National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

Metroplex Metrology Lab, Inc.
2309 E. Loop 820 North
Fort Worth, TX 76118-7103
Mr. Jim Johnson
Phone: 817-589-8300 Fax: 817-589-8311
E-mail: jljohnson@mmllab.com
URL: www.metroloplexmetrology.com

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**
Scope Revised: 2006-08-15

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

DIMENSIONAL

NVLAP Code: 20/D01
Angular

	Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
Levels	All Sizes	150 µin per 12 in (3 seconds)	Gage Blocks
Sine Bar & Plates	All Sizes	6.7 seconds	Angle Blocks, Gage Blocks
Chamfer Gages	to 2 in	440 µin	Comparison to Master Chamfer Rings
Chamfer Gage Standards	to 2 in	320 µin	Optical Comparator
Protractors	to 360˚	3 minutes 33 seconds	Optical Comparator
Angle Plates	to 18 in	140 µin	Comparison to Master Square
Precision Squares	to 18 in	226 µin	Comparison to Master Square
Angle Blocks	to 45˚	7.6 seconds	Comparison to Master Sine Plate & Gage Blocks

2006-04-01 through 2007-03-31
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**

Scope Revised: 2006-08-15

NVLAP Code: 20/D03
Gage Blocks – Steel and Ceramic

	Range	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
	to 1 in	3.2	Comparison to Master
	> in to 4 in	(0.8 + 2.9L) [note 2]	Comparison to Master
Gage Blocks – Chrome Carbide			
	to 1 in	5.0	Comparison to Master
	>1 in to 4 in	(1.3 + 2.9L) [note 2]	Comparison to Master
Gage Blocks – Long Blocks			
	5 in to 20 in	(2.2 + 2.28L) [note 2]	Comparison to Master

NVLAP Code: 20/D05
Length and Diameter

	Range	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
Caliper [note 7]	to 72 in	(600 + 4L) [note 2]	Gage Blocks
OD Micrometers [note 7]	to 36 in	(60 + 14.5L) [note 2]	Gage Blocks Resolution 0.0001
	to 36 in	(38 + 15L) [note 2]	Gage Blocks Resolution 0.00005
ID Micrometers [note 7]	to 1.0 in	70	Comparison to Gage Blocks
ID Micrometers Rods	to 18 in	(30 + 3.2L) [note 2]	Comparison to Gage Blocks
	19 in to 30 in	300	Comparison to Gage Blocks
Micrometer End Stds.			
Spherical	to 18 in	(30 + 3.2L) [note 2]	Comparison to Gage Blocks
Flat	to 18 in	(20 + 3.6L) [note 2]	Comparison to Gage Blocks
	19 in to 60 in	(35 + 4.5L) [note 2]	Comparison to Gage Blocks
Flat [note 7]	to 18 in	(22 + 4L) [note 2]	Comparison to Gage Blocks
Height Gages [note 7]	to 40 in	(120 + 14L) [note 2]	Comparison to Gage Blocks
Dial Indicators [note 7]	to 8 in	(230 + 4 L) [note 2]	Comparison to Gage Blocks Resolution 0.0010 in

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

	to 8 in	(118 + 7.2L) *note 2*	Comparison to Gage Blocks Resolution 0.0005 in
	to 8 in	(32 + 14.4L) *note 2*	Comparison to Gage Blocks Resolution 0.0001 in
	to 8 in	24	Comparison to Gage Blocks Resolution 0.00005 in
	to 8 in	26	Comparison to Gage Blocks Resolution 0.0002 in
Radius Gages	All Sizes	302	Optical Comparator
Optical Comparators *note 7*			
Linear Travel	to 30 in	150	Comparison to Master
Magnification	10x to 100x	0.14 + 0.2 %	Comparison to Master
Thickness Gages *note 7*	to 1 in	140	Comparison to Gage Blocks Resolution 0.0001
	to 1 in	340	Comparison to Gage Blocks Resolution to 0.001
ID Micrometer (3 pt.)	to 6 in (150 mm)	(122 + 13.2L) *note 2*	Comparison to Master Plain Ring – Resolution 0.0001
	to 6 in (150 mm)	(156 + 11.6L) *note 2*	Comparison to Master Plain Ring – Resolution 0.0002
Depth Gage *note 7*	to 24 in	(740 + 10L) *note 2*	Comparison to Gage Blocks

