National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION LABORATORIES **NVLAP LAB CODE 200659-0**

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

NVLAP Code: 20/D03
Gage Blocks

Range in Inches	*Best Uncertainty (±) in μ inches* [note 1]	*Remarks*
0 to 4	4.1 + 1.1L	L in inches for Steel
0 to 4	4.2 + 0.6L	L in inches for Chrome Carbide

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current Output

	Best Uncertainty (±) in A [note 1] *Frequency in Hertz*						
Range in A	*10*	*20*	*40*	*1 k*	*5 k*	*10 k*	*Remarks*
0.00022	1.16 E-06	1.16 E-06	5.78 E-07	3.05 E-07	4.19 E-07	4.19 E-07	Source / Measure
0.0022	1.16 E-05	1.16 E-05	5.78 E-06	3.03 E-06	4.19 E-06	4.19 E-06	Source / Measure
0.022	1.16 E-04	1.16 E-04	5.78 E-05	3.02 E-05	4.13 E-05	4.13 E-05	Source / Measure
0.22	1.16 E-03	1.16 E-03	6.01 E-04	4.63 E-04	9.37 E-04	9.37 E-04	Source / Measure

2008-10-01 through 2009-09-30
Effective dates

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2.2	1.16 E-03	1.39 E-03	1.39 E-03	9.43 E-03	9.43 E-03	Source / Measure
11.0		2.91 E-02	2.95 E-02	3.59 E-02	3.67 E-02	Source / Measure

NVLAP Code: 20/E05
2 Wire Resistance

Range in Ω	***Best Uncertainty (±) in Ω*** [note 1]	***Remarks***
0	2.89 E-01	Source / Measure
1	2.89 E-01	Source / Measure
1.9	2.89 E-01	Source / Measure
10	2.89 E-01	Source / Measure
19	2.90 E-01	Source / Measure
100	2.91 E-01	Source / Measure
190	2.92 E-01	Source / Measure
1 k	3.01 E-01	Source / Measure
1.9 k	3.19 E-01	Source / Measure
10 k	4.18 E-01	Source / Measure
19 k	5.89 E-01	Source / Measure
100 k	1.63 E + 00	Source / Measure
190 k	6.04 E + 00	Source / Measure
1 M	2.31 E + 01	Source / Measure
1.9 M	2.27 E + 02	Source / Measure
10 M	7.31 E + 02	Source / Measure
19 M	1.21 E + 04	Source / Measure
100 M	5.92 E + 04	Source / Measure

4 Wire Resistance

0	6.56 E-05	Source / Measure
1	9.59 E-05	Source / Measure
1.9	1.40 E-04	Source / Measure
10	2.69 E-04	Source / Measure
19	9.39 E-04	Source / Measure
100	2.11 E-03	Source / Measure

2008-10-01 through 2009-09-30

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200659-0**

190	3.11 E-03	Source / Measure
1 k	1.31 E-02	Source / Measure
1.9 k	3.10 E-02	Source / Measure
10 k	1.31 E-01	Source / Measure
19 k	2.96 E-01	Source / Measure
100 k	1.37 E + 00	Source / Measure
190 k	5.76 E + 00	Source / Measure
1 M	2.28 E + 01	Source / Measure
1.9 M	2.27 E + 02	Source / Measure
10 M	7.31 E + 02	Source / Measure
19 M	1.21 E + 04	Source / Measure

NVLAP Code: 20/E06
DC Voltage

Range in V	*Best Uncertainty (±) in V note 1*	*Remarks*
0	9.33 E-07	Source / Measure
0.22	3.27 E-06	Source / Measure
2.2	2.20 E-05	Source / Measure
11	1.52 E-04	Source / Measure
22	2.92 E-04	Source / Measure
220	2.73 E-03	Source / Measure
1100	1.26 E-02	Source / Measure

NVLAP Code: 20/E06
DC Voltage Fixed Points

Range in V	*Best Uncertainty (±) in V note 1*	*Remarks*
0.1	1.22 E-06	Source / Measure
1	3.65 E-06	Source / Measure
10	2.46 E-05	Source / Measure
100	3.33 E-04	Source / Measure
1000	4.16 E-03	Source / Measure

