



**National Voluntary  
Laboratory Accreditation Program**



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

**Strategic Weapons Fac. Pacific Cal. Lab. Oper. by Lockheed Martin**

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**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200406-0**

Scope Revised: 2011-04-13

*NVLAP Code:* 20/A01

ANSI/NCSL Z540-1-1994; Part 1

Compliant

**DIMENSIONAL**

*NVLAP Code:* 20/D03

Gage Blocks - Steel

<i>Range in inches</i>	<i>Best Uncertainty (±) in <math>\mu\text{in}</math> <sup>note 1</sup></i>	<i>Remarks</i>
0.01 to 0.09375	3.3	Mechanical Comparison
0.10 to 1.0	3.3	Mechanical Comparison
2.0	3.4	Mechanical Comparison
3.0	3.8	Mechanical Comparison
4.0	4.3	Mechanical Comparison
5.0	4.3	Mechanical Comparison
6.0	5.0	Mechanical Comparison
7.0	5.7	Mechanical Comparison
8.0	6.4	Mechanical Comparison
10.0	7.9	Mechanical Comparison
12.0	9.4	Mechanical Comparison
16.0	12.2	Mechanical Comparison
20.0	15.2	Mechanical Comparison

2011-04-01 through 2012-03-31

*Effective dates*

*Sally S. Bruce*

*For the National Institute of Standards and Technology*



# National Voluntary Laboratory Accreditation Program



## CALIBRATION LABORATORIES

NVLAP LAB CODE 200406-0  
Scope Revised: 2011-04-13

Gage Blocks - Ceramic, Chrome Carbide and Tungsten Carbide

0.01 to 0.09375	4.3	Mechanical Comparison
0.10 to 1.0	4.3	Mechanical Comparison
2.0	4.4	Mechanical Comparison
3.0	4.8	Mechanical Comparison
4.0	5.3	Mechanical Comparison

**NVLAP Code:** 20/D11  
Spherical Diameter, Plug Ring Gages

<b>Range in inches</b>	<b>Best Uncertainty (<math>\pm</math>) in <math>\mu\text{in}</math> <sup>note 1</sup></b>	<b>Remarks</b>
Ring Gages > 0 to 8.0	20 + 2.0 L	Comparison to Gage Blocks
Plug Gages > 0 to 3.0	40	Comparison to Gage Blocks

**NVLAP Code:** 20/D14  
Threaded Plug and Ring Gages

Threaded Plug Gages, 60°

	<b>Range</b>	<b>Best Uncertainty (<math>\pm</math>) in <math>\mu\text{in}</math> <sup>note 1</sup></b>	<b>Remarks</b>
Pitch Diameter	> 0 in to 6.0 in	90	Three Wire Method
Major Diameter	> 0 in to 6.0 in	40	Universal Measuring Machine
Pitch	4 TPI to 80 TPI	100	Universal Measuring Machine

Threaded Ring Gages, 60°

Minor Diameter	> 0 in to 6.0 in	40
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## CALIBRATION LABORATORIES

NVLAP LAB CODE 200406-0

Scope Revised: 2011-04-13

### ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02

AC Current

Range	Frequency in Hz Best Uncertainty ( $\pm$ ) in ( $\mu A/A + nA$ ) <sup>note 1</sup>				
	10 to 20	20 to 40	40 to 1k	1k to 5k	5k to 10k
220 $\mu A$	230 + 16	140 + 10	110 + 8	250 + 12	900 + 65
2.2 mA	230 + 40	140 + 35	110 + 35	180 + 110	900 + 650
22 mA	230 + 400	140 + 350	110 + 350	180 + 550	900 + 5000

Range	Frequency in Hz Best Uncertainty ( $\pm$ ) in ( $\mu A/A + \mu A$ ) <sup>note 1</sup>				
	10 to 20	20 to 40	40 to 1k	1k to 5k	5k to 10k
220 mA	230 + 4	140 + 3.5	110 + 2.5	180 + 3.5	900 + 10

