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

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CALIBRATION

Valid To: January 31, 2023 Certificate Number: 0935.20

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations and dimensional testing[1, 10]:

I. Acoustics & Vibration

Parameter/Equipment	Range	CMC[2] (±)	Comments
Sound Pressure Level/Sound Level Meter	(94 & 114) dB @ 1 kHz	0.24 dB	Comparison to sound level calibrator

II. Chemical Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Conductivity Meters	10 µS/cm 100 µS/cm 1000 µS/cm 1408 µS/cm	0.55 µS/cm 2.2 µS/cm 5.9 µS/cm 7.0 µS/cm	Comparison to standard solutions
pH Meters	(4, 7, 10) pH unit	0.02 pH unit	Comparison to standard solutions
Mass Concentration – Refractometers	(0 to 70) % Brix	0.12 % Brix	Balance

III. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Calipers	Up to 40 in	(310 + 4.1*L*) µin	Gage blocks and check master
Indicators	Up to 4.0 in	(3.3 + 5.4*L*) µin	Indicator calibrator, master gage blocks
Micrometers (Internal, External, Depth, Bore)	Up to 8 in (8 to 24) in	(33 + 1.4*L*) µin (19 + 5.2*L*) µin	Gage blocks and gage rods
Height Gages	Up to 40 in	(23 + 3.2*L*) µin	Gage blocks and check master
Rules and Tapes	Up to 40 in Up to 164 ft	(75 + 15*L*) µin (140 + 19*L*) µin	Comparison to glass scales
Gauge Blocks – Length	Up to 12 in	(2.3 + 1.3*L*) µin	P&W Labmaster™, master gage blocks
Cylindrical Plain Plug Gages – Outside Diameter	Up to 12 in	(2.5 + 1.3*L*) µin	P&W Labmaster™, master gage blocks
Thread Plug Gage – Major Diameter Pitch Diameter	 Up to 12 in Up to 12 in	 (2.5 + 1.4*L*) µin (47 + 0.29*L*) µin	 P&W Labmaster™ & thread measuring wires
Thread Ring Gage – Minor Diameter Pitch Diameter	 Up to 12 in Up to 12 in	 (10 + 0.87*L*) µin (40 + 0.58*L*) µin	 P&W Labmaster™, master ring gage, master gage blocks

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
Ring Gage – Plain Cylindrical	Up to 12 in	(10 + 0.87*L*) µin	P&W Labmaster™, master rings and master gage blocks
Micrometers/Length Standards	Up to 12 in	(2.2 + 1.6*L*) µin	P&W Labmaster™, master gage blocks
Feeler/Taper Gage	Up to 0.5 in	(18 + 0.30*L*) µin	Supermicrometer and master gage blocks
Angle Meter (Protractor)	(0 to 90)°	0.0085°	Sine bar and gage blocks
Supermicrometer – Length	Up to 1 in	(4.8 + 3.4*L*) µin	Gage blocks and optical parallel
Surface Plates –			
Local Area Flatness	[(12 x 12) to (70 x 140)] in	16 µin	Repeat-o-meter
Overall Flatness	[(12 x 12) to (70 x 140)] in	0.23 % + 0.25 arcsec	Wyler surface plate measuring system
Radius Gage	Up to 6 in	(110 + 1.0*L*) µin	Optical comparator
CMM[3] –			ISO 10360-2: 2001:
3D Length – Error of Indication	Up to 40 in	(2.5 + 24*L*) µin	Checker master
Probing Error	0.785 985 in	8.2 µin	Master sphere

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Optical Comparators and Visual Systems[3] – X & Y Axis Length Error of Indication Angle	 Up to 0.5 in Up to 24 in 0, 30°, 45°, 60°, 90°	 (50 + 0.19*L*) µin (79 + 6.4*L*) µin 0.0017°	 Glass scale and gage blocks Angle blocks
Coating Thickness Gauge – Ferrous and Non-Ferrous	Up to 60 mils	0.010 mils	Comparison to standard shims

IV. Dimensional Testing[7]

Parameter/Equipment	Range	CMC[2] (±)	Comments
Length (3D)[3] – Fixtures and Workpieces	Up to 1500 mm	110 µm/m + 6.2 µm	CMM
Length (2D) – Fixtures and Workpieces	Up to 200 mm	250 µm/m + 1.1 µm	Optical comparators

V. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	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	12 µV/V + 1.0 µV 12 µV/V + 1.0 µV 10 µV/V + 2.2 µV 15 µV/V 14 µV/V + 43 µV 14 µV/V + 43 µV	Direct comparison to Fluke multi-calibrator

