



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

PRIMARY INSTRUMENTS, INC.
9553 Vassar Avenue
Chatsworth, CA 91311
Abner de Leon Phone: 818 993 4971

CALIBRATION

Valid To: September 30, 2013

Certificate Number: 2011.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments	
Calipers ³	(0 to 40) in	0.0007 in	Comparison to reference gage blocks	
Gage Blocks	(0.01 to 0.95) in	(3.0 + 1.0L) µin	Master gage block set with mechanical comparator federal 130B-24	
	(1 to 4) in	(3.0 + 2.0L) µin		
	(0.5 to 5) mm	0.081 µm		
	(>5 to 10) mm	0.086 µm		
	(>10 to 20) mm	0.096 µm		
	(>20 to 25) mm	0.10 µm		
	(>25 to 50) mm	0.18 µm		
	(>50 to 75) mm	0.23 µm		
	(>75 to 100) mm	0.28 µm		
	5 in	11 µin		Electronic indicator and master gage blocks
	6 in	18 µin		
	7 in	24 µin		
	8 in	26 µin		
	10 in	36 µin		
12 in	40 µin			
16 in	53 µin			
20 in	61 µin			

Parameter/Equipment	Range	CMC ² (±)	Comments
Micrometers ³ – Outside, Inside, Depth	< 1 in (>1 to 6) in (>6 to 12) in (>12 to 24) in (>24 to 40) in	63 µin 74 µin 110 µin 170 µin 280 µin	Comparison to reference gage blocks
Height Masters	(0 to 12) in (12 to 24) in	45 µin 85 µin	Comparison to reference gage blocks
Mu-Checker / Electronic Height Gage	± 0.00015 in ± 0.0005 in ± 0.0015 in ± 0.005 in ± 0.015 in ± 0.05 in	7.4 µin 8.2 µin 30 µin 58 µin 300 µin 600 µin	Comparison to reference gage blocks
Plain Ring Gages – Up to Class XX Up to Class X	(0.06 to 1) in (1 to 2) in (2 to 3) in (3 to 4) in (4 to 5) in (5 to 6) in (6 to 7) in (7 to 8) in (8 to 9) in (9 to 10) in (10 to 11) in (11 to 12) in	9.0 µin 12 µin 16 µin 20 µin 23 µin 27 µin 38 µin 32 µin 35 µin 48 µin 51 µin 82 µin	Dia-Met comparator Pratt & Whitney internal super- micrometer ^{TM,6} model U36334
Inside Diameter – Dial and Digital Bore Gages, Holtest, IntrimikV	(0.06 to 1) in (1 to 5) in (5 to 6) in (6 to 9) in (9 to 10) in (10 to 11) in (11 to 12) in	64 µin 75 µin 80 µin 94 µin 100 µin 110 µin 130 µin	Master ring gages and gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Dial & Digimatic Indicators ³ Resolution: 0.00005 in 0.0001 in 0.0005 in 0.001 in 0.0001 in 0.001 in	(0 to 1) in (0 to 2) in (0 to 4) in	30 µin 60 µin 300 µin 600 µin 60 µin 600 µin	Comparison to reference gage blocks
Indicator Calibrator Resolution: 0.0001 in 0.00005 in 0.00001 in	(0 to 1) in	100 µin 30 µin 11 µin	Mechanical comparison to master gage blocks
Depth Gage ³	(0 to 12) in	350 µin + 0.6R	Comparison to reference gage blocks
Feeler Gage/Thickness Specimen	(0.0005 to 0.200) in	26 µin	Supermicrometer ^{TM, 6}
Thread Wire Set	(4.5 to 80) TPI	18 µin	Master wire set
Thread Plug Gages – Pitch Diameter Major Diameter	(4.5 to 80) TPI Up to 10 in	26 µin 18 µin	Thread wire set and super micrometer
Thread Rings	(0.08 to 3.0) in Diameter	220 µin	Master set plugs
End Standards	(1 to 40) in	(41 + 2.5L) µin	Gage blocks
V Blocks	(0 to 8) in	120 µin	Mu checker with lever head probe

