



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

PRIMARY INSTRUMENTS INCORPORATED
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CALIBRATION

Valid To: October 31, 2025

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 calibrations^{1, 10}:

I. Chemical

Parameter/Equipment	Range	CMC ² (±)	Comments
Conductivity Measuring Instruments ³	100 µS/cm 1414 µS/cm 10 000 µS/cm	2.3 µS/cm 8.6 µS/cm 61 µS/cm	Comparison with conductivity standard solutions
pH Measuring Instruments	(4, 7, 10) pH	0.020 pH	Comparison with pH calibration buffer standard solution

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Calipers ^{3, 8}	Up to 40 in	(180 + 0.79L) µin	Gage blocks
Wire Cloth & Sieves	Up to 2 in	86 µin	Optical comparator

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Gage Blocks	(0.01 to 0.95) in (1 to 4) in	($2.4 + 1.9L$) μ in ($3.4 + 1.0L$) μ in	Master gage block set mechanical comparator Federal 130B-24
	(0.5 to 5) mm (>5 to 10) mm (>10 to 20) mm (>20 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm 5 in 6 in 7 in 8 in 10 in 12 in 16 in 20 in	0.065 μ m 0.085 μ m 0.11 μ m 0.11 μ m 0.14 μ m 0.16 μ m 0.19 μ m 11 μ in 11 μ in 16 μ in 17 μ in 27 μ in 27 μ in 36 μ in 37 μ in	Master gage block set mechanical comparator Federal 130B-16
Micrometers ^{3, 8} – Outside, Inside, & Depth	Up to 40 in	($6.5 + 1.6L$) μ in	Gage blocks
Height Masters	Up to 12 in (12 to 24) in	23 μ in 38 μ in	Gage blocks
Height Gages ^{3, 8}	Up to 40 in	($34 + 1.1L$) μ in	Gage blocks
Mu-Checker/Electronic Height Gage	± 0.000 15 in ± 0.0005 in ± 0.0015 in ± 0.005 in ± 0.015 in ± 0.05 in	4.4 μ in 6.6 μ in 29 μ in 58 μ in 0.000 29 in 0.000 58 in	Gage blocks

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Plain Ring Gages – Up to Class X, XX, XXX	(0.04 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	4.7 µin 6.9 µin 7.6 µin 9.1 µin 12 µin 13 µin 18 µin 19 µin 19 µin 29 µin 29 µin 29 µin	Pratt & Whitney Lab Master
Inside Diameter – Dial & Digital Bore Gages, Holtest, IntrimikV	(0.04 to 12) in	(15 + 1.9D) µin	Lab Master plus master ring gages & gage blocks
Dial & Test Indicators ^{3, 8}	Up to 0.5 in Up to 4 in	37 µin 0.000 18 in	Gage blocks
Digital Indicators ^{3, 8}	Up to 2 in (2 to 4) in	(11 + 0.92L) µin (20 + 1.1L) µin	Gage blocks
Indicator Calibrator – Resolution: 0.0001 in 0.000 05 in 0.000 01 in	Up to 1 in	68 µin 34 µin 8.3 µin	Gage blocks
Depth Gage ^{3, 8}	Up to 12 in	90 µin	Gage blocks
Feeler Gage/Thickness Specimen	(0.0005 to 0.2) in	26 µin	Pratt & Whitney Supermicrometer™
Thread Wire Set	(4.5 to 80) TPI	6.3 µin	Master wire set

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
Thread Plug Gages – Pitch Diameter Major Diameter	(4.5 to 80) TPI Up to 10 in	9 μ in 10 μ in	Thread wire set & Pratt & Whitney Lab Master
Adjustable Thread Rings ⁶	(0.08 to 3) in Diameter	W Set Plug Tolerance	Master threaded plug set
End Standards	(1 to 40) in	(10 + 1.6L) μ in	Gage blocks with Mu-Checker
V Blocks (Parallelism)	Up to 8 in	14 μ in	Mu checker with lever head probe
Cylindrical Plug Gages	(0.005 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	7.2 μ in 7.7 μ in 8.8 μ in 10 μ in 13 μ in 14 μ in 19 μ in 20 μ in 21 μ in 30 μ in 30 μ in 31 μ in	Gage blocks & Pratt & Whitney Lab Master
Optical Comparator ³ – Linear Travel Magnification	Up to 8 in 10x to 50x	65 μ in 0.12 %	Gage blocks Glass scales
Toolmakers Microscopes ³ – Linear Travel	Up to 12 in	(93 + 4.0L) μ in	Glass scales
Optical Flats/Parallels – Flatness Parallelism	Up to 3 in Up to 3 in	3.2 μ in 4.3 μ in	Master optical flat Mechanical comparator

Parameter/Equipment	Range	CMC ² ($\pm$)	Comments
Granite Surface Plates ³ –			
Flatness	Up to 18 in	20 μ in	Gage blocks & Mu checker
	Up to (48 x 72) in	30 μ in	Autocollimator
Repeatability	TIR $\pm$ 0.002 in	41 μ in	Repeat-o-meter (TIR means test indicator range)
Autocollimator	(0 to 60) arc-minutes	0.39 arc-sec	Adjustable sine plate

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 7, 8} ($\pm$)	Comments
DC Voltage ³ – 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	14 μ V/V + 0.80 μ V 15 μ V/V + 1.2 μ V 14 μ V/V + 4.0 μ V 14 μ V/V + 8.0 μ V 15 μ V/V + 0.10 mV 17 μ V/V + 0.60 mV	Fluke 5700A
Fixed Point	10 V	2.3 μ V/V	Fluke 732B
DC Voltage ³ – Measure	100 mV 1 V 10 V 100 V 1000 V (1000 to 5000) V	14 μ V/V + 0.30 μ V 14 μ V/V + 0.30 μ V 14 μ V/V + 0.50 μ V 14 μ V/V + 30 μ V 15 μ V/V + 0.10 mV* 0.068 % + 0.08 V	HP 3458A, opt 002 *add 12 μ V/V ($V_{in}/1000$) ² for $V_{in} > 100$ V Vitretek 4700
DC Current ³ – Generate	(0 to 220) μ A (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 (>11 to 20) A	88 μ A/A + 0.010 μ A 88 μ A/A + 0.010 μ A 88 μ A/A + 0.10 μ A 99 μ A/A + 1.0 μ A 0.013 % + 30 μ A 0.058 % + 0.50 mA 0.12 % + 0.75 mA	Fluke 5700A Fluke 5520A

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
DC Current ³ – Measure	100 μ A 1 mA 10 mA 100 mA 1 A (1 to 15) A (1 to 100) A	38 μ A/A + 0.80 nA 36 μ A/A + 0.0050 μ A 37 μ A/A + 0.050 μ A 57 μ A/A + 0.50 μ A 0.014 % + 10 μ A 0.046 % 0.049 %	HP 3458A, opt 002 L&N 4360 shunt L&N 4361 shunt
DC Resistance – Generate, Fixed Points	0.001 Ω 0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω	0.016 % 17 $\mu\Omega/\Omega$ 34 $\mu\Omega/\Omega$ 2.3 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 13 $\mu\Omega/\Omega$ 14 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$	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 L&N Rosa 4214 L&N Rosa 4045-B L&N Rosa 4050-B Guildline 9330-10M
DC Resistance ³ – Generate, Fixed Points	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	0.016 % 0.016 % 47 $\mu\Omega/\Omega$ 46 $\mu\Omega/\Omega$ 29 $\mu\Omega/\Omega$ 29 $\mu\Omega/\Omega$ 22 $\mu\Omega/\Omega$ 22 $\mu\Omega/\Omega$ 22 $\mu\Omega/\Omega$ 22 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$ 25 $\mu\Omega/\Omega$ 35 $\mu\Omega/\Omega$ 36 $\mu\Omega/\Omega$ 70 $\mu\Omega/\Omega$ 79 $\mu\Omega/\Omega$ 0.019 %	Fluke 5700A

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
DC Resistance ³ – Measure	10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	27 $\mu\Omega/\Omega$ + 0.10 m Ω 27 $\mu\Omega/\Omega$ + 1.0 m Ω 18 $\mu\Omega/\Omega$ + 1.0 m Ω 18 $\mu\Omega/\Omega$ + 10 m Ω 18 $\mu\Omega/\Omega$ + 0.10 Ω 27 $\mu\Omega/\Omega$ + 4.0 Ω 94 $\mu\Omega/\Omega$ + 0.10 k Ω 0.12 % + 1.0 k Ω	HP 3458A opt 002
Inductance – Measure @ 1 kHz	100 μ H (1, 10, 100, 1000) mH	0.30 % 0.14 %	GenRad 1689M bridge
Inductance – Generate, Fixed Points @ 1 kHz	100 μ H 1 mH 10 mH 100 mH 1 H	0.29 % 0.13 % 0.12 % 0.12 % 0.12 %	GenRad 1482B GenRad 1482E GenRad 1482H GenRad 1484L GenRad 1482P
Capacitance – Generate, Fixed Values @ 1 kHz	10 pF 100 pF 1000 pF	0.017 % 0.0024 % 0.0024 %	GenRad 1404-C GenRad 1404-B GenRad 1404-A
Capacitance – Measure @ 1 kHz	(10 to 100) pF (100 to 1000) pF 1000 pF	0.017 % 0.0062 % 0.0062 %	GenRad 1689M bridge

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
AC Voltage ³ – Generate (cont)			
(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	0.081 % + 16 μ V 0.033 % + 10 μ V 0.015 % + 10 μ V 0.049 % + 10 μ V 0.12 % + 30 μ V 0.15 % + 30 μ V 0.24 % + 40 μ V 0.49 % + 0.10 mV	Fluke 5700A
(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	0.081 % + 0.10 mV 0.024 % + 30 μ V 0.012 % + 7.0 μ V 0.019 % + 20 μ V 0.038 % + 80 μ V 0.065 % + 0.15 mV 0.16 % + 0.40 mV 0.33 % + 1.0 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	0.081 % + 1.0 mV 0.024 % + 0.30 mV 0.012 % + 70 μ V 0.019 % + 0.20 mV 0.038 % + 0.40 mV 0.081 % + 1.7 mV 0.19 % + 5.0 mV 0.40 % + 9.0 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	0.081 % + 10 mV 0.024 % + 3.0 mV 0.012 % + 1.0 mV 0.035 % + 4.0 mV 0.081 % + 10 mV	
(220 to 1000) V	50 Hz to 1 kHz	0.12 % + 4.0 mV	

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	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 μ V 0.025 % + 1.1 μ V 0.037 % + 1.1 μ V 0.12 % + 1.1 μ V 0.58 % + 1.1 μ V 4.6 % + 2.0 μ V	HP 3458A, opt 002
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 μ V 0.0095 % + 2.0 μ V 0.018 % + 2.0 μ V 0.050 % + 2.0 μ V 0.099 % + 2.0 μ V 0.35 % + 10 μ V 1.2 % + 10 μ V	
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	0.0087 % + 40 μ V 0.0087 % + 20 μ V 0.016 % + 20 μ V 0.035 % + 20 μ V 0.094 % + 20 μ V 0.35 % + 0.10 mV 1.2 % + 0.10 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	0.0096 % + 0.40 mV 0.0087 % + 0.20 mV 0.016 % + 0.20 mV 0.035 % + 0.20 mV 0.093 % + 0.20 mV 0.35 % + 1.0 mV 1.2 % + 1.0 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	0.025 % + 4.0 mV 0.023 % + 2.0 mV 0.025 % + 2.0 mV 0.041 % + 2.0 mV 0.14 % + 2.0 mV 0.46 % + 10 mV	
700 V	40 Hz to 1 kHz (1 to 20) kHz	0.048 % + 20 mV 0.070 % + 20 mV	
(700 to 1000) V (1000 to 5000) V	(50 to 400) Hz 60 Hz	0.15 % + 0.11 V 0.16 % + 0.15 V	Vitretek 4700

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
AC Current ³ – Generate			
(9 to 220) μ A	(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 % + 50 nA 0.24 % + 0.10 μ A	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 % + 0.50 μ A 0.24 % + 1.0 μ A	
(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 % + 0.50 μ A 0.057 % + 0.40 μ A 0.024 % + 0.40 μ A 0.10 % + 5.0 μ A 0.24 % + 10 μ A	
(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 % + 5.0 μ A 0.057 % + 4.0 μ A 0.028 % + 4.0 μ A 0.10 % + 50 μ A 0.24 % + 0.10 mA	
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.10 % + 40 μ A 0.12 % + 0.10 mA 1.4 % + 0.20 mA	
(2.2 to 10.9999) A	(45 to 100) Hz (0.1 to 1.0) kHz (1.0 to 5.0) kHz	0.07 % + 2.0 mA 0.14 % + 2.0 mA 3.5 % + 2.0 mA	Fluke 5520A
(>11 to 20) A	(45 to 100) Hz (0.1 to 1.0) kHz (1.0 to 5.0) kHz	0.14 % + 5.0 mA 0.18 % + 5.0 mA 3.6 % + 5.0 mA	

