NIST HANDBOOK 150-1 CHECKLIST
ENERGY EFFICIENT LIGHTING PRODUCTS PROGRAM

Instructions to the Assessor: This checklist addresses specific accreditation requirements prescribed in NIST Handbook 150-1, Energy Efficient Lighting Products. The Test Method Review Summary, which is used to review the laboratory's ability to perform Energy Efficient Lighting Products test methods, is to be used in conjunction with this checklist.

- All items on this checklist shall be addressed.
- Select "X" for each item that represents a nonconformity.
- Select "C" for each item on which you are commenting for other reasons.
- Select "OK" for each item you observed or verified as compliant at the laboratory.
- Record the item number and the nonconformity explanation and/or comment on the appropriate comment sheet.

Note: The numbering of the checklist items correlates to the numbering scheme in NIST Handbook 150-1, clauses 3, 4, and 5.

3 Accreditation process

3.2 Management system review

3.2.1 The laboratory shall have a fully implemented management system.

3.3 On-site assessment

3.3.3

___ a) All laboratory equipment required to perform accredited testing shall be available for assessment and in good working order.

___ b) Although all test methods need not be set up and operational during the on-site assessment, the laboratory shall be prepared to demonstrate selected test methods as requested by the assessor.

___ c) For those cases where the test methods are not operational and a demonstration is not requested, the laboratory shall be prepared to describe the test method and procedures it would follow and show the actual equipment, fixtures and arrangements that would be used.

___ 3.3.4 The laboratory shall make available all supporting technical information in a format that is conducive to a detailed review.

___ 3.3.6 The laboratory shall review all comments for potential improvements in energy efficient lighting product testing.

3.4 Proficiency testing

___ 3.4.2 Laboratories applying for initial accreditation for solid state test methods shall participate satisfactorily in bilateral proficiency testing with NIST.

___ 3.4.5 Laboratories renewing accreditation shall have satisfactorily participated in all required proficiency testing during their previous accreditation period.

___ 3.4.6 The proficiency testing shall not be contracted out to another laboratory.

___ 3.4.7 In no case shall proficiency test samples be considered as calibration standards or standard reference materials or be used as substitutes for calibration standards that are traceable to NIST or other national metrology institutes (NMIs).

___ 3.4.8 All proficiency test samples, like all other samples received by the laboratory, shall be listed or entered into the normal sample tracking and identification system for control and data recording.

3.4.9

___ a) Using the test data from proficiency testing, the laboratory shall monitor its own testing performance.

___ b) Procedures for analyzing and monitoring the laboratory's own test results shall be documented in its management system.

3.4.10

___ a) Unsatisfactory performance in proficiency testing (e.g., outlying results) as determined by NVLAP is a technical nonconformity that shall be resolved by the laboratory to maintain its accreditation for the test method(s) in question.

___ b) If the laboratory performs unsatisfactorily in any proficiency test, it shall take corrective action to investigate and resolve nonconformities in a timely manner, according to the requirements in 4.9 of NIST Handbook 150 for the control of nonconforming work.

3.4.11

___ a) The results of proficiency testing shall be made available to NVLAP assessors for use during laboratory on-site assessment visits.

___ b) Any problems indicated by proficiency testing shall be discussed with appropriate laboratory personnel responsible for developing and implementing plans for resolving the problems.

4 Management requirements for accreditation

4.2 Management system

___ 4.2.1 The laboratory shall create a cross-reference document that facilitates verification by both the laboratory and the NVLAP assessor that all program requirements have been addressed by the management system.

___ 4.2.2 The laboratory shall have readily available, in either electronic or paper format, all documentary standards for which accreditation is being requested.

___ 4.2.3 When a documentary standard contains normative references, the laboratory shall have readily available the referenced documents, where relevant.

4.13 Control of Records

4.13.1 The records to be maintained shall include (but shall not be limited to):

___ a) acceptance/rejection (e.g., rejected due to damage) of lamps and luminaires submitted for test;

___ b) comprehensive logs for tracking specimens and test activities;

___ c) original data collected by laboratory;

___ d) calibration and verification data;

___ e) data and results of quality control;

___ f) equipment and maintenance records;

___ g) test reports.

4.13.2

___ a) Records for each test, including calibration of test equipment, shall contain sufficient information to permit the same or another laboratory to reproduce the test plan in a manner that would make it possible to obtain comparable test results.

___ b) These records shall be kept for a period of at least three years following the issuance of a test report, unless a longer period is required by the customer, regulation, or the laboratory's own procedures.

4.14 Internal audits

___ 4.14.1 The internal audit shall cover compliance with NVLAP, laboratory management system, contractual, testing, and test method requirements and shall be completed at an interval of no greater than two years. A NVLAP on-site assessment does not take the place of an internal audit.

___ 4.14.2 An applicant laboratory shall conduct at least one complete internal audit, including the test methods that are requested to be on the laboratory's scope of accreditation, prior to the first on-site assessment.

___ 4.14.3 For accredited laboratories, reports and pertinent records for internal audits conducted since the previous on-site assessment shall be made available for review during the on-site assessment.

4.15 Management reviews

___ 4.15.1 Periodic reviews of the management system shall reflect adherence to NVLAP requirements and the laboratory's quality objectives and shall be completed, at a minimum, on an annual basis.

___ 4.15.2 An applicant laboratory shall perform at least one complete management review prior to the first on-site assessment.

___ 4.15.3 For accredited laboratories, reports and pertinent records for management reviews conducted since the previous on-site assessment shall be made available for review during the on-site assessment.

5 Technical requirements for accreditation

5.2 Personnel

5.2.1 Personnel records

___ 5.2.1.1 *Key NVLAP accreditation personnel* — The laboratory shall maintain a document of personnel designated to fulfill NVLAP requirements including: Laboratory Director, Technical Director, Team Leaders, NVLAP Authorized Representative, NVLAP Approved Signatories, and the staff responsible for conducting testing.

___ 5.2.1.2 *All testing laboratory staff* — The laboratory shall document and maintain records on the required qualifications of each staff member, including a résumé of qualifications; laboratory testing procedures to which the person is assigned and authorized to perform; and the results of periodic testing performance (competency) reviews (see also 5.2.3.4), which may include interlaboratory testing and/or repeated testing by the same operator or comparative testing with two or more operators.

___ 5.2.1.3 *Notification of changes* — The laboratory shall notify NVLAP when key personnel (see 5.2.1.1) are added to or removed from the staff. Notification to NVLAP of personnel changes shall include a current résumé for each new staff member.

5.2.2 Specific experience and competence of Technical Director

___ The laboratory's Technical Director (or an appropriate supervisor) shall have a combination of knowledge, experience and training in testing energy efficient lighting products under the scope of the test methods selected by the laboratory and shall have the technical competence and the supervisory capability to direct the work of professionals and technicians in testing energy efficient lighting products.

5.2.3 Competency reviews

___ 5.2.3.1 The laboratory shall develop an appropriate list of staff member competencies for each test method.

___ 5.2.3.2 The laboratory shall evaluate the competency of each staff member for each test method or part of a test method the staff member is authorized to conduct.

___ 5.2.3.3 For each staff member, the staff member's immediate supervisor, or a designee appointed by the Laboratory Director, shall conduct annually an assessment and/or an observation of performance competency.

___ 5.2.3.4 These annual performance competency reviews shall be documented, dated, signed by the supervisor and the employee, retained in the personnel files and be available for review by the assessor.

5.2.4 Training

___ a) The training program shall be maintained and updated.

___ b) Current staff members shall be given additional training when accredited test methods are updated or procedures change, or when the individuals are assigned new responsibilities.

5.3 Accommodation and environmental conditions

___ 5.3.1 Monitoring devices shall be calibrated (if required – see 5.6.1 and 5.6.2.2.1 and their notes in NIST Handbook 150) and functioning properly so as to maintain and record the environmental conditions required (a) by the standards or laboratory methods or (b) where the environmental conditions influence the quality of the test results.

___ 5.3.2 The laboratory shall maintain and document the required environmental conditions as specified in the particular standard test procedure/method to which the laboratory is accredited.