2008-10-01 through 2009-09-30

Effective dates

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NVLAP Code: 20/E06
DC Current

Range in A	*Best Uncertainty (±) in A* [note 1]	*Remarks*
0	3.47 E-09	Source / Measure
0.00022	1.38 E-08	Source / Measure
0.0022	1.14 E-07	Source / Measure
0.022	1.45 E-06	Source / Measure
0.22	3.75 E-05	Source / Measure
2.2	2.74 E-03	Source / Measure
11.0	4.89 E-03	Source / Measure

NVLAP Code: 20/E09
LF AC Voltage

	Best Uncertainty (±) in % + µV [note 1] *Frequency in Hertz*							
Range	*10 to 20*	*20 to 40*	*40 to 20 k*	*20 k to 50 k*	*50 k to 100 k*	*100 k to 300 k*	*300 k to 500 k*	*500 k to 1 M*
2.2 mV	0.209 + 4	0.209 + 4	0.18 + 4	0.808 + 4	1.697 + 5	1.680 + 10	1.680 + 10	1.683 + 20
22 mV	0.036 + 4	0.036 + 4	0.047 + 4	0.047 + 4	0.105 + 4	0.406 + 5	1.214 + 10	1.215 + 20
220 mV	0.034 + 12	0.032 + 7	0.032 + 7	0.047 + 7	0.105 + 07	0.405 +17	1.214 + 20	1.215 + 25
2.2 V	0.034 + 40	0.032 + 15	0.032 + 15	0.046 + 8	0.104 + 10	0.404 + 30	1.213 + 80	1.214 + 200
22 V	0.048 + 400	0.047 + 150	0.047 + 150	0.052 + 50	0.150 + 100	0.150 + 200	1.790 + 600	1.791 + 2000
Range	*Best Uncertainty (±) in % + mV* [note 1]							
220 V	0.071 + 4	0.070 + 1.5	0.070 + 1.5	0.150 + 0.6	0.358 + 1	0.358 + 2.5	1.749 + 16	1.777 + 40
1100 V	0.067 + 16	0.053 + 4	0.053 + 3.5					

TIME AND FREQUENCY

2008-10-01 through 2009-09-30
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NVLAP Code: 20/F01
Frequency Dissemination

Range in Hz	***Best Uncertainty (±) (Fractional Frequency Error)*** [note 1]	***Remarks***
10 M	1.07×10^{-11}	GPS Master Oscillator

MECHANICAL

NVLAP Code: 20/M05
Flow Rate

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
0.1 SLPM to 1.0 SLPM	0.6 % of Reading + 0.01 % FS	Laminar
3.0 SLPM to 30 SLPM	0.6 % of Reading + 0.01 % FS	Laminar
28 SLPM to 100 SLPM	0.5 % of Reading + 0.01 % FS	Sonic
67 SLPM to 250 SLPM	0.5 % of Reading + 0.01 % FS	Sonic
248 SLPM to 1000 SLPM	0.5 % of Reading + 0.01 % FS	Sonic
3 sccm to 40 000 sccm	0.56 % of Reading	Sierra

NVLAP Code: 20/M06
Torque Transducers

Range	***Best Uncertainty (±) in %*** [note 1]	***Remarks***
4 to 50 in lb	0.24	
30 to 400 in lb	0.20	
80 to 1000 in lb	0.22	
20 to 250 ft lb	0.16	
60 to 600 ft lb	0.09	
Torque Wrenches		
4 in lb to 600 ft lb	0.25	

2008-10-01 through 2009-09-30

Effective dates

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NVLAP Code: 20/M08
Mass

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
50 lb	13 mg	Echelon II
20 kg	7.8 mg	Echelon II
10	2.7 mg	Echelon II
5	2.3 mg	Echelon II
2	0.41 mg	Echelon II
1	0.12 mg	Echelon II
500 g	0.067 mg	Echelon II
200	0.042 mg	Echelon II
100	0.039 mg	Echelon II
50	0.024 mg	Echelon II
20	0.011 mg	Echelon II
10	8.3 µg	Echelon II
5	4.5 µg	Echelon II
2	2.1 µg	Echelon II
1	1.8 µg	Echelon II
500 mg	1.3 µg	Echelon II
200	1.0 µg	Echelon II
100	1.0 µg	Echelon II
50	0.9 µg	Echelon II
20	0.7 µg	Echelon II
10	0.7 µg	Echelon II
5	0.7 µg	Echelon II
2	0.6 µg	Echelon II
1	0.6 µg	Echelon II

