Laboratory Accreditation Bureau

Certificate of Accreditation

ISO/IEC 17025:2005 Certificate Number L2216.01

Cal Lab Co., Inc
3695 N. 126th St
Brookfield, WI 53005

has met the requirements set forth in L-A-B's policies and procedures, and all requirements of ANSI Z540-1 & ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories." This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).

Accreditation valid through September 29, 2010

R. Douglas Leonard, Jr., Managing Director
Laboratory Accreditation Bureau

*Laboratory Accreditation Bureau is found to be in compliance with ISO/IEC 17011:2004 and recognized by ILAC (International Laboratory Accreditation Cooperation) and NACLA (National Cooperation for Laboratory Accreditation).

LABORATORY ACCREDITATION BUREAU

Certificate # L2216.01

Scope of Accreditation For Cal Lab Co., Inc.

3695 N. 126th St.
Brookfield, WI 53005
J. Brent Snoddy
262-790-1916

In recognition of a successful assessment to ISO/IEC 17025:2005 and ANSI Z540-1, accreditation is granted to **Cal Lab Co., Inc.** to perform the following Calibrations:

Accreditation granted through: **September 29, 2010**

Calibration

Mass – Pressure

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Pressure – Measure & Generate	(0 to 15) psi	0.011 psig	Pressure Transducers
	(0 to 100) psi	0.07 psig	
	(0 to 1 000) psi	0.65 psig	
	(0 to 10 000) psi	10 psig	

Mass – Vacuum

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Vacuum – Measure & Generate	(0 to -14.5) psig	0.016 psig	Pressure Transducer