Range	Frequency in Hz Best Uncertainty ( $\pm$ ) in ( $\mu A/A + \mu A$ ) <sup>note 1</sup>		
	20 to 1k	1k to 5k	5k to 10k
2.2 A	240 to 35	390 + 80	6000 + 160

Range	Frequency in Hz Best Uncertainty ( $\pm$ ) in ( $\mu A/A + \mu A$ ) <sup>note 1</sup>			Remarks
	40 to 1k	1k to 5k	5k to 10k	
11A	400 + 170	850 + 380	3300 + 750	5725A

NVLAP Code: 20/E05

DC Current

Range	Best Uncertainty ( $\pm$ ) in ( $\mu A/A + nA$ ) <sup>note 1</sup>	Remarks
220 $\mu A$	35 + 6	
2.2 mA	30 + 7	
22 mA	30 + 40	

Range	Best Uncertainty ( $\pm$ ) in ( $\mu A/A + \mu A$ ) <sup>note 1</sup>	Remarks
220 mA	40 + 0.7	
2.2 A	60 + 12	
11A	340 + 48	5725A

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## CALIBRATION LABORATORIES

NVLAP LAB CODE 200406-0  
Scope Revised: 2011-04-13

NVLAP Code: 20/E05  
DC Resistance

Range in ohms	Best Uncertainty ( $\pm$ ) in ppm <sup>note 1</sup>	Remarks
1.0	1	Using Guildline Bridge
10.0	3	Using Guildline Bridge
100.0	1	Using Guildline Bridge
1000.0	1	Using Guildline Bridge
10 000.0	1	Using Guildline Bridge
100 000.0	1	Using Guildline Bridge

NVLAP Code: 20/E06  
DC Voltage

Range ( $\pm$ ) in V	Best Uncertainty ( $\pm$ ) in ppm <sup>note 1</sup>	Remarks
0.1	8.1	Compared to 10 V Reference Cell
1.0	1.3	Compared to 10 V Reference Cell
10.0	1.0	Compared to 10 V Reference Cell
100.0	1.0	Compared to 10 V Reference Cell
1000.0	1.1	Compared to 10 V Reference Cell

NVLAP Code: 20/E09  
LF AC Voltage

Range	Frequency in Hz Best Uncertainty ( $\pm$ ) in ( $\mu$ V/V + $\mu$ V) <sup>note 1</sup>							
	10 to 20	20 to 40	40 to 20k	20k to 50k	50k to 100k	100k to 300k	300k to 500k	500k to 1M
2.2 mV	220 + 4	85 + 4	75 + 4	180 + 4	460 + 5	900 + 10	1200 + 20	2500 + 20
22 mV	220 + 4	85 + 4	75 + 4	180 + 4	460 + 5	900 + 10	1200 + 20	2500 + 20
220 mV	220 + 12	85 + 7	75 + 7	180 + 7	420 + 17	750 + 20	1200 + 25	2500 + 45
2.2 V	220 + 40	80 + 15	40 + 8	70 + 10	105 + 30	340 + 80	900 + 200	1500 + 300
22 V	220 + 400	80 + 150	40 + 50	70 + 100	95 + 200	260 + 600	900 + 200	1300 + 3200

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Scope Revised: 2011-04-13

Range	10 to 20	20 to 40	40 to 20 k	20k to 50k	50k to 100 k	100k to 300k	300k to 500k	500k to 1M
220 V	220 + 4	80 + 1.5	47 + 0.6	75 + 1	130 + 2.5	800 + 16	4200 + 40	7000 + 80

1100 V	15 to 50 260 + 16	50 to 1k 60 + 3.5
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**Best Uncertainty ( $\pm$ ) in (uV/V + mV)<sup>note 1</sup>**

	40 to 1k	1k to 20k	20k to 50k	Remarks
1100 V	80 + 4	125 + 6	360 + 11	5725A

750 V		3k to 50k 360 + 11	50 k to 100k 1300 + 45	5725A
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NVLAP Code: 20/E10  
LF Capacitance

