

# Scope of Accreditation For American Calibration, Inc.

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In recognition of a successful assessment to ISO/IEC 17025:2005, accreditation is granted to **American Calibration, Inc.** to perform the following Calibrations:

Accreditation granted through: **May 6, 2012**

## Calibration

### Amount of Substance – pH / Conductivity

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
pH Meter	4 pH	0.017 pH	Aqueous pH Solutions
	7 pH	0.024 pH	
	10 pH	0.055 pH	

### Electrical – Capacitance

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Capacitance – Measure	(1 to 5) nF	0.099 nF	Fluke 87
	(5 to 50) nF	0.96 nF	
	(50 to 500) nF	9.9 nF	
	500 nF to 5 μF	0.15 μF	
Capacitance – Source	(0.33 to 0.4999) nF	0.21 % reading + 0.038 nF	Fluke 5500A
	(0.5 to 1.0999) nF	0.36 % reading + 0.023 nF	
	(1.1 to 3.2999) nF	0.21 % reading + 0.063 nF	
	(3.3 to 10.999) nF	0.38 % reading + 0.053 nF	
	(11 to 32.999) nF	0.27 % reading + 0.13 nF	
	(33 to 109.99) nF	0.14 % reading + 0.57 nF	
	(110 to 329.99) nF	0.25 % reading + 0.61 nF	
	(0.33 to 1.0999) μF	0.14 % reading + 5.7 nF	

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Capacitance – Source	(1.1 to 3.2999) $\mu$ F	0.36 % reading + 5.8 nF	Fluke 5500A
	(3.3 to 10.999) $\mu$ F	0.23 % reading + 55 nF	
	(11 to 32.999) $\mu$ F	0.42 % reading + 57 nF	
	(33 to 109.99) $\mu$ F	0.55 % reading + 160 nF	
	(110 to 329.99) $\mu$ F	0.77 % reading + 510 nF	
	(0.33 to 1.1) mF	1.1 % reading + 920 nF	

**Electrical – Current**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
DC Current – Measure	(10 to 100) $\mu$ A	7.6 nA	HP 3458A
	(100 to 1) mA	35 nA	
	(1 to 10) mA	440 nA	
	(10 to 100) mA	6.7 $\mu$ A	
	100 mA to 1.1 A	160 $\mu$ A	
DC Current – Source	(0 to 3.3) mA	1.7 % reading + 0.1 $\mu$ A	Fluke 5500A
	(3.3 to 33) mA	0.011 % reading + 0.65 $\mu$ A	
	(33 to 330) mA	0.011 % reading + 6.9 $\mu$ A	
	330 mA to 2.2 A	0.033 % reading + 0.096 mA	
	(2.2 to 11) A	0.037 % reading + 5.8 mA	
AC Current – Source  (0.029 to 0.33) mA	(10 to 20) Hz	0.21 % reading + 0.57 $\mu$ AAC	Fluke 5500A
	(20 to 45) Hz	0.084 % reading + 0.6 $\mu$ AAC	
	45 Hz to 1 kHz	0.084 % reading + 0.6 $\mu$ AAC	
	(1 to 5) kHz	0.38 % reading + 0.55 $\mu$ AAC	
	(5 to 10) kHz	1.4 % reading + 0.43 $\mu$ AAC	
(0.33 to 3.3) mA	(10 to 20) Hz	0.22 % reading + 0.73 $\mu$ AAC	
	(20 to 45) Hz	0.11 % reading + 0.59 $\mu$ AAC	
	45 Hz to 1 kHz	0.11 % reading + 0.59 $\mu$ AAC	
	(1 to 5) kHz	0.23 % reading + 0.52 $\mu$ AAC	
	(5 to 10) kHz	0.69 % reading + 0.42 $\mu$ AAC	