Electricity and Magnetism – Voltage

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
DC Voltage – Measure [1]	(0 to 200) mV	0.2 µV + 4.5 µV / V + 0.6*R*	Fluke 8508A & 5520A
	(0.2 to 2) V	0.8 µV + 3.5 µV / V+ 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
DC Voltage – Measure [1]	(2 to 20) V	2.2 µV + 2.3 µV / V + 0.6*R*	Fluke 8508A & 5520A
	(20 to 200) V	0.04 mV + 5.5 µV / V + 0.6*R*	
	(200 to 1000) V	0.5 mV + 5.5 µV / V + 0.6*R*	
	(1.1 to 100) kV	0.59 kV	HV source/meter
DC Voltage – Measure only[1]	(0 to 5) kV	2.1 V + 10 mV / V + 0.6*R*	2012 Electrostatic meter
	(0.5 to 10) kV	3.1 V + 5 mV / V + 0.6*R*	HV meter
	(10 to 15) kV	2.1 V + 10 mV / V + 0.6*R*	Electrostatic meter
	(15 to 20) kV	2.1 V + 10 mV / V + 0.6*R*	
	(20 to 30) kV	6.7 V + 9.9 mV / V + 0.6*R*	
	(30 to 100) kV	0.59 kV + 0.6*R*	HV meter
	(100 to 200) kV	1.2 kV + 0.6*R*	
AC Voltage – Measure and Generate [1] Up to 200 mV	(10 to 40) Hz	4 µV + 0. 14 mV / V + 0.6*R*	Fluke 8508A & 5520A
	(40 to 100) Hz	4 µV + 0.11 mV / V + 0.6*R*	
	100 Hz to 2 kHz	2 µV + 0.11 mV / V + 0.6*R*	
	(2 to 10) kHz	4 µV + 0.13 mV / V + 0.6*R*	
	(10 to 30) kHz	8 µV + 0.34 mV / V + 0.6*R*	
	(30 to 100) kHz	0.02 mV + 0.76 mV / V + 0.6*R*	
(0.2 to 2) V [1]	(10 to 40) Hz	0.02 mV + 0.11 mV / V + 0.6*R*	Fluke 8508A & 5520A
	(40 to 100) Hz	0.02 mV + 0.09 mV / V + 0.6*R*	
	100 Hz to 2 kHz	0.02 mV + 75 µV / V + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
	(2 to 10) kHz	0.02 mV + 0.11m V / V + 0.6*R*	
	(10 to 30) kHz	0.04 mV + 0.22 mV / V + 0.6*R*	
	(30 to 100) kHz	0.2m V + 0.57 mV / V + 0.6*R*	
	(100 to 300) kHz	2 mV + 3 mV / V + 0.6*R*	
	300 kHz to 1 MHz	0.02 V + 0.01 V / V + 0.6*R*	
(2 to 20) V [1]	(10 to 40) Hz	0.2 mV + 0.11 mV / V + 0.6*R*	Fluke 8508A & 5520A
	(40 to 100) Hz	0.2 mV + 90 µV / V + 0.6*R*	
	100 Hz to 2 kHz	0.2 mV + 75 µV / V + 0.6*R*	
	(2 to 10) kHz	0.2 mV + 0.11 mV / V + 0.6*R*	
	(10 to 30) kHz	0.4 mV + 0.22 mV / V + 0.6*R*	
	(30 to 100) kHz	2 mV + 0.57 mV / V + 0.6*R*	
	(100 to 300) kHz	0.02 V + 3 mV / V + 0.6*R*	
	300 kHz to 1 MHz	0.2 V + 10 mV / V + 0.6*R*	
(20 to 200) V [1]	(10 to 40) Hz	2 mV + 0.11 mV / V + 0.6*R*	Fluke 8508A & 5520A
	(40 to 100) Hz	2 mV + 90 µV / V + 0.6*R*	
	100 Hz to 2 kHz	2 mV + 75 µV / V + 0.6*R*	
	(2 to 10) kHz	2 mV + 0.11 mV / V + 0.6*R*	
	(10 to 30) kHz	4 mV + 0.22 mV / V + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
	(30 to 100) kHz	0.02 V + 0.57 mV / V + 0.6*R*	
	(100 to 300) kHz	0.2 V + 3 mV / V + 0.6*R*	
	300 kHz to 1 MHz	2 V + 10 mV / V + 0.6*R*	
(200 to 1000) V [1]	(10 to 40) Hz	0.02 V + 0.12 mV / V + 0.6*R*	Fluke 8508A > 300 V, add 0.00004 (reading - 300)^2 µV/V
	40 Hz to 10 kHz	0.02 V + 0.11 mV / V + 0.6*R*	
	(10 to 30) kHz	0.04 V + 0.22 mV / V + 0.6*R*	
	(30 to 100) kHz	0.2 V + 0.58 mV / V + 0.6*R*	
(0 to 25) kV	60 Hz	6.7 V + 9.9 mV / V + 0.6*R*	HV Source & Electrostatic meter
AC Voltage – Measure Only [1] (0 to 5) kV	DC to 160 kHz	2.1 V + 10 mV / V + 0.6*R*	Electrostatic meter
(0 to 10) kV [1]	60 Hz	5.1 V + 0.01 V / V + 0.6*R*	HV meter
(5 to 10) kV [1]	DC to 160 kHz	2.1 V + 10 mV / V + 0.6*R*	Electrostatic meter
(10 to 15) kV [1]		2.1 V + 10 mV / V + 0.6*R*	
(15 to 20) kV [1]		2.1 V + 10 mV / V + 0.6*R*	
(20 to 30) kV [1]		6.7 V + 9.9 mV / V + 0.6*R*	
(30 to 100) kV [1]	60 Hz	1.2 kV + 0.6*R*	HV meter
(100 to 200) kV [1]		2.3 kV + 0.6*R*	

Electricity and Magnetism – Resistance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Resistance – Measure and Generate [1]	(0.1 to 2) Ω	4 μΩ + 17 μΩ / Ω + 0.6*R*	Fluke 8508A
	(2 to 20) Ω	14 μΩ + 9.5 μΩ / Ω + 0.6*R*	
	(20 to 200) Ω	50 μΩ + 8 μΩ / Ω + 0.6*R*	
	200 Ω to 2 kΩ	0.5 mΩ + 8 μΩ / Ω + 0.6*R*	
	(2 to 20) kΩ	5 mΩ + 8 μΩ / Ω + 0.6*R*	
	(20 to 200) kΩ	0.05 Ω + 8 μΩ / Ω + 0.6*R*	
	200 kΩ to 2 MΩ	1 Ω + 9 μΩ / Ω + 0.6*R*	
	(2 to 20) MΩ	1 Ω + 17 μΩ / Ω + 0.6*R*	Fluke 8508A HV mode
	(20 to 200) MΩ	1 kΩ + 65 μΩ / Ω + 0.6*R*	
	200 MΩ to 2 GΩ	0.1 MΩ + 0.18 mΩ / Ω + 0.6*R*	
	(2 to 20) GΩ	10 MΩ + 1.5 mΩ / Ω + 0.6*R*	
	(5 to 100) GΩ	0.04 Ω / Ω + 0.6*R*	Keithley 619
	(0.5 to 1) TΩ	0.1 Ω / Ω + 0.6*R*	
Fixed Points [1]	(0.1, 1, 10, 100) mΩ	10 μΩ / Ω + 0.6*R*	Standard Resistors
	100 GΩ	120 μΩ / Ω + 0.6*R*	Keithley 5156
	1 TΩ	0.01 Ω / Ω + 0.6*R*	High Resistance Standard
	10 TΩ	900 μΩ / Ω + 0.6*R*	