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Voltage – Measure[3]	(0 to 100) mV 100 mV to 1V (1 to 10) V (10 to 100) V (100 to 1000) V	1.8 µV/V + 0.90 µV 0.46 µV/V + 1.0 µV 1.1 µV/V + 0.42 µV 1.2 µV/V + 0.48 µV 6.1 µV/V + 0.50 mV	Direct comparison to DMM
High Voltage	(100 to 1000) V (1000 to 20 000) V	0.71 mV/V + 0.53 V 3.3 mV/V + 8.3 V	Comparison to high voltage meter
DC Current - Generate[3]	(0 to 22) mA (22 to 220) mA 220 mA to 2.2 A	66 µA/A + 0.24 µA 0.010 % 0.023 %	Direct comparison to Fluke multi-calibrator
	(2.2 to 11) A (11 to 20.5) A	0.056 % 0.17 %	
	(0.1 to 1000) A	0.21 %	Comparison to Fluke multi-calibrator with current coil
DC Current – Measure[3]	(0 to 1) µA (1 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	4.3 µA/A + 0.059 nA 1.8 µA/A + 0.061 nA 3.9 µA/A + 0.041 nA 6.7 µA/A + 0.24 nA 5.7 µA/A + 0.73 nA 10 µA/A + 0.040 µA 0.14 mA/A + 0.013 mA	Direct comparison to DMM
	(0.1 to 15) A (15 to 100) A (100 to 300) A (300 to 1000) A	0.0042 % 0.0048 % 0.0058 % 0.038 %	Shunt monitored with DMM
	(0.1 to 2000) A	0.84 %	Comparison to digital clamp meter

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Resistance – Generate[3]	(0 to 1.9) Ω (1.9 to 19) Ω (19 to 190) Ω (0.19 to 1.9) kΩ (1.9 to 19) kΩ (19 to 190) kΩ (0.19 to 1.9) MΩ (1.9 to 19) MΩ (19 to 100) MΩ	96 µΩ/Ω + 51 µΩ 38 µΩ/Ω + 0.12 mΩ 21 µΩ/Ω + 0.39 mΩ 18 µΩ/Ω + 0.65 mΩ 17 µΩ/Ω + 0.32 mΩ 22 µΩ/Ω + 0.69 mΩ 38 µΩ/Ω + 3.8 Ω 34 µΩ/Ω + 72 Ω 11 µΩ/Ω + 0.45 kΩ	Comparison to Fluke multi-calibrator
	(0.1 to 100) mΩ (0.1 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ (1 to 10) GΩ (10 to 100) GΩ 1 TΩ 10 TΩ	0.60 % 0.064 % 0.0087 % 0.0035 % 0.0031 % 0.0028 % 0.0027 % 0.0060 % 0.0062 % 0.0092 % 0.016 % 0.016 % 0.025 % 0.35 % 1.5 %	Comparison to resistor standards
Resistance[3] – Measure	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ	53 µΩ/Ω + 26 µΩ 2.2 µΩ/Ω + 76 µΩ 6.7 µΩ/Ω + 32 µΩ 2.9 µΩ/Ω + 0.41 mΩ 2.9 µΩ/Ω + 0.42 mΩ 6.6 µΩ/Ω + 37 mΩ 17 µΩ/Ω + 1 Ω 78 µΩ/Ω + 63 Ω 0.30 mΩ/Ω + 2.3 kΩ 2.3 mΩ/Ω + 0.20 MΩ	Direct comparison to DMM
	(1 to 10) GΩ	4.5 mΩ/Ω + 0.20 MΩ	LCR meter