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
AC Current – Measure			
100 μ A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.030 μ A 0.17 % + 0.030 μ A 0.071 % + 0.030 μ A 0.071 % + 0.030 μ A	HP 3458A opt 002
1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.46 % + 0.20 μ A 0.17 % + 0.20 μ A 0.070 % + 0.20 μ A 0.036 % + 0.20 μ A 0.070 % + 0.20 μ A	
10 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.46 % + 2.0 μ A 0.17 % + 2.0 μ A 0.070 % + 2.0 μ A 0.036 % + 2.0 μ A 0.070 % + 2.0 μ A	
100 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.46 % + 20 μ A 0.17 % + 20 μ A 0.070 % + 20 μ A 0.036 % + 20 μ A 0.072 % + 20 μ A	
1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.46 % + 0.20 mA 0.19 % + 0.20 mA 0.095 % + 0.20 mA 0.12 % + 0.20 mA 0.35 % + 0.20 mA	

IV. Electrical – RF/Microwave

Parameter/Equipment	Frequency	CMC ^{2, 5, 7} ($\pm$)	Comments
RF Power Sensors ³	0.1 MHz to 8 GHz (8 to 12) GHz (12 to 18) GHz	2.0 % <i>CF</i> 2.2 % <i>CF</i> 2.3 % <i>CF</i>	Tegam 1827 <i>CF</i> = calibration factor
RF Power ³ – Measure (@ 0 dBm)	10 MHz 50 MHz to 7 GHz 8 GHz (9 to 10) GHz	1.4 % + <i>M</i> 2.5 % + <i>M</i> 2.1 % + <i>M</i> 2.2 % + <i>M</i>	HP 478A w/ HP 432A <i>M</i> = mismatch on both ports

V. Mechanical

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Scales & Balances ³ – Linearity & Shift Test Only			
Resolution: 0.000 002 g 0.000 01 g 0.0001 g 0.001 g	1 mg to 3 g 1 mg to 200 g	0.0062 mg 0.031 mg 0.065 mg 0.58 mg	Class 1 weights
Resolution: 0.0001 g 0.001 g 0.01 g 0.1 g	200 g to 20 kg	0.065 mg 0.60 mg 6.0 mg 58 mg	Class 1 weights
Resolution: 0.001 lb 0.01 lb 0.1 lb	2 oz to 2000 lb	0.0036 lb 0.0068 lb 0.058 lb	Class F weights
Torque Wrenches & Screwdrivers ³	0.5 ozf·in to 200 lbf·in 37.5 lbf·in to 2000 lbf·ft	0.14 % 0.19 %	CDI 2000-011-0H CDI 2000-610-02
Torque Transducers	0.5 ozf·in to 200 lbf·in (37.5 to 2000) lbf·ft	0.040 % 0.040 %	Calibrated weights & torque arms

Parameter/Equipment	Range	CMC ^{2, 5, 9} (±)	Comments
Pressure – Measuring Instruments			
Pneumatic	(0 to 1000) psig	0.020 %	DHI PPC3
	(0 to 10 000) psig	0.010 %	DHI 5203
	(0 to 30) psig	0.016 %	DHI RPM3
Vacuum	(-14.0 to 0) psig	0.015 %	DHI RPM3
Absolute	(1.7 to <8) psia	0.029 %	Mensor 2102
	(8 to 16) psia	0.017 %	
Hydraulic	(60 to 40 000) psig	0.012 %	Ruska 2450
Force Gages – Tension & Compression	2 ozf to 1000 lbf	0.043 lbf	Class F weights
	(500 to 2000) lbf	0.52 %	CDI-2000-011-0H
	1 gf to 20 kgf	0.099 gf	Class 1 weights
Load Cells – Tension & Compression	(0 to 1000) lbf	0.060 lbf	Class F weights
	(500 to 25 000) lbf	0.17 lbf	Load cell & force stand
Mass	1 mg	2.3 µg	Class 1 weights & Mettler AX26 balance
	(2 to 10) mg	2.6 µg	
	(10 to 500) mg	3.3 µg	
	1 g	4.3 µg	
	2 g	5.5 µg	
	3 g	6.4 µg	
	4 g	13 µg	Class 1 weights & Mettler AT201 balance
	5 g	14 µg	
	10 g	18 µg	
	20 g	18 µg	
	50 g	20 µg	
	100 g	35 µg	
	200 g	55 µg	
	(>200 to 500) g	0.16 mg	Class 1 weights & Volland Jupiter 3000
	1kg	0.25 mg	
	2 kg, 3 kg	0.52 mg	
	(>3 to 5) kg	8 mg	Class 1 weights & Sartorius LC5101S
	20 kg	15 mg	Class 1 weight & Sartorius 3808 MP8-1