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
(3.3 to 33) mA	(10 to 20) Hz	0.22 % reading + 6.9 $\mu$ AAC	Fluke 5500A
	(20 to 45) Hz	0.11 % reading + 5.2 $\mu$ AAC	
	45 Hz to 1 kHz	0.1 V + 4.5 $\mu$ AAC	
	(1 to 5) kHz	0.23 % reading + 3.9 $\mu$ AAC	
	(5 to 10) kHz	0.56 % reading + 57 $\mu$ AAC	
(33 to 330) mA	(10 to 20) Hz	0.23 % reading + 70 $\mu$ AAC	
	(20 to 45) Hz	0.11 % reading + 41 $\mu$ AAC	
	45 Hz to 1 kHz	0.1 % reading + 41 $\mu$ AAC	
	(1 to 5) kHz	0.23 % reading + 40 $\mu$ AAC	
	(5 to 10) kHz	0.69 % reading + 40 $\mu$ AAC	
330 mA to 2.2 A	(10 to 45) Hz	0.23 % reading + 0.37 $\mu$ AAC	
	45 Hz to 1 kHz	0.11 % reading + 0.38 $\mu$ AAC	
	(1 to 5) kHz	0.87 % reading + 0.36 $\mu$ AAC	
(2.2 to 11) A	(45 to 100) Hz	0.048 % reading + 6.8 $\mu$ AAC	
	100 Hz to 1 kHz	0.097 % reading + 5.4 $\mu$ AAC	
AC Current – Measure (0 to 1) A	50 Hz to 5 kHz	1 mA	Agilent 34401A
(1 to 2) A	50 Hz to 5 kHz	1.5 mA	
(2 to 10) A	60 Hz and 400 Hz	18 mA	

**Electrical – Inductance**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Inductance – Source	Up to 10 mH	3.2 $\mu$ H + 1.6 mH/H	Decade Inductance Substituter
	(10 to 100) mH	0.53 $\mu$ H + 800 $\mu$ H/H	
	100 mH to 1 H	0.03 $\mu$ H + 600 $\mu$ H/H	
	(1 to 10) H	0.1 H + 600 $\mu$ H/H	

**Electrical – Resistance**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Resistance – Source	(0 to 10.999) $\Omega$	0.014 % reading + 6.9 m $\Omega$	Fluke 5500A
	(11 to 32.999) $\Omega$	0.014 % reading + 12 m $\Omega$	
	(33 to 109.999) $\Omega$	0.01 % reading + 12 m $\Omega$	
	(110 to 329.999) $\Omega$	0.01 % reading + 12 m $\Omega$	

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Resistance – Source	(0.33 to 1.09999) kΩ	0.012 % reading + 65 mΩ	Fluke 5500A
	(1.1 to 3.29999) kΩ	0.01 % reading + 81 mΩ	
	(3.3 to 10.9999) kΩ	0.012 % reading + 0.66 Ω	
	(11 to 32.9999) kΩ	0.01 % reading + 0.82 Ω	
	(33 to 109.999) kΩ	0.013 % reading + 6.9 Ω	
	(110 to 329.999) kΩ	0.014 % reading + 6.8 Ω	
	(0.33 to 1.09999) MΩ	0.018 % reading + 61 Ω	
	(1.1 to 3.29999) MΩ	0.019 % reading + 52 Ω	
	(3.3 to 10.9999) MΩ	0.069 % reading + 0.64 kΩ	
	(11 to 32.9999) MΩ	0.13 % reading + -0.92 kΩ	
	(33 to 109.999) MΩ	0.58 % reading + 6.5 kΩ	
	(110 to 329.999) MΩ	0.55% reading + -0.14 MΩ	
Resistance – Measure	(0 to 10) Ω	0.41 mΩ	HP 3458A
	(10 to 100) Ω	3.5 mΩ	
	100 Ω to 1 kΩ	20 mΩ	
	(1 to 10) kΩ	0.19 Ω	
	(10 to 100) kΩ	2 Ω	
	100 kΩ to 1 MΩ	31 Ω	
	(1 to 10) MΩ	940 Ω	
	(10 to 100) MΩ	1.036 kΩ	

**Electrical – RF Power**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
RF Power Measure 1	100 kHz to 4.2 GHz	1.2 dBm + 23 μdBm / dBm	Agilent E4418B with 8482A Power Sensor

**Electrical – Voltage**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
DC Voltage – Source	(0 to 330) mV	3.61 μV + 0.069 μV/mV	Fluke 5500A
	330 mV to 3.3 V	5.89 μV + 58 μV/V	
	(3.3 to 33) V	0.06 mV + 0.058 mV/V	
	(33 to 330) V	0.58 mV + 0.064 mV/V	
	(330 to 1020) V	2.1 mV + 0.065 mV/V	