Scales (Length)

Range in in	***Best Uncertainty (±) in in*** *note 1*	***Remarks***
to 6	0.0012	Optical Comparator
to 12	0.0016	Optical Comparator
to 18	0.0016	Optical Comparator
to 24	0.0020	Optical Comparator
to 36	0.0023	Optical Comparator
to 48	0.0026	Optical Comparator
to 72	0.0033	Optical Comparator
to 96	0.0037	Optical Comparator
to 120	0.0040	Optical Comparator

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**

Scope Revised: 2006-08-15

NVLAP Code: 20/D07
Measuring Wires

	Range in Degrees	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
Thread Wire	29 and 60	16	In accordance with ANSI/ASME B1.2

NVLAP Code: 20/D11
Spherical Diameter

	Range	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
Plain Plug Gages	to 12 in	(17.6 + 4.36L) [note 2]	Comparison to Gage Blocks
Plain Ring Gages	0.06 in to 0.13 in	57.2	Comparison to Master Ring
	0.13 in to 0.8 in	22.8	Comparison to Master Ring
	0.8 in to 7 in	(24 + 5.15L) [note 2]	Comparison to Master Ring
Pin Gages	to 1 in	24	Comparison to Gage Blocks
Bore Gages	to 1 in (25mm)	230	Comparison to Gage Blocks Resolution to 0.001
	to 1 in (25 mm)	118	Comparison to Gage Blocks Resolution to 0.0005
	to 1 in (25 mm)	32	Comparison to Gage Blocks Resolution to 0.0001
Holtest	to 6 in (150 mm)	(122 + 13.2L) [note 2]	Comparison to Master Plain Ring – Resolution 0.0001
	to 6 in (150 mm)	(156 + 11.6L) [note 2]	Comparison to Master Plain Ring – Resolution 0.0002

NVLAP Code: 20/D12
Surface

	Range	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
Surface Plates [note 7]	to 72 in x 144 in	18D to 23.7D [note 3]	Laser

NVLAP Code: 20/D14
Threaded Plug and Ring Gages

	Range	***Best Uncertainty (±) in µin*** [note 1]	***Remarks***
Threaded Plug Gages			
Pitch Diameter	to 17 in	(64 + 12.4L) [note 2]	Over wire Measurement

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**
Scope Revised: 2006-08-15

Major Diameter	to 17 in	(17.6 + 4.36L) *note 2*	Direct Measurement
Threaded Ring Gages			
Pitch Diameter	to 8 in	(156 + 44L) *note 2*	Master Set Plug (Functional)
Minor Diameter	to 0.5 in	360	Hole Micrometer, Pin Gages
	to 3.2 in	(175 + 39L) *note 2*	Comparison to Master Ring
National Pipe Thread (NPT) Plugs			
Pitch Diameter	to 3 in	(356 + 0.2L) *note 2*	Over wire Measurement
National Pipe Thread (NPT) Rings			
Step Height	to 3 in	(350 + 8L) *note 2*	Comparison to Gage Blocks

ELECTROMAGNETICS – DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current Source

Range	***Frequency in Hz***	***Best Uncertainty (±)*** *note 1*	***Remarks***
0.033 mA to 0.33 mA	10 to 20	0.25% + 0.15 µA	Fluke 5500 S6
	20 to 1 k	0.125% + 0.25 µA	Fluke 5500 S6
	1 k to 5 k	0.40% + 0.15 µA	Fluke 5500 S6
	5 k to 10 k	1.39% + 0.508 µA	Fluke 5500 S6
0.33 mA to 3.3 mA	10 to 5 k	0.2% + 0.3 µA	Fluke 5500 S6
	5 k to 10 k	0.6% + 3 µA	Fluke 5500 S6
3.3 mA to 33 mA	10 to 5 k	0.2 % + 3 µA	Fluke 5500 S6
	5 k to 10 k	0.6 % + 3 µA	Fluke 5500 S6
33 mA to 330 mA	10 to 5 k	0.2 % + 30 µA	Fluke 5500 S6
	5 k to 10 k	0.6 % + 30 µA	Fluke 5500 S6
0.330 A to 2.2 A	10 to 1 k	0.22 % + 300 µA	Fluke 5500 S6
	1 k to 5 k	0.76 % + 300 µA	Fluke 5500 S6
2.2 A to 11 A	45 to 500	0.30 % + 2000 µA	Fluke 5500 S6
	500 to 1 k	0.33 % + 2000 µA	Fluke 5500 S6
AC Current Measure			
100 µA	10 to 20	0.4% + 30 nA	Agilent 3458A
	20 to 45	0.15% + 30 nA	Agilent 3458A
	45 to 100	0.06% + 30 nA	Agilent 3458A