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
Capacitance[3] – Generate			Comparison to Fluke multi-calibrator
(220 to 399.9) pF	10 Hz to 10 kHz	4.4 mF/F + 12 pF	
(0.4 to 1.0999) nF	10 Hz to 10 kHz	4.3 mF/F + 12 pF	
(1.1 to 3.2999) nF	10 Hz to 3 kHz	10 mF/F	
(3.3 to 10.999) nF	10 Hz to 1 kHz	2.3 mF/F + 11 pF	
(11 to 32.999) nF	10 Hz to 1 kHz	8.0 mF/F	
(33 to 109.99) nF	10 Hz to 1 kHz	2.3 mF/F + 0.11 nF	
(110 to 329.99) nF	10 Hz to 1 kHz	2.3 mF/F + 0.34 nF	
(0.33 to 1.0999) µF	(10 to 600) Hz	2.3 mF/F + 1.2 nF	
(1.1 to 3.2999) µF	(10 to 300) Hz	2.2 mF/F + 3.6 nF	
(3.3 to 10.999) µF	(10 to 150) Hz	2.3 mF/F + 11 nF	
(11 to 32.999) µF	(10 to 120) Hz	3.6 mF/F + 3.4 nF	
(33 to 109.99) µF	(10 to 80) Hz	4.2 mF/F + 0.11 µF	
(110 to 329.99) µF	(0.1 to 50) Hz	3.9 mF/F + 0.35 µF	
(0.33 to 1.0999) mF	(0.1 to 20) Hz	3.9 mF/F + 1.2 µF	
(1.1 to 3.2999) mF	(0.1 to 6) Hz	4.0 mF/F + 3.5 µF	
(3.3 to 10.999) mF	(0.1 to 2) Hz	3.9 mF/F + 12 µF	
(11 to 32.999) mF	(0.1 to 0.6) Hz	8.1 mF/F + 35 µF	
(33 to 110) mF	(0.1 to 0.2) Hz	12 mF/F + 0.12 mF	
Capacitance[8] – Generate			
1 pF to 10 µF	(60 to 1000) Hz	0.052 %	Direct comparison to capacitance decade
Inductance[8] – Generate			
1.0 mH	Fixed Points (0.1 to 10) kHz	0.029 %	Direct comparison to standard inductor
10 mH		0.029 %	
100 mH		0.032 %	
1 H		0.028 %	

Parameter/Equipment	Range	CMC² (±)	Comments
Electrical Simulation of Thermocouple – Generate / Measure			
Type B	(600 to 800) °C (800 to 1550) °C (1550 to 1820) °C	0.57 °C 0.47 °C 0.46 °C	Comparison to Fluke multi-calibrator
Type C	(0 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.37 °C 0.59 °C 0.98 °C	
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.58 °C 0.19 °C 0.25 °C	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.32 °C 0.20 °C 0.27 °C	
Type K	(-200 to -100) °C (-100 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.39 °C 0.22 °C 0.31 °C 0.47 °C	
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.43 °C 0.31 °C 0.21 °C	
Type N	(-200 to -100) °C (-100 to 410) °C (410 to 1300) °C	0.47 °C 0.26 °C 0.32 °C	
Type R	(0 to 250) °C (250 to 1000) °C (1000 to 1767) °C	0.68 °C 0.44 °C 0.49 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.58 °C 0.47 °C 0.57 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.73 °C 0.28 °C 0.20 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.65 °C 0.32 °C	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Electrical Simulation of RTD Indicating Systems[3] –			
Pt 385, 100 Ω	(-200 to 800) °C	0.0064 % + 0.053 °C	Comparison to Fluke multi-calibrator
Pt 3926, 100 Ω	(-200 to 630) °C	0.0050 % + 0.055 °C	
Pt 3916, 100 Ω	(-200 to 630) °C	0.0059 % + 0.054 °C	
Pt 385, 200 Ω	(-200 to 630) °C	0.0060 % + 0.052 °C	
Pt 385, 500 Ω	(-200 to 630) °C	0.0060 % + 0.058 °C	
Pt 385, 1000 Ω	(-200 to 630) °C	0.0051 % + 0.054 °C	
PtNi 385, 120 Ω	(-80 to 260) °C	0.0023 % + 0.044 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.0065 % + 0.071 °C	
Electrical Simulation of RTD Calibrators Systems[3] –			
Pt 385, 100 Ω	(-200 to 800) °C	0.039 °C	Comparison to DMM
Pt 3926, 100 Ω	(-200 to 630) °C	0.044 °C	
Pt 3916, 100 Ω	(-200 to 630) °C	0.041 °C	
Pt 385, 200 Ω	(-200 to 630) °C	0.039 °C	
Pt 385, 500 Ω	(-200 to 630) °C	0.053 °C	
Pt 385, 1000 Ω	(-200 to 630) °C	0.043 °C	
PtNi 385, 120 Ω	(-80 to 260) °C	0.042 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.04 °C	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage[3] – Generate			
(0 to 220) mV	(10 to 40) Hz (40 to 20) kHz (20 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.33 mV/V + 6.3 µV 0.17 mV/V + 6.8 µV 1.3 mV/V + 6.1 µV 1.5 mV/V + 12 µV 2.4 mV/V + 22 µV 4.9 mV/V + 35 µV	Direct comparison to Fluke multi-calibrator
220 mV to 2.2 V	(10 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.44 mV/V + 15 µV 0.10 mV/V + 20 µV 0.31 mV/V + 0.20 mV 0.63 mV/V + 0.19 mV 1.6 mV/V + 0.17 mV 3.7 mV/V + 0.29 mV	
(2.2 to 22) V	(10 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.25 mV/V + 0.36 mV 0.19 mV/V 0.87 mV/V 2.1 mV/V 2.1 mV/V 5.2 mV/V	
(22 to 220) V	(10 to 40) Hz 40 Hz to 20 kHz (20 to 100) kHz	0.26 mV/V + 0.19 mV 0.12 mV/V + 1.2 mV 0.80 mV/V + 0.32 mV	
(220 to 1000) V	50 Hz to 1 kHz	0.14 mV/V + 2.1 mV	
AC Voltage[3] – Measure			
(0 to 100) mV	(0.01 to 1) kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	56 µV + 6.1 µV 0.16 mV/V + 4.3 µV 0.40 mV/V + 55 µV 1.2 mV/V + 0.48 mV 11 mV/V + 32 µV	Direct comparison to DMM
100 mV to 1 V	(0.01 to 1) kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.11 mV/V + 0.14 µV 0.19 mV/V + 1.2 µV 0.95 mV/V + 0.16 µV 3.6 mV/V + 0.20 µV 12 mV/V + 0.12 µV	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Voltage[3] – Measure (cont)			
(1 to 10) V	(0.01 to 1) kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz	0.11 mV/V + 4.3 µV 0.19 mV/V + 0.66 µV 0.95 mV/V + 0.61 µV 3.6 mV/V + 0.17 µV 12 mV/V + 3.5 µV 6.0 mV/V + 57 mV	Direct comparison to DMM
(10 to 100) V	(0.01 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.27 mV/V + 1.6 mV 0.26 mV/V + 0.75 mV 0.44 mV/V + 0.73 mV 1.5 mV/V + 1.3 mV	
(100 to 1000) V	(0.01 to 1) kHz (1 to 20) kHz	0.52 mV/V + 27 mV 0.79 mV/V + 27 mV	
High Voltage			
(0.1 to 1) kV (1 to 20) kV	(50 to 100) Hz	0.89 mV/V + 1.4 V 3.3 mV/V + 6.7 V	Comparison to high voltage meter
AC Current[3] – Generate			
(0 to 22) mA	10 Hz to 1 kHz (1 to 10) kHz	0.23 mA/A + 15 nA 0.28 %	Direct comparison to Fluke multi-calibrator
(22 to 220) mA	10 Hz to 1 kHz (1 to 10) kHz	1.4 mA/A 0.17 % + 21 µA	
220 mA to 2.2 A	40 Hz to 1 kHz (1 to 10) kHz	0.38 mA/A + 0.19 mA 0.65 %	
(2.2 to 11) A	45 Hz to 1 kHz (1 to 5) kHz	2.6 mA/A 3.9 %	
(11 to 20.5) A	45 Hz to 1 kHz (1 to 5) kHz	1.6 mA/A + 4.8 mA 3.1 %	
(20 to 1000) A	(50 to 400) Hz	0.29 %	Comparison to Fluke multi-calibrator with current coil

