



**National Voluntary  
Laboratory Accreditation Program**



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005**

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**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 105014-0**

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

**DIMENSIONAL**

*NVLAP Code:* 20/D03  
Gage Blocks

<i>Nominal Length in in</i>	<i>Best Uncertainty (±) in μin<sup>note 1</sup></i>
0.01 to < 0.05	2.0
0.05 to < 0.1	1.8
0.1 to < 1.0	1.2
1.0	1.4
2.0	1.9
3.0	2.0
4.0	3.0
5.0	9.0
6.0	6.6
7.0	6.5
8.0	7.2
10.0	8.3
12.0	9.7
16.0	10.3
20.0	11.5

2009-04-01 through 2010-03-31

*Sally S. Bruce*

*Effective dates*

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Laboratory Accreditation Program**



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**NVLAP LAB CODE 105014-0**

*Nominal Length in mm*

*Best Uncertainty (±) in nm <sup>note 1</sup>*

0.5 to < 1.0	59.2
1.0 to < 2.5	43.3
2.5 to < 25.0	43.2
25.0	46.7
50.0	50.4
75.0	88.6
100.0	126.7

**NVLAP Code:** 20/D11

Spherical Diameter; Ring Gages

*Range in inches*

*Best Uncertainty (±) in μin <sup>note 1</sup>*

*Remarks*

0.040 to 0.825	10	Comparison to gage blocks
> 0.825 to 1.510	8	Comparison to gage blocks
> 1.510 to 2.510	9	Comparison to gage blocks
> 2.510 to 4.510	14	Comparison to gage blocks
> 4.510 to 6.510	21	Comparison to gage blocks
> 6.510 to 9.010	29	Comparison to gage blocks
> 9.010 to 12.010	40	Comparison to gage blocks
> 12.010 to 13.25	44	Comparison to gage blocks

**ELECTROMAGNETICS - DC/LOW FREQUENCY**

**NVLAP Code:** 20/E02

AC Current

AC/DC Transfer Standard and A40 Shunts

*Best Uncertainty (±) in ppm <sup>note 1</sup>*  
*Frequency in Hz*

<i>Range</i>	<i>10</i>	<i>20</i>	<i>40</i>	<i>400 to 10 k</i>
10 mA	278	209	142	132
20 mA	278	209	142	132
30 mA	278	209	142	132
50 mA	300	202	124	109
100 mA	278	209	142	132

2009-04-01 through 2010-03-31

*Sally S. Bruce*

*Effective dates*

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# National Voluntary Laboratory Accreditation Program



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200 mA	278	209	142	132			
300 mA	278	209	142	132			
500 mA	300	203	124	109			
	<b>10</b>	<b>20</b>	<b>40</b>	<b>400 to 5 k</b>	<b>10 k</b>		
1A	300	203	125	110	112		
	<b>10</b>	<b>20</b>	<b>40</b>	<b>400 to 10 k</b>			
2A	305	206	127	113			
3A	305	206	127	113			
	<b>10</b>	<b>20</b>	<b>40</b>	<b>400 to 5 k</b>	<b>10 k</b>		
5A	309	210	134	120	123		
	<b>10</b>	<b>20</b>	<b>40</b>	<b>400</b>	<b>1 k</b>	<b>5 k</b>	<b>10 k</b>
10A	318	216	140	127	127	127	128
							<b>400 to 10 k</b>
20A							135

NVLAP Code: 20/E05  
DC Current<sup>note 6</sup>

**Range**

**Best Uncertainty (±) in ppm<sup>note 1,4</sup>**

10 nA	4.4
100 nA	4.0
1 µA	2.6
10 µA	2.2
100 µA	1.9
1 mA	1.9
10 mA	1.9
100 mA	1.9
1 A	11
10 A	11
30 A	21

2009-04-01 through 2010-03-31

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## CALIBRATION LABORATORIES

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DC Resistance

<i>Nominal Value in <math>\Omega</math></i>	<i>Best Uncertainty (<math>\pm</math>) in ppm <sup>note 1</sup></i>	<i>Remarks</i>
100 $\mu$	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	0.30	Automated DC Resistance Calibration System
1	0.20	Automated DC Resistance Calibration System
10	0.30	Automated DC Resistance Calibration System
25	0.30	Automated DC Resistance Calibration System
100	0.30	Automated DC Resistance Calibration System
1 k	0.30	Automated DC Resistance Calibration System
10 k	0.40	Automated DC Resistance Calibration System
100 k	1.2	Automated DC Resistance Calibration System
1 M	1.7	Automated DC Resistance Calibration System
10 M	2.1	Automated DC Resistance Calibration System
100 M	2.6	Automated DC Resistance Calibration System