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

	100 to 1 k	0.06% + 30 nA	Agilent 3458A
1 mA to 100 mA	10 to 20	0.4% + 20 µA	Agilent 3458A
	20 to 45	0.15% + 20 µA	Agilent 3458A
	45 to 100	0.06% + 20 µA	Agilent 3458A
	100 to 5 k	0.03% + 20 µA	Agilent 3458A
	5 k to 10 k	0.06% + 20 µA	Agilent 3458A
1 A	10 to 20	0.4% + 200 µA	Agilent 3458A
	20 to 45	0.16% + 200 µA	Agilent 3458A
	45 to 100	0.08% + 200 µA	Agilent 3458A
	100 to 5 k	0.1% + 200 µA	Agilent 3458A
	5 k to 10 k	0.3% + 200 µA	Agilent 3458A

NVLAP Code: 20/E05
DC Current Source

Range	***Best Uncertainty (±)*** *note 1*	***Remarks***
0 mA to 3.3 mA	0.013 % + 0.05 µA	Fluke 5500 S6
0 mA to 33 mA	0.01% + 0.25 µA	Fluke 5500 S6
0 mA to 330 mA	0.01% + 3.3 µA	Fluke 5500 S6
0 A to 2.2 A	0.03% + 44 µA	Fluke 5500 S6
0 A to 11 A	0.06% + 330 µA	Fluke 5500 S6
Resistance – Fixed Values		
0.05 mΩ	0.25%	Empro 1000-50
0.1 mΩ	0.25%	Empro 1000-100
1 mΩ	0.25%	Westinghouse 50-50
10 mΩ	0.25%	Fluke 80J-10
1 Ω	10 µΩ/Ω	Fluke 742A-1
100 Ω	7 µΩ/Ω	Fluke 742A-100
10 kΩ	4 µΩ/Ω	Fluke 742A-10 k
Resistance Source		
Range in Ω	***Best Uncertainty (±)*** *note 1*	***Remarks***
0 to 11	0.012% + 0.008 Ω	Fluke 5500 S6
11 to 330	0.012% + 0.015 Ω	Fluke 5500 S6
330 to 3.3 k	0.009% + 0.332 Ω	Fluke 5500 S6
3.3 k to 33 k	0.009% + 0.6 Ω	Fluke 5500 S6
33 k to 330 k	0.012% + 6 Ω	Fluke 5500 S6

2006-04-01 through 2007-03-31

Effective dates

For the National Institute of Standards and Technology

0.330 M to 3.3 M	0.015% + 55 Ω	Fluke 5500 S6
3.3 M to 33 M	0.1% + 550 Ω	Fluke 5500 S6
33 M to 110 M	0.5% + 5.5 k Ω	Fluke 5500 S6
110 M to 330 M	0.5% + 18.8 k Ω	Fluke 5500 S6

DC Current Measure

0 nA to 100 nA	66 ppm + 0.043 nA	Agilent 3458A
0 nA to 1 µ	34.4 ppm + 0.043 nA	Agilent 3458A
0 µA to 10 µA	20 ppm + 0.102 nA	Agilent 3458A
0 µA to 100 µA	26.5 ppm + 0.917 nA	Agilent 3458A
0 mA to 1 mA	25.1 ppm + 8.7 nA	Agilent 3458A
0 mA to 10 mA	25.5 ppm + 50 nA	Agilent 3458A
0 mA to 100 mA	35.0 ppm + 500 nA	Agilent 3458A
0 A to 1 A	133.4 ppm + 10 µA	Agilent 3458A