Electricity and Magnetism – Current

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
DC Current – Measure and Generate [1]	(10 to 200) µA	0.4 nA + 12 µA / A + 0.6*R*	Fluke 8508A
	200 µA to 2 mA	4 nA + 12 µA / A + 0.6*R*	
	(2 to 20) mA	40 nA + 14 µA / A + 0.6*R*	
	(20 to 200) mA	0.8 µA + 48 µA / A + 0.6*R*	
	200 mA to 2 A	16 µA + 0.18 mA / A + 0.6*R*	
	(2 to 20) A	0.4 mA + 0.4 mA / A + 0.6*R*	
Current Clamps [1]	(16.5 to 149.999) A	7.8 mA + 2.2 mA / A + 0.6*R*	Fluke 5520A with Fluke 50-turn coil
	(150 to 1025) A	0.022 A + 2.1 mA / A + 0.6*R*	
AC Current – Measure and Generate [1] (20 to 200) µA [1]	10 Hz to 10 kHz	0.02 µA + 0.3 mA / A + 0.6*R*	Fluke 8508A
	(10 to 30) kHz	0.02 µA + 0.71 mA / A + 0.6*R*	
	(30 to 100) kHz	0.02 µA + 4 mA / A + 0.6*R*	
(0.2 to 2) mA [1]	10 Hz to 10 kHz	0.2 µA + 0.3 mA / A + 0.6*R*	
	(10 to 30) kHz	0.2 µA + 0.71 µA / A + 0.6*R*	
	(30 to 100) kHz	0.2 µA + 4 mA / A + 0.6*R*	
(2 to 20) mA [1]	10 Hz to 10 kHz	2 µA + 0.3 mA / A + 0.6*R*	
	(10 to 30) kHz	2 µA + 0.71 mA / m + 0.6*R*	
	(30 to 100) kHz	2 µA + 4 mA / A + 0.6*R*	
(20 to 200) mA [1]	10 Hz to 10 kHz	0.02 mA + 0.3 mA / A + 0.6*R*	
	(10 to 30) kHz	0.02 mA + 0.62 mA / A + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
200 mA to 2 A [1]	10 Hz to 10 kHz	0.2 mA + 0.72 mA / A + 0.6*R*	
	(10 to 30) kHz	0.2 mA + 03 mA / A + 0.6*R*	
(2 to 20) A [1]	10 Hz to 2 kHz	2 mA + 0.82 mA / A + 0.6*R*	
	(2 to 10) kHz	2 mA + 2.5 mA / A + 0.6*R*	
(20 to 100) A [1]	DC to 1 kHz	0.1 A + 1.5 mA / A + 0.6*R*	Transcond. amp
Current Clamps [1]	(45 to 65) Hz	0.022 A + 2.1 mA / A + 0.6*R*	Fluke 5520A with Fluke 50-turn coil
	(65 to 440) Hz	0.021 A + 6.2 mA / A + 0.6*R*	
	(45 to 65) Hz	0.055 A + 2.5 mA / A + 0.6*R*	
	(65 to 440) Hz	0.074 A + 6.3 mA / A + 0.6*R*	
5 A to 30 kA	60 Hz	500 mA + 0.01 A / A + 0.6*R*	AEMC 30K-24-2

