



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION LABORATORIES

NVLAP LAB CODE 105014-0
Scope Revised: 2011-04-13

NVLAP Code: 20/A01 ANSI/NCSL Z540-1-1994; Part 1 Compliant

DIMENSIONAL

NVLAP Code: 20/D11
Spherical Diameter; Ring Gages

<i>Range in inches</i>	<i>Best Uncertainty (±) in μin ^{note 1}</i>	<i>Remarks</i>
0.250 to 0.825	12	Comparison to gage blocks
> 0.825 to 1.510	11	Comparison to gage blocks
> 1.510 to 2.510	12	Comparison to gage blocks
> 2.510 to 4.510	16	Comparison to gage blocks
> 4.510 to 6.510	22	Comparison to gage blocks
> 6.510 to 9.010	30	Comparison to gage blocks
> 9.010 to 12.010	41	Comparison to gage blocks
> 12.010 to 13.25	45	Comparison to gage blocks

2011-04-01 through 2012-03-31

Effective dates

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CALIBRATION LABORATORIES

NVLAP LAB CODE 105014-0

Scope Revised: 2011-04-13

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02

AC Current

AC/DC Transfer Standard and A40 Shunts

<i>Range</i>	<i>Best Uncertainty (±) in $\mu A/A$ ^{note 1}</i>					
	<i>Frequency in Hz</i>					
	<i>10</i>	<i>20</i>	<i>40</i>	<i>400 to 5k</i>	<i>10k</i>	<i>400 to 10 k</i>
10 mA	301	202	124			109
20 mA	301	202	124			109
30 mA	301	202	124			109
50 mA	301	202	124			109
100 mA	301	202	124			109
200 mA	301	202	124			109
300 mA	301	202	124			109
500 mA	301	204	124			109
	<i>10</i>	<i>20</i>	<i>40</i>	<i>400 to 5k</i>	<i>10k</i>	
1A	301	204	126	111	112	
	<i>10</i>	<i>20</i>	<i>40</i>	<i>400 to 10 k</i>		
2A	305	207	128	113		
3A	305	207	128	113		
	<i>10</i>	<i>20</i>	<i>40</i>	<i>400 to 5 k</i>	<i>10 k</i>	
5A	309	210	134	121	123	
	<i>10</i>	<i>20</i>	<i>40</i>	<i>400</i>	<i>1 k</i>	<i>5 k</i>
10A	319	217	140	127	127	127
						<i>10 k</i>
20A						135

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DC Current ^{note 6}

<i>Range</i>	<i>Best Uncertainty (±) in $\mu\text{A/A}$ ^{note 1,4}</i>
10 nA	3
100 nA	2
1 μA	2
10 μA	2
100 μA	2
1 mA	2
10 mA	2
100 mA	2
1 A	10
10 A	10
30 A	20

DC Resistance

<i>Nominal Value in Ω</i>	<i>Best Uncertainty (±) in $\mu\Omega/\Omega$ ^{note 1}</i>	<i>Remarks</i>
100 μ	6.1	Automated DC Resistance Calibration System
1 m	4.1	Automated DC Resistance Calibration System
10 m	3.1	Automated DC Resistance Calibration System
100 m	0.20	Automated DC Resistance Calibration System
1	0.20	Automated DC Resistance Calibration System
10	0.20	Automated DC Resistance Calibration System
25	0.20	Automated DC Resistance Calibration System
100	0.20	Automated DC Resistance Calibration System
1 k	0.20	Automated DC Resistance Calibration System
10 k	0.20	Automated DC Resistance Calibration System
100 k	0.9	Automated DC Resistance Calibration System
1 M	1.2	Automated DC Resistance Calibration System
10 M	1.4	Automated DC Resistance Calibration System
100 M	5.2	Automated DC Resistance Calibration System