Resistance Measure

10 Ω	21.8 ppm + 0.0761 mΩ	Agilent 3458A
100 Ω	18.7 ppm + 0.503 mΩ	Agilent 3458A
1 kΩ	12.4 ppm + 0.5 mΩ	Agilent 3458A
10 kΩ	12.4 ppm + 5.0 mΩ	Agilent 3458A
100 kΩ	12.4 ppm + 50 mΩ	Agilent 3458A
1 MΩ	19.15 ppm + 2.0 Ω	Agilent 3458A
10 MΩ	64.7 ppm + 100 Ω	Agilent 3458A
100 MΩ	500 ppm + 1000 Ω	Agilent 3458A
1 GΩ	5000 ppm + 10 kΩ	Agilent 3458A

NVLAP Code: 20/E06
DC Volts – Fixed Values

Range	***Best Uncertainty (±) in µV/V*** [note 1]	***Remarks***
1 V	12	Fluke 732
1.018 V	12	Fluke 732
10 V	6	Fluke 732

DC Volt Source

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
0 mV to 330 mV	0.006% + 3 µV	Fluke 5500 S6
0 V to 3.3 V	0.005% + 5 µV	Fluke 5500 S6

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

0 V to 33 V	0.0055% + 50 µV	Fluke 5500 S6
30 V to 330 V	0.0055% + 633 µV	Fluke 5500 S6
100 V to 1000 V	0.0055% + 1502 µV	Fluke 5500 S6
DC Volt Measure		
0 mV to 100 mV	9.2 ppm + 0.44 µV	Agilent 3458A
0 V to 1 V	8.93 ppm + 1.02 µV	Agilent 3458A
0 V to 10 V	8.56 ppm + 5.86 µV	Agilent 3458A
0 V to 100 V	11.06 ppm + 37.6 µV	Agilent 3458A
0 V to 1000 V	17 ppm + 116 µV	Agilent 3458A

NVLAP Code: 20/E08
Inductance Source *note 7*

Range	***Best Uncertainty (±)*** *note 1*	***Remarks***
1 mH to 10 mH	1.9 %	GenRad 1490-A
10 mH to 100 mH	1.5 %	GenRad 1490-A
100 mH to 1000 mH	1.5 %	GenRad 1490-A

NVLAP Code: 20/E09
AC Volt Source

Range	***Frequency in Hz***	***Best Uncertainty (±)*** *note 1*	***Remarks***
1 mV to 33 mV	10 to 45	0.35% + 20 µV	Fluke 5500 S6
	45 to 50 k	0.25% + 20 µV	Fluke 5500 S6
	50 k to 100 k	0.35% + 33 µV	Fluke 5500 S6
	100 k to 500 k	1.0% + 60 µV	Fluke 5500 S6
33 mV to 330 mV	10 to 45	0.25% + 50 µV	Fluke 5500 S6
	45 to 50 k	0.16% + 40 µV	Fluke 5500 S6
	50 k to 100 k	0.24% + 170 µV	Fluke 5500 S6
	100 k to 500 k	0.7% + 330 µV	Fluke 5500 S6
0.33 V to 3.3 V	10 to 45	0.15% + 250 µV	Fluke 5500 S6
	45 to 20 k	0.08% + 60 µV	Fluke 5500 S6
	20 k to 50 k	0.14% + 300 µV	Fluke 5500 S6
	50 k to 100 k	0.24 % + 1700 µV	Fluke 5500 S6
	100 k to 500 k	0.5 % + 3300 µV	Fluke 5500 S6
3.3 V to 33 V	10 to 45	0.15% + 2500 µV	Fluke 5500 S6
	45 to 20 k	0.04% + 600 µV	Fluke 5500 S6
	20 k to 50 k	0.08% + 2600 µV	Fluke 5500 S6
	50 k to 100 k	0.19% + 5000 µV	Fluke 5500 S6
	100 k to 500 k	0.24% + 1700 µV	Fluke 5500 S6

