report.

b) In general, the records system must include the sample identification, the test document identification, date of test, the identity of the test method, the identity of the test equipment, original test or observations and calculations, the identity of the person performing the test, an indication that calculations and manual data transfers have been checked, any other information specified in the test method, and other contractual documents or relevant statutory regulations.

4.14 Internal Audits

The internal audit schedule needs to cover, over a twelve- month period, the technical and management requirements of ISO/IEC 17025.

4.15 Management Reviews

The effectiveness of the quality system shall be reviewed by the laboratory's management at least once per year. Refer to PAB LA/GD16 on Management Review for Laboratories and Inspection Bodies.

5 TECHNICAL REQUIREMENTS

5.2 Personnel

5.2.1 a) The Quality Manager shall have completed at least a Bachelor's degree and must have a minimum of three years experience in management and planning.

In addition, he must have completed a minimum of forty (40) credit hours of training relevant to the laboratory's area of activity.

b) The Technical Manager shall have completed a Bachelor's degree in Engineering in the field of electronics / electrical and must have a minimum of three years experience related to the laboratory's area of activity.

In addition, he must have completed a minimum of forty (40) credit hours of training relevant to the laboratory's area of activity. The Technical Manager shall be responsible for planning, organizing, supervising, monitoring and controlling the technical aspect of the laboratory in accordance with accepted standard and regulations governing the laboratory work.

c) Test Engineers or equivalent position shall have completed a Bachelor's degree in Engineering in the field of electronics / electrical with at least two years of practice of such character as to indicate that he is competent to supervise or take charge of laboratory's area of electrical testing

d) The Laboratory Technician or equivalent position shall have a minimum of two-year electronics / electrical technical course or at least third year level of Electronics/ Electrical Engineering course. In addition he/she must have completed a minimum of forty (40) credit hour of training and has a subsequent specific record of at least six months of apprenticeship in operation, handling, storage and maintenance of utilization devices and equipment in the laboratory.

e) Testing staff involved in mobile or on-site work must be properly trained in the operation of the mobile facilities and be aware that additional precautions over those of a conventional laboratory need to be taken to ensure the reliability and integrity of the results obtained. Additional documented procedures may also be required.

5.2.3 Any testing carried out on-site shall be under adequate technical control of an Approved Signatory. Signatories who do not usually accompany the measurement and testing staff when these facilities are operating must undertake sufficient technical audits of the testing activities to maintain confidence in them. For PAB-endorsed reports, the Approved Signatory assumes the responsibility for field tests carried out by other staff.

Where on-site testing staff is based remotely from the base-site, at least one of these staff shall be an approved signatory for the tests being carried out.

5.3 Accommodation and Environmental Conditions

The laboratory shall specify limits on the environmental conditions to be achieved in the laboratory, on-site and in mobile facilities. The conditions shall be appropriate as specified in a relevant test specification.

For on-site testing or activities carried out in mobile facilities, special precautions shall be adopted and documented with regard to:

- The handling and transport of equipment to prevent vibration, shock and temperature excursions;
- Additional cross-checking of equipment;
- Access to equipment;
- Security of records
- Uncertainties of measurement

As well as factors such as temperature and humidity, additional care needs to be exercised that other factors outside of the control of the facility staff (e.g. the electromagnetic environment, stability of the available power supply) are considered when setting up and conducting tests.

5.4 Test and Calibration Methods and Method Validation

5.4.1 Laboratories accredited for testing to standard test methods must maintain records of all interpretive decisions which they may make as a response to ambiguities in the test methods or specifications contained in Standards.

Laboratories must make all reasonable efforts to ensure that interpretations made are consistent with those of other laboratories and regulatory authorities. The appropriate PAB Technical Committee should be advised of any interpretive issues. Other laboratories

accredited for the same test should also be consulted. Attendance at relevant fora where such interpretations are discussed is strongly encouraged.

5.4.2 Selection of Methods

Where a test can be performed by more than one method there must be documented criteria for method selection. Where relevant, the degree of correlation between the methods must be established and documented.

5.4.3 Laboratory-developed methods

PAB does not grant accreditation to applicant laboratories using methods based on draft standards. Laboratories may, however, be accredited for such methods if they are documented and validated as laboratory-developed methods.

