



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017,
ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3-2006

MICRO PRECISION CALIBRATION
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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 0935.10

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 7}:

I. Chemical Quantities

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Conductivity ³ – Measuring Equipment	0.89 µS/cm 9.94 µS/cm 100.5 µS/cm 9989 µS/cm 100 021 µS/cm	0.63 µS/cm 0.63 µS/cm 2.2 µS/cm 4.7 µS/cm 360 µS/cm	Standard conductivity solutions
pH ³ – Measuring Equipment.	1.67 pH 4 pH 7 pH 10 pH	0.01 pH 0.01 pH 0.01 pH 0.01 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 9} (±)	Comments
Calipers – Vernier Dial, Digital ³	Up to 40 in	(290 + 0.2L) µin	Gage blocks
Height Gages ³	Up to 40 in	(35 + 0.4L) µin	Gage blocks, surface plate

Parameter/Equipment	Range	CMC ^{2,9} ($\pm$)	Comments
Micrometers ³ – Resolution: 10 μ in 50 μ in 100 μ in 0.001 in Flatness Parallelism	Up to 1 in Up to 4 in (4 to 24) in (24 to 40) in 50 μ in 80 μ in	(6 + L) μ in (29 + 0.1L) μ in (48 + 1.7L) μ in (590 + 0.1L) μ in 7 μ in 9 μ in	Gage blocks Optical flat Optical parallels
Micrometer Standards	(1 to 4) in (> 4 to 20) in	(22 + 2L) μ in (15 + 3L) μ in	Universal length measuring machine, gage blocks
Indicators – Dial & Digital Indicators, LVDTs ³	Up to 6 in	(3.5 + 4L) μ in	Universal length measuring machine, gage blocks
Rigid Rules & Tape Measures ³ – Length	Up to 96 in	(2.4 + 0.001L) min	Ruler calibrator
Surface Plate ³ – Local Flatness	(-1000 to 1000) μ in	34 μ in	Repeat-o-meter
Gage Blocks – Length	(0.05 to 4) in (> 4 to 20) in	(2.6 + 1.5L) μ in (5 + 0.7L) μ in	Gage block comparator, universal length measuring machine, gage blocks
Plain Cylindrical Ring Gages – Internal Diameter	(0.05 to 12) in	(5 + 2L) μ in	Universal length measuring machine, gage blocks
Cylindrical Pin – Plug Gages	Up to 4 in (> 4 to 12 in)	(4 + 2L) μ in (-4 + 3L) μ in	Universal length measuring machine, gage blocks
Thread Wires, (80 to 5) TPI	(0.007 to 0.155) μ in	(1 + 4L) μ in	Universal length measuring machine, gage blocks

Parameter/Equipment	Range	CMC ^{2,9} ($\pm$)	Comments
Thread Plug Gages – Major Diameter Simple Pitch Diameter	(0.04 to 12) in (0.04 to 12) in	(16 + 1.6L) μ in (58 + 2.3L) μ in	Universal length measuring machine, gage blocks, master plug, thread measuring wires
Thread-Rings Gages – Minor Diameter Simple Pitch Diameter	(0.1 to 4) in (0.1 to 4) in	(22 + 2.6L) μ in (62 + 0.34L) μ in	Universal length measuring machine, gage blocks, master ring, T-square probe
Universal Length Measuring Machine – Linear Measurement ³	Up to 4 in (4 to 20) in	(2.6 + 1.5L) μ in (1 + 2L) μ in	Gage blocks

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,4,5} ($\pm$)	Comments
DC Voltage – Generate ³	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	3.6 μ V/V + 0.6 μ V 3.5 μ V/V + 2.3 μ V 2.4 μ V/V + 23 μ V 4 μ V/V + 15 μ V 6.2 μ V/V + 170 μ V 4 μ V/V + 5.5 mV	Multiproduct calibrator
DC Voltage – Measure ³	(0 to 100) mV 100 mV to 1V (1 to 10) V (10 to 100) V (100 to 1000) V (1000 to 100 000) V	8 μ V/V + 0.6 μ V 6 μ V/V + 0.6 μ V 4 μ V/V + 1.2 μ V 6.2 μ V/V - 14 μ V 5.4 μ V/V + 2 mV 1.2 mV/V + 68 μ V	Multimeter Multimeter / high voltage probe