33V to 330 V	45 to 1 k	0.05% + 6.6 mV	Fluke 5500 S6
	1 k to 20 k	0.09% + 33 mV	Fluke 5500 S6
330 V to 1000 V	45 to 1 k	0.05% + 80 mV	Fluke 5500 S6
	1 k to 10 k	0.20% + 500 mV	Fluke 5500 S6
AC Volt Measure			
1 mV to 10 mV	1 to 40	0.03% + 3 µV	Agilent 3458A
	40 to 1 k	0.02% + 1.1 µV	Agilent 3458A
	1 k to 20 k	0.03% + 1.1 µV	Agilent 3458A
	20 k to 50 k	0.1% + 1.1 µV	Agilent 3458A
	50 k to 100 k	0.5% + 1.1 µV	Agilent 3458A
	100 k to 300 k	4.0% + 2 µV	Agilent 3458A
0.100 V to 10 V	40 to 1 k	0.009% + 200 µV	Agilent 3458
	1 k to 20 k	0.015% + 200 µV	Agilent 3458
	20 k to 50 k	0.03% + 200 µV	Agilent 3458
	50 k to 100 k	0.08% + 200 µV	Agilent 3458
	100 k to 300 k	0.3% + 1.0 mV	Agilent 3458
	300 k to 1 M	1.0% + 1 mV	Agilent 3458
10 V to 100 V	40 to 1 k	0.02% + 2 mV	Agilent 3458
	1 k to 20 k	0.02% + 2 mV	Agilent 3458
	20 k to 50 k	0.035% + 2 mV	Agilent 3458
	50 k to 100 k	0.12% + 2 mV	Agilent 3458
100 V to 1000 V	40 to 1 k	0.04% + 20 mV	Agilent 3458
	1 k to 20 k	0.06% + 20 mV	Agilent 3458

NVLAP Code: 20/E10
Capacitance Source

Range	***Best Uncertainty (±)*** *note 1*	***Remarks***
0.33 nF to 11 nF	0.5% + 0.01 nF	Fluke 5500 S6
11 nF to 330 nF	0.25% + 0.3 nF	Fluke 5500 S6
0.33 µF to 3.3 µF	0.35% + 3 nF	Fluke 5500 S6
3.3 µF to 33 µF	0.40% + 30 nF	Fluke 5500 S6
33 µF to 330 µF	0.70% + 300 nF	Fluke 5500 S6
0.330 mF to 1.1 mF	1.0% + 300 nF	Fluke 5500 S6

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**

Scope Revised: 2006-08-15

NVLAP Code: 20/E20
Oscilloscopes

Range	***Frequency in Hz***	***Best Uncertainty (±)*** [note 1]	***Remarks***
Oscilloscope Source Volt Division			
@50 Ω 1 mV to 6.6 v p-p		0.25% + 100 µV	Fluke 5500 S6
@1 MΩ 1 mV to 130 v p-p		0.25% + 100 µV	Fluke 5500 S6
Oscilloscope Source Edge			
0.005 V to 2.5 V		0.2% + 200 µV	Fluke 5500 S6
Oscilloscope Source Level Sinewave			
0.05 V to 5.5 V	50 k	2% + 200 µV	Fluke 5500 S6
	0.050 M to 100 M	3.5% + 300 µV	Fluke 5500 S6
	100 M to 300 M	3.74% + 300 µV	Fluke 5500 S6
	300 M to 600 M	4.3% + 300 µV	Fluke 5500 S6
Oscilloscope Source Marker			
5 sec to 50 msec		25 ppm + 15 mHz	Fluke 5500 S6
20 msec to 2 nsec		2.5 ppm	Fluke 5500 S6

TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Source

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
1 Hz @ 1 V	74 parts in 10^6	HP3325B
10 MHz @ 1 V	5 parts in 10^6	HP3325B
RF Frequency Source		
1 Hz to 10 MHz	5 parts in 10^6	Agilent 3325B
10 MHz to 40 GHz	0.1 parts in 10^6	Agilent 83640L
Frequency Measure		
1 Hz to 40 Hz	0.05%	Agilent 3458A
40 Hz to 10 MHz	0.01%	Agilent 3458A