Range	Best Uncertainty ( $\pm$ ) <sup>note 1</sup>	Remarks
10 pF to 1 $\mu$ F	0.0125%	GR 1620-AP Bridge System

NVLAP Code: 20/E15  
Phase Meters

Range	Best Uncertainty ( $\pm$ ) in m <sup>o</sup> notes 1, 2
0.000 <sup>o</sup> to 999.999 <sup>o</sup>	

Amplitude and Ratio	Frequency Range in Hertz			
	1 to 1 k	> 1 k to 6.25 k	> 6.25 k to 50 k	> 50 k to 100 k
5 V, 1:1 Ratio	11	11	18	20
50 mV to 100 V, 10:1 ratio	11 + 0.05 ratio	10 + 0.1 ratio	15 + 0.15 ratio	40 + 0.4 ratio
100 V to 120 V, 100:1 ratio	10 + 0.1 ratio	20 + 0.2 ratio	30 + 0.3 ratio	100 + ratio

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Scope Revised: 2011-04-13

**TIME AND FREQUENCY**

*NVLAP Code:* 20/F01  
Frequency Dissemination

<i>Range in MHz</i>	<i>Best Uncertainty (±) <sup>note 1</sup></i>	<i>Remarks</i>
0.1	2 x 10 <sup>-12</sup>	
1	2 x 10 <sup>-12</sup>	
5	2 x 10 <sup>-12</sup>	
10	2 x 10 <sup>-12</sup>	

*NVLAP Code:* 20/F02  
Time Dissemination

<i>Range</i>	<i>Best Uncertainty (±) <sup>note 1</sup></i>	<i>Remarks</i>
1 pps	10 μs	

**MECHANICAL**

*NVLAP Code:* 20/M06  
Force

<i>Range in lbs</i>	<i>Best Uncertainty (±) in lbs <sup>note 1</sup></i>	<i>Remarks</i>
200 to 1000	0.48	Morehouse Proving Ring
1000 to 3000	1.07	Morehouse Proving Ring
3000 to 5000	1.56	Morehouse Proving Ring
5000 to 10 000	31.3	Morehouse Proving Ring
10 000 to 30 000	13.8	Morehouse Proving Ring
30 000 to 50 000	19.4	Morehouse Proving Ring
50 000 to 100 000	31.3	Morehouse Proving Ring

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## CALIBRATION LABORATORIES

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Scope Revised: 2011-04-13

Force - Torque

<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></i>	<i>Remarks</i>
2.0 lb-in to 20 lb-in	0.2 % of Full Scale (FS)	
10 lb-in to 100 lb-in	0.1 % of Full Scale (FS) or 0.2 % of Indicated Value (IV) whichever is greater	
10 lb-ft to 100 lb-ft	0.1 % of Full Scale (FS) or 0.2 % of Indicated Value (IV) whichever is greater	
100 lb-ft to 1000 lb-ft	0.1 % of Full Scale (FS) or 0.2 % of Indicated Value (IV) whichever is greater	

*NVLAP Code:* 20/M08

Mass

<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>) in mg<sup>note 1</sup></i>	<i>Remarks<sup>note 3</sup></i>
20 kg	12	Echelon III
10 kg	5.9	Echelon III
5 kg	4.2	Echelon III
3 kg	4.2	Echelon III
2 kg	4.2	Echelon III
1 kg	0.7	Echelon III
500 g	0.7	Echelon III
300 g	0.7	Echelon III
200 g	0.7	Echelon III
100 g	0.13	Echelon III
50 g	0.09	Echelon III
30 g	0.09	Echelon III
20 g	0.09	Echelon III
10 g	0.03	Echelon III
5 g	0.013	Echelon III
3 g	0.012	Echelon III
2 g	0.012	Echelon III

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1 g	0.005	Echelon III
500 mg	0.005	Echelon III
300 mg	0.005	Echelon III
200 mg	0.005	Echelon III
100 mg	0.005	Echelon III
50 mg	0.005	Echelon III
30 mg	0.005	Echelon III
20 mg	0.005	Echelon III
10 mg	0.005	Echelon III
5 mg	0.005	Echelon III
3 mg	0.005	Echelon III
2 mg	0.005	Echelon III
1 mg	0.005	Echelon III