NVLAP Code: 20/E06

DC Voltage

<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>) in ppm <sup>notes 1,2</sup></i>	<i>Remarks</i>
1.00 V	0.80	Automated DC Calibration System w/ Zeners
1.018 V	0.80	Automated DC Calibration System w/ Zeners
10 V	0.30	Automated DC Calibration System w/ Zeners
(1 to 5) mV	0.012 %	Ratiometric Measurement Techniques using high precision voltage
(>5 to 10) mV	19	Ratiometric Measurement Techniques using high precision voltage
(>10 to 20) mV	11	Ratiometric Measurement Techniques using high precision voltage
(>20 to 30) mV	5.5	Ratiometric Measurement Techniques using high precision voltage
(>30 to 40) mV	3.8	Ratiometric Measurement Techniques using high precision voltage
(>40 to 60) mV	3.0	Ratiometric Measurement Techniques using high precision voltage
(>60 to 80) mV	2.0	Ratiometric Measurement Techniques using high precision voltage
(>80 to 100) mV	1.5	Ratiometric Measurement Techniques using high precision voltage
100 mV	0.70	Ratiometric Measurement Techniques using high precision voltage
1 V	0.40	Ratiometric Measurement Techniques using high precision voltage

2009-04-01 through 2010-03-31

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10 V	0.40	Ratiometric Measurement Techniques using high precision voltage
20 V	0.50	Ratiometric Measurement Techniques using high precision voltage
100 V	0.40	Ratiometric Measurement Techniques using high precision voltage
1 kV	0.80	Ratiometric Measurement Techniques using high precision voltage

NVLAP Code: 20/E09  
LF AC Voltage

*Best Uncertainty (±) in ppm* <sup>notes 1,3,4</sup>  
*Frequency in Hz*

<i>Range</i>	<i>10</i>	<i>20</i>	<i>40</i>	<i>100</i>	<i>1 k</i>	<i>5 kHz</i>	<i>10 k</i>	<i>15 kHz</i>	<i>20 k</i>	<i>25 kHz</i>
2 mV	461	902	862	891	399	593	861	862	861	783
10 mV	160	204	151	217	220	212	204	204	203	208
20 mV	141	136	134	143	135	134	137	134	134	140
30 mV	179	163	142	137	136	133	133	134	135	140
100 mV	122	123	120	122	121	121	121	121	121	122
190 mV	123	120	120	119	119	119	119	119	119	119
300 mV	73	77	68	68	68	68	67	68	69	70
1 V	137	73	67	65	65	65	66	65	65	65
1.9 V	73	68	67	65	65	65	65	65	65	65
3 V	69	71	68	65	65	65	65	65	65	65
10 V	67	71	66	64	64	64	64	64	64	64
19 V	69	67	66	64	64	64	64	64	64	64
30 V	69	73	69	66	66	66	66	66	67	67
100 V	107	73	67	66	66	66	66	66	65	66
190 V	78	69	67	67	66	66	66	66	66	66
300 V			131	129	127	128	128	128	128	128
500 V			130	128	127	127	127	127	127	128
700 V			129	128	127	127	127	127	127	128
1000 V			128	128	127	127	127	127	127	128
<i>Range</i>	<i>30 kHz</i>	<i>50 k</i>	<i>60 kHz</i>	<i>100 k</i>	<i>300 k</i>	<i>500 K</i>	<i>700 kHz</i>	<i>800 k</i>	<i>1M</i>	
2 mV	705	420	526	1029	1242	2093	2312	2424	2424	
10 mV	214	236	252	316	262	643	473	391	423	
20 mV	146	176	188	234	323	467	389	351	389	
30 mV	145	174	187	246	358	577	587	624	686	

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NVLAP LAB CODE 105014-0

100 mV	122	124	127	140	195	232	274	295	224
190 mV	120	124	127	142	177	169	240	279	227
300 mV	71	74	76	88	131	155	185	201	165
1 V	66	67	67	66	95	112	114	115	99
1.9 V	65	66	66	66	110	112	104	101	99
3 V	66	69	67	65	111	114	115	115	117
10 V	64	64	65	65	95	115	116	117	125
19 V	64	64	65	65	105	111	104	101	102
30 V	68	71	71	71	110				
100 V	67	71	70	66					
190 V	66	67	67	67					
300 V	128	129	129	132					
500 V	128	130	131	134					
700 V	128	132	132	136					
1 kV	129								