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Current[3] – Measure			
(0 to 100) µA	(0.01 to 1) kHz	16 nA	Direct comparison to DMM
(0.1 to 1) mA	(0.01 to 1) kHz	74 µA/A + 3.9 nA	
(1 to 10) mA	(0.01 to 1) kHz	73 µA/A + 5.5 nA	
(10 to 100) mA	(0.01 to 1) kHz	73 µA/A + 0.013 nA	
(0.1 to 1) A	(0.01 to 1) kHz	0.13 mA/A	
(0.1 to 15) A	(0.01 to 1) kHz	0.027 %	Shunt monitored with DMM
(15 to 100) A	(0.01 to 1) kHz	0.11 %	
(100 to 300) A	(0.01 to 1) kHz	0.10 %	
(300 to 1000) A	(0.01 to 1) kHz	0.081 %	Comparison to digital clamp meter
(0 to 2000) A	(0.01 to 1) kHz	1.6 %	

VI. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Dynamic Viscosity[3] – Measurement Equipment	(0.1 to 140) mPa·s (0.1 to 3000) mPa·s (0.1 to 25 000) mPa·s (0.1 to 70 000) mPa·s (0.1 to 210 000) mPa·s	0.54 % 0.65 % 0.48 % 0.65 % 0.48 %	Comparison to Cannon viscosity standards
Flow[3] (Air) – Measurement Equipment	(0.1 to 500) ml/min (0.1 to 10) l/min (0.1 to 50) l/min	0.42 % 0.41 % 0.41 %	Comparison to flow calibrator system
Velocity (Air) – Measurement Equipment	(0 to 20) m/s	4.2 % +0.098 m/s	Comparison to standard anemometer with wind tunnel