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
DC Current – Generate ³	(0 to 220) μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A	35 μ A/A + 0.13 nA 31 μ A/A + 0.53 nA 32 μ A/A - 1.1 nA 54 μ A/A - 220 nA 160 μ A/A - 11 μ A 6 mA	Multi-function calibrator
DC Current – Measure ³ Toroidal Clamp Meter Other Type Clamp Meter	Up to 100 μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 500) A (10 to 500) A (10 to 500) A	20 μ A/A + 8 nA 63 μ A/A + 3 nA 100 μ A/A - 31 nA 330 μ A/A - 2.4 μ A 58 μ A/A + 25 μ A 25 μ A/A + 270 μ A 3 mA/A + 320 μ A 7 mA/A + 12 mA	Multimeter Multimeter with shunt 50 turn coil
DC Power – Generate ³	(1 to 9.99) W (10 to 149.99) W (150 to 899.99) W (900 to 2999) W (3000 to 6000) W	300 μ W/W + 0.8 mW 730 μ W/W - 3 mW 1.5 mW/W - 130 mW 900 μ W/W + 450 mW 1 mW/W + 2 mW	Multi-product calibrator

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage – Generate ³ (0 to 1100) V (0 to 220) V (0 to 22) V	$\leq$ 20 kHz (> 20 to 50) kHz (> 50 to 100) kHz (> 100 to 300) kHz > 300 kHz to 1 MHz	93 μ V/V + 2.5 μ V 86 μ V/V + 2.6 μ V 86 μ V/V + 9 μ V 240 μ V/V + 9 μ V 86 μ V/V + 9 μ V	Multi-function calibrator
AC Voltage – Measure ³ Up to 1000 V	$\leq$ 40 Hz > 40 Hz to 100 kHz	370 μ V/V + 310 nV 90 μ V/V + 5 μ V	Multimeter, synchronous sub-sampled mode

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage – Measure ³ (cont)			
Up to 100 V	(> 100 to 300) kHz > 300 kHz to 1 MHz (> 1 to 2) MHz	240 μ V/V + 14 μ V 240 μ V/V + 25 μ V 240 μ V/V + 370 μ V	Multimeter, synchronous sub- sampled mode
(1000 to 21 000) kV	60 Hz	6 mV/V	Multimeter / high voltage divider, synchronous sub- sampled mode
AC Current – Generate ³			
Up to 220 mA Up to 2.2 A	(10 to 20) Hz (> 20 to 40) Hz > 40 Hz to 5 kHz (> 5 to 10) kHz	5 mA/A + 12 nA 1.4 mA/A + 70 nA 1.4 mA/A - 36 nA 4 mA/A - 270 nA	Multi-function calibrator
(2.2 to 11) A	45 Hz to 1 kHz	61 mA	
AC Current – Measure ³			
Up to 1 A	(10 to 20) Hz (> 20 to 100) Hz > 100 Hz to 5 kHz (> 5 to 20) kHz (> 20 to 50) kHz (> 50 to 100) kHz	320 μ A/A + 17 nA 320 μ A/A - 8 nA 540 μ A/A - 6 nA 8.3 mA/A - 620 nA 8.3 mA/A - 6.3 μ A 1.3 mA/A + 780 nA	Multimeter
(1 to 11) A (11 to 500) A	45 Hz to 1 kHz 10 Hz to 30 kHz	330 μ A 420 μ A	Multimeter with shunt
Toroidal Clamp Meter: (10 to 500) A	(45 to 65) Hz (65 to 440) Hz	3.7 mA/A + 2.3 mA 9.7 mA/A + 1 mA	50 turn coil
Other Type Clamp Meter: (10 to 500) A	(45 to 65) Hz (65 to 440) Hz	9 mA/A + 15 mA 14 mA/A + 14 mA	

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Power – Generate ³ – PF = 0 to 1 (45 to 65) Hz 65 Hz to 1 kHz	(1 to 6000) W (1 to 6000) W	69 μ W/W + 8 mW 740 μ W/W + 7 mW	Multi-product calibrator