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**
Scope Revised: 2006-08-15

RF Frequency Measure		
to 26.5 GHz	1.2 parts in 10^6	Agilent 53151A
to 1.3 GHz	0.2 parts in 10^6	SRS620

NVLAP Code: 20/F02
Period Measure

Range	***Best Uncertainty (±)*** *note 1*	***Remarks***
1 sec to 25 msec	0.05%	Agilent 3458A
25 msec to 100 nsec	0.01%	Agilent 3458A
0 sec to 1000 sec *note 7*	0.05%	SRS620

Timers and Stop Watches *note 7*		
15 sec to 24 hour	0.36 sec	Phillips PM6666

MECHANICAL

NVLAP Code: 20/M01
Acoustic

Sound Level Source *note 7*

Range	***Best Uncertainty (±)*** *note 1*	***Remarks***
114 dbB @ 500 Hz	0.32 dB	GenRad 1562
114 dB @ 250 Hz, 1 kHz, 2 kHz	0.52 dB	GenRad 1562
94 dB @ 1 kHz	0.81 dB	Extech 407736

Sound Level Measure *note 7*		
35 dB to 95 dB	1.5 dB	Extech 407736
75 dB to 130 dB	1.5 dB	Extech 407736

NVLAP Code: 20/M06
Torque Wrenches *note 7*

Range	***Best Uncertainty (±) in %*** *note 1*	***Remarks***
to 250 lbf·ft	0.56 *note 4*	Torque Tester

Force Gages *note 7*

Range	***Best Uncertainty (±) in lbf*** *note 1*	***Remarks***
up to 200 lbs	(0.14 + 0.002 f) *note 6*	Resolution 0.1 and 0.25
up to 200 lbs	(0.28 + 0.0013 f) *note 6*	Resolution 0.5

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

up to 200 lbs	(0.58 + 0.0008 f) *note 6*	Resolution 1.0

NVLAP Code: 20/M08
Scales, Weighing *note 7*

Range	***Best Uncertainty (±)*** *notes 1, 8*	***Remarks***
Metric		
to 250 mg	0.07 mg	Class 1
to 100 g	0.82 mg	Class 2
to 200 g	1.64 mg	Class 2
to 500 g	3.12 mg	Class 2
to 1000 g	5.89 mg	Class 2
1 g to 10 000 g	1.287 g	Class 2
to 5 kg	1.190 g	Class 3
to 10 kg	1.409 g	Class 3
to 25 kg	1.446 g	Class 3
to 50 kg	2.887 g	Class 3
to 150 kg	8.674 g	Class 3
to 250 kg	14.43g	Class 3
Avoirdupois		
to 5 lb	0.00121 lb	Class 3
to 10lb	0.00237 lb	Class 3
to 20 lb	0.00478 lb	Class 3
to 50 lb	0.01207 lb	Class 3
to 100 lb	0.01754 lb	Class 3
to 200 lb	0.02612 lb	Class 3
to 500 lb	0.04700 lb	Class 3
to 1000 lb	0.07796 lb	Class 3
to 100 lb	0.01754 lb	Class 4
to 500 lb	0.29104 lb	Class 4
to 1000 lb	0.57972 lb	Class 4

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**

Scope Revised: 2006-08-15

NVLAP Code: 20/M13
Hardness to Rockwell Hardness Tester Verification [note 7]

Range	***Best Uncertainty (±) in Rockwell Points*** [note 1]	***Remarks***
C Scale		ASTM E-18 Indirect Method Temperature Range 72˚F to 81˚F
High	0.90	
Medium	0.90	
Low	0.92	

Tachometers [note 7]

Range in RPM	***Best Uncertainty (±)*** [note 1]	***Remarks***
30 to 32 500	0.05%	Phaser – Strobe

OPTICAL RADIATION

NVLAP Code: 20/O01
Laser Power Energy [note 7]

Optical Power Measure

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
800 nm to 1600 nm	5 % + 5 pW	1 LX FPM 8200
Optical Power Measure 700 nm to 1650 nm	15.5 ppm + 0.005 nm	HP 86120B