Electricity and Magnetism – Inductance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Inductance – Measure and Generate [1] 1 kHz	(5 to 100) µH	2 mH / H + 0.6*R*	SRS SR720
	100 µH to 1 mH	1 mH / H + 0.6*R*	
	1 mH to 80 H	0.5 mH / H + 0.6*R*	
	80 H to 1 kH	1 mH / H + 0.6*R*	
100 Hz	10 mH to 800 H	0.5 mH / H + 0.6*R*	
Fixed Values 1 kHz [1]	100 µH	0.03 µH + 0.6*R*	1232 Standard inductors
	500 µH	0.12 µH + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
	1 mH	0.21 µH + 0.6*R*	
	2 mH	0.6 µH + 0.6*R*	
	10 mH	2.9 µH + 0.6*R*	
	50 mH	15 µH + 0.6*R*	
	100 mH	21 µH + 0.6*R*	
	200 mH	58 µH + 0.6*R*	
	1 H	0.29 mH + 0.6*R*	
	2 H	1 mH + 0.6*R*	
	10 H	2.9 mH + 0.6*R*	

Electricity and Magnetism – Capacitance

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-)[2, 3]	Remarks
Capacitance – Measure and Generate [1] 1 kHz	500 µF to 10 mF	2 mF / F + 0.6*R*	SRS SR720
	(50 to 500) µF	1 mF / F + 0.6*R*	
	500 pF to 50 µF	0.52 mF / F + 0.6*R*	
	(50 to 500) pF	1 mF / F + 0.6*R*	
	(5 to 50) pF	2 mF / F + 0.6*R*	
100 Hz	5 nF to 500 µF	0.5 mF / F + 0.6*R*	
Fixed Points [1] 1 kHz	1 nF	0.049 pF + 0.6*R*	Keithley 5156
	100 nF	0.51 pF + 0.6*R*	
	0.001 µF	0.1 pF + 0.6*R*	Standard capacitors
	0.002 µF	0.2 pF + 0.6*R*	
	0.005 µF	0.5 pF + 0.6*R*	
	0.01 µF	1 pF + 0.6*R*	
	0.1 µF	10 pF + 0.6*R*	
	0.5 µF	50 pF + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-)[2, 3]	Remarks
	1 µF	100 pF + 0.6*R*	
Range Values [1] 1 kHz	35 pF to 1.1 nF	0.53 mF / F + 0.6*R*	GenRad 1422D

Electricity and Magnetism – Electrical Temperature Simulation

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Electrical Calibration of RTD Indicating Devices [1] Pt 385, 100 Ω	-200 °C to 0 °C	0.04 °C + 0.6*R*	Fluke 5520A
	>0 °C to 100 °C	0.05 °C + 0.6*R*	
	>100 °C to 300 °C	0.07 °C + 0.6*R*	
	>300 °C to 400 °C	0.08 °C + 0.6*R*	
	>400 °C to 630 °C	0.09 °C + 0.6*R*	
	>630 °C to 800 °C	0.18 °C + 0.6*R*	
Pt 3926, 100 Ω	-200 °C to 0 °C	0.04 °C + 0.6*R*	Fluke 5520A
	>0 °C to 100 °C	0.05 °C + 0.6*R*	
	>100 °C to 300 °C	0.07 °C + 0.6*R*	
	>300 °C to 400 °C	0.08 °C + 0.6*R*	
	>400 °C to 630 °C	0.09 °C + 0.6*R*	
	-200 °C to -190 °C	0.19 °C + 0.6*R*	Fluke 5520A
	>-190 °C to -80 °C	0.03 °C + 0.6*R*	
	>-80 °C to 0 °C	0.04 °C + 0.6*R*	
	>0 °C to 260 °C	0.05 °C + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Pt 3916, 100 Ω			
	>260 °C to 300 °C	0.06 °C + 0.6*R*	
	>300 °C to 400 °C	0.07 °C + 0.6*R*	
	>400 °C to 600 °C	0.08 °C + 0.6*R*	
	>600 °C to 630 °C	0.18 °C + 0.6*R*	
Electrical Calibration of Thermocouple Indicating Devices [1] Type E	-250 °C to -100 °C	0.39 °C + 0.6*R*	Fluke 5520A
	>-100 °C to -25 °C	0.12 °C + 0.6*R*	
	>-25 °C to 350 °C	0.11 °C + 0.6*R*	
	>350 °C to 650 °C	0.12 °C + 0.6*R*	
	>650 °C to 1000 °C	0.16 °C + 0.6*R*	
Type J	-210 °C to -100 °C	0.21 °C + 0.6*R*	Fluke 5520A
	>-100 °C to -30 °C	0.12 °C + 0.6*R*	
	>-30 °C to 150 °C	0.11 °C + 0.6*R*	
	>150 °C to 760 °C	0.13 °C + 0.6*R*	
	>760 °C to 1200 °C	0.18 °C + 0.6*R*	
Type K	-200 °C to -100 °C	0.26 °C + 0.6*R*	Fluke 5520A
	>-100 °C to -25 °C	0.14 °C + 0.6*R*	
	>-25 °C to 120 °C	0.12 °C + 0.6*R*	
	>120 °C to 1000 °C	0.20 °C + 0.6*R*	
	>1000 °C to 1372 °C	0.31 °C + 0.6*R*	
Type R	0 °C to 250 °C	0.44 °C + 0.6*R*	Fluke 5520A
	>250 °C to 400 °C	0.27 °C + 0.6*R*	