5.4.6 Estimation of uncertainty of measurement

Appropriate methods of analysis are contained in:

- LA/GD 05: Guidelines on the Estimation of Uncertainty of Measurement in Testing (APLAC TC 005)
- ISO Guide to the Expression of Uncertainty in Measurement

It is recognized that some test specifications specify other methods for the estimation of uncertainty.

PAB will only require estimation of uncertainty for electrical test methods where statistical analysis of uncertainty forms part of and is required by the method, however, laboratories are encouraged to have an understanding of the variability of all their results whenever this is possible.

The variability can be estimated for internal purpose through analysis of performance of the methods and operators in QC activities, proficiency, monitoring and training. Laboratories are required to establish and apply acceptance/rejection criteria whenever applicable.

For each sub-class, parameter or measurement range to be listed in their scope of accreditation, laboratories are required to estimate their “least uncertainty of measurement”.
Detailed records of uncertainty calculations shall be maintained. Laboratories shall have a system for reviewing and, where necessary, updating uncertainty calculations following recalibration of reference equipment or other changes that would significantly affect the magnitude of relevant uncertainty components.

5.4.7 Control of Data

Laboratories shall ensure that appropriate checks of calculations and data transfers have been carried out before results are issued.

Transcription errors are a common source of incorrect results. A senior staff or equally competent laboratory personnel should check all calculations and data transfers. Worksheets must have a place dedicated for the signature of the checking officer. Special care should be taken to ensure that correct formulas are used in computer spreadsheets.

Problems are caused when computer files such as spreadsheet, word processor worksheets and/or report files are reused by overwriting previous results. Only blank templates should be used.

Where measurements are highly automated and/or routine, or where information is processed electronically, the emphasis may be moved to checking for errors created by the system, to audit checks and to automatic highlighting of results falling outside the expected range.

5.6 Measurement Traceability

5.6.1 General

Test and calibration equipment that has a significant effect on the reported results and associated uncertainties of measurement (including, where relevant, instruments used for monitoring critical environmental conditions) shall be calibrated.

For PAB recognized calibration providers and other information on measurement traceability, refer to LA/SR10: Supplementary Requirements on Traceability of Measurements

5.6.2 Reference standards and equipment shall be calibrated over the range and to the appropriate level of accuracy specified in relevant test methods.

5.7 Sampling

Whenever applicable, laboratories responsible for sampling are encouraged to gain accreditation for sampling. The following conditions must be met to gain accreditation for sampling.

a) Documented sampling procedures must be held. These maybe national or international standards. If in-house methods are used, their validity for the intended purpose must be demonstrated by appropriate data.
b) The sampling procedure must be cited on the test report whenever the laboratory wishes to extend the tests results from a sample to an entire batch.

For product certification tests, products tested will usually be as submitted by the supplier or manufacturer.

Where “check testing” is to be performed as per the requirements of a regulatory authority for market surveillance testing, the regulator is responsible for the test samples.

5.8 Handling of Test and Calibration Items

5.8.1 Where the equipment to be tested may be dismantled or may be provided with accessories, these shall be appropriately identified and stored.

Where type testing or product development testing is performed, laboratories must take steps to ensure the issues covered by this clause, including “visual” security of the equipment under test, are adequately addressed.

5.8.2 As many electrical instruments and electrical equipment are identified by a manufacturer's model type or number as well as unique serial number, additional labelling of equipment under test may not be necessary.

5.9 Assuring the Quality of Test and Calibration Results

For information relating to Proficiency Testing, please refer to LA/SR09: Supplementary Requirements on Participation to Proficiency Testing Programs. Internal quality control chart can be applied as a way of assuring the quality of test and calibration results.

5.10 Reporting the Results

5.10.2 Test reports

Units and unit symbols shall be in the form specified in PNS/ISO/IEC or other international standards unless the device being calibrated reads in other units or where contractual arrangements demand.

PAB endorsement

Accredited laboratories are encouraged to apply the PAB endorsement for tests covered by their accreditation.

Endorsed test documents must include the information (a) – (k) detailed in this clause of ISO/IEC 17025. Additional details relating to the appropriate forms of endorsement and the reproduction of endorsed test reports are provided in LA/SR11: Requirements on the Use of PAB Laboratory and Inspection Body Accreditation Symbol.