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
DC Voltage – Measure	(1 to 100) mV	3.1 $\mu$ V	HP 3458A
	100 mV to 1 V	19 $\mu$ V	
	(1 to 10) V	180 $\mu$ V	
	(10 to 100) V	1.8 mV	
	(100 to 1000) V	19 mV	
DC Voltage – Measure	(1 to 6) kV	74 mV + 2 % reading	High Voltage Divider and DMM
	(6 to 40) kV	0.87 V + 2 % reading	
AC Voltage – Source  (1 to 33) mV	(10 to 45) Hz	0.4 % reading + 0.025 mVAC	Fluke 5500A
	45 Hz to 10 kHz	0.17 % reading + 0.023 mVAC	
	(10 to 20) kHz	0.23 % reading + 0.023 mVAC	
	(20 to 50) kHz	0.29 % reading + 0.024 mVAC	
	(50 to 100) kHz	0.4 % reading + 0.039 mVAC	
	(100 to 500) kHz	1.1 % reading + 0.074 mVAC	
(33 to 330) mV	(10 to 45) Hz	0.28 % reading + 0.072 mVAC	
	45 Hz to 10 kHz	0.057 % reading + 0.025 mVAC	
	(10 to 20) kHz	0.12 % reading + 0.024 mVAC	
	(20 to 50) kHz	0.18 % reading + 0.048 mVAC	
	(50 to 100) kHz	0.28 % reading + 0.2 mVAC	
	(100 to 500) kHz	0.81 % reading + 0.39 mVAC	
330 mV to 3.3 V	(10 to 45) Hz	0.17 % reading + 0.5 mVAC	
	45 Hz to 10 kHz	0.034 % reading + 0.098 mVAC	
	(10 to 20) kHz	0.092 % reading + 0.083 mVAC	
	(20 to 50) kHz	0.15 % reading + 0.61 mVAC	
	(50 to 100) kHz	0.28 % reading + 2 mVAC	
	(100 to 500) kHz	0.57 % reading + 3.9 mVAC	
(3.3 to 33) V	(10 to 45) Hz	0.17 % reading + 5 mVAC	
	45 Hz to 10 kHz	0.046 % reading + 0.93 mVAC	
	(10 to 20) kHz	0.092 % reading + 3.1 mVAC	
	(20 to 50) kHz	0.22 % reading + 5.9 mVAC	
	(50 to 100) kHz	0.28 % reading + 20 mVAC	

<b>Calibration Parameter/Equipment <sup>1</sup></b>	<b>Range</b>	<b>Calibration and Measurement Capability(+/-)</b>	<b>Remarks</b>	
(33 to 330) V	40 Hz to 1 kHz	0.057 % reading + 10 mVAC	Fluke 5500A	
	(1 to 10) kHz	0.092 % reading + 19 mVAC		
	(10 to 20) kHz	0.1 % reading + 39 mVAC		
(330 to 1020) V	45 Hz to 1 kHz	0.057 % reading + 100 mVAC		
	(1 to 5) kHz	0.23 % reading + 120 mVAC		
	(5 to 10) kHz	0.23 % reading + 580 mVAC		
AC Voltage – Measure  (1 to 10) mV	(1 to 40) Hz	0.021 mV		HP 3458A
	40 Hz to 1 kHz	0.02 mV		
	(1 to 20) kHz	0.02 mV		
	(20 to 50) kHz	0.023 mV		
	(50 to 100) kHz	0.057 mV		
	(100 to 300) kHz	0.42 mV		
	300 kHz to 1 MHz	0.13 mV		
	(1 to 4) MHz	0.74 mV		
	(4 to 8) MHz	2.1 mV		
(10 to 100) mV	(1 to 40) Hz	0.023 mV		
	40 Hz to 1 kHz	0.022 mV		
	(1 to 20) kHz	0.026 mV		
	(20 to 50) kHz	0.039 mV		
	(50 to 100) kHz	0.088 mV		
	(100 to 300) kHz	0.32 mV		
	300 kHz to 1 MHz	1.1 mV		
	(1 to 2) MHz	1.6 mV		
	(2 to 4) MHz	4.2 mV		
	(4 to 8) MHz	4.2 mV		
100 mV to 1 V	(4 to 8) MHz	16 mV		
	(1 to 40) Hz	0.18 mV		
	40 Hz to 1 kHz	0.17 mV		
	(1 to 20) kHz	0.22 mV		
	(20 to 50) kHz	0.36 mV		
	(50 to 100) kHz	0.87 mV		