ELECTROMAGNETICS – RF/MICROWAVE

NVLAP Code: 20/R17
RF Microwave Power [note 7]

RF Power Source

Range	***Best Uncertainty (±)*** [note 1]	***Remarks***
-56 dBm to + 10 dBm < 20 MHz	0.6 dB	Agilent 3325B
-10 dBm to + 10 dBm < 26.5 GHz	0.9 dB	Agilent 83640L
-60 dBm to -10 dBm < 26.5 GHz	1.2 dB	Agilent 83640L
-110 dBm to -60 dBm < 26.5 GHz	1.7 dB	Agilent 83640L

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200262**
Scope Revised: 2006-08-15

RF Power Measure		
100 kHz to 2.6 GHz	0.16 dB	HP 8902A with 11722A
2 GHz to 26.5 GHz	0.38 dB	HP 8902A with 11792A
Tuned RF Power Measure		
150 kHz to 2.6 GHz	0.22 dB	HP 8902A with 11722A
2 GHz to 26.5 GHz	0.86 dB	HP 8902A with 11792A
Modulation Measure		
Amplitude	3 % of reading + 1 digit	HP8902A
Frequency	5 % of reading + 1 digit	HP8902A
Phase	4 % of reading + 1 digit	HP8902A

THERMODYNAMICS

NVLAP Code: 20/T02
Humidity

Range in %	***Best Uncertainty (±) in %*** *note 1*	***Remarks***
10 to 50	4.6	Relative Humidity Temperature / Humidity Recorders. Single Verification Point

NVLAP Code: 20/T03
Laboratory Thermometers – Liquid-in-glass

Rane	***Best Uncertainty (±)*** *note 1*	***Remarks***
0 ˚C to 100 ˚C	0.0545 ˚C	Comparison to PRT Hart Micro-Bath Temperature / Humidity Recorders. Single Point Verification
66 ˚F to 70 ˚F	1.2 ˚F	

NVLAP Code: 20/T05
Pressure Gages *note 7*

Range in psi	***Best Uncertainty (±) in psi*** *note 1*	***Remarks***
0 to 150	(0.024 +0.0008P) *note 5*	Comparison to Master
>150 thru 5000	(4 + 0.003P) *note 5*	Comparison to Master

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

>5000 thru 30 000	(24 + 0.0014P) *note 5*	Comparison to Master

NVLAP Code: 20/T07
Temperature RTD, ˚C

Range in ˚C	***Best Uncertainty (±) in ˚C*** *note 1*	***Remarks***
-200 to 0	0.05	Pt385, 100 ohm
0 t 100	0.07	Pt385, 100 ohm
100 to 300	0.09	Pt385, 100 ohm
300 to 400	0.10	Pt385, 100 ohm
400 to 630	0.12	Pt385, 100 ohm
630 to 800	0.23	Pt385, 100 ohm
-200 to 0	0.05	Pt392.6, 100 ohm
0 to 100	0.07	Pt392.6, 100 ohm
100 to 300	0.09	Pt392.6, 100 ohm
300 to 400	0.10	Pt392.6, 100 ohm
400 to 650	0.12	Pt392.6, 100 ohm
-200 to -190	0.25	Pt391.6, 100 ohm
-190 to -80	0.04	Pt391.6, 100 ohm
-80 to 0	0.05	Pt391.6, 100 ohm
0 to 100	0.06	Pt391.6, 100 ohm
100 to 260	0.07	Pt391.6, 100 ohm
260 to 300	0.08	Pt391.6, 100 ohm
300 to 400	0.09	Pt391.6, 100 ohm
400 to 600	0.10	Pt391.6, 100 ohm
600 to 630	0.23	Pt391.6, 100 ohm
-190 to –80	0.02	Pt385, 200 ohm
-80 to 100	0.04	Pt385, 200 ohm
100 to 260	0.05	Pt385, 200 ohm
260 to 300	0.12	Pt385, 200 ohm
300 to 400	0.13	Pt385, 200 ohm
400 to 600	0.14	Pt385, 200 ohm
600 to 630	0.16	Pt385, 200 ohm

