National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200823-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Gamma Scientific, Inc.	**Fields of Calibration**
9925 Carroll Canyon Road San Diego, CA 92131 Mr. Frank Vachlin Phone: 858-279-8034 Fax 858-576-9286 E-mail:fvachlin@gamma-sci.com URL: www.gamma-sci.com	Electromagnetics – DC/Low Frequency Optical Radiation This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01)

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	**Range**	**Expanded Uncertainty** [Note 3,5]	**Remarks**
ELECTROMAGNETICS – DC/LOW FREQUENCY			
DC RESISTANCE and CURRENT (20/E05)			
Current Generate (Gamma Scientific instruments)	100 pA to 1 nA (1 to 10) nA (10 to 100) nA 100 nA to 1 µA (1 to 10) µA (10 to 100) µA 100 µA to 10 mA (1 to 10) mA	0.30 % 0.086 % 0.078 % 0.041 % 0.029 % 0.029 % 0.030 % 0.041 %	
Current Reading (Gamma Scientific instruments)	100 mA to 1 A 1 A to 10 A	0.32 % 0.16 %	
DC VOLTAGE (20/E06)			
Voltage Source Generate and Reading (Gamma Scientific instruments)	100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.018 % 0.0095 % 0.0083 % 0.011 %	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Note 3,5]	Remarks
OPTICAL RADIATION			
PHOTOMETRIC (20/O02)			
Illuminance	0.001 lux to 0.1 lux 0.1 lux < to 100 000 lux	1.2 % 0.68 %	See note 7
Illuminance Spectroradiometer	0.1 lux to 100 000 lux	1.8 %	
Illuminance Responsivity	0.001 mV/lux to 1 mV/lux 0.001 V/lux to 10 V/lux	1.2 % 0.68 %	
Luminance	0.001 cd/m^2 to 1 cd/m^2 1 cd/m^2 to 100 000 cd/m^2	1.2 % 0.68 %	
Luminance Spectroradiometer	1 cd/m2 to 100 000 cd/m2	1.2 %	
Luminance Responsivity	1 µV/cd/m^2 to 1 mV/cd/m^2 1 mV/cd/m^2 to 10 V/cd/m^2	1.2 % 0.74 %	
Luminous Intensity	0.001 cd to 0.1 cd 0.1 cd to 10 000 cd	1.2 % 0.68 %	
Total Luminous Flux	0.01 lm to 10 lm 10 lm to 10 000 lm 10 000 lm to 100 000 lm	1.5 % 1.1 % 1.6 %	
Chromaticity x y u’ v’	Nominal for lamp type	 0.0008 0.0004 0.0004 0.0002	Dimensionless quantity
Correlated Color Temperature	2600 K to 3150 K	7 K	Based on 1000W FEL Irradiance Standard Uncertainty of Spectral Profile in Photometric Region
Color Rendering Index (CRI)	Nominal for lamp type	1.2 %	Dimensionless quantity

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Note 3,5]	Remarks
RADIOMETRIC (20/O03)			
Total Spectral Radiant Flux	0.001 µW to 100 000 µW		
	220 nm	3.9 %	
	250 nm	3.7 %	
	350 nm	2.5 %	
	450 nm	2.0 %	
	555 nm	1.7 %	
	654.6 nm	1.6 %	
	900 nm	1.3 %	
	1100 nm	1.2 %	
Spectral Irradiance	0.001 µW to 100 000 µW		
1000 W FEL Lamp	220 nm	3.7 %	
	250 nm	3.4 %	
	350 nm	2.5 %	
	450 nm	1.9 %	
	555 nm	1.6 %	
	654.6 nm	1.4 %	
	900 nm	1.1 %	
	1100 nm	1.0 %	
	2000 nm	1.2 %	
	2300 nm	1.7 %	
	2400 nm	2.1 %	
Tungsten or LED source with integrating cavity	0.001 µW/cm2 to 100 000µW/cm2		
	300 nm to 400 nm	2.7 %	
	400 nm to 930 nm	1.8 %	
	930 nm to 1200 nm	1.4 %	
Spectral Radiance			
Tungsten or LED source with integrating cavity	0.001 (µW/cm2)·sr to 100 000 (µW/cm2)·sr		
	300 nm to 400 nm	3.0 %	
	400 nm to 930 nm	2.1 %	
	930 nm to 1200 nm	1.9 %	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Note 3,5]	Remarks
Radiometric Detectors	0.1 µW to 10 W @ 0.1 nA to 10 A or 0.1 µV to 1 kV Readout		Reported in volts or amps per watt format for wavelength shown in range; CMC values At 5 nm per step
	200 nm to 220 nm	6.2 %	
	220 nm to 240 nm	2.1 %	
	240 nm to 260 nm	1.9 %	
	260 nm to 280 nm	1.6 %	
	280 nm to 300 nm	0.98 %	
	300 nm to 320 nm	0.83 %	
	320 nm to 340 nm	0.81 %	
	340 nm to 350 nm	0.92 %	
	350 nm to 375 nm	1.1 %	
	375 nm to 400 nm	0.70 %	
	400 nm to 425 nm	0.45 %	
	425 nm to 450 nm	0.40 %	
	450 nm to 455 nm	0.39 %	
	455 nm to 525 nm	0.35 %	
	525 nm to 675 nm	0.33 %	
	675 nm to 725 nm	0.32 %	
	725 nm to 900 nm	0.30 %	
	900 nm to 925 nm	0.32 %	
	925 nm to 975 nm	0.33 %	
	975 nm to 1000 nm	0.42 %	
	1000 nm to 1025 nm	0.41 %	
	1025 nm to 1050 nm	0.39 %	
	1050 nm to 1200 nm	0.38 %	
	1200 nm to 1225 nm	0.39 %	
	1225 nm to 1450 nm	0.40 %	
	1400 nm to 1450 nm	0.39 %	
	1450 nm to 1500 nm	0.38 %	
	1500 nm to 1525 nm	0.39 %	
	1525 nm to 1550 nm	0.41 %	
	1550 nm to 1575 nm	0.42 %	
	1575 nm to 1600 nm	0.46 %	
	1600 nm to 1625 nm	0.47 %	
	1625 nm to 1650 nm	0.67 %	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Note 3,5]	Remarks
	1650 nm to 1675 nm 1675 nm to 1700 nm 1700 nm to 1725 nm 1725 nm to 1750 nm 1750 nm to 1775 nm 1775 nm to 1800 nm 1800 nm	1.3 % 1.6 % 2.0 % 2.4 % 2.9 % 3.6 % 4.3 %	
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.

Note 7: All photometric parameters are for halogen or incandescent sources operating at a nominal color temperature of 2856 K.

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