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
100 mV to 1 V	(100 to 300) kHz	3.2 mV	HP 3458A
	300 kHz to 1 MHz	11 mV	
	(1 to 2) MHz	16 mV	
	(2 to 4) MHz	42 mV	
	(4 to 8) MHz	42 mV	
	(8 to 10) MHz	160 mV	
(1 to 10) V	(1 to 40) Hz	1.8 mV	
	40 Hz to 1 kHz	1.5 mV	
	(1 to 20) kHz	2.2 mV	
	(20 to 50) kHz	3.7 mV	
	(50 to 100) kHz	9 mV	
	(100 to 300) kHz	44 mV	
	300 kHz to 1 MHz	110 mV	
	(1 to 2) MHz	160 mV	
	(2 to 4) MHz	420 mV	
	(4 to 8) MHz	430 mV	
	(8 to 10) MHz	1.6 V	
	(10 to 100) V	(1 to 40) Hz	
40 Hz to 1 kHz		27 mV	
(1 to 20) kHz		30 mV	
(20 to 50) kHz		45 mV	
(50 to 100) kHz		140 mV	
(100 to 300) kHz		460 mV	
300 kHz to 1 MHz		1.7 V	
(100 to 600) V	(1 to 40) Hz	0.34 V	
	40 Hz to 1 kHz	0.31 V	
	(1 to 20) kHz	0.45 V	
	(20 to 50) kHz	0.86 V	
	(50 to 100) kHz	2.1 V	
(1 to 6) kV	60 Hz	1.6 V + 5.5 % reading	High Voltage Divider and DMM
(6 to 40) kV	60 Hz	3.3 V + 5.4 % reading	

<b>Calibration Parameter/Equipment <sup>1</sup></b>	<b>Range</b>	<b>Calibration and Measurement Capability(+/-)</b>	<b>Remarks</b>
Thermocouple Millivolt Simulation  Type B	(600 to 800) °C	0.51 °C	Fluke 5500A
	(800 to 1000) °C	0.39 °C	
	(1000 to 1550) °C	0.35 °C	
	(1550 to 1820) °C	0.39 °C	
Type C	(0 to 150) °C	0.34 °C	
	(150 to 650) °C	0.3 °C	
	(650 to 1000) °C	0.36 °C	
	(1000 to 1800) °C	0.58 °C	
	(1800 to 2316) °C	0.97 °C	
Type E	(-250 to -100) °C	0.58 °C	
	(-100 to -25) °C	0.19 °C	
	(-25 to 350) °C	0.16 °C	
	(350 to 650) °C	0.19 °C	
	(650 to 1000) °C	0.24 °C	
Type J	(-210 to -100) °C	0.31 °C	
	(-100 to -30) °C	0.19 °C	
	(-30 to 150) °C	0.16 °C	
	(150 to 760) °C	0.2 °C	
	(760 to 1200) °C	0.27 °C	
Type K	(-200 to -100) °C	0.38 °C	
	(-100 to -25) °C	0.21 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 1000) °C	0.3 °C	
	(1000 to 1372) °C	0.46 °C	
Type N	(-200 to -100) °C	0.46 °C	
	(-100 to -25) °C	0.25 °C	
	(-25 to 120) °C	0.22 °C	
	(120 to 410) °C	0.21 °C	
	(410 to 1300) °C	0.31 °C	

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Type R	(0 to 250) °C	0.66 °C	Fluke 5500A
	(250 to 400) °C	0.4 °C	
	(400 to 1000) °C	0.39 °C	
	(1000 to 1767) °C	0.46 °C	
Type S	(0 to 250) °C	0.54 °C	
	(250 to 1000) °C	0.42 °C	
	(1000 to 1400) °C	0.43 °C	
	(1400 to 1767) °C	0.53 °C	
Type T	(-200 to -150) °C	0.73 °C	
	(-150 to 0) °C	0.28 °C	
	(0 to 120) °C	0.19 °C	
	(120 to 400) °C	0.16 °C	