-190 to –80	0.02	Pt385, 500 ohm
-80 to 100	0.05	Pt385, 500 ohm
100 to 260	0.06	Pt385, 500 ohm
260 to 400	0.08	Pt385, 500 ohm
400 to 600	0.09	Pt385, 500 ohm
600 to 630	0.11	Pt385, 500 ohm
-190 to –80	0.02	Pt385, 1000 ohm
-80 to 0	0.03	Pt385, 1000 ohm
0 to 100	0.04	Pt385, 1000 ohm
100 to 260	0.05	Pt385, 1000 ohm
260 to 300	0.06	Pt385, 1000 ohm
300 to 600	0.07	Pt385, 1000 ohm
600 to 630	0.23	Pt385, 1000 ohm

Simulated Output in Ohms

Range in ˚C	***Best Uncertainty (±) in ˚C*** *note 1*	***Remarks***
-80 to 100	0.08	Pt Ni385, 120 ohm
100 to 260	0.14	Pt Ni385, 120 ohm
-100 to 260	0.3	Cu427, 10 ohm

NVLAP Code: 20/T08
Temperature Thermocouple ˚C

Simulated output in V

Range in ˚C	***Best Uncertainty (±) in ˚C*** *note 1*	***Type***
600 to 800	0.44	B
800 to 1000	0.34	B
1000 to 1550	0.30	B
1550 to 1820	0.33	B
0 to 150	0.30	C
150 to 650	0.26	C
650 to 1000	0.31	C
1000 to 1800	0.50	C
1800 to 2316	0.84	C

-250 to -100	0.50	E
-100 to -25	0.16	E
-25 to 350	0.14	E
350 to 650	0.16	E
650 to 1000	0.21	E
-210 to -100	0.27	J
-110 to -30	0.162	J
-30 to 150	0.14	J
150 to 760	0.17	J
760 to 1200	0.23	J
-200 to -100	0.332	K
-100 to -25	0.184	K
-25 to 120	0.16	K
120 to 1000	0.26	K
1000 to 1372	0.40	K
-200 to -100	0.37	L
-100 to 800	0.26	L
800 to 900	0.17	L
-200 to -100	0.40	N
-100 to -25	0.22	N
-25 to 120	0.19	N
120 to 410	0.18	N
410 to 1300	0.27	N
0 to 250	0.57	R
250 to 400	0.354	R
400 to 1000	0.334	R
1000 to 1767	0.40	R
0 to 25	0.47	S
250 to 1000	0.36	S
1000 to 1400	0.37	S
1400 to 1767	0.46	S

-250 to –150	0.63	T
-150 to 0	0.24	T
0 to 120	0.16	T
210 to 400	0.14	T
-200 to 0	0.56	U
0 to 600	0.27	U

Temperature Source [note 7]

Range	***Best Uncertainty (±) in ˚C*** [note 1]	***Remarks***
JTC -210 ˚C to -100 ˚C	0.3	Fluke 702
JTC -100 ˚C to 800 ˚C	0.2	Fluke 702
KTC -200 ˚C to -100 ˚C	0.4	Fluke 702
KTC -100 ˚C to 1372 ˚C	0.3	Fluke 702

Temperature Measure [note 7]

JTC -210 ˚C to -100 ˚C	0.6	Fluke 702
JTC -100 ˚C to 800 ˚C	0.3	Fluke 702
JTC 800 ˚C to 1200 ˚C	0.5	Fluke 702
KTC -200 ˚C to -100 ˚C	0.7	Fluke 702
KTC -100 ˚C to -400 ˚C	0.3	Fluke 702
KTC 400 ˚C to 1200 ˚C	0.7	Fluke 702
KTC 1200 ˚C to 1372 ˚C	0.7	Fluke 702

1. Represents an expanded uncertainty using a coverage factor, k = 2, at an approximate level of confidence of 95 %.
2. L= Length in inches
3. D = Diagonal Length in feet
4. t = Torque in lbf.ft
5. P = Pressure in psi
6. f = Force in lbf
7. Items available for on-site service. Based on environmental variances uncertainties will generally be greater than those listed on this scope.
8. ASTM Class 1 and NIST Class F weight used in the calibration of scales.

2006-04-01 through 2007-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology