



**National Voluntary
Laboratory Accreditation Program**



CALIBRATION LABORATORIES

NVLAP LAB CODE 105013-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
DIMENSIONAL			
NVLAP Code: 20/D05 LENGTH and DIAMETER Length Indicators	0.05 in to 1 in	68 μ m	Comparison to Gage Blocks
	2 in	94 μ m	
	3 in	140 μ m	
	4 in	170 μ m	
	6 in	180 μ m	
	10 in	210 μ m	

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
NVLAP Code: 20/E02 AC RESISTORS AC Current	100 μ A	10 Hz	860 μ A/A	
		60 Hz	360 μ A/A	
		1 kHz	320 μ A/A	
		5 kHz	270 μ A/A	
		10 kHz	240 μ A/A	
		1 mA	60 Hz	
	1 kHz		40 μ A/A	
	5 kHz		80 μ A/A	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3}	Remarks	
	10 mA	10 kHz	140 μ A/A		
		30 kHz	1200 μ A/A		
	100 mA	60 Hz	1 kHz		100 μ A/A
			5 kHz		50 μ A/A
			10 kHz		110 μ A/A
			30 kHz		100 μ A/A
			1200 μ A/A		
	100 mA	60 Hz	1 kHz		88 μ A/A
			5 kHz		40 μ A/A
			10 kHz		100 μ A/A
			30 kHz		65 μ A/A
			1200 μ A/A		
	1 A	60 Hz	1 kHz		130 μ A/A
			5 kHz		140 μ A/A
			10 kHz		160 μ A/A
			310 μ A/A		
10 A	60 Hz	1 kHz	250 μ A/A		
		5 kHz	210 μ A/A		
		1600 μ A/A			

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
NVLAP Code: 20/E05 DC RESISTANCE DC Current - Generated	100 μ A	20 μ A/A	
	1 mA	20 μ A/A	
	10 mA	20 μ A/A	
	100 mA	20 μ A/A	
	1 A	45 μ A/A	
	10 A	180 μ A/A	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3</small>	Remarks
DC Resistance	1 Ω	220 $\mu\Omega/\Omega$	Readout devices that actually measure resistance.
	10 Ω	27 $\mu\Omega/\Omega$	
	100 Ω	15 $\mu\Omega/\Omega$	
	1 k Ω	12 $\mu\Omega/\Omega$	
	10 k Ω	6.8 $\mu\Omega/\Omega$	
	100 k Ω	7.0 $\mu\Omega/\Omega$	
	1 M Ω	9.1 $\mu\Omega/\Omega$	
	10 M Ω	40 $\mu\Omega/\Omega$	
	100 M Ω	230 $\mu\Omega/\Omega$	
	1 G Ω	1.4 m Ω/Ω	
Digital Thermometry Indicators Resistance Function	10 Ω	1 $\mu\Omega/\Omega$	
	25 Ω	1 $\mu\Omega/\Omega$	
	100 Ω	1 $\mu\Omega/\Omega$	
	300 Ω	1 $\mu\Omega/\Omega$	
	10 k Ω	39 $\mu\Omega/\Omega$	
	1 Ω to 400 Ω 400 Ω to 10 k Ω	1 $\mu\Omega/\Omega$ 39 $\mu\Omega/\Omega$	
NVLAP Code: 20/E06 DC VOLTAGE	10 mV	87 $\mu\text{V}/\text{V}$	
	100 mV	9.0 $\mu\text{V}/\text{V}$	
	1 V	6.0 $\mu\text{V}/\text{V}$	
	10 V	6.0 $\mu\text{V}/\text{V}$	
	100 V	6.0 $\mu\text{V}/\text{V}$	
	1000 V	6.5 $\mu\text{V}/\text{V}$	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3}	Remarks	
NVLAP Code: 20/E09 LF AC VOLTAGE	10 mV	1 kHz	390 μ V/V		
		10 Hz	82 μ V/V		
	100 mV	60 Hz	93 μ V/V		
		1 kHz	96 μ V/V		
		5 kHz	84 μ V/V		
		10 kHz	83 μ V/V		
		30 kHz	120 μ V/V		
		1 V	10 Hz	120 μ V/V	
			60 Hz	100 μ V/V	
	1 kHz		84 μ V/V		
	5 kHz		87 μ V/V		
	10 kHz		88 μ V/V		
	30 kHz		170 μ V/V		
	10 V	10 Hz	190 μ V/V		
		60 Hz	140 μ V/V		
		1 kHz	140 μ V/V		
		5 kHz	130 μ V/V		
		10 kHz	120 μ V/V		
		30 kHz	140 μ V/V		
	100 V	60 Hz	140 μ V/V		
		1 kHz	130 μ V/V		
		5 kHz	130 μ V/V		
		10 kHz	120 μ V/V		
		30 kHz	120 μ V/V		
1000 V	60 Hz	130 μ V/V			
	1 kHz	100 μ V/V			
	5 kHz	100 μ V/V			
	10 kHz	120 μ V/V			