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
Cylindrical Plug Gages	(0.005 to 10) in	(12 + 2.5L) μin	Gage blocks and super micrometer
Optical Comparator – Linear Travel Magnification	Up to 8 inch 10x to 50x	100 μin 0.12 %	Gage blocks Glass scales
Toolmakers Microscopes – Linear Travel	Up to 8 in	90 μin	Glass scale
Optical Flats/Parallels – Flatness Parallelism	Up to 8 in Up to 8 in	3.2 μin 5.0 μin	Master optical flat Mechanical comparator
Wire Cloth and Sieves	Up to 2 in	110 μin	Optical comparator
Surface Flatness	Up to 18 in	120 μin	Gage blocks and dial indicator

II. Electrical – DC & Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Voltage – Generate	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1000) V	16 μV/V + 0.8 μV 16 μV/V + 1.2 μV 15 μV/V + 4 μV 15 μV/V + 8 μV 15 μV/V + 0.10 mV 17 μV/V + 0.60 mV	Fluke 5700A
Fixed Points	1.018 V 10.0 V	11 μV/V 2.3 μV/V	Fluke 732B

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Voltage ³ – Measure	100 mV 1 V 10 V 100 V 1000 V	13 μV/V + 0.3 μV 12 μV/V + 0.3 μV 12 μV/V + 0.5 μV 12 μV/V + 30 μV 12 μV/V + 0.1 mV*	HP 3458A, option 002 *add 12 μV/V (V _{in} /1000) ² for V _{in} > 100 V
DC Current ³ – Generate	(0 to 220) μA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A	88 μA/A + 0.01 μA 87 μA/A + 0.01 μA 87 μA/A + 0.1 μA 99 μA/A + 1 μA 0.013 % + 30 μA 0.095 % + 0.33 mA	Fluke 5700A Fluke 5500A
DC Current ³ – Measure	100 μA 1 mA 10 mA 100 mA 1 A (1 to 15) A (1 to 100) A	29 μA/A + 0.80 μA 29 μA/A + 0.005 μA 29 μA/A + 0.05 μA 47 μA/A + 0.5 μA 0.013 % + 10 μA 0.093 % 0.094 %	HP 3458A Opt 002: with L&N 4360 shunt with L&N 4363 shunt
DC Resistance – Generate (Fixed Points)	0.001 Ω 0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ	0.017 % 13 μΩ/Ω 12 μΩ/Ω 1.7 μΩ/Ω 12 μΩ/Ω 12 μΩ/Ω 12 μΩ/Ω 1.2 μΩ/Ω 12 μΩ/Ω 12 μΩ/Ω 12 μΩ/Ω	L&N 4223-B L&N 4222 L&N 4221 Thomas 4210 L&N Rosa 4025-B L&N Rosa 4030-B L&N Rosa 4035-B ESI SR-104 L&N Rosa 4045-B L&N Rosa 4050-B Guildline 9330-10M

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Resistance – Generate (Fixed Points), (cont)	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	0.016 % 0.016 % 47 μΩ/Ω 46 μΩ/Ω 29 μΩ/Ω 29 μΩ/Ω 22 μΩ/Ω 22 μΩ/Ω 25 μΩ/Ω 25 μΩ/Ω 35 μΩ/Ω 37 μΩ/Ω 69 μΩ/Ω 81 μΩ/Ω 0.018 %	Fluke 5700A
DC Resistance ³ – Measure	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	24 μΩ/Ω + 0.1 mΩ 24 μΩ/Ω + 1 mΩ 18 μΩ/Ω + 1 mΩ 18 μΩ/Ω + 10 mΩ 18 μΩ/Ω + 100 mΩ 24 μΩ/Ω + 4 Ω 88 μΩ/Ω + 100 Ω 0.12 % + 1.0 kΩ	HP 3458A, option 2
Inductance – Measure (@ 1 kHz)	100 μH 1 mH to 1 H	0.35 % 0.23 %	GenRad 1689M bridge
Inductance – Generate Fixed Points (@ 1 kHz)	100 μH 1 mH 10 mH 100 mH 1 H	0.33 % 0.20 % 0.20 % 0.20 % 0.20 %	GenRad 1482B GenRad 1482E GenRad 1482H GenRad 1484L GenRad 1482P

