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| NVLAP® | **DEPARTMENT OF COMMERCE**<br>National Institute of Standards and Technology<br>National Voluntary Laboratory Accreditation Program | **ISSUE DATE:**<br>February 8, 2013 |
| | **LAB BULLETIN** | **NUMBER:** LB-72-2013 |
| | | **LAP:** Energy Efficient Lighting Products |
| **SUBJECT:** | Calibration of Integrating Spheres and Goniophotometers and Associated Measurement Uncertainty | |

The purpose of this NVLAP Lab Bulletin is to define NVLAP's expectations with regard to the calibration of integrating spheres and goniophotometers and the associated measurement uncertainty of the calibration. Measurement uncertainty requirements for testing have not changed and will continue to be assessed against the requirements of NIST Handbook 150-1, 5.4.2.

The following sections of NIST Handbook 150 and NIST Handbook 150-1 are clear in the requirements that these instruments must be calibrated and when this calibration is performed in-house, the measurement uncertainty of the calibration must be determined.

**NIST Handbook 150, *NVLAP Procedures and General Requirements***

**5.4 Test and calibration methods and method validation**

**5.4.6 Estimation of uncertainty of measurement**

**5.4.6.1** A calibration laboratory, or a testing laboratory performing its own calibrations, shall have and shall apply a procedure to estimate the uncertainty of measurement for all calibrations and types of calibrations.

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**5.6 Measurement traceability**

**5.6.1 General**

All equipment used for tests and/or calibrations, including equipment for subsidiary measurements (e.g., for environmental conditions) having a significant effect on the accuracy or validity of the result of the test, calibration or sampling shall be calibrated before being put into service. The laboratory shall have an established program and procedure for the calibration of its equipment.

**NIST Handbook 150-1, *NVLAP Energy Efficient Lighting Products***

**5.6 Measurement traceability**

**5.6.5** The following requirements apply for calibrations and calibration certificates.

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.

There are not many calibration laboratories that offer the calibration of integrating spheres and goniophotometers, and testing laboratories commonly perform this calibration in-house with the use of a reference standard lamp traceable through an NMI (national metrology institute).

There are two important points concerning the measurement uncertainty of the calibration: 1) the uncertainty of the calibration of a piece of equipment includes more than the uncertainty of the reference standard used to calibrate the equipment, and 2) the uncertainty of the calibration of a piece of equipment is not the same as the uncertainty associated with using that piece of equipment to make a test measurement.

NVLAP has not consistently reviewed calibration records for integrating spheres and goniophotometers in the past, especially for measurement uncertainty requirements. Also, we understand that there is not a lot of guidance and training available for lighting testing and calibration measurement uncertainty. Considering this, for the next two years NVLAP assessors will ask to review calibration records for integrating spheres and goniophotometers. These records may be from an accredited calibration laboratory per Annex B.3.3 of NIST Handbook 150, or the calibration may be performed in-house per Annex B.3.2. If the laboratory is not able to supply these records with the associated measurement uncertainty, the assessor will document a comment in the assessment report. After **December 31, 2014**, assessors will write nonconformities for laboratories that do not meet the requirements. NVLAP is exploring options to provide training in measurement uncertainty and will make future announcements as more is known.

This bulletin should be maintained with your copy of NIST Handbook 150-1 until the next edition of the handbook is released. Questions regarding the bulletin should be directed to Timothy Rasinski, NVLAP Program Manager, at 301-975-6697, or timothy.rasinski@nist.gov.