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NVLAP LAB CODE 105014-0

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NVLAP Code: 20/E06

DC Voltage

Range	Best Uncertainty (\pm) in $\mu V/V$ notes 1,2	Remarks
1.00 V	0.70	Automated DC Calibration System w/ Zeners
1.018 V	0.70	Automated DC Calibration System w/ Zeners
10 V	0.20	Automated DC Calibration System w/ Zeners
(>5 to 10) mV	11.6	Ratiometric Measurement Techniques using high precision voltage
(>10 to 20) mV	5.8	Ratiometric Measurement Techniques using high precision voltage
(>20 to 30) mV	3.9	Ratiometric Measurement Techniques using high precision voltage
(>30 to 40) mV	3.0	Ratiometric Measurement Techniques using high precision voltage
(>40 to 70) mV	1.8	Ratiometric Measurement Techniques using high precision voltage
(>70 to 100) mV	1.3	Ratiometric Measurement Techniques using high precision voltage
100 mV	0.50	Ratiometric Measurement Techniques using high precision voltage
1 V	0.30	Ratiometric Measurement Techniques using high precision voltage
10 V	0.30	Ratiometric Measurement Techniques using high precision voltage
20 V	0.30	Ratiometric Measurement Techniques using high precision voltage
100 V	0.30	Ratiometric Measurement Techniques using high precision voltage
1 kV	0.50	Ratiometric Measurement Techniques using high precision voltage

NVLAP Code: 20/E09

LF AC Voltage

Best Uncertainty (\pm) in $\mu V/V$ notes 1,3,4
Frequency in Hz

Range	10	20	40	100	1 k	5 kHz	10 k	15 kHz	20 k	25 kHz
2 mV	324	330	326	325	327	331	327	325	327	326
10 mV	81	67	66	67	67	66	66	66	66	69
20 mV	76	62	62	62	62	62	62	62	62	65
30 mV	67	55	53	54	54	53	53	52	52	55
100 mV	41	36	32	27	17	17	17	19	22	22
190 mV	28	23	14	14	13	13	13	14	14	15
300 mV	26	21	14	12	11	11	11	12	12	13
1 V	25	22	17	8	6	6	6	6	6	6

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1.9 V	26	20	17	8	6	6	6	6	6	6
3 V	25	20	17	8	6	6	6	6	6	6
10 V	25	20	17	8	6	6	6	6	6	6
19 V	25	20	17	8	7	7	7	7	7	7
30 V	25	21	18	8	8	8	8	8	8	8
100 V	25	21	18	8	7	7	7	7	8	8
190 V	35	21	19	9	8	8	8	9	9	9
300 V			20	11	9	10	9	10	10	10
500 V			21	15	11	11	11	11	11	12
700 V			21	17	13	13	13	13	13	14
1000 V			21	19	18	17	18	18	18	19
Range	30 kHz	50 k	60 kHz	100 k	300 k	500 K	700 kHz	800 k	1M	
2 mV	328	329	345	422	511	615	675	703	712	
10 mV	72	85	95	143	213	282	309	323	360	
20 mV	68	82	95	141	213	284	310	325	362	
30 mV	59	71	81	125	192	266	297	309	340	
100 mV	21	22	25	41	75	110	158	182	182	
190 mV	16	20	23	36	76	111	145	164	177	
300 mV	14	17	20	29	63	92	121	134	148	
1 V	7	8	8	9	20	25	29	31	41	
1.9 V	6	6	7	8	20	25	29	30	40	
3 V	6	7	7	8	20	25	28	30	40	
10 V	6	7	7	9	20	25	28	30	40	
19 V	7	8	8	9	20	25	28	30	40	
30 V	8	8	9	11	25					
100 V	8	9	9	10						
190 V	9	10	11	15						
300 V	11	14	17	31						
500 V	12	15	19	34						
700 V	15	19	22	38						
1 kV	21									

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TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

<i>Range</i>	<i>Best Uncertainty (±) ^{note 1}</i>	<i>Remarks</i>
10 MHz	1.2 x 10 ⁻¹²	GPS Receiver

MECHANICAL

NVLAP Code: 20/M05
Flow Rate

<i>Nominal Flow Rate</i>	<i>Best Uncertainty (±) in percent ^{notes 1, 5}</i>
(0.8 to 30) L/s	0.3
(0.1 to 800) mL/s	0.4