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
MECHANICAL			
NVLAP Code: 20/M05 FLOW RATE Gas Flow DH Molblocs, N ₂	2 sccm to 30 slpm > 30 slpm to 100 slpm	0.4 % 1.5 %	sccm: standard cubic centimeters slpm: standard liters per minute Standard conditions are 14.7 psia (101 353 pascals) and 70°F (21.1 °C).
NVLAP Code: 20/M08 MASS Metric	50 kg 30 kg 25 kg 20 kg 10 kg 5 kg 3 kg 2 kg 1 kg 500 g 300 g 200 g 100 g 50 g 30 g 20 g 10 g 5 g 3 g 2 g 1 g 500 mg 300 mg 200 mg 100 mg 50 mg 30 mg 20 mg	2.6 mg 1.5 mg 1.2 mg 0.94 mg 0.46 mg 0.23 mg 0.13 mg 82 µg 40 µg 21 µg 15 µg 9.0 µg 5.8 µg 3.6 µg 2.3 µg 1.7 µg 1.5 µg 1.1 µg 0.74 µg 0.66 µg 0.51 µg 0.41 µg 0.41 µg 0.41 µg 0.33 µg 0.31 µg 0.31 µg 0.31 µg	Echelon I

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3</small>	Remarks
Metric	10 mg	0.31 μg	Echelon II
	5 mg	0.22 μg	
	3 mg	0.22 μg	
	2 mg	0.22 μg	
	1 mg	0.22 μg	
	500 kg	1.2 g	
	250 kg	0.53 g	
	200 kg	0.46 g	
	100 kg	0.44 g	
	50 kg	0.11 g	
	30 kg	45 mg	
	25 kg	28 mg	
	20 kg	24 mg	
	10 kg	12 mg	
	5 kg	10 mg	
	3 kg	10 mg	
	2 kg	6.6 mg	
	1 kg	0.59 mg	
	500 g	0.48 mg	
	300 g	0.40 mg	
	200 g	0.21 mg	
	100 g	0.11 mg	
	50 g	90 μg	
	30 g	69 μg	
	20 g	52 μg	
	10 g	29 μg	
	5 g	14 μg	
	3 g	8.0 μg	
	2 g	8.0 μg	
	1 g	5.0 μg	
	500 mg	5.0 μg	
	300 mg	4.0 μg	
	200 mg	4.0 μg	
100 mg	4.0 μg		
50 mg	4.0 μg		

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
Avoirdupois	30 mg	3.7 μ g	Echelon II
	20 mg	3.7 μ g	
	10 mg	3.7 μ g	
	5 mg	3.7 μ g	
	3 mg	3.7 μ g	
	2 mg	3.7 μ g	
	1 mg	3.7 μ g	
	3000 lb	13 g	
	2500 lb	13 g	
	2000 lb	12 g	
	1000 lb	0.90 g	
	500 lb	0.65 g	
	200 lb	0.58 g	
	100 lb	0.16 g	
	50 lb	68 mg	
	25 lb	16 mg	
	20 lb	6.0 mg	
	10 lb	4.0 mg	
	5 lb	2.0 mg	
	3 lb	2.0 mg	
	2 lb	0.47 mg	
	1 lb	0.38 mg	
	0.5 lb	0.28 mg	
	0.3 lb	0.11 mg	
	0.2 lb	57 μ g	
	0.1 lb	39 μ g	
	0.05 lb	39 μ g	
0.03 lb	24 μ g		
0.02 lb	23 μ g		
0.01 lb	22 μ g		
0.005 lb	14 μ g		
0.003 lb	13 μ g		
0.002 lb	11 μ g		
0.001 lb	11 μ g		