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
Resistance – Measure ³	(0 to 9.99) Ω (10 to 99.99) Ω 100 Ω to 0.999 k Ω (1 to 9.99) k Ω (10 to 99.99) k Ω 100 k Ω to 0.99 M Ω (1 to 9.99) M Ω (10 to 99.99) M Ω 100 M Ω to 1 G Ω	6.3 $\mu\Omega/\Omega$ + 54 $\mu\Omega$ 5 $\mu\Omega/\Omega$ + 64 $\mu\Omega$ 6 $\mu\Omega/\Omega$ - 11 $\mu\Omega$ 8.4 $\mu\Omega/\Omega$ - 2.6 m Ω 8.4 $\mu\Omega/\Omega$ - 2.3 m Ω 6.5 $\mu\Omega/\Omega$ + 180 m Ω 2 $\mu\Omega/\Omega$ + 5 Ω 10 $\mu\Omega/\Omega$ - 81 Ω 8 $\mu\Omega/\Omega$ + 100 Ω	Multimeter
Resistance – Generate ³	(0 to 10.99) Ω (11 to 32.99) Ω (33 to 109.99) Ω (110 to 329.99) Ω 330 Ω to 1.099 k Ω (1.1 to 3.299) k Ω (3.3 to 10.99) k Ω (11 to 32.99) k Ω (33 to 109.99) k Ω (110 to 329.99) k Ω 330 k Ω to 1.099 M Ω (1.1 to 3.299) M Ω (3.3 to 10.99) M Ω (11 to 32.99) M Ω (33 to 109.99) M Ω (110 to 330) M Ω	4.2 $\mu\Omega/\Omega$ + 87 $\mu\Omega$ 37 $\mu\Omega/\Omega$ - 240 $\mu\Omega$ 1.1 $\mu\Omega/\Omega$ + 830 $\mu\Omega$ 36 $\mu\Omega/\Omega$ - 2.4 m Ω 2.1 $\mu\Omega/\Omega$ + 7 m Ω 37 $\mu\Omega/\Omega$ - 25 m Ω 5.4 n Ω/Ω + 76 m Ω 34 $\mu\Omega/\Omega$ - 270 m Ω 11 n Ω/Ω + 760 m Ω 36 $\mu\Omega/\Omega$ - 2.8 m Ω 12 n Ω/Ω + 8 Ω 68 $\mu\Omega/\Omega$ - 60 Ω 160 n Ω/Ω + 140 Ω 920 $\mu\Omega/\Omega$ - 9 k Ω 2 n Ω/Ω + 19 k Ω 13 n Ω/Ω + 19 k Ω	Multi-product calibrator
Fixed Points	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω	26 $\mu\Omega$ 26 $\mu\Omega$ 27 $\mu\Omega$ 93 $\mu\Omega$ 860 $\mu\Omega$ 890 $\mu\Omega$ 8 m Ω	

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
Resistance – Generate ³ (cont) Fixed Points	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	8 m Ω 76 m Ω 77 m Ω 760 m Ω 0.77 Ω 7.9 Ω 8.2 Ω 140 Ω 160 Ω 19 k Ω 19 k Ω	Multi-product calibrator
Inductance – Generate ³	(100 to 1000) nH 1 μ H to 1000 mH	0.001 nH + 0.024 % of setting 0.025 % of setting	Decade inductor
Electrical Calibration of Thermocouple Indicators ³ – Type B Type C Type E Type J	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C (0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.52 °C 0.41 °C 0.36 °C 0.39 °C 0.36 °C 0.31 °C 0.37 °C 0.60 °C 1.0 °C 0.60 °C 0.19 °C 0.17 °C 0.19 °C 0.25 °C 0.32 °C 0.19 °C 0.17 °C 0.20 °C 0.28 °C	Multi-product calibrator

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
Electrical Calibration of Thermocouple Indicators ³ –			
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.39 °C 0.22 °C 0.19 °C 0.31 °C 0.48 °C	Multi-product calibrator
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.48 °C 0.26 °C 0.23 °C 0.22 °C 0.32 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.68 °C 0.42 °C 0.39 °C 0.48 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.56 °C 0.43 °C 0.44 °C 0.55 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.75 °C 0.29 °C 0.19 °C 0.17 °C	
Electrical Calibration of RTD Indicating Systems ³ –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C (630 to 800) °C	0.07 °C 0.09 °C 0.11 °C 0.12 °C 0.26 °C	Multi-product calibrator