Approved Signatories

The test document must be signed by a PAB approved signatory. Please refer to LA/GD 07: Guidelines for Laboratory Personnel and Approved Signatories and LA/SR11: Requirements on the Use of PAB Laboratory and Inspection Body Accreditation Symbol.

Unendorsed reports and Partial reports

An accredited laboratory may issue unendorsed documents reporting results within and outside its scope of accreditation or may issue partial test reports prior to final endorsed test reports. The final test report shall contain a reference to the partial test report. For information related to this case, please refer to LA/SR11: Requirements on the Use of PAB Laboratory and Inspection Body Accreditation Symbol.

Electronic Signatures

The electronic report should show the identity of all the signatories in the original test report. This may involve an electronic signature. The security of these signatures should be such as to prevent inadvertent use or misuse.

5.10.3.1b Statements of compliance

If a result of a test or calibration falls within the range of the specified limit, taking into account the estimated uncertainty of the measurement, then the result and its associated measurement uncertainty shall be reported. For details related to this clause, please refer

to LA/SR11: Requirements on the Use of PAB Laboratory and Inspection Body Accreditation Symbol.

5.10.4.1b Reporting the uncertainty of measurement

Where numerical results are reported then the associated uncertainty of measurement shall also be reported if required by the client. For details related to this clause, please refer to Guidelines on the Estimation of Uncertainty of Measurement in Testing (APLAC TC 005).

5.10.3 Test Reports

In addition to the requirements detailed under 5.10.2, endorsed test documents must also include information as described in 5.10.3a, b, c and e of this clause, where relevant.

5.10.6 Testing results obtained from subcontractors

The subcontractor's endorsed test report shall be issued in full to the client, except in those cases where only part of a calibration or test is subcontracted. Refer to LA/SR11: Requirements on the Use of PAB Laboratory and Inspection Body Accreditation Symbol for detailed information on results obtained from subcontractors.

5.10.7 Electronic transmission and remote issue of results

Test reports may be electronically issued (including from a site other than the accredited laboratory) provided that the reports have been appropriately authorized for release. The adequacy of such arrangements will be reviewed at assessment.

The laboratory must be able to demonstrate appropriate controls over the electronic generation, access, storage and back-up of results and reports and program controls such as password protection. If the report is to be accessed from a web site by the client there shall be an appropriate control in place to ensure the report can only be downloaded in a protected format.

Printing issues may also need to be considered. Any information normally included in a hardcopy report shall be included on the electronically transmitted version and appear in any hard copy printed by the recipient. Flexible pagination to accommodate formatting changes when printed by the recipient may also be required.

Annex 1: **Artifact Calibration**

5.6 Measurement Traceability

Some digital instruments are adjusted by a process usually referred to as "artifact calibration". Although artifact calibration is specified by the manufacturer and should be performed at the specified intervals, it does not constitute an adequate calibration by itself. It is still necessary to perform the full calibration (verification) of the instrument as specified by the manufacturer.

Annex 2: **Electrical Product Certification and/or Check Testing**

5.1.1 General

Laboratories wishing to be accredited for product certification and/or check testing of electrical products must meet the requirements of ISO/IEC 17025, this document and applicable regulatory requirements (e.g. Philippine National Standards under Mandatory Electrical Product Certification).

6 References

6.1 Requirements for the Use of PAB Laboratory and Inspection Body Accreditation Symbol, LA/SR11/Issue 1/January 2015.

6.2 Supplementary Requirements on Traceability of Measurements, LA/SR10/Issue 1/January 2015.

6.3 Supplementary Requirements on Participation to Proficiency Testing Programs, LA/SR09/Issue 1/January 2015.

6.4 Guidelines on the Estimation of Uncertainty of Measurement in Testing (APLAC TC 005), LA/GD 05/Issue 1/January 2015

6.5 PAB Guidelines for Laboratory Personnel and Approved Signatories, LA/GD07/Issue 1/January 2015

6.6 Supplementary Requirements for Accreditation in the Field of Electrical Testing, National Association of Testing Authorities, Australia, 2002, version 1.

6.7 Guide to the Expression of Uncertainty in Measurement (GUM), issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML.

6.8 List of Philippine National Standards (PNS) under Mandatory Product Certification, 31 March 2004.

ISSUE AND AMENDMENT RECORD

Title	Issue	Date	Amendments
Supplementary Requirements for Accreditation of Electrical Testing Laboratories	01	January 2015	Initial Issue