**Length – Artifacts and Standards 1D**

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>2,3</sup>	Remarks
Gage Blocks	Up to 4 in	$(4 + 2.33L) \mu\text{in}$	Ref Blocks and Comparator
Laser Micrometer <sup>1</sup> (1 $\mu\text{in}$ Resolution)	Up to 2 in	23 $\mu\text{in}$	XXX Pin Gage
Snap Gages <sup>1</sup>	(0.05 to 4) in	22 $\mu\text{in}$	Gage Blocks
Pin Gages / Plug Gages <sup>1</sup>	Up to 1.9 in	46 $\mu\text{in}$	Laser Micrometer
Pin Gages / Plug Gages	Up to 2 in	$(5.2 + 10D) \mu\text{in}$	ULM
	(1.9 to 18) in	$(4 + 11D) \mu\text{in}$	
Plain Rings	(0.275 to 13.25) in	$(51 + 1.2L) \mu\text{in}$	Master Ring and ULM
Thread Wires	Up to 0.14434 in	$(12 + 27D) \mu\text{in}$	ULM
Measuring Rods <sup>1</sup>	Up to 12 in	$(15 + 1.4L) \mu\text{in}$	
	(12 to 20) in	$(39 + 5L) \mu\text{in}$	

**Length – Artifacts and Standards 2D**

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>2,4</sup>	Remarks
Thread Plugs Pitch Diameter (5 to 100) TPI	Up to 8 in	$(74 + 7.6L) \mu\text{in}$	Wires and ULM
Thread Rings	Up to 2 in	330 $\mu\text{in}$	Reference Thread Plug

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>2,4</sup>	Remarks
Surface Plates <sup>1</sup>			
Flatness	12 in x 12 in to 10 ft x 16 ft	Closure Error + 12 μin + 0.42 μin/in X	Electronic Levels
Surface Plate Repeat		36 μin	Repeat-o-meter

**Length – Hand Tools and Precision Gages 1D**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-) <sup>2</sup>	Remarks
Bore Gage (0.0001 in Resolution)	(1 to 8) in	180 μin	Bore Gage Calibrator
Calipers (0.0005 in Resolution)	(0.05 to 8) in	460 μin	Gage Blocks
(0.001 in Resolution)	(0.05 to 12) in	800 μin	
	(12 to 59) in	(1600 + 10.03L) μin	End Measuring Rods
Outside Micrometers (0.00005 in Resolution)	(0 to 1) in	140 μin	Gage Blocks
(0.0001 in Resolution)	(0 to 1) in	180 μin	
(0.001 in Resolution)	(0 to 1) in	1600 μin	
(0.0001 in Resolution)	(0 to 20) in	(810 + 17.163L) μin	Gage Blocks and End Measuring Rod
Depth Micrometers (0.0001 in Resolution)	(0 to 12) in	140 μin	Gage Blocks
(0.001 in Resolution)		1200 μin	
Dial Indicators (50 μin Resolution)	(0 to 2) in	61 μin	Indicator Calibrator
(0.0001 in Resolution)		110 μin	
(0.001 in Resolution)		1200 μin	
Height Gages (50 μin Resolution)	Up to 12 in	180 μin	Gage Blocks
	(12 to 20) in	840 μin	Measuring Rods
Extensometers (0.00005 in Resolution)	Up to 2 in	140 μin	Micrometer Head
Measuring Tables (0.005 in Resolution)	Up to 59 in	0.01 in	Measuring Rods

**Length – Hand Tools and Precision Gages 2D**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Optical Comparators			
Magnification	10x & 100x	210 μin	Glass Scale
Linearity (10 μin Resolution)	(0 to 6) in	120 μin	
Angularity	0° to 30°	0° 2' 10"	
Microscopes	(0 to 2) in	160 μin	Glass Scale
Profilometers	Up to 120	3.1 μin	Roughness Standard

**Length – Hand Tools and Precision Gages 3D**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-) <sup>2</sup>	Remarks
CMM Linear Accuracy	(0.5 to 24.5) in	(90 + 9.24L) μin	Step Gage
CMM Volumetric Accuracy	Up to 25 in	(0.88 + 23.56L) μin	Ball Bars
CMM Squareness	(0.25 + 11.75) in	210 μin	Square and Indicator

**Mass – Force**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Force Gauges	(0 to 100) lbs	0.0008 lbs + 0.008 % reading	Dead Weights
Force Machines			Comparison with ASTM E74 Load Cell and Indicator
Tension	(6 to 60) klb	12 lbf	
Compression	(6 to 60) klb	16 lbf	
	(60 to 120) klb	120 lbf	

**Mass – Hardness**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Rockwell Hardness Testers	HR15N		Indirect Verification according to ASTM E18
	Low	1.3 HR15N	
	Middle	1.3 HR15N	
	High	0.89 HR15N	
	HR30N		
	Low	1.4 HR30N	
	Middle	1.4 HR30N	
	High	1 HR30N	
	HR45N		
Low	1.4 HR45N		
Middle	1.4 HR45N		
High	1.3 HR45N		

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Rockwell Hardness Testers	HRA Low Middle High	1.3 HRA 1.3 HRA 0.7 HRA	Indirect Verification according to ASTM E18
	HRBw Low Middle High	2 HRBw 1.4 HRBw 1.4 HRBw	
	HRC Low Middle High	1.3 HRC 1.3 HRC 1.3 HRC	
	HR15Tw Low Middle High	2 HR15Tw 1.4 HR15Tw 1.3 HR15Tw	
	HR30Tw Low Middle High	1.9 HR30Tw 1.3 HR30Tw 1.3 HR30Tw	
	HR45Tw Low Middle High	1.9 HR45Tw 1.3 HR45Tw 1.4 HR45Tw	
Brinell Hardness Testers	HRBw 3000 Kgf	0.057 mm	Indirect Verification according to ASTM E10
Micro-Hardness Indentation Testers (Knoop and Vickers)  Repeatability under Force (1 to 500) gf	(100 to 250) HK 650 HK and up	1.41 % 1.47 %	Indirect Verification per ASTM E384  Uncertainty is stated as the repeatability per ASTM E384
	(100 to 240) HV 600 HV and up	1.8 % 1.71 %	
	Error	1.5 %	

**Mass – Pressure / Low Vacuum**

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-)	Remarks
Pressure	(10 to 500) psig	0.23 psi + 0.001 % reading	Deadweight Testers
Pressure <sup>1</sup>	(0 to 300) psig	1.2 psi	Pressure Calibrator / Comparison to High Accuracy Gage
	(300 to 10 000) psig	41 psi	
Vacuum <sup>1</sup>	(-660 to 0) mmHg	0.83 mmHg + 0.68 % of reading	Pressure Calibrator

**Mass – Scales and Balances**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Weighing Systems  (0.005 Resolution)	(0 to 10) lb	0.005 lb	Comparison to ASTM Class 3 & NIST Class F Weights per NIST Handbook 44
	(10 to 50) lb	0.014 lb	
(0.02 Resolution)	(50 to 250) lb	0.06 lb	

**Mass – Torque**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Torque Wrenches	(25 to 250) lbf-ft	1.9 lbf-ft	Torque Wrench Cal Sys
	(80 to 800) lbf-ft	2 lbf-ft	

**Time and Frequency – Oscilloscopes**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Square Wave Signal  Amplitude into 50  Amplitude into 1	1.8 mV to 2.2 V	0.58 mV + 2.3 mV/V	Fluke 5500A with SC300
	1.8 mV to 55 V	0.57 mV + 4.1 mV/V	
Time Marker Output into 50	(5 to 2) s	680 $\mu$ s/s	
	(2 to 1) s	420 $\mu$ s/s	
	1 s to 500 ms	370 $\mu$ s/s	
	500 ms to 2 ns	360 $\mu$ s/s	
Rise Time	< 400 ps	425 ps	

**Time and Frequency – Frequency / Period**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Tachometers  Contact  Non-Contact	(6 to 10 000) rpm	2.5 rpm + 0.67 % reading	Shimpo DT-205L
		1.5 rpm + 0.01 % reading	

**Thermodynamic – Thermometers and Probes**

Calibration Parameter/Equipment <sup>1</sup>	Range	Calibration and Measurement Capability(+/-)	Remarks
Temperature Measuring Systems  (0.1 °C Resolution)	(-15 to 110) °C	0.25 °C	Dry Block Calibrator
	(50 to 350) °C	0.71 °C	