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicating Systems ³ – (cont)			Multi-product calibrator
Pt 3926, 100 Ω	(-200 to 0) °C	0.07 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 400) °C	0.11 °C	
	(400 to 630) °C	0.12 °C	
Pt 3916, 100 Ω	(-200 to -190) °C	0.30 °C	
	(-190 to 0) °C	0.07 °C	
	(0 to 300) °C	0.09 °C	
	(300 to 600) °C	0.10 °C	
	(600 to 630) °C	0.26 °C	
Pt 385, 200 Ω	(-200 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 600) °C	0.17 °C	
	(600 to 630) °C	0.20 °C	
Pt 385, 500 Ω	(-200 to 100) °C	0.07 °C	
	(100 to 260) °C	0.08 °C	
	(260 to 600) °C	0.11 °C	
	(600 to 630) °C	0.13 °C	
Pt 385, 1 kΩ	(-200 to 100) °C	0.05 °C	
	(100 to 260) °C	0.06 °C	
	(260 to 600) °C	0.08 °C	
	600 °C to 630 °C	0.27 °C	
PtNi 385, 120 Ω	(-80 to 100) °C	0.09 °C	
	(1000 to 260) °C	0.16 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.36 °C	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
Capacitance – Measuring Equipment ³			Multi-product calibrator
(0.33 to 329.99) nF	50 Hz to 1 kHz	6 pF/F + 30 pF	
(0.33 to 109.99) μF		8 μF/F + 0.6 μF	
(110 to 329.99) μF		1.4 μF	
(33 to 1100) μF		0.013 μF/F + 0.2 μF	

Parameter/Range	Frequency	CMC ^{2,4,5} ($\pm$)	Comments
Capacitance – Generate ³ (100 to 1000) pF (1 to 100) nF (0.1 to 1) μ F	50 Hz to 1 kHz	0.06 % + 0.03 pF 0.06 % + 0.01 nF 0.03 μ F	Decade capacitor

Parameter/Equipment	Range	CMC ^{2,4,5} ($\pm$)	Comments
Oscilloscope ³ –			
DC Vertical Deflection Accuracy 50 Ω Load	(1 to 10) mV (> 10 to 100) mV (> 100 to 1000) mV (> 1 to 5) V	4 μ V 45 μ V 500 μ V 3 mV	Scope calibrator w/active probe
DC Vertical Deflection Accuracy 1 M Ω Load	(1 to 10) mV (> 10 to 100) mV (> 100 to 1000) mV (> 1 to 10) V (> 10 to 100) V (> 100 to 220) V	4 μ V 54 μ V 390 μ V 5 mV 33 mV 350 mV	
Vertical Deflection Accuracy 50 Ω Load Square Wave Signal < 10kHz	1 to 10) mV (> 10 to 100) mV (> 100 to 1000) mV (> 1 to 5) V	4 μ V 38 μ V 450 μ V 3 mV	
Vertical Deflection Accuracy 1 M Ω Load Square Wave Signal < 10kHz	(1 to 10) mV (> 10 to 100) mV (> 100 to 1000) mV (> 1 to 10) V (> 10 to 100) V (> 100 to 220) V	5 μ V 40 μ V 400 μ V 4 mV 39 mV 490 mV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
Oscilloscope ³ – (cont)			
Horizontal Cursor Accuracy (Time Base)	5 s 2 s 1 s 500 ms 200 ms 100 ms 50 ms 20 ms 10 ms 5 ms 2 ms 1 ms 500 µs 200 µs 100 µs 50 µs 20 µs 10 µs 5 µs 2 µs 1 µs 500 ns 200 ns 100 ns 50 ns 20 ns 10 ns 5 ns 2 ns	4 ms 2 ms 2 ms 0.39 ms 0.35 ms 0.28 ms 46 µs 39 µs 35 µs 4 µs 4 µs 2 µs 0.41 µs 0.34 µs 0.22 µs 62 ns 49 ns 47 ns 4 ns 3 ns 2 ns 0.62 ns 0.37 ns 0.33 ns 54 ps 33 ps 27 ps 4 ps 3 ps	Scope calibrator w/active probe
Bandwidth 50 Ω	50 kHz 50 kHz to 100 MHz (> 100 to 300) MHz (> 300 to 600) MHz 600 MHz to 26.5 GHz (> 26.5 to 50) GHz	0.44 % 0.71 % 0.76 % 0.81 % 1.1 % 1.9 %	Multi-product calibrator power splitter, power sensors power meter
Bandwidth 50 Ω, Relative to 50 kHz	50 kHz to 100 MHz (> 100 to 300) MHz (> 300 to 600) MHz 600 MHz to 26.5 GHz (> 26.5 to 50) GHz	0.38 % 0.78 % 0.83 % 1.1 % 1.9 %	
Rise / Fall Time			
3.4 ns	(10 to 90) %	0.39 ns	
14 ns	(10 to 90) %	0.43 ns	

