National Institute of Standards and Technology

NVLAP®

National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

Revised 10/22/2004

CALIBRATION LABORATORIES **NVLAP LAB CODE 200403-0**

SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN
P.O. Box 47299
Kings Bay, GA 31547
Mr. Fred N. Zuschlag
Phone: 912-573-1850 Fax: 912-573-3609
E-mail: fred.n.zuschlag@lmco.com

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

DIMENSIONAL

NVLAP Code: 20/D03
Gage Blocks - Steel and Chrome Carbide

Range in inches	*Best Uncertainty (±) in µinch[note 1,2]*	*Remarks*
0.05	3.5	Mechanical Comparison
0.1	2.9	Mechanical Comparison
0.125	2.9	Mechanical Comparison
0.14	2.9	Mechanical Comparison
0.25	2.9	Mechanical Comparison
0.5	2.9	Mechanical Comparison
0.75	2.9	Mechanical Comparison
1.0	3.3	Mechanical Comparison
2.0	4.7	Mechanical Comparison

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3.0	6.6	Mechanical Comparison
4.0	6.6	Mechanical Comparison
5.0	7.5	Mechanical Comparison
12.0	10.5	Mechanical Comparison
20.0	22.0	Mechanical Comparison

NVLAP Code: 20/D03
Gage Blocks - Ceramic and Tungsten Carbide

Range in inches	*Best Uncertainty (±) in µinch*[note 1,2]	*Remarks*
0.05	4.5	Mechanical Comparison and probe penetration correction
0.1	3.9	Mechanical Comparison and probe penetration correction
0.125	3.9	Mechanical Comparison and probe penetration correction
0.14	3.9	Mechanical Comparison and probe penetration correction
0.25	3.9	Mechanical Comparison and probe penetration correction

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0.5	3.9	Mechanical Comparison and probe penetration correction
0.75	3.9	Mechanical Comparison and probe penetration correction
1.0	4.3	Mechanical Comparison and probe penetration correction
2.0	5.7	Mechanical Comparison and probe penetration correction
3.0	7.6	Mechanical Comparison and probe penetration correction
4.0	7.6	Mechanical Comparison and probe penetration correction
5.0	8.5	Mechanical Comparison and probe penetration correction
12.0	11.5	Mechanical Comparison and probe penetration correction
20.0	22.0	Mechanical Comparison and probe penetration correction

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

NVLAP Labcode: 20/D07
Measuring Wires

Range in inches	*Best Uncertainty (±) µinch[note 1]*	*Remarks*
0.007227 (80 TPI) to 0.14434 (4 TPI)	12.43	Universal Measuring Machine with Master Set Calibration

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

Range in inches	*Best Uncertainty (±) in µinch[note 1,2]*	*Remarks*
Ring Gages		
1.0	10.3	Comparison to Gage Blocks
6.0	21.1	Comparison to Gage Blocks
Plug Gages		
0.125	5.8	Comparison to Gage Blocks
0.250	6.2	Comparison to Gage Blocks
0.500	10.0	Comparison to Gage Blocks
3.000	10.2	Comparison to Gage Blocks
6.000	17.5	Comparison to Gage Blocks

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

NVLAP Code: 20/D14
Threaded Plug and Ring Gages

Threaded Plug Gages, 60° Unified

	Range	*Best Uncertainty (±)[note 1,2]*	*Remarks*
Pitch Diameter	4-48	40.6 μin	Three Wire Method
	0.375-24	51.7 μin	Three Wire Method
	0.625-11	52.4 μin	Three Wire Method

	Range in Inches	*Best Uncertainty (±)[note 1,2]*	*Remarks*
Major Diameter	4-48	29.0	Universal Measuring Machine
	0.375-24	46.9	Universal Measuring Machine
	0.625-11	30.0	Universal Measuring Machine
Half Angle	60° (11 TPI)	3.1 arc minutes	Optical Comparator Inspection

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

Threaded Ring Gages, Solid, 60° Unified

	Range	*Best Uncertainty (±)*[note 1]	*Remarks*
Pitch Diameter	0.750-10-NC-5	83.0 μin	Universal Measuring Machine
	1.750-5	10.8 μin	Universal Measuring Machine
Minor Diameter	0.750-10-NC-5	265 μin	Measured with Bore Micrometer
Minor Diameter	1.75-5	246 μin	Measured with Bore Micrometers
Half Angle	60° (11 TPI)	4.1 arc minutes	Optical Inspection of Thread Casting