Mass - Avoirdupois

50 lb	54	Echelon III
25 lb	28	Echelon III
20 lb	26	Echelon III
10 lb	6.8	Echelon III
5 lb	5.1	Echelon III
3 lb	4.1	Echelon III
2 lb	0.70	Echelon III
1 lb	0.67	Echelon III
8 oz	0.65	Echelon III
4 oz	0.15	Echelon III
2 oz	0.11	Echelon III
1 oz	0.1	Echelon III
1/2 oz	0.087	Echelon III
1/4 oz	0.023	Echelon III
1/8 oz	0.016	Echelon III
1/16 oz	0.013	Echelon III
1/32 oz	0.012	Echelon III

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NVLAP Code: 20/M08

Balances – In Place and Off-Site <sup>note 9</sup>

### Class I <sup>note 5</sup>

<i>Range in grams</i>	<i>Readability in mg</i>	<i>Minimum Tested Capacity</i> <sup>note 6</sup>	<i>Best Uncertainty (±) in milligrams</i> <sup>notes 1,8</sup>	<i>Remarks</i> <sup>note 7</sup>
0 to 20	0.001	100 %	0.24	NIST Class 3
0 to 30	0.01	100 %	0.35	NIST Class 3
0 to 40	0.01	100 %	0.38	NIST Class 3
0 to 60	0.1	100 %	0.6	NIST Class 3
0 to 60	1	100 %	4	NIST Class 3
0 to 150	0.01	100 %	1.47	NIST Class 3
0 to 160	0.1	100 %	1.3	NIST Class 3
0 to 200	0.1	100 %	2.1	NIST Class 3
0 to 200	1	100 %	4	NIST Class 3
0 to 500	1	100 %	5	NIST Class 3
0 to 800	1	100 %	8	NIST Class 3
0 to 1200	0.1	100 %	8.4	NIST Class 3
0 to 1200	1	100 %	10	NIST Class 3
0 to 1600	10	100 %	30	NIST Class 3
0 to 2000	10	100 %	40	NIST Class 3
0 to 40 000	2	100 %	284	NIST Class 3

### Class II <sup>note 5</sup>

0 to 100	1	100 %	9	NIST Class 3
0 to 200	10	100 %	30	NIST Class 3
0 to 300	10	100 %	10	NIST Class 3
0 to 500	10	100 %	20	NIST Class 3
0 to 600	10	100 %	50	NIST Class 3
0 to 2000	100	100 %	200	NIST Class 3
0 to 4000	100	100 %	100	NIST Class 3

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## CALIBRATION LABORATORIES

NVLAP LAB CODE 200406-0

Scope Revised: 2011-04-13

**NVLAP Code:** 20/M11

Acceleration/Vibration

Voltage and Charge Calibration 0.5g to 10g

**Range**

- 5 Hz to 10 Hz
- 10 Hz to 2 kHz
- 2 kHz to 4 kHz
- 4 kHz to 10 kHz

**Best Uncertainty ( $\pm$ ) in % <sup>note 1</sup>**

- 1.7
- 1.5
- 2.3
- 2.6 to 4.3

## MICROWAVE

**NVLAP Code:** 20/R02

RF/Microwave Termination

Reflection Coefficient (or Scattering Parameters  $S_{ij}$ )

**Best Uncertainty ( $\pm$ ) <sup>note 1</sup>**

**Frequency in Hz**

Connector Type	Quantity	Quantity Range	0.045 G to 2 G	2 G to 8 G	8 G to 20 G	20 to 26.5
APC-3.5	$S_{ii}$	0 to 1	0.005 to 0.014	0.007 to 0.025	0.007 to 0.03	0.007 to 0.03
APC-3.5	Arg ( $S_{ii}$ )	$0 <  S_{ii}  < 1$ -180° to +180°	0.7 to 180	2.634 to 180	5.03 to 180	6.3 to 180
Connector Type	Quantity	Quantity Range	0.045 G to 2 G	2 G to 8 G	8 G to 18 G	
N - Type	$S_{ii}$	0 to 1	0.004 to 0.01	0.008 to 0.019	0.008 to 0.027	
N - Type	Arg ( $S_{ij}$ )	$0 <  S_{ii}  < 1$ -180° to +180°	0.5 to 180	2.5 to 180	4.7 to 180	