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
	>400 °C to 1000 °C	0.26 °C + 0.6*R*	
	>1000 °C to 1767 °C	0.31 °C + 0.6*R*	
Type S	0 °C to 250 °C	0.36 °C + 0.6*R*	Fluke 5520A
	>250 °C to 1000 °C	0.28 °C + 0.6*R*	
	>1000 °C to 1400 °C	0.29 °C + 0.6*R*	
	>1400 °C to 1767 °C	0.36 °C + 0.6*R*	
Type T	-250 °C to -150 °C	0.49 °C + 0.6*R*	Fluke 5520A
	>-150 °C to 0 °C	0.19 °C + 0.6*R*	
	>0 °C to 120 °C	0.12 °C + 0.6*R*	
	>120 °C to 400 °C	0.11 °C + 0.6*R*	

Electricity and Magnetism / Time and Frequency – Oscilloscopes

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Oscilloscopes [1] Amplitude DC 50Ω	(0 to ± 6.6) V	31 µV + 2 mV /V + 0.6*R*	Fluke 5520A/6
1 MΩ	(0 to ± 130) V	31 µV + 0.39 mV / V + 0.6*R*	
Amplitude – Square Wave (peak to peak) [1] 50 Ω	± 1 mV to ± 6.6 V	31 µV + 2 mV / V + 0.6*R*	
1 MΩ	± 1 mV to ± 130 V	31 µV + 0.78 mV / V + 0.6*R*	
Leveled Sine Wave [1]	50 kHz reference	0.24 mV + 16 mV / V + 0.6*R*	
Amplitude [1] (@ 50 kHz ref.)	50 kHz to 100 MHz	0.24 mV + 27 mV / V + 0.6*R*	
	(>100 to 300) MHz	0.24 mV + 31 mV / V + 0.6*R*	
	(>300 to 600) MHz	0.24 mV + 47 mV / V + 0.6*R*	
Flatness [1] (@ 50 kHz ref.)	50 kHz to 100 MHz	78 µV + 12 mV / V + 0.6*R*	
	(>100 to 300) MHz	78 µV + 16 mV / V + 0.6*R*	
	(>300 to 600) MHz	78 µV + 31 mV / V + 0.6*R*	
	(>600 to 1050) MHz	78 µV + 39 mV / V + 0.6*R*	Fluke 5520A/1.1 GHz
	(>600 to 1050) MHz	42 mV / V + 0.6*R*	Tektronix SG 504
Time Marker [1]	0.2 Hz to 1 GHz	0.5 µHz / Hz + 0.6*R*	Tektronix TG501-01
Rise Time – Voltage [1]	≤ 300 ps	130 ps + 0.6*R*	Tektronix 067-0681-00
Rise Time – Current [1]	(0 to 65) A	20 ns + 0.6*R*	Pearson 110