## TIME AND FREQUENCY

NVLAP Code: 20/F01  
Frequency Dissemination

Range	Best Uncertainty ( $\pm$ ) <sup>note 1</sup>	Remarks
10 MHz	$1.2 \times 10^{-12}$	GPS Receiver

## MECHANICAL

NVLAP Code: 20/M05  
Flow Rate

Nominal Flow Rate	Best Uncertainty ( $\pm$ ) in percent <sup>notes 1, 5</sup>
(0.8 to 30) L/s	0.3
(0.1 to 800) mL/s	0.4

2009-04-01 through 2010-03-31

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NVLAP LAB CODE 105014-0

NVLAP Code: 20/M06

Force

<i>Nominal Force in lbf</i>	<i>Best Uncertainty (±) in lbf<sup>note 1</sup></i>	<i>Remarks</i>
2 to 200	0.05	Dead Weight
> 200 to 300	0.10	Proving Ring
> 300 to 500	0.16	Proving Ring
> 500 to 1000	0.31	Proving Ring
> 1000 to 2000	0.60	Proving Ring
> 2000 to 5000	0.99	Proving Ring
> 5000 to 10 000	1.97	Proving Ring
> 10 000 to 20 000	5.98	Proving Ring
> 20 000 to 35 000	6.56	Proving Ring
> 35 000 to 50 000	12.29	Proving Ring
> 50 000 to 60 000	17.31	Proving Ring
> 60 000 to 100 000	28.17	Proving Ring
> 100 000 to 300 000	130.17	Proving Ring

NVLAP Code: 20/M08

Mass

<i>Range</i>	<i>Best Uncertainty (±) in mg<sup>notes 1,2</sup></i>	<i>Remarks</i>
10 kg	2.0	Echelon I
7 kg	1.4	Echelon I
5 kg	0.87	Echelon I
3 kg	0.62	Echelon I
2 kg	0.50	Echelon I
1 kg	0.040	Echelon I
500 g	0.026	Echelon I
300 g	0.029	Echelon I
200 g	0.017	Echelon I
100 g	0.022	Echelon I
50 g	0.011	Echelon I
30 g	0.0072	Echelon I
20 g	0.0047	Echelon I
10 g	0.0035	Echelon I

2009-04-01 through 2010-03-31

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# National Voluntary Laboratory Accreditation Program



## CALIBRATION LABORATORIES

NVLAP LAB CODE 105014-0

5 g	0.0017	Echelon I
3 g	0.0011	Echelon I
2 g	0.0007	Echelon I
1 g	0.0005	Echelon I
500 mg	0.0003	Echelon I
300 mg	0.0003	Echelon I
200 mg	0.0002	Echelon I
100 mg	0.0002	Echelon I
50 mg	0.0004	Echelon I
30 mg	0.0005	Echelon I
20 mg	0.0003	Echelon I
10 mg	0.0004	Echelon I
5 mg	0.0003	Echelon I
3 mg	0.0004	Echelon I
2 mg	0.0003	Echelon I
1 mg	0.0003	Echelon I
30 kg	17	Echelon II
25 kg	16	Echelon II
20 kg	15	Echelon II
10 kg	2.2	Echelon II
7 kg	1.7	Echelon II
5 kg	1.3	Echelon II
3 kg	1.1	Echelon II
2 kg	1.1	Echelon II
1 kg	0.056	Echelon II
500 g	0.048	Echelon II
300 g	0.056	Echelon II
200 g	0.044	Echelon II
100 g	0.022	Echelon II
50 g	0.013	Echelon II
30 g	0.010	Echelon II
20 g	0.0076	Echelon II
10 g	0.0069	Echelon II
5 g	0.0022	Echelon II

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**CALIBRATION LABORATORIES**

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3 g	0.0019	Echelon II
2 g	0.0016	Echelon II
1 g	0.0015	Echelon II
0.5 g	0.0014	Echelon II
0.3 g	0.0015	Echelon II
0.2 g	0.0014	Echelon II
0.1 g	0.0014	Echelon II
0.05 g	0.0015	Echelon II
0.03 g	0.0016	Echelon II
0.02 g	0.0014	Echelon II
0.01 g	0.0015	Echelon II
0.005 g	0.0014	Echelon II
0.003 g	0.0015	Echelon II
0.002 g	0.0014	Echelon II
0.001 g	0.0014	Echelon II