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current

	Best Uncertainty (±) in ppm[note 1] Frequency in Hertz					
Current	***10***	***20***	***40***	***1 k***	***5 k***	***10 k***
20 mA	120	120	110	110	110	110
200 mA	120	120	110	110	110	110
2 A			120	120	120	120
10 A			180	180	200	211

NVLAP Code: 20/E05
DC Current

Range (±)	***Best Uncertainty (±) in ppm[note 1]***	***Remarks***
200 μA	22	
2.0 mA	22	
20 mA	22	
200 mA	22	
2.0 A	40	

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

3.0 A	120
5.0 A	120
10.0 A	120

NVLAP Code: 20/E05
DC Resistance

Range in ohms	*Best Uncertainty (±) in ppm*[note 1]	*Remarks*
1.0	2	Using Guildline Bridge
10.0	2	Using Guildline Bridge
100.0	2	Using Guildline Bridge
1000.0	2	Using Guildline Bridge
10000.0	2	Using Guildline Bridge
100000.0	2.4	Using Guildline Bridge
0.01	0.234 (in %)	Using 242D System
0.1	234.0	Using 242D System
1.0	25.0	Using 242D System
10.0	13.0	Using 242D System

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

100.0	12.5	Using 242D System
1000.0	12.5	Using 242D System
10000.0	12.5	Using 242D System
100000.0	12.0	Using 242D System
1.0 M	12.0	Using 242D System
10.0 M	12.0	Using 242D System
100.0 M	17.5	Using 242D System
0.01	115.7	Using Measurements International Bridge Model 6242A
0.1	6.0	Using Measurements International Bridge Model 6242A
1.0	1.3	Using Measurements International Bridge Model 6242A
10.0	1.3	Using Measurements International Bridge Model 6242A
100.0	1.3	Using Measurements International Bridge Model 6242A
0.1 k	1.0	Using Measurements International Bridge Model 6242A

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CALIBRATION LABORATORIES **NVLAP LAB CODE 200403-0**

SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

1.0 k	0.8	Using Measurements International Bridge Model 6242A
10.0 k	1.4	Using Measurements International Bridge Model 6242A
100.0 k	2.6	Using Measurements International Bridge Model 6242A
1000.0 k	11.9	Using Measurements International Bridge Model 6242A

NVLAP Code: 20/E06
DC Voltage - Generation

Range (±)	*Best Uncertainty (±) in ppm* [note 1]	*Remarks*
0.1 V	6.3	
0.2 V	3.5	
1.0 V	1.9	
2.0 V	1.9	
10.0 V	1.8	
20.0 V	1.8	
100.0 V	1.8	
200.0 V	2.0	

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

1000.0 V	2.0
DC Voltage - Measurement	
0.1 V	8.0
0.2 V	8.0
1.0 V	4.0
2.0 V	4.0
10.0 V	3.5
20.0 V	3.5
100.0 V	5.0
200.0 V	5.0
1000.0 V	5.0

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

NVLAP Code: 20/E09
LF AC Voltage

Best Uncertainty (±) in ppm[note 1]
Frequency in Hertz

Range	*10*	*20*	*40*	*50*	*300*	*1 k*	*20 k*	*50 k*	*100 k*	*300 k*	*500 k*	*1 M*
20 mV	110	100	100			100	100	200	310	410	580	580
200 mV	50	50	30			30	30	50	90	150	150	240
2 V	100	40	30			20	20	40	50	120	120	120
20 V	40	40	30			20	20	40	50	120	130	130
200 V	40	45	25			25	25	50	60			
300 V							40					
600 V								60	80			
1000 V			35	35	30	30	40	40				

TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

Range	*Best Uncertainty (±)[note 1]*	*Remarks*
1 MHz, 5 MHz, 10 MHz	5.0×10^{-12}	Comparison using FMS

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

NVLAP Code: 20/F02
Time Dissemination

Range	*Best Uncertainty (±)[note 1]*	*Remarks*
n/a	1 μ second	UTC(USNO) Transfer

MECHANICAL

NVLAP Code: 20/M06
Force

Nominal Force in lbf	*Best Uncertainty (±)[note 1]*	*Remarks*
200 to 2000	0.085%	2000 lbf Proving Rings
500 to 5000	0.075%	5000 lbf Proving Rings
1000 to 10000	0.075%	10000 lbf Proving Rings
2500 to 25000	0.072%	25000 lbf Proving Rings
10000 to 100000	0.089%	100000 lbf Proving Rings

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

NVLAP Code: 20/M06
Force - Torque

Calibration of strain gage torque standards, increasing torque, non-adjustable, defined scale instruments.