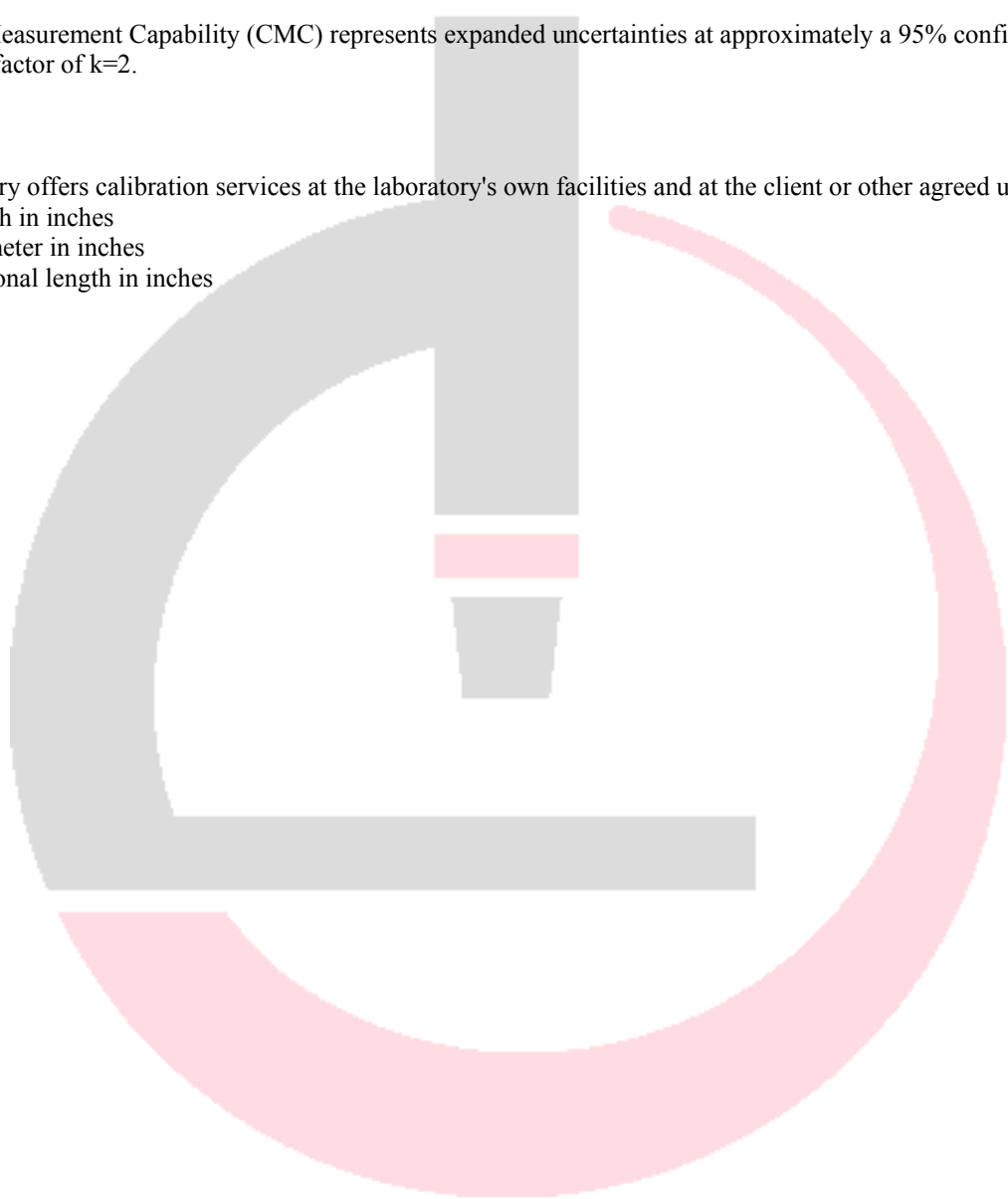
**Thermodynamic – Thermodynamic Sources**


<b>Calibration Parameter/Equipment</b>	<b>Range</b>	<b>Calibration and Measurement Capability(+/-)</b>	<b>Remarks</b>
Temperature – Measure	(-200 to 1370) °C	2.3 °C	Fluke 714 with Thermocouple Probes

Calibration and Measurement Capability (CMC) represents expanded uncertainties at approximately a 95% confidence level using a coverage factor of k=2.

Notes:

- 1) Laboratory offers calibration services at the laboratory's own facilities and at the client or other agreed upon facilities.
- 2) *L* = length in inches
- 3) *D* = diameter in inches
- 4) *X* = diagonal length in inches



Approved by:   
 R. Douglas Leonard  
 Chief Technical Officer

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