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## CALIBRATION LABORATORIES

NVLAP LAB CODE 200406-0

Scope Revised: 2011-04-13

**NVLAP Code:** 20/R12

RF Power Sensor Calibration Factor

**Range**

10 MHz to 18 GHz @ 1 mW

**Best Uncertainty ( $\pm$ ) in % <sup>note 1</sup>**

3.25

**NVLAP Code:** 20/R13

RF/Microwave Attenuators

Attenuation (or Scattering Parameters  $S_{ij}$ )

**Best Uncertainty ( $\pm$ ) in dB <sup>note 1</sup>**

**Frequency in Hz**

Connector Type	Quantity	Quantity Range in dB	Frequency in Hz			
			0.045 to 2 G	2 G to 8 G	8 G to 20 G	20 G to 26.5 G
APC-3.5	$S_{ij}$	0 to 20	0.05	0.05	0.07	0.08
		20 to 40	0.05	0.05 to 0.06	0.07 to 0.08	0.08 to 0.19
		40 to 60	0.05 to 0.22	0.06 to 0.31	0.08 to 0.48	0.19 to 1.88

Connector Type	Quantity	Quantity Range in dB	Frequency in Hz			
			0.045 to 2 G	2 G to 8 G	8 G to 18 G	
N - Type	$S_{ij}$	0 to 20	0.05 to 0.06	0.06	0.09	---
		20 to 40	0.06 to 0.35	0.06	0.09 to 0.10	---
		40 to 60	---	0.06 to 0.19	0.10 to 0.31	

## THERMODYNAMICS

**NVLAP Code:** 20/T02

Humidity

**Range**

10 to 95 % rH

**Best Uncertainty ( $\pm$ ) <sup>note 1</sup>**

1.2% rH

**Remarks**

Thunder Scientific 2500

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**NVLAP LAB CODE 200406-0**

Scope Revised: 2011-04-13

*NVLAP Code:* 20/T03  
Laboratory Thermometers

<i>Range</i>	<i>Best Uncertainty (±) <sup>note 1</sup></i>	<i>Remarks</i>
(0 to 260) °C	0.0076 °C	Comparison to SPRT

*NVLAP Code:* 20/T05  
Pressure - Absolute

<i>Range</i>	<i>Best Uncertainty (±) of reading <sup>note 1</sup></i>	<i>Remarks</i>
0.25 to 25 psia	0.0055% + 0.000023 psia	Low Pressure Piston
2 to 100 psia	0.0053% + 0.000023 psia	Middle Pressure Piston
25 to 1000 psia	0.0073% + 0.000023 psia	High Pressure Piston

Pressure - Gage

0.25 to 25 psig	0.0055%	2465 Low Pressure Piston
2 to 100 psig	0.0054%	2465 Mid Pressure Piston
25 to 1000 psig	0.0073%	2465 High Pressure Piston
200 to 10000 psig	0.0066%	2485 All Pressure Pistons

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1. Represents an expanded uncertainty using a coverage factor,  $k = 2$ , at an approximate level of confidence of 95 %.
2. R is the ratio of the larger output voltage to the smaller output voltage.
3. Double substitution using ASTM Class 3 weights.
4. Differential weighing using ASTM Class 3 weights.
5. Scale classifications determined by NIST Handbook 44, Table 3.
6. Minimum tested capacity required by NIST Handbook 44, Table 4.
7. Class weights used.
8. Uncertainty s reported at the upper limit of the balance. Actual uncertainty may be smaller than the uncertainty reported.
9. For calibration of balances in locations other than the SWFPAC laboratory, components of uncertainty based on instrument use and environmental conditions at the operating location are needed.

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