Range in lb-ft	*Best Uncertainty (±)*[note 1]	*Remarks*
10 to 100	0.107% of Full Scale	Comparison to moment arm and dead weights
100 to 6500	0.097% of Full Scale	Comparison to moment arm and dead weights

NVLAP Code: 20/M08
Mass

Range	*Best Uncertainty (±) in mg*[note 1]	*Remarks*[note 3]
20 kg	19.5	Echelon III
10 kg	6.6	Echelon III
5 kg	6.0	Echelon III
2 kg	5.8	Echelon III
1 kg	2.8	Echelon III
500 g	0.35	Echelon III
200 g	0.27	Echelon III

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100 g	0.08	Echelon III
50 g	0.066	Echelon III
20 g	0.065	Echelon III
10 g	0.024	Echelon III
5 g	0.023	Echelon III
2 g	0.023	Echelon III
1 g	0.016	Echelon III

THERMODYNAMICS

NVLAP Code: 20/T03
Laboratory Thermometers

Nominal Temperature in °F	*Best Uncertainty ± °F[note 1]*	*Remarks*
-40.0 to 300	0.47	Liquid in Glass
-40.0 to 300	0.92	Bi-metallic

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NVLAP Code: 20/T05
Pressure Gage

Nominal Pressure in psi	*Best Uncertainty (±)*[note 1]	*Remarks*
5 to 70	495.9 ppm	Ruska 2565A-754
80 to 100	175.3 ppm	Ruska 2565A-754
100 to 2000	94.6 ppm	Ruska 2481-700
2000 to 10000	149.8 ppm	Ruska 2481-700

Pressure Absolute

Nominal Pressure in inches of Hg	*Best Uncertainty (±) inches of Hg*[note 1]	*Remarks*
0.510232	0.000282	Ruska 2565A-754
1.602940	0.000234	Ruska 2565A-754
3.203770	0.000105	Ruska 2565A-754
6.405820	0.000188	Ruska 2565A-754
9.607630	0.000279	Ruska 2565A-754
12.809400	0.000371	Ruska 2565A-754
16.011200	0.000463	Ruska 2565A-754
19.213100	0.000556	Ruska 2565A-754

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22.415200	0.000648	Ruska 2565A-754
25.617000	0.000740	Ruska 2565A-754
28.819000	0.000832	Ruska 2565A-754
31.995700	0.000924	Ruska 2565A-754

Pressure Gage

Nominal Pressure in psi	*Best Uncertainty (±)[note 1]*	*Remarks*
0 to 4	0.001 psi	King Nutronics 3689A
4 to 10000	0.025% Indicated Value	King Nutronics 3689A

Pressure - Absolute

Nominal Pressure in inches of Hg	*Best Uncertainty (±)[note 1]*	*Remarks*
0.5 to 35	0.002 inches of Hg	King Nutronics 3689A

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NVLAP Code: 20/T07
Resistance Thermometers

Temperature Range in °C	*Best Uncertainty (±) °C*	*Remarks*
37.0	0.091	PRT reference in Medium Temperature Hart Bath
65.0	0.092	PRT reference in Medium Temperature Hart Bath
107.0	0.092	PRT reference in Medium Temperature Hart Bath
148.0	0.094	PRT reference in Medium Temperature Hart Bath
-40.0	0.051	PRT reference in Low Temperature Hart Bath
37.0	0.028	PRT reference in Low Temperature Hart Bath
0.0	0.023	Ice Point

1. Represents an expanded uncertainty using a coverage factor, k=2, at an aproximate level of confidence of 95%.
2. L is length or diameter in inches.
3. Double Substitution using ASTM Class 3 weights.

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