NVLAP Code: 20/M06
Force

<i>Nominal Force in lbf</i>	<i>Best Uncertainty (±) in lbf ^{note 1}</i>	<i>Remarks</i>
2 to 200	0.05	Dead Weight
> 200 to 500	0.16	Proving Ring
> 500 to 1000	0.32	Proving Ring
> 1000 to 2000	0.68	Proving Ring
> 2000 to 5000	0.89	Proving Ring
> 5000 to 10 000	1.79	Proving Ring
> 10 000 to 20 000	6.33	Proving Ring
> 20 000 to 35 000	6.3	Proving Ring
> 35 000 to 50 000	14.35	Proving Ring
> 50 000 to 100 000	31.07	Proving Ring
> 100 000 to 300 000	131.71	Load Cell

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NVLAP Code: 20/M08
Mass

Range	Best Uncertainty (\pm) ^{notes 1,2}	Remarks
30 kg	15 mg	Echelon I
20 kg	11 mg	Echelon I
10 kg	2.5 mg	Echelon I
5 kg	1.1 mg	Echelon I
3 kg	0.8 mg	Echelon I
2 kg	0.6 mg	Echelon I
1 kg	56 μ g	Echelon I
500 g	34 μ g	Echelon I
300 g	33 μ g	Echelon I
200 g	20 μ g	Echelon I
100 g	24 μ g	Echelon I
50 g	13 μ g	Echelon I
30 g	9.5 μ g	Echelon I
20 g	6.2 μ g	Echelon I
10 g	5.5 μ g	Echelon I
5 g	2.8 μ g	Echelon I
3 g	1.9 μ g	Echelon I
2 g	1.2 μ g	Echelon I
1 g	0.9 μ g	Echelon I
500 mg	0.7 μ g	Echelon I
300 mg	0.7 μ g	Echelon I
200 mg	0.5 μ g	Echelon I
100 mg	0.5 μ g	Echelon I
50 mg	0.52 μ g	Echelon I
30 mg	0.64 μ g	Echelon I
20 mg	0.42 μ g	Echelon I
10 mg	0.48 μ g	Echelon I
5 mg	0.58 μ g	Echelon I
3 mg	0.72 μ g	Echelon I

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2 mg	0.46 µg	Echelon I
1 mg	0.56 ug	Echelon I
30 kg	20 mg	Echelon II
25 kg	17 mg	Echelon II
20 kg	17 mg	Echelon II
10 kg	3.2 mg	Echelon II
5 kg	1.8 mg	Echelon II
3 kg	1.3 mg	Echelon II
2 kg	1.2 mg	Echelon II
1 kg	131 µg	Echelon II
500 g	77 µg	Echelon II
300 g	61 µg	Echelon II
200 g	51 µg	Echelon II
100 g	26 µg	Echelon II
50 g	15.4 µg	Echelon II
30 g	10.7 µg	Echelon II
20 g	9.0 µg	Echelon II
10 g	7.9 µg	Echelon II
5 g	3.2 µg	Echelon II
3 g	2.0 µg	Echelon II
2 g	1.9 µg	Echelon II
1 g	1.6 µg	Echelon II
500 mg	1.5 µg	Echelon II
300 mg	1.6 µg	Echelon II
200 mg	1.5 µg	Echelon II
100 mg	1.5 µg	Echelon II
50 mg	1.5 µg	Echelon II
30 mg	1.5 µg	Echelon II
20 mg	1.5 µg	Echelon II
10 mg	1.5 µg	Echelon II
5 mg	1.5 µg	Echelon II

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3 mg	1.5 µg	Echelon II
2 mg	1.5 µg	Echelon II
1 mg	1.5 µg	Echelon II

NVLAP Code: 20/M11

Vibration

Charge and Voltage Calibrations

Acceleration levels are from 0.1 to 100g ^{note 7}

Frequency in Hz	Best Uncertainty (\pm) in % ^{notes 1, 7}	Remarks
2	3.4	Comparison to working accelerometer
4	3.2	Comparison to working accelerometer
5	2.7	Comparison to working accelerometer
8	1.3	Comparison to working accelerometer
10	1.3	Comparison to working accelerometer
15	1.3	Comparison to working accelerometer
25	1.3	Comparison to working accelerometer
50	1.3	Comparison to working accelerometer
100	1.3	Comparison to working accelerometer
159	1.3	Comparison to working accelerometer
300	1.3	Comparison to working accelerometer
400	1.3	Comparison to working accelerometer
500	1.3	Comparison to working accelerometer
600	1.3	Comparison to working accelerometer
700	1.3	Comparison to working accelerometer
800	1.3	Comparison to working accelerometer
900	1.3	Comparison to working accelerometer
1000	1.3	Comparison to working accelerometer
1500	1.3	Comparison to working accelerometer
1700	1.3	Comparison to working accelerometer
2000	1.3	Comparison to working accelerometer
2500	2.6	Comparison to working accelerometer
3000	2.6	Comparison to working accelerometer
3500	2.6	Comparison to working accelerometer
4000	2.6	Comparison to working accelerometer