Balances [Note 2]

Readability in mg	***Uncertainty(±) in mg***	***Remarks***
0.001	0.0043	OIML Class E2 Weights
0.01	0.059	OIML Class E2 Weights
0.1	0.095	OIML Class E2 Weights
1	0.75	OIML Class E2 Weights
10	7.5	OIML Class E2 Weights
100	75	OIML Class E2 Weights

2008-10-01 through 2009-09-30

Effective dates

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THERMODYNAMIC

NVLAP Code: 20/T02
Humidity

Range in %	*Best Uncertainty (±) in %* [Note 1]	*Remarks*
10 to 95 RH	1.2	2500

NVLAP Code: 20/T03
Laboratory Thermometers

RTD's, Thermistors, and Direct Reading Thermometers

Range in ˚C	*Best Uncertainty (±) in ˚C* [Note 1]	*Remarks*
0 to 100	0.0093	Water Bath
100 to 419	0.265	Fluidized Bath

Thermocouples

Thermocouple Type	*Best Uncertainty (±) in ˚C* [Note 1] *(Range 0 to 100 ºC in Water)*	*Best Uncertainty (±) in ˚C* [Note 1] *(Range 100 to 419 ºC in Fluidized Bath)*
B	n/a	1.359
C	0.197	0.368
E	0.177	0.357
J	0.178	0.358
K	0.179	0.358
R	0.282	0.390
S	0.279	0.391
T	0.179	0.358

2008-10-01 through 2009-09-30

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NVLAP Code: 20/T05
Pressure
Absolute Mode

Range	***Best Uncertainty (±) in ppm of Reading + mPa (psi)*** [note 1]	***Remarks***
1.0 Pa to 15 kPa	37 + 8	FPG 8601
0.000145 psia to 2.17 psia	37 + (1.2 E-6)	FPG 8601

Range	***Best Uncertainty (±) in ppm of Reading + Pa*** [note 1]	***Remarks***
10 to 380 kPa (1.45 to 55 psia)	15.7 + 0.10	7601 (10 kPa/kg)
50 to 1900 kPa (7.3 to 275 psia)	18.0 + 0.12	7601 (50 kPa/kg)
200 to 7600 kPa (29 to 1100 psia)	19.9 + 0.25	7601 (200 kPa/kg)

Absolute Differential Mode

Range	***Best Uncertainty (±) in ppm of Reading + mPa (psi)*** [note 1]	***Remarks***
0 Pa to 15 kPa	37 + 5	FPG 8601
0 psia to 2.17 psia	37 + (7.3 E-7)	FPG 8601

Gauge Mode	***Best Uncertainty (±) in ppm of Reading + mPa (psi)*** [note 1]	***Remarks***
0 Pa to 15 kPa	37 + 5	FPG 8601
0 psi to 2.17 psi	37 + (7.3 E-7)	FPG 8601

Range	***Best Uncertainty (±) in ppm*** [note 1]	***Remarks***
10 to 380 kPa (1.45 to 55 psi)	16.0 + 0.01 Pa	7601 (10 kPa/kg)
50 to 1900 kPa (7.3 to 275 psi)	18.3 + 0.06 Pa	7601 (50 kPa/kg)
200 to 7600 kPa (29 to 1100 psi)	20.2 + 0.23 Pa	7601 (200 kPa/kg)
1.379 MPa to 68.948 MPA	108	5202
200 psig to 10 000 psig	108	5202

2008-10-01 through 2009-09-30

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NVLAP Code: 20/T07
Resistance Thermometry

Range in °C	*Best Uncertainty (±) in mK*	*Remarks*
0.01	1.0	TPW
29.7646	2.0	GaMP
231.928	4.0	Sn FP
419.527	8.0	Zn FP

1. Represents an expanded uncertainty using a coverage factor, k = 2, at an approximate level of confidence of 95 %.
2. This parameter is accredited for field service, reported uncertainties may be higher due to environmental conditions.

2008-10-01 through 2009-09-30

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