

CALIBRATION LABORATORIES

NVLAP LAB CODE 200951-0

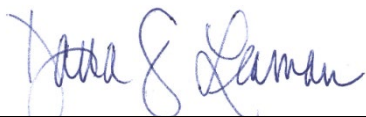
SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

| | |
|---|--|
| <p>Labsphere Inc. 231 Shaker Road North Sutton, NH 03260 Steven M. Bowers Phone: 603-927-1074 Fax: 603-927-4694 E-mail: sbowers@labsphere.com URL: http://www.labsphere.com</p> | <p>Fields of Calibration Optical Radiation</p> <p>This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01)</p> |
|---|--|

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

| Measured Parameter or Device Calibrated | Range | Expanded Uncertainty <small>Notes 3,5</small> | Remarks |
|--|-----------------------|---|---|
| OPTICAL RADIATION | | | |
| Photometric (20/O02) | | | |
| Total Luminous Flux | 10 lm to 3000 lm | 1.0 % | Halogen, 4 π , 2 π , and directional 2 π versions |
| Correlated Color Temperature | 2500 K to 3300 K | 7 K to 10 K | Chromaticity is a dimensionless quantity |
| Chromaticity | Typical for Lamp Type | | |
| x | | 0.0005 | |
| y | | 0.0004 | |
| u' | | 0.0005 | |
| v' | 0.0002 | | |
| Spectral Reflectance Factor at Wavelength Shown Below: | | | Spectral reflectance factor is a dimensionless quantity |
| 250 nm to 600 nm | > 0.00 to 0.02 | 0.0016 | |
| | > 0.02 to 0.05 | 0.0029 | |
| | > 0.05 to 0.10 | 0.012 | |
| | > 0.10 to 0.20 | 0.012 | |
| | > 0.20 to 0.50 | 0.0054 | |
| | > 0.50 to 0.80 | 0.0054 | |
| | > 0.80 to 0.99 | 0.0053 | |
| 601 nm to 1500 nm | > 0.00 to 0.02 | 0.0017 | |

2022-12-16 through 2023-12-31
Effective dates


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| Measured Parameter or Device Calibrated | Range | Expanded Uncertainty ^{Notes 3,5} | Remarks |
|---|-------------------------------|---|--|
| 1501 nm to 2200 nm | > 0.02 to 0.05 | 0.0022 | |
| | > 0.05 to 0.10 | 0.0025 | |
| | > 0.10 to 0.20 | 0.0052 | |
| | > 0.20 to 0.50 | 0.0064 | |
| | > 0.50 to 0.80 | 0.0064 | |
| | > 0.80 to 0.99 | 0.0049 | |
| | > 0.00 to 0.02 | 0.0090 | |
| 2201 nm to 2500 nm | > 0.02 to 0.05 | 0.0090 | |
| | > 0.05 to 0.10 | 0.015 | |
| | > 0.10 to 0.20 | 0.015 | |
| | > 0.20 to 0.50 | 0.0099 | |
| | > 0.50 to 0.80 | 0.0083 | |
| | > 0.80 to 0.99 | 0.0088 | |
| | > 0.00 to 0.02 | 0.054 | |
| > 0.02 to 0.05 | 0.054 | | |
| > 0.05 to 0.10 | 0.043 | | |
| > 0.10 to 0.20 | 0.043 | | |
| > 0.20 to 0.50 | 0.035 | | |
| > 0.50 to 0.80 | 0.028 | | |
| > 0.80 to 0.99 | 0.032 | | |
| Radiometric (20/O03) | | | |
| Total Spectral Radiant Flux | Typical for lamp type in W/nm | 2.1 % 1.7 % 1.7 % | Halogen, 4 π , 2 π , and directional 2 π versions |
| 350 nm to 400 nm | | | |
| 400 nm to 600 nm | | | |
| 600 nm to 1050 nm | | | |
| Spectral Radiance of Source | 250 nm | 1.91 % | Calibration transfer from monochromator and calibrated detectors |
| | 260 nm | 2.03 % | |