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Capacitance Generate – Fixed Values (@ 1 kHz)	10 pF 100 pF 1000 pF	0.12 % 0.017 % 0.0024 %	GenRad 1404-C GenRad 1404-B GenRad 1404-A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Capacitance – Generate (0.33 to 0.4999) nF (0.5 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.2999) nF (11 to 32.999) nF (33 to 109.99) nF (110 to 329.99) nF (0.33 to 1.0999) μF (1.1 to 3.2999) μF (3.3 to 10.999) μF (11 to 32.999) μF (33 to 109.99) μF (110 to 329.99) μF (0.33 to 1.1) mF	50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz (50 to 400) Hz (50 to 400) Hz (50 to 200) Hz (50 to 100) Hz (50 to 100) Hz	0.64 % + 0.01 nF 0.64 % + 0.01 nF 0.64 % + 0.01 nF 0.64 % + 0.01 nF 0.33 % + 0.10 nF 0.33 % + 0.10 nF 0.33 % + 0.30 nF 0.33 % + 1.0 nF 0.46 % + 3.0 nF 0.46 % + 10 nF 0.52 % + 30 nF 0.64 % + 0.10 μF 0.92 % + 0.30 μF 1.0 % + 0.30 μF	Fluke 5500A
Capacitance – Measure (10 to 1000) pF	1 kHz Input	0.15 %	GenRad 1689M bridge
AC Voltage ³ – Generate (0 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.14 % + 5 μV 0.092 % + 5 μV 0.088 % + 5 μV 0.16 % + 5 μV 0.35 % + 8 μV 1.0 % + 15 μV 0.56 % + 30 μV 0.77 % + 30 μV	Fluke 5700A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Generate (cont)			
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.08 % + 6 μV 0.04 % + 6 μV 0.020 % + 6 μV 0.06 % + 6 μV 0.13 % + 8 μV 0.18 % + 15 μV 0.25 % + 30 μV 0.49 % + 30 μV	Fluke 5700A
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.08 % + 16 μV 0.03 % + 10 μV 0.015 % + 10 μV 0.05 % + 10 μV 0.12 % + 30 μV 0.15 % + 30 μV 0.24 % + 40 μV 0.49 % + 0.1 mV	
(0.22 to 2.2) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.08 % + 0.1 mV 0.02 % + 30 μV 0.012 % + 7 μV 0.02 % + 20 μV 0.02 % + 80 μV 0.07 % + 0.15 mV 0.16 % + 0.4 mV 0.32 % + 1 mV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.08 % + 1 mV 0.02 % + 0.3 mV 0.012 % + 70 μV 0.02 % + 0.2 mV 0.04 % + 0.4 mV 0.08 % + 1.7 mV 0.19 % + 5 mV 0.39 % + 9 mV	
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.08 % + 10 mV 0.02 % + 3 mV 0.012 % + 1 mV 0.04 % + 4 mV 0.08 % + 10 mV	
(220 to 1000) V	50 Hz to 1 kHz	0.005 % + 4 mV	

--	--	--	--

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Measure			
10 mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.036 % + 3.0 μV 0.024 % + 1.1 μV 0.037 % + 1.1 μV 0.12 % + 1.1 μV 0.58 % + 1.1 μV 4.7 % + 2.0 μV	HP 3458A, option 2
100 mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.011 % + 4.0 μV 0.010 % + 2.0 μV 0.017 % + 2.0 μV 0.035 % + 2.0 μV 0.095 % + 2.0 μV 0.35 % + 10 μV 1.2 % + 10 μV	
1 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.009 % + 40 μV 0.009 % + 20 μV 0.016 % + 20 μV 0.035 % + 20 μV 0.093 % + 20 μV 0.35 % + 0.1 mV 1.2 % + 0.1 mV	
10 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.011 % + 40 μV 0.009 % + 20 μV 0.016 % + 20 μV 0.035 % + 20 μV 0.093 % + 20 μV 0.35 % + 0.1 mV 1.2 % + 0.1 mV	
100 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.023 % + 4.0 mV 0.023 % + 2.0 mV 0.023 % + 2.0 mV 0.041 % + 2.0 mV 0.14 % + 2.0 mV 0.47 % + 10 mV	
1000 V	40 Hz to 1 kHz (1 to 20) kHz	0.046 % + 20 mV 0.070 % + 20 mV	