IV. Electrical – RF/Microwave

[illegible]

Parameter/Range	Frequency	CMC ^{2, 6, 8} ($\pm$)	Comments
Power Sensor Calibration Factor (cont) – (-70 to -20) dB	(0.01 to 0.03) GHz (> 0.03 to 4) GHz (> 4 to 18) GHz (> 18 to 34) GHz (> 34 to 40) GHz (> 40 to 50) GHz	1.8 % 1.8 % 2.1 % 3.4 % 4.2 % 6.9 %	Coaxial thermistor & thermocouple power sensors
Frequency Modulation Rejection – Equipment ³ Rate: 400 HZ to 1 kHz Dev.: $\leq$ 5 kHz peak Dev.: $\leq$ 50 kHz peak Residuals AM ³	250 kHz to 10 MHz 10 MHz to 26.5 GHz 150 kHz to 26.5GHz	0.12 % AM 0.12 % AM 0.007 % (rms)	Measuring receiver
Frequency Modulation Distortion ³ – Bandwidth: 20 Hz to 250 kHz	150 kHz to 26.5 GHz	0.13 % IV	Measuring receiver IV = Indicated value
Frequency Modulation – Magnitude Deviation ³ – Rate: 20 Hz to 10 kHz Dev: $\leq$ 40 kHz Rate: 50 Hz to 200 kHz Dev: $\leq$ 400 kHz Rate: 50 Hz to 200 kHz Dev: $\leq$ 400 kHz Rate: 50 Hz to 200 kHz Dev: $\leq$ 400 kHz	250 kHz to 10 MHz 10 MHz to 6.6 GHz (6.6 to 13.2) GHz (13.2 to 26.5) GHz	0.1 Hz 0.2 Hz 0.4 Hz 0.5 Hz	Measuring receiver

Parameter/Range	Frequency	CMC ^{2, 6, 8} (±)	Comments
Amplitude Modulation – Rejection ³ – Rate: 400 Hz to 1 kHz Depth: ≤ 50 %	150 kHz to 6.6 GHz (6.6 to 13.2) GHz (13.2 to 26.5) GHz	12 Hz 24 Hz 48 Hz	Measuring receiver
Amplitude Modulation – Depth ³ – Rate: 50 Hz to 10 kHz Depth: (5 to 99) % Rate: 50 Hz to 100 kHz Depth: (20 to 99) % Rate: 50 Hz to 100 kHz Depth: (5 to 20) % Rate: 50 Hz to 100 kHz Depth: (20 to 99) % Rate: 50 Hz to 100 kHz Depth: (5 to 20) %	150 kHz to 10 MHz 10 MHz to 3 GHz 10 MHz to 3 GHz (3 to 26.5) GHz (3 to 26.5) GHz	0.2 % IV 0.3 % IV 0.3 % IV 0.9 % IV 0.5 % IV	Measuring receiver IV = indicated value
Amplitude Modulation – Flatness ³ – Rate: (9 Hz to 10 kHz) Depth: (5 to 99) %	10 MHz to 26.5 GHz	0.15 % IV	Measuring receiver IV = indicated value
Residuals FM ³ – Bandwidth: 50 Hz to 3 kHz	150 kHz to 10 MHz (3 to 6.6) GHz (6.6 to 13.2) GHz (13.2 to 26.5) GHz	1.3 Hz 1.9 Hz 2.7 Hz 3.8 Hz	Measuring receiver