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| Measured Parameter or Device Calibrated | Range | Expanded Uncertainty ^{Notes 3,5} | Remarks |
|--|--------------|--|----------------|
| | 270 nm | 2.08 % | |
| | 280 nm | 2.04 % | |
| | 290 nm | 1.65 % | |
| | 300 nm | 1.58 % | |
| | 310 nm | 1.52 % | |
| | 320 nm | 1.47 % | |
| | 330 nm | 1.42 % | |
| | 340 nm | 1.37 % | |
| | 350 nm | 1.32 % | |
| | 360 nm | 1.29 % | |
| | 370 nm | 1.25 % | |
| | 380 nm | 1.23 % | |
| | 390 nm | 1.19 % | |
| | 400 nm | 1.16 % | |
| | 450 nm | 0.99 % | |
| | 500 nm | 0.93 % | |
| | 555 nm | 0.86 % | |
| | 600 nm | 0.84 % | |
| | 654.6 nm | 0.79 % | |
| | 700 nm | 0.78 % | |
| | 800 nm | 0.73 % | |
| | 900 nm | 0.69 % | |
| | 1050 nm | 0.67 % | |
| | 1150 nm | 0.67 % | |
| | 1200 nm | 0.66 % | |
| | 1300 nm | 0.64 % | |
| | 1540 nm | 0.62 % | |
| | 1600 nm | 0.61 % | |
| | 1700 nm | 0.62 % | |
| | 2000 nm | 0.63 % | |
| | 2100 nm | 0.63 % | |
| | 2300 nm | 0.63 % | |
| | 2400 nm | 1.18 % | |
| | 2500 nm | 1.18 % | |

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| Measured Parameter or Device Calibrated | Range | Expanded Uncertainty ^{Notes 3,5} | Remarks |
|---|--------------|--|---|
| Spectral Radiance of Source | 350 nm | 1.58 % | Calibration transfer from calibrated integrating sphere |
| | 360 nm | 1.56 % | |
| | 370 nm | 1.53 % | |
| | 380 nm | 1.43 % | |
| | 390 nm | 1.37 % | |
| | 400 nm | 1.28 % | |
| | 450 nm | 1.22 % | |
| | 500 nm | 1.06 % | |
| | 555 nm | 0.96 % | |
| | 600 nm | 0.89 % | |
| | 654.6 nm | 0.83 % | |
| | 700 nm | 0.81 % | |
| | 800 nm | 0.77 % | |
| | 900 nm | 0.75 % | |
| | 1050 nm | 0.77 % | |
| | 1150 nm | 0.79 % | |
| | 1200 nm | 0.81 % | |
| | 1300 nm | 0.84 % | |
| | 1540 nm | 0.98 % | |
| | 1600 nm | 1.02 % | |
| 1700 nm | 1.11 % | | |
| 2000 nm | 3.73 % | | |
| 2100 nm | 3.73 % | | |
| 2300 nm | 3.73 % | | |
| 2400 nm | 3.87 % | | |
| 2500 nm | 3.27 % | | |
| Creation of FEL Spectral Irradiance Working Standards | 250 nm | 2.77 % | |
| | 260 nm | 3.33 % | |
| | 270 nm | 2.19 % | |
| | 280 nm | 1.78 % | |



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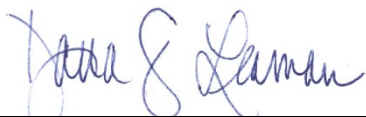
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| Measured Parameter or Device Calibrated | Range | Expanded Uncertainty ^{Notes 3,5} | Remarks |
|---|----------|---|---------|
| | 290 nm | 1.63 % | |
| | 300 nm | 1.53 % | |
| | 310 nm | 1.47 % | |
| | 320 nm | 1.42 % | |
| | 330 nm | 1.47 % | |
| | 340 nm | 1.31 % | |
| | 350 nm | 1.26 % | |
| | 360 nm | 1.23 % | |
| | 370 nm | 1.20 % | |
| | 380 nm | 1.16 % | |
| | 390 nm | 1.12 % | |
| | 400 nm | 1.09 % | |
| | 450 nm | 0.91 % | |
| | 500 nm | 0.84 % | |
| | 555 nm | 0.77 % | |
| | 600 nm | 0.74 % | |
| | 654.6 nm | 0.69 % | |
| | 700 nm | 0.67 % | |
| | 800 nm | 0.62 % | |
| | 900 nm | 0.58 % | |
| | 1050 nm | 0.56 % | |
| | 1150 nm | 0.54 % | |
| | 1200 nm | 0.54 % | |
| | 1300 nm | 0.52 % | |
| | 1540 nm | 0.49 % | |
| | 1600 nm | 0.48 % | |
| | 1700 nm | 0.49 % | |
| | 2000 nm | 0.51 % | |
| | 2100 nm | 0.51 % | |
| | 2300 nm | 0.51 % | |
| | 2400 nm | 1.11 % | |
| | 2500 nm | 1.11 % | |
| END | | | |

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Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty with a level of confidence of approximately 95 %, typically using a coverage factor of $k = 2$. However, laboratories may report a coverage factor different than $k = 2$ to achieve the 95 % level of confidence. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

Note 3a: The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

Note 3b: As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

Note 3c: As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions*. However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.5. of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

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