--	--	--	--

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current ³ – Generate			
(0 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.11 % + 30 nA 0.057 % + 25 nA 0.024 % + 20 nA 0.11 % + 1 µA 0.24 % + 4 µA	Fluke 5700A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.11 % + 50 nA 0.057 % + 40 nA 0.024 % + 40 nA 0.10 % + 2 µA 0.24 % + 4 µA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.11 % + 0.5 µA 0.057 % + 0.4 µA 0.024 % + 0.4 µA 0.10 % + 10 µA 0.24 % + 20 µA	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.11 % + 5 µA 0.057 % + 4 µA 0.028 % + 4 µA 0.10 % + 50 µA 0.24 % + 0.1 mA	
(0.22 to 2.2) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.10 % + 40 µA 0.12 % + 0.1 mA 1.4 % + 0.2 mA	Fluke 5700A
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz (0.5 to 1.0) kHz	0.082 % + 2 mA 0.14 % + 2 mA 0.47 % + 2 mA	Fluke 5500A

--	--	--	--

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Measure			
100 µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.03 µA 0.17 % + 0.03 µA 0.07 % + 0.03µA 0.07 % + 0.03µA	HP 3458A, option 2
1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 0.02 µA 0.17 % + 0.02 µA 0.07 % + 0.02 µA 0.06 % + 0.02µA 0.07 % + 0.02 µA	
10 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 2.0 µA 0.17 % + 2.0 µA 0.07 % + 2.0 µA 0.04 % + 2.0 µA 0.07 % + 2.0 µA	
100 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 20 µA 0.17 % + 20 µA 0.07 % + 20 µA 0.04 % + 20 µA 0.07 % + 20 µA	
1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 0.2 mA 0.19 % + 0.2 mA 0.09 % + 0.2 mA 0.12 % + 0.2 mA 0.07 % + 0.2 mA	
10 mA to 2 A	(0.1 to 5) kHz	0.024 %	Fluke A40 shunts

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments	
Oscilloscopes –				
Level Sine Wave @ 50 kHz reference	1 mV to 5.5 V (p-p)	2.3 %	Fluke 5500A/SC600	
Level Sine Flatness 5 mV to 5.5 V	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	1.7 % 2.3 % 4.6 %		
Vertical Gain DC – Into 50 Ω Into 1 MΩ	(0 to 6.6) V (0 to 130) V	0.29 % + 40 μV 0.12 % + 40 μV		
Square Wave – Into 50 Ω Into 1 MΩ	1 mV to 6.6 V (p-p) 1 mV to 130 V (p-p)	0.29 % + 40 μV 0.12 % + 40 μV		
Time Marker Output Into 50 Ω	5 s to 50 ms 20 ms to 2 ns	(29 + t*1000) μs/s 29 μs/s		t = time in seconds
Pulse Rise Time 5 mV to 2.5 V (p-p)	≤ 350ps	(+0 ps/-100 ps)		
Electrical Simulation of Thermocouple Indicating Devices –				
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.36 °C 0.22 °C 0.20 °C 0.23 °C 0.30 °C	Fluke 5500A/SC600	
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.43 °C 0.24 °C 0.22 °C 0.35 °C 0.52 °C		
Type T	-250 °C to 150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.80 °C 0.32 °C 0.22 °C 0.20 °C		
Type E	-250 °C to 100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.64 °C 0.22 °C 0.20 °C 0.22 °C 0.28 °C		

III. Electrical – RF / Microwave

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
RF Power Sensors ³	0.1 MHz to 8 GHz (8 to 12) GHz (12 to 18) GHz	1.8 % CF 2.1 % CF 2.4 % CF	Tegam 1827, CF = calibration factor
RF Power Thermistor ³ – Generate (@ 0 dBm)	10 MHz 50 MHz to 7 GHz 8 GHz (9 to 10) GHz	3.1 % + <i>M</i> 2.6 % + <i>M</i> 3.3 % + <i>M</i> 2.5 % + <i>M</i>	HP 478A with HP 432A <i>M</i> = mismatch on both ports
Tuned RF Power Level ³ – Measure Reference: 0 dB (0.0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -100) dB (-100 to -110) dB (-110 to -127) dB	2.5 MHz to 1.3 GHz	0 dB 0.02 dB 0.04 dB 0.06 dB 0.08 dB 0.14 dB 0.16 dB 0.18 dB 0.2 dB 0.26 dB 0.28 dB 0.3 dB 0.4 dB	HP 8902A with 11722A