Electricity and Magnetism – Other

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
DC Power [1] (0.33 to 330) mA	(0.033 to 1020) V	0.18 mA / A + 0.6*R*	Fluke 5520A
(0.33 to 3) A [1]	(0.033 to 1020) V	0.17 mA / A + 0.6*R*	
(3 to 20.5) A [1]	(0.033 to 1020) V	0.5 mA / A + 0.6*R*	
AC Power (45 to 65) Hz [1] (3.3 to 9) mA	(33 to 330) mV	1.1 mA / A + 0.6*R*	Fluke 5520A
	(0.33 to 1020) V	0.9 mA / A + 0.6*R*	
(9 to 33) mA	(33 to 330) mV	1 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.6 mA / A + 0.6*R*	
(33 to 90) mA	(33 to 330) mV	1.1 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.9 mA / A + 0.6*R*	
(90 to 330) mA	(33 to 330) mV	1 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.6 mA / A + 0.6*R*	
(0.33 to 0.9) A	(33 to 330) mV	1 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.9 mA / A + 0.6*R*	
(0.9 to 2.2) A	(33 to 330) mV	0.9 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.7 mA / A + 0.6*R*	
(2.2 to 4.5) A	(33 to 330) mV	1 mA / A + 0.6*R*	
	(0.33 to 1020) V	0.9 mA / A + 0.6*R*	
(4.5 to 20.5) A	(33 to 330) mV	0.9 mA / A + 0.6*R*	
	(0.33 to 1020) V	1 mA / A + 0.6*R*	
Phase – Measure and Generate [1]	10 Hz to 30 kHz	0.05° + 0.6*R*	Krohn-Hite 6500

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
RF Power – Measure [1] (+20 to -30) dBm 50 Ω	100 kHz	16 parts in $10^3 + M + 0.6R$	HP 436A power meter with: HP 8482A Type-N (m) power sensor HP 436A power meter with: HP 8481D Type-N (m) power sensor
	300 kHz to 1 GHz	12 parts in $10^3 + M + 0.6R$	
	(2 to 4.2) GHz	13 parts in $10^3 + M + 0.6R$	
(-20 to -70) dBm 50 Ω	10 MHz to 15 GHz	23 parts in $10^3 + M + 0.6R$	
	(16 to 17) GHz	24 parts in $10^3 + M + 0.6R$	
	18 GHz	25 parts in $10^3 + M + 0.6R$	

Time and Frequency – Frequency / Period

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Frequency – Measure	Up to 1.3 GHz	1 part in $10^{11} + 0.6R$	Counter & Rubidium Oscillator
Frequency Measuring Equipment	10 MHz	5 parts in $10^{12} + 0.6R$	WWVB receiver
	10 MHz	1 part in $10^{11} + 0.6R$	Rubidium Oscillator
Tachometers [1] (Contact Type)	1 rpm to 4 000 rpm	1 µrpm / rpm + 0.6*R*	Tachometer Calibrator
Tachometers [1] (Non-Contact Type)	(25 to 90 000) rpm	0.5 µrpm / rpm + 0.6*R*	Frequency Counter

Time and Frequency – Time Dissemination

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2, 3]	Remarks
Stopwatch	1 s to 24 h	0.3 s + 0.6*R*	WWV

Thermodynamic – Rhodium – IR Devices

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2]	Remarks
IR Thermometers [1]	35° to 400°C	0.28°C + 0.001°C / °C	Blackbody Source (ε = 0.95), Reference Probe, Keithley 2002

Thermodynamic – Thermodynamic Devices (all)

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2]	Remarks
Temperature Generate [1]	Ice Point	0.046°C	Kaye Ice Point, Reference Probe, Keithley 2002
	33° to 300°C	0.58°C + 0.002°C / °C	Dry-well, Reference Probe, Keithley 2002
Temperature Measure [1]	-196 °C to 420 °C	0.037 °C	Reference Probe, Keithley 2002

Thermodynamic – Humidity

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) [2]	Remarks
Humidity – Measure [1]	10 % to 80 %	1.4% RH	Thermohygrometer

Notes:

1) Laboratory offers calibration services at the laboratory's own facilities and at the client or other agreed upon facilities.

2) Best uncertainties represent expanded uncertainties at approximately the 95% confidence level using a coverage factor of k=2.

3) *L* = length in inches, *R* = Resolution of the unit under test, *M* = represents the source mismatch uncertainty.

Approved by: _____ Date: September 29, 2009

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Issued: 9/29/09