*NVLAP Code:* 20/M11

Vibration

Charge and Voltage Calibrations

Acceleration levels are from 0.1 to 100g *note 7*

<i>Frequency in Hz</i>	<i>Best Uncertainty (±) in percent</i> <sup>notes 1, 7</sup>	<i>Remarks</i>
2	3.73	Comparison to working accelerometer
4	3.66	Comparison to working accelerometer
5	3.22	Comparison to working accelerometer
8	1.28	Comparison to working accelerometer
10	1.30	Comparison to working accelerometer
15	1.14	Comparison to working accelerometer
25	1.14	Comparison to working accelerometer
50	1.14	Comparison to working accelerometer
100	1.14	Comparison to working accelerometer
159	1.14	Comparison to working accelerometer
300	1.14	Comparison to working accelerometer
400	1.14	Comparison to working accelerometer
500	1.14	Comparison to working accelerometer
600	1.14	Comparison to working accelerometer

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700	1.14	Comparison to working accelerometer
800	1.14	Comparison to working accelerometer
900	1.14	Comparison to working accelerometer
1000	1.14	Comparison to working accelerometer
1500	1.14	Comparison to working accelerometer
1700	1.14	Comparison to working accelerometer
2000	1.14	Comparison to working accelerometer
2500	2.07	Comparison to working accelerometer
3000	2.07	Comparison to working accelerometer
3500	2.08	Comparison to working accelerometer
4000	2.36	Comparison to working accelerometer
4500	2.43	Comparison to working accelerometer
5000	2.49	Comparison to working accelerometer
5500	2.56	Comparison to working accelerometer
6000	2.62	Comparison to working accelerometer
6500	2.70	Comparison to working accelerometer
7000	2.77	Comparison to working accelerometer
7500	2.84	Comparison to working accelerometer
8000	2.92	Comparison to working accelerometer
8500	3.00	Comparison to working accelerometer
9000	3.09	Comparison to working accelerometer
10 000	3.26	Comparison to working accelerometer

Velocity Calibrations - Velocity levels are from 0.1 to 50 in/sec <sup>note 8</sup>

<i>Frequency in Hz</i>	<i>Best Uncertainty (±) in percent</i> <sup>notes 1,8</sup>	<i>Remarks</i>
2	3.42	Comparison to working accelerometer
4	3.42	Comparison to working accelerometer
5	2.95	Comparison to working accelerometer
8	2.91	Comparison to working accelerometer
10	1.25	Comparison to working accelerometer
15	1.25	Comparison to working accelerometer
25	1.25	Comparison to working accelerometer
50	1.25	Comparison to working accelerometer
100	1.25	Comparison to working accelerometer
159	1.25	Comparison to working accelerometer

2009-04-01 through 2010-03-31

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300	1.25	Comparison to working accelerometer
400	1.25	Comparison to working accelerometer
500	1.25	Comparison to working accelerometer
600	1.85	Comparison to working accelerometer
700	1.85	Comparison to working accelerometer
800	1.85	Comparison to working accelerometer
900	1.85	Comparison to working accelerometer
1000	1.85	Comparison to working accelerometer
1500	1.85	Comparison to working accelerometer
1700	1.85	Comparison to working accelerometer
2000	1.90	Comparison to working accelerometer
2500	5.42	Comparison to working accelerometer
3000	5.42	Comparison to working accelerometer
3500	5.42	Comparison to working accelerometer
4000	5.53	Comparison to working accelerometer
4500	5.55	Comparison to working accelerometer
5000	5.57	Comparison to working accelerometer

## THERMODYNAMIC

**NVLAP Code:** 20/T05  
Pressure  
Piston Gage Cross Float

<b>Range</b>	<b>Best Uncertainty (<math>\pm</math>) in ppm <sup>note 1</sup></b>	<b>Remarks</b>
(0 to 50) psi	25	Gas
(> 50 to 1450) psi	49	Gas
(> 1.45 to 16) kpsi	90	Gas
(> 0.1 to 10) kpsi	62	Oil
(> 10 to 30) kpsi	114	Oil
(> 30 to 50) kpsi	213	Oil

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# National Voluntary Laboratory Accreditation Program



## CALIBRATION LABORATORIES

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*NVLAP Code:* 20/T07

Resistance Thermometry

	<i>Range</i>	<i>Best Uncertainty (±) in mK<sup>note 1</sup></i>	<i>Remarks</i>
77.348 K	-195.80 °C	4.13	BP LN <sub>2</sub> by Comparison
83.8058 K	-189.34 °C	1.06	TP Ar
234.3156 K	-38.83 °C	0.94	TP Hg
273.16 K	0.01 °C	0.68	TP W
505.078 K	231.93 °C	1.96	FP Sn
692.77 K	419.53 °C	2.59	FP Zn

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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