Parameter/Range	Frequency	CMC ^{2, 6, 8} ($\pm$)	Comments
Amplitude Modulation – Distortion ³ – Rate: 20 Hz to 250 kHz BW (0.01 to 100) %	150 kHz to 26.5 GHz	0.1 % IV	Measuring receiver IV = indicated value
Phase Modulation – Accuracy ³ – Rate: 20 Hz to 200 kHz Deviation: > 0.7 Rad Deviation: > 0.3 Rad Rate: 20 Hz to 200 kHz Deviation: > 2 Rad Deviation: > 0.6 Rad Rate: 20 Hz to 200 kHz Deviation: > 4 Rad Deviation: > 1.2 Rad	100 kHz to 6.6 GHz 100 kHz to 6.6 GHz (6.6 to 13.2) GHz (6.6 to 13.2) GHz (13.2 to 26.5) GHz (13.2 to 26.5) GHz	0.1 % IV 0.2 % IV 0.1 % IV 0.2 % IV 0.1 % IV 0.2 % IV	Measuring receiver IV = indicated value
AM Rejection ³ – Rate: 50 Hz to 3 kHz Deviation: > 50 % AM @ 1 kHz Rate	100 kHz to 26.5 GHz	0.004 rad	Measuring receiver
Phase Residuals ³ – Rate: 50 Hz to 3 kHz	100 kHz to 26.5 GHz	0.01 rad	Measuring receiver
Phase Distortion ³ – Bandwidth: 20 Hz to 250 kHz	150 kHz to 26.5 GHz	0.14 % IV	Measuring receiver IV = indicated value
Harmonics – Measure ³	30 Hz to 50 GHz	1.3 dB	Spectrum analyzer

Parameter/Equipment	Range	CMC ^{2, 6, 8} ($\pm$)	Comments
Reflection Magnitude – Phase $S_{11/22}$ – Measure ³	5 Hz to 500 MHz	0.064 lin 0.36°	Vector network analyzer, calibration kit & network analyzer
Transmission Magnitude – Phase $S_{21/12}$ – Measure ³	5 Hz to 500 MHz	0.014 dB 0.36°	Vector network analyzer, calibration kit & network analyzer
Reflection Magnitude - Phase $S_{11/22}$ – Measure ³	30 Hz to 1.3 GHz (> 1.3 to 3) GHz (> 3 to 6) GHz (> 6 to 8) GHz (> 8 to 18) GHz (> 18 to 26.5) GHz	0.002 lin 0.6° 0.002 lin 1.3° 0.004 lin 1.7° 0.005 lin 1.5° 0.01 lin 1.5° 0.013 lin 1.5°	Network analyzer, cal kit
Transmission Magnitude – Phase $S_{21/12}$ – Measure ³	30 Hz to 1.3 GHz (> 1.3 to 3) GHz (> 3 to 6) GHz (> 6 to 8) GHz (> 8 to 18) GHz (> 18 to 26.5) GHz	0.06 dB 0.4° 0.08 dB 0.8° 0.15 dB 0.8° 0.12 dB 1.8° 0.23 dB 1.8° 0.29 dB 1.8°	Network analyzer, cal kit
Impedance $S_{11/22}$ – Measure ³	5 Hz to 500 MHz 30 Hz to 3 GHz (>3 to 6) GHz (>6 to 8) GHz (>8 to 18) GHz (>18 to 26.5) GHz	6.4 % IV 0.2 % IV 0.4 % IV 0.5 % IV 1 % IV 1.3 % IV	Network analyzer, cal kit
Input Noise Level – Measure ³	30 Hz to 3GHz (> 3 to 6) GHz	0.2 dB 0.4 dB	Cal kit
Trace Noise Magnitude Phase – Measure ³	30 Hz to 3GHz (> 3 to 6) GHz	0.04 dB 0.8° 0.05 dB 0.8°	Cal kit
Insertion Delay ³ Group Delay Flatness ³ F0= +/- 21MHz	220 MHz to 6 GHz 220 MHz to 6 GHz	0.4 ns 0.4 ns	Network analyzer, calibration unit

V. Mechanical

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Pressure – Measure & Measuring Equipment ³	(-10 to 10) in H ₂ O (-15 to 0) psi (0 to 5) psi (> 5 to 100) psi (> 100 to 300) psi (50 to 15 000) psi	0.09 % + 0.003 in H ₂ O 0.03 % + 0.017 psi 0.002 psi 0.003 % + 0.04 psi 0.18 psi 0.014 % + 1.2 psi	Pressure calibrator Dead weight tester
Torque Tools – Measure ³	(0.1 to 100) ozf·in (0.15 to 9) lbf·in (10 to 100) lbf·in (0.1 to 200) lbf·ft (> 200 to 1000) lbf·ft	1 % + 0.1 ozf·in 0.03 % + 0.05 lbf·in 0.5 % + 0.1 lbf·in 0.6 % + 0.1 lbf·ft 1.2 % + 0.33 lbf·ft	Torque calibrator
Torque Analyzers & Transducers – Measure ³	Up to 100 lbf·in	0.02 % IV + 0.06 lbf·in	Torque wheel/arm, weights
Mass	(1 to 100) mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 3 kg 5 kg 10 kg 15 kg 20 kg 25 kg	6.7 µg 8.2 µg 8.3 µg 8.4 µg 8.5 µg 9 µg 10 µg 14 µg 20 µg 33 µg 50 µg 0.6 mg 780 µg 1.2 mg 1.6 mg 2.6 mg 5.2 mg 5.8 mg 6.3 mg 6.6 mg	Ultra Class, Class 0 & 1 weights with balance Class 1,2 & 3 weights with balance