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Mass - Avoirdupois	0.125 lb 0.25 lb	27 μ g 52 μ g	Class 1 weights & Mettler AT201 balance
	0.5 lb 1 lb 2 lb 5 lb 10 lb	0.59 mg 0.60 mg 0.63 mg 1.3 mg 6.7 mg	Class 1 weights & Sartorius LC5101S
	20 lb 25 lb 50 lb	14 mg 14 mg 15 mg	Class 1 weights & Sartorius 3808 MP8-1
Cable Tension	Up to 2000 lbf	0.52 %	CDI torque system with transducers &/or Class F weights

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 9} ($\pm$)	Comments
Temperature – Measuring Equipment	-196 °C Nominal	0.036 °C	LN2 w/ Hart 1590 & 5614 PRT
	(-80 to 0) °C	0.049 °C	Kaye CTR-80 bath w/ Hart 1590 Superthermometer & 5614 PRT
	0 °C	0.034	Drywell 9101 ice point w/ Hart 1590 Superthermometer & 5614 PRT
	(0 to 50) °C	0.034 °C	Fluke 7341 with Hart 1590 & 5614 PRT
	(50 to 200) °C	0.038 °C	Fluke 6331 w/ Hart 1590 Superthermometer & 5614 PRT
	(200 to 420) °C	0.068 °C	Drywell Hart 9122 w/ Hart 1590 Superthermometer & 5614 PRT
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 0.036 °C	Hart 1590 & 5614 PRT

Parameter/Equipment	Range	CMC ^{2, 9} (±)	Comments
Temperature ³ – Measure Uniformity of Ovens, Furnaces, Freezers, Refrigerators, Environmental Chambers	(-30 to 140) °C (140 to 200) °C (200 to 400) °C (-30 to 140) °C (140 to 200) °C (200 to 400) °C	1.9 °C 2.5 °C 2.6 °C 1.4 °C 2.2 °C 2.4 °C	Graphtec GL220 w/: Type K T/C Graphtec GL220 w/: Type T T/C
Infrared Temperature ³ – Measuring Equipment	-20 °C (100 to 400) °C (400 to 1000) °C (20 to 500) °C	1.6 °C (1.9 + 0.0020T) °C (0.8 + 0.0046T) °C (0.65 + 0.0012T) °C	Mikron M340 Omega BB-4A w/ Fluke 52 where <i>T</i> is temperature in °C Fluke 9132 w/ Fluke 5614 PRT & 1590 Superthermometer Where: $\lambda = (8 \text{ to } 14 \text{ } \mu\text{m})$ $\varepsilon = 0.95 \pm 0.02$
Relative Humidity ³ – Generate & Measure	(10 to 96) % RH	1.1 % RH	Edgetech RH CAL w/ Vaisala MI70

VII. Time & Frequency

Parameter/Range	Frequency	CMC ^{2, 9} (±)	Comments
Frequency – Measuring Equipment, Fixed Points	(5, 10) MHz	2.2×10^{-12} Hz/Hz	Fluke 910 GPS controlled frequency reference
Timometer	32 768 Hz (nominal)	0.0086 s/day	Fluke 910 w/ 33250A function generator
Digital Stopwatches & Timers Quartz Crystal	32 768 Hz (nominal)	0.038 s/day	Timometer

¹ This laboratory offers commercial and field calibration service.

- ² Calibration and Measurement Capability (CMC) uncertainty 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. 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; R is the numerical value of the resolution of the device in microinches; D is the diameter of the device in inches.
- ⁵ In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.
- ⁶ Adjustable thread rings are set to applicable specifications using calibrated master set plug gages.
- ⁷ The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.
- ⁸ Resolution of UUT not included in the calculation of CMC value.
- ⁹ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.
- ¹⁰ This scope meets A2LA's *P112 Flexible Scope Policy*.



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 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 April 2017).



Presented this 22nd day of September 2023.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2011.01
Valid to October 31, 2025

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