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks		
Metric	1000 kg	10 g	Echelon III		
	500 kg	1.2 g			
	200 kg	0.46 g			
	100 kg	0.44 g			
	50 kg	0.11 g			
	30 kg	65 mg			
	25 kg	38 mg			
	20 kg	33 mg			
	10 kg	37 mg			
	5 kg	28 mg			
	3 kg	26 mg			
	2 kg	23 mg			
	1 kg	3.4 mg			
	500 g	2.4 mg			
	300 g	2.3 mg			
	Magnetic Susceptibility (χ) of mass standards or materials used to manufacture mass standards.	10 kg		4.4 E-04 χ	Range value is indicating DUT nominal mass. χ is a dimensionless unit ranging from 0 to 1
		5 kg		3.8 E-04 χ	
		3 kg		3.4 E-04 χ	
		2 kg		3.2 E-04 χ	
		1 kg		3.5 E-04 χ	
500 g		4.4 E-04 χ			
300 g		4.9 E-04 χ			
200 g		5.2 E-04 χ			
100 g		5.7 E-04 χ			
50 g		6.3 E-04 χ			
30 g		6.5 E-04 χ			
20 g		6.7 E-04 χ			
10 g		4.6 E-04 χ			
5 g		6.8 E-04 χ			
3 g		6.8 E-04 χ			
2 g	6.9 E-04 χ				
1 g	6.9 E-04 χ				

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
NVLAP Code: 20/M12 VOLUME and DENSITY Pipettes - It is recommended that adjustable volume pipettes not be used below 10 % of capacity. Gravimetric Method	0.1 μ l	0.030 μ l	
	0.2 μ l	0.030 μ l	
	0.5 μ l	0.030 μ l	
	1.0 μ l	0.038 μ l	
	2.5 μ l	0.047 μ l	
	5.0 μ l	0.056 μ l	
	10 μ l	0.12 μ l	
	25 μ l	0.12 μ l	
	50 μ l	0.26 μ l	
	100 μ l	0.41 μ l	
	200 μ l	0.44 μ l	
	500 μ l	1.4 μ l	
	1.000 μ l	4.0 μ l	
	2.5 ml	5.3 μ l	
	5 ml	12 μ l	
	10 ml	20 μ l	
	Density in the Range of 2.69 g/cm ³ to 8.5 g/cm ³	5 kg	
3 kg		4.1 mg/cm ³	
2 kg		3.4 mg/cm ³	
1 kg		1.3mg/cm ³	
500 g		6.4 mg/cm ³	
300 g		7.5 mg/cm ³	
200 g		5.3mg/cm ³	
100 g		2.3mg/cm ³	
50 g		3.0 mg/cm ³	
30 g		6.7 mg/cm ³	
20 g		2.9 mg/cm ³	
10 g	3.1 mg/cm ³		

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
	5 g 3g 2 g 1 g	17 mg/cm ³ 15 mg/cm ³ 13 mg/cm ³ 16 mg/cm ³	
THERMODYNAMIC			
NVLAP Code: 20/T02 HUMIDITY Generate Relative Humidity	10 % to 95 %	0.5 %	
Dew/Frost Point	-20 °C to 70 °C	0.70 °C	
NVLAP Code: 20/T03 LABORATORY THERMOMETERS Liquid in Glass Thermometers Total Immersion	-35 °C to 100 °C 100 °C to 156 °C 0 °C to 156 °C 156 °C to 250 °C	0.07 °C 0.05 °C 0.12 °C 0.09 °C	Graduation 0.1 °C 0.1 °C 0.2 °C 0.2 °C
Partial Immersion	0 °C to 100 °C -35 °C to 0 °C 0 °C to 100 °C 100 °C to 156 °C 156 °C to 250 °C	0.38 °C 0.41 °C 0.60 °C 0.49 °C 0.66 °C	0.5 °C 1.0 °C 1.0 °C 1.0 °C 1.0 °C
NVLAP Code: 20/T05 PRESSURE Pneumatic Pressure using Piston Gauge (Absolute Mode) – Direct Pressure Comparison	13.8 kPa to 68.9 kPa 68.9 kPa to 345.0 kPa 345.0 kPa to 689.500 kPa 689.5 kPa to 6895.0 kPa	0.003 % + 0.2 Pa 0.0019 % + 0.2 Pa 0.0046 % + 2.0 Pa 0.0022 % + 2.0 Pa	2.0 psia to 10.0 psia 10.0 psia to 50.0 psia 50.0 psia to 100.0 psia 100.0 psia to 1000 psia