Parameter/Equipment	Range	CMC ^{2, 6, 8} ($\pm$)	Comments
Scales & Balances ³	Up to 200 g > 200 g to 25 kg (> 25 to 150) kg	1.4 μ g/g + 9 μ g 0.3 μ g/g + 730 μ g 0.23 μ g/g + 1.5 mg	Ultra Class Class 1 & 3 weights Class F weights
POVA (Piston/Plunger Operated Volumetric Apparatus) Pipettes, Syringes, Piston/Displacement Burettes, Dispensers, Liquid Handlers, Titrators, & Dilutors.	(Up to 50) μ L (> 0.050 to 200) mL	0.13 % IV + 24 η L 0.17 % IV	Analytical balance IV = indicated value
Accelerometers – Frequency Response 10 Hz to 2 kHz (> 2 to 10) kHz	(1 to 5) g	1.6 % IV 2.2 % IV	Vibration calibration system, standard accelerometers IV = indicated value
Force ³ – Measure & Measuring Equipment Tension – Compression	(Up to 25 000) lbf (> 25 000 to 50 000) lbf (> 50 000 to 100 000) lbf	0.003 % + 0.8 lbf 0.005 % + 0.6 lbf 0.005 % + 1 lbf	Load cell & press

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 6, 8} ($\pm$)	Comments
Humidity – Measuring Equipment	(11 to 90) % RH (90 to 95) % RH	1.5 % RH 2.5 % RH	Humidity meter
Temperature ³ – Measuring Equipment	(-80 to 420) °C (> 420 to 450) °C	0.0006 % + 0.02 °C 0.15 % - 0.6 °C	Bath, drywell calibrator temperature meter, SPRT

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Temperature Coefficients ITS-90 SPRT, PRT, RTD Probes	(-80 to 420) °C < 0.010° > 0.010°	0.11 % 0.09 %	Bath, drywell calibrator, meter, SPRT
Temperature ³ – Infrared Thermometers	(10 to 300) °C	0.03 % IV + 1.2 °C	Black body calibrator $\epsilon = 0.99$, $\lambda = (8 \text{ to } 14) \mu\text{m}$ IV = Indicated Value

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Frequency ³ – Measure Generate	1 Hz to 40 GHz 1 Hz to 50 GHz	10 mHz 1.2 part in 10 ¹² Hz	GPS receiver, counter
Swipe Time ³ – Generate	(20 to 100) ns (> 100 to 100) ms > 100 ms to 1 s (> 1 to 10) s (> 10 to 100) s (> 100 to 200) s	3.7 ns 0.61 μs 58 μs 340 μs 5.9 ms 0.2 s	GPS receiver, signal generator
Timers – Measure ³	Up to 9:59:59.999 hr	730 ns/s + 0.07 ms	Function generator, counter

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Photo Tachometer ³ – Measure	(0 to 90 000) RPM	0.002 % IV + 0.05 RPM	Function generator with lamp IV = indicated value
Rotational Speed ³ – Measure	(0 to 19 000) RPM	0.009 % IV + 0.5 RPM	Photo tachometer IV = indicated value

¹ This laboratory offers commercial calibration service and field calibration services.

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. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % confidence level, 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 The measurands stated are generated with the Fluke 5500A, Fluke 5720A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁵ The measurands stated are measured with the HP 3458A series of instruments. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.

⁶ In the statement of CMC, the value is defined as the percentage of reading unless otherwise noted.

⁷ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁸ 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.

⁹ In the statement of CMC, L is the numerical value of the nominal length in the indicated units.



Accredited Laboratory

A2LA has accredited

MICRO PRECISION CALIBRATION

San Diego, 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, ANSI/NCSL Z540.3-2006, 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 13th 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 0935.10
Valid to September 30, 2025

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