IV. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Scales & Balances ³ – Resolution: 0.00001 g 0.0001 g 0.001 g	(1 to 200) g	0.031 mg 0.070 mg 0.60 mg	Class 1 weights
Resolution: 0.001 g 0.01 g 0.1 g	1 g to 9 kg	0.009 g 0.011 g 0.058 g	Class F weights
Resolution: 0.001 lb 0.01 lb 0.1 lb	2 oz to 700 lb	0.0013 lb 0.006 lb 0.06 lb	Class F weights

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Pressure – Measure	Pneumatic Pistons	(0 to 5) psig 0.017 % (1.5 to 100) psig 0.016 % (15 to 1000) psig 0.021 %	Volumetric 7-201
	Hydraulic Pistons	(6 to 15 140) psig 0.036 %	Ruska 2400HL
Torque Transducers	0.5 in·oz to 200 in·lb	0.075 %	Calibrated weights and torque arms
	(37.5 to 2000) ft·lb	0.075 %	
Torque Wrenches and Screwdrivers ³	0.5 in·oz to 200 in·lb	0.60 %	CDI 2000-400-0
	37.5 in·lb to 2000 ft·lb	0.60 %	CDI 2000-1-0
Force Gages – Tension and Compression	2 ozf to 700 lbf (500 to 2000) lbf 1 gf to 9 kgf	0.04 lbf 0.52 % 0.10 gf	Class F weights CDI-2000-1-0 Class F weights

V. Thermodynamics

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature ³ – Measuring Equipment	0 °C	0.033 °C	Drywell 9101 ice point with Hart 1590 and 5614 PRT
	(0 to 100) °C	0.033 °C	Liquid bath 5023 with Hart 1590 and 5614 PRT
	(-15 to 100) °C	0.067 °C	Drywell DB-35 with Hart 1590 and 5614 PRT
	(100 to 420) °C	0.068 °C	Drywell Amtek 601 with Hart 1590 and 5614 PRT

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Temperature ³ – Measure	(-196 to -38) °C (-38 to 0) °C 0 °C (0 to 232) °C (232 to 420) °C	0.033 °C 0.033 °C 0.032 °C 0.034 °C 0.033 °C	Hart 1590 and 5614 PRT
Temperature ³ – Measure Uniformity of Ovens, Furnaces, Freezers, Refrigerators, Environmental Chambers	-130 to 1250°C -150 to 400 °C	1.9 °C 1.4 °C	Fluke 2190 with: Type K T/C Type T T/C
Infrared Black Body ³ – Measuring Equipment	100 °C to 982 °C	1.4 °C + 0.3 %	Venzetti 1560
Relative Humidity ³ – Measure	(10 to 90) % RH	1.4 % RH	Thunder Scientific M5.1MP psychrometer

VI. Time & Frequency

Parameter/Range	Frequency	CMC ² (±)	Comments
Frequency – Measuring Equipment	(1, 5, 10) MHz	2.2 pHz	Fluke 910 GPS controlled frequency reference

¹ This laboratory offers commercial and field calibration service.

² Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMC's represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

- ³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.
- ⁴ In the statement of CMC, *L* is the numerical value of the nominal length of the device measured in inches. In the statement of CMC, *R* is the numerical value of the resolution of the device in microinches.
- ⁵ Whenever percent is indicated in the CMC column, it refers to percent of reading unless otherwise indicated.
- ⁶ "Supermicrometer" is a registered trade mark owned by Pratt & Whitney Measurement Systems, Inc., Connecticut U.S.A.



World Class Accreditation

The American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

PRIMARY INSTRUMENTS INCORPORATED

Chatsworth, CA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 8 January 2009*).

Presented this 28th day of October 2011.





Peter Meyer

President & CEO
For the Accreditation Council
Certificate Number 2011.01
Valid to September 30, 2013

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.