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
Pneumatic Pressure using Piston Gauge (Gage Mode) – Direct Pressure Comparison	13.8 kPa to 68.9 kPa 68.9 kPa to 345.0 kPa 345.0 kPa to 689.500 kPa 689.5 kPa to 6895.0 kPa	0.003 % + 0.2 Pa 0.0019 % + 0.2 Pa 0.0046 % + 2.0 Pa 0.0022 % + 2.0 Pa	2.0 psia to 10.0 psia 10.0 psia to 50.0 psia 50.0 psia to 100.0 psia 100.0 psia to 1000 psia
Pneumatic Effective Area using Piston Gauge- Direct Pressure Comparison	13.8 kPa to 344.7 kPa 689.5 kPa to 6895.0 kPa	0.0016 % + 0.2 Pa 0.0026 % + 2.0 Pa	2.0 psia to 50.0 psia 100.0 psia to 1000 psia
Pneumatic Pressure using Precision Transducer	100 psi to 200 psi 200 psi to 500 psi 500 psi to 1000 psi 1 psi to 10 psi 10 psi to 50 psi 50 psi to 100 psi	0.027 % + 2.0 Pa 0.014 % + 2.0 Pa 0.007 % + 2.0 Pa 0.14 % + 0.2 Pa 0.013 % + 0.2 Pa 0.0058 % + 2.0 Pa	1000 psi range on PPC3 100 psi range on PPC3
Pressure Drop	100 mmH ₂ O to 1500 mmH ₂ O	1.4 %	
NVLAP Code: 20/T07 RESISTANCE THERMOMETRY			
Digital Thermometer System	-196 °C -70 °C to -40 °C -40 °C to 0 °C 0 °C to 100 °C 100°C to 156 °C 156 °C to 250 °C 250 °C to 450 °C	Repeatability of the thermometer under test is not included in the stated uncertainty. Information regarding thermometer repeatability is included in the calibration certificate. 0.011 °C 0.007 °C 0.010 °C 0.009 °C 0.006 °C 0.012 °C 0.009 °C	Comparison Method LMBP Comparison Method

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
Platinum Resistance Thermometers by Fixed Point	450 °C to 660 °C	0.014 °C	
ArTP	-189.3442 °C	0.0025 °C	
ArTP, HgTP, H ₂ OTP	-189.3442 °C to 0 °C	0.0026 °C	Includes Propagation
HgTP	-38.8342 °C	0.00066 °C	
HgTP, H ₂ OTP, GaMP	-38.8342 °C to 29.7646 °C	0.0010 °C	Includes Propagation
TPW	0.01 °C	0.00045 °C	
GaMP	29.7646 °C	0.0010 °C	
H ₂ OTP, GaMP	0 °C to 29.7646 °C	0.0010 °C	Includes Propagation
InFP	156.5985 °C	0.0014 °C	
H ₂ OTP, InFP	0 °C to 156.5985 °C	0.0014 °C	Includes Propagation
SnFP	231.928 °C	0.0012 °C	
H ₂ OTP, InFP, SnFP	0 °C to 231.928 °C	0.0017 °C	Includes Propagation
ZnFP	419.527 °C	0.0018 °C	
H ₂ OTP, SnFP, ZnFP	0 °C to 419.527 °C	0.0018 °C	Includes Propagation
Resistance Thermometry	-196 °C	0.011 °C	Comparison Method LMBP
	-70 °C to -40 °C	0.007 °C	Comparison Method
	-40 °C to 0 °C	0.010 °C	
	0 °C to 100 °C	0.009 °C	
	100 °C to 156 °C	0.006 °C	
	156 °C to 250 °C	0.012 °C	
	250 °C to 450 °C	0.009 °C	
	450 °C to 660 °C	0.014 °C	
	-40 °C to 0 °C	0.010 °C	Thermistors
	0 °C to 100 °C	0.009 °C	
	100 °C to 156 °C	0.006 °C	
NVLAP Code: 20/T08 THERMOCOUPLES & PYROMETER INDICATORS			
Thermocouple Indicator	-100 mV	42 μV/V	
	-10 mV	230 μV/V	
	-1 mV	1900 μV/V	

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3</small>	Remarks
	1 mV	1800 μ V/V	
	10 mV	220 μ V/V	
	100 mV	41 μ V/V	
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 using a coverage factor, $k = 2$, with a level of confidence of approximately 95 %. 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.1.h. 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: Uncertainty 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: See [NIST Handbook 150](#) for further explanation of these notes.

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