5.4 Test and calibration methods and method validation

5.4.1 Standard test methods

5.4.1.1

___ a) The management system documentation shall contain or make reference to detailed written documentation of the procedures, practices, instructions and equipment that the laboratory uses in conducting the test methods for the different types of lamps, luminaires, solid state lighting products or LED devices for which it seeks or holds accreditation.

___ b) These detailed instructions, including those for equipment operation, calibration checks, quality control checks, and operation of particular type(s) of devices tested shall address any laboratory-specific information not contained in the standard method and shall be supplemented with additional detailed instructions beyond the test method to ensure consistent application.

___ 5.4.1.2 All energy efficient lighting devices shall be tested in the orientation specified by the standard or by the customer.

___ 5.4.1.3 All energy efficient lighting devices shall be properly seasoned or preburned according to the standard or specified by the customer.

___ 5.4.1.4 Measurements of energy efficient lighting products shall only be reported after test units have stabilized.

___ 5.4.1.5 For lumen performance tests, laboratory procedures for monitoring and recording lumen maintenance times along with specimen failure shall be appropriate to the test methods.

___ 5.4.1.6 Self-absorption correction procedures shall be applied for sphere measurements, or documented evidence shall be collected demonstrating that self-absorption correction is not required.

___ 5.4.1.7 Adjustments for instrument electrical losses, if any, shall be applied.

___ 5.4.1.8 A laboratory seeking or holding accreditation for colorimetric measurements of light sources conducted in accordance with IES LM-58 shall include, in the management system documentation, detailed laboratory-specific (see 5.4.1.1) descriptions of the procedures it uses to conduct testing in compliance with LM-58.

5.4.1.9

___ a) A laboratory seeking or holding accreditation for colorimetric measurements of light sources conducted in accordance with CIE Pub. 13.2:1974 and/or CIE Pub. 13.3:1995 shall include, in the management system documentation, detailed laboratory-specific (see 5.4.1.1) descriptions of the procedures it uses to conduct testing.

___ b) In addition, the laboratory seeking or holding accreditation for colorimetric measurements of light sources conducted in accordance with CIE Pub. 13.2:1974 and/or CIE Pub. 13.3:1995 shall provide documentation validating the calculation procedure used to determine the color rendering index. Commercially obtained software provided by the instrumentation manufacturer need not be validated.

5.4.1.10

___ a) A laboratory seeking or holding accreditation for colorimetric measurements of light sources conducted in accordance with CIE Pub. 15:2004 shall include, in the management system documentation, detailed laboratory-specific (see 5.4.1.1) descriptions of the procedures it uses to conduct testing.

___ b) In addition, the laboratory seeking or holding accreditation for colorimetric measurements of light sources conducted in accordance with CIE Pub. 15:2004 shall provide documentation validating the calculation procedures used to determine the color quantities described in this technical recommendation. Commercially obtained software provided by the instrumentation manufacturer need not be validated.

5.4.2. Estimation of measurement uncertainty

___ a) The management system documentation shall list the important components that substantially affect the uncertainty of the test results for each test method.

___ b) Further, an estimate of the uncertainty contribution of the important components shall be quantified.

___ c) The uncertainty shall be determined in more detail and reported if required by the test method, the regulator, or the customer.

5.5 Equipment

___ 5.5.1 The laboratory shall notify NVLAP when key testing equipment is added, removed, or altered. Documentation of equipment performance validation shall be provided to NVLAP.

___ 5.5.2 The laboratory shall ensure that test equipment, devices, and instruments meet the required accuracy regulations and calibration conditions for the appropriate documentary standard specifications.

___ 5.5.3 The laboratory shall ensure that electrical power is conditioned and regulated as required by the appropriate documentary standard specifications.

___ 5.5.4 Standard reference lamps shall be recalibrated at appropriate intervals determined by the laboratory.

___ 5.5.5 The laboratory shall maintain a record or log of the number of hours each reference lamp is burned.

5.6 Measurement traceability

___ 5.6.1 The laboratory shall determine equipment calibration intervals based on the equipment's frequency of use and the environment in which it is used, and also in accordance with standard test methods and/or manufacturer's recommendations.

5.6.2

___ a) Proper performance and calibration of measurement and test equipment shall be periodically verified as needed through the use of cross-checks and working standards for the individual measurement and test equipment units.