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4500	2.6	Comparison to working accelerometer
5000	2.6	Comparison to working accelerometer
5500	2.6	Comparison to working accelerometer
6000	2.7	Comparison to working accelerometer
6500	2.7	Comparison to working accelerometer
7000	2.7	Comparison to working accelerometer
7500	2.7	Comparison to working accelerometer
8000	2.8	Comparison to working accelerometer
8500	2.8	Comparison to working accelerometer
9000	2.9	Comparison to working accelerometer
10 000	2.9	Comparison to working accelerometer

Velocity Calibrations - Velocity levels are from 0.1 to 50 in/sec *note 8*

<i>Frequency in Hz</i>	<i>Best Uncertainty (±) in % ^{notes 1,8}</i>	<i>Remarks</i>
2	2.35	Comparison to working accelerometer
4	2.35	Comparison to working accelerometer
5	2.35	Comparison to working accelerometer
8	2.33	Comparison to working accelerometer
10	0.74	Comparison to working accelerometer
15	0.74	Comparison to working accelerometer
25	0.73	Comparison to working accelerometer
50	0.74	Comparison to working accelerometer
100	0.74	Comparison to working accelerometer
159	0.74	Comparison to working accelerometer
300	0.73	Comparison to working accelerometer
400	0.74	Comparison to working accelerometer
500	0.74	Comparison to working accelerometer
600	1.3	Comparison to working accelerometer
700	1.3	Comparison to working accelerometer
800	1.3	Comparison to working accelerometer
900	1.3	Comparison to working accelerometer
1000	1.3	Comparison to working accelerometer
1500	1.3	Comparison to working accelerometer
1700	1.3	Comparison to working accelerometer

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2000	1.6	Comparison to working accelerometer
2500	4.3	Comparison to working accelerometer
3000	4.3	Comparison to working accelerometer
3500	4.3	Comparison to working accelerometer
4000	4.4	Comparison to working accelerometer
4500	4.4	Comparison to working accelerometer
5000	4.7	Comparison to working accelerometer

THERMODYNAMIC

NVLAP Code: 20/T05

Pressure

Piston Gage Cross Float

<i>Range</i>	<i>Best Uncertainty (±) in %^{note 1}</i>	<i>Remarks</i>
(0 to 50) psi	0.002	Gas
(> 50 to 1450) psi	0.003	Gas
(> 1.45 to 16) kpsi	0.006	Gas
(> 0.1 to 10) kpsi	0.005	Oil
(> 10 to 30) kpsi	0.011	Oil
(> 30 to 50) kpsi	0.023	Oil

NVLAP Code: 20/T07

Resistance Thermometry

<i>Fixed Points</i>	<i>Best Uncertainty (±) in mK^{note 1}</i>	<i>Remarks</i>
-195.80 °C	2.8	BP LN ₂ by Comparison
-38.83 °C	0.58	TP Hg
0.01 °C	0.36	TP W
231.93 °C	1.53	FP Sn
419.53 °C	2.1	FP Zn

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1. Represents an expanded uncertainty using a coverage factor, $k = 2$, at an approximate level of confidence of 95 %.
2. Approximate value. Actual value determined by the test statistics.
3. All ACV measurements performed via AC/DC transfer system.
4. Uncertainties listed are representative of the laboratory's accredited capabilities within the stated ranges. Accreditation is not limited to only those fixed values shown.
5. Dependent upon principle of operation of device being calibrated and its performance relative to standards at the time of the test.
6. All measurements performed utilizing standard resistors maintained under SPC, applying a current source, and measuring the voltage drop with a long scale DVM.
7. Acceleration level generated during calibration will vary depending upon instrument and frequency range of test.
8. Velocity level generated during calibration will vary depending upon instrument and frequency range of test

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