___ b) Periodical verification shall be documented.

5.6.3

___ a) Ultimately, the laboratory shall be responsible for the determination and documentation of test and measurement equipment calibration, including the calibration interval.

___ b) The laboratory shall have a documented procedure to deal with nonconforming work if test and measurement equipment is found to be out of calibration through the use of cross-checks and working standards.

___ 5.6.4 The reference standards used and the environmental conditions at the time of calibration shall be documented for all calibrations.

5.6.5 The following requirements apply for calibrations and calibration certificates.

___ a) Certificates shall be required for calibrations performed by outside services. A calibration certificate shall indicate uncertainty or accuracy tolerance limits, and traceability of reference standards. Certificates from accredited outside service providers shall include the accreditation body logo or reference to the accreditation body, and records shall be kept showing that the accreditation is current.

___ b) Certificates shall be required when a laboratory performs its own calibration. If the testing laboratory performs its own calibration, the identity of the properly trained personnel involved, the standard metrological procedures used, the environmental conditions, and the measurement uncertainty shall be documented. Evidence and demonstration of traceability as required in NIST Handbook 150, Annex B, shall be documented. Records shall contain sufficient information to permit repetition of the calibration.

___ c) Laboratories using standard reference lamps and/or standard photometers shall document each step of the traceability chain and, for each step, the magnitude of the associated uncertainty as stated on their calibration certificates (or the uncertainty as determined [or estimated] by the laboratory if it is an in-house calibration conducted by the laboratory).

5.7 Sampling

___ Appropriate sampling plans and procedures shall be included in the management system when sampling is required by the test method or when the laboratory is required to sample.

5.9 Assuring the quality of test and calibration results

___ 5.9.1 The laboratory shall conduct a test after every calibration to assure and validate that the calibration of the system is acceptable.

___ 5.9.2 The laboratory shall have a documented method to assure that the check lamps used to verify calibration results are valid; i.e., the measured values have not changed but are within a given limit of repeatability.

___ 5.9.3 The laboratory shall document the frequency or schedule at which check or working standards are measured.

___ 5.9.4 The laboratory shall have a documented procedure to deal with nonconforming work if retest or recalibrations of check or working standards are found to be out of the documented acceptable range.

___ 5.9.5 Procedures for the laboratory's participation in NVLAP proficiency testing, including analyzing and monitoring the laboratory's results, a description of any corrective actions taken because of the results, and procedures for comparing the laboratory's proficiency test results with those from NIST or other NVLAP-accredited laboratories shall be documented.

5.10 Reporting the results

5.10.1 General

___ Test reports shall clearly reference the test method and edition, including the published year, applied to the product or system tested.

5.10.2 Data analysis and report generation

___ 5.10.2.1 The laboratory personnel responsible for report writing and generation shall be available during the laboratory's on-site assessment to be interviewed by the assessor for evaluation of the laboratory's compliance with the NVLAP criteria for test reports.

___ 5.10.2.2 At times, the final report may be written and generated at an off-site facility that is located some distance from the testing laboratory such that the assessor cannot interview the off-site personnel. In such a case, the laboratory shall have in place for assessor review appropriate written descriptions in the management system documentation of procedures and documentation for assuring the accuracy and validity of the data transmission, the incorporation and accurate analysis of the data in the test report, and the compliance of the test report with NVLAP criteria.

___ 5.10.2.3 If a laboratory uses several organizational departments for the discrete functions of testing, data collection, data processing, and test report preparation and generation, it is necessary that lines of responsibility with distinct supervisory positions be defined and that no conflicts exist. The assessor shall review the procedures and documentation of the lines of responsibility with distinct supervisory positions during the on-site assessment, and also shall verify that all NVLAP requirements regarding the writing and storage of reports are followed.

NIST HANDBOOK 150-1 CHECKLIST
COMMENTS AND NONCONFORMITIES

Instructions to the Assessor: Use this sheet to document comments and nonconformities. For each, identify the appropriate item number from the checklist. Identify each comment with a "C" and each nonconformity with an "X." If additional space is needed, make copies of this page or use additional blank sheets.

Item No.	*C or X*	*Comments and/or Nonconformities*

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