VII. Mechanical

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRC: < 35 HRC (≥ 35 and < 60) HRC ≥ 60 HRC HRBW: < 60 HRBW (≥ 60 and < 80) HRBW ≥ 80 HRBW HR15N < 78 HR15N (≥ 78 and < 90) HR15N ≥ 90 HR15N HR45N < 37 HR45N (≥ 37 and < 66) HR45N ≥ 66 HR45N HR30TW < 57 HR30TW (≥ 57 and < 70) HR30TW ≥ 70 HR30TW HR15TW < 81 HR15TW (≥ 81 and < 87) HR15TW ≥ 87 HR15TW	 0.40 HRC 0.36 HRC 0.33 HRC 0.65 HRBW 0.65 HRBW 0.48 HRBW 0.43 HR15N 0.33 HR15N 0.25 HR15N 0.47 HR45N 0.48 HR45N 0.21 HR45N 0.56 HR30TW 0.36 HR30TW 0.34 HR30TW 0.44 HR15TW 0.37 HR15TW 0.33 HR15TW	Indirect method - ASTM E18
Shore Hardness	(20 to 90) points	0.35 points	Direct comparison to gage blocks and balance
Gauge Pressure[3] – Measurement Equipment	(-15 to +30) psi (0 to 1000) psi (0 to 10 000) psi	0.030 % + 0.000 64 psi 0.016 % + 0.080 psi 0.015 % + 0.71 psi	Comparison to Fluke pressure calibrator systems

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Torque – Measurement Equipment	(0.1 to 400) in·ozf (0.1 to 50) in·lbf (0.1 to 150) in·lbf (0.1 to 400) in·lbf (0.1 to 600) ft·lbf	0.56 % 0.55 % 0.55 % 0.58 % 0.56 %	CDI torque system
Torque Analyzers, Transducers	(0.1 to 200) in·lbf (0.1 to 370) ft·lbf	0.080 % 0.14 %	Direct comparison to torque wheel & dead weights
Force – Tension and Compression	(0.1 to 1000) kgf (0.1 to 200) kgf (0.1 to 4500) kgf (0.1 to 45 000) kgf	0.018 % 0.071 % 0.088 % 0.33 %	Direct comparison to dead weights Comparison to force transducer
Scales and Balances[3]	 (0 to 300) g (0 to 100) kg (0 to 1000) kg	 1.5 µg/g+.015 mg 3.4 µg/g 0.20 mg/g	Comparison to weights ASTM Class 0 ASTM Class 1 OIML Class M2
Mass	(1 to 100) g (1 to 34) kg	0.16 mg 54 µg/g + 69 mg	Substitution method using reference weight & balance
Piston/Plunger Operated Volumetric Apparatus (POVA)	(10 to 20) µl (20 to 50) µl (50 to 100) µl 100 µl to 20 ml	0.77 % of reading 0.40 % of reading 0.21 % of reading 0.14 % of reading	Scale, Weight Set Class 0, Barometer DP97
Other Volumetric Devices	(0.1 to 100) ml (0.1 to 34) l	0.13 ml/l 0.20 ml/l + 0.25 ml	Gravimetric method using reference weight & balance

VIII. Thermodynamics

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Relative Humidity – Measuring Equipment	11 % RH 33 % RH 75 % RH 97 % RH	0.70 % RH 0.61 % RH 0.90 % RH 1.5 % RH	Saturated salt solutions
Relative Humidity – Measure[3]	(0 to 100) % RH	1.6 %	Comparison to humidity meter
Temperature – Infrared Thermometers	(35 to 500) °C (500 to 1000) °C	0.73 % 0.77 %	Comparison to infrared calibrator
Temperature – Measuring Equipment	(-40 to 300) °C (300 to 1100) °C	0.21 °C 0.46 %	Comparison to temperature blocks calibrators
Temperature[3] – Measure	(-80 to 300) °C	0.084 °C	Comparison to RTD thermometer

IX. Time & Frequency

Parameter/Equipment	Range	CMC[2, 9] (±)	Comments
Frequency – Measure	1 Hz to 10 MHz 1 MHz to 3 GHz	0.12 nHz/Hz + 0.39 nHz 4.6 nHz/Hz + 0.41 mHz	Direct comparison using DMM Using universal counter
Frequency – Generate	0.01 Hz to 2 MHz	30 µHz/Hz + 0.88 mHz	Direct comparison to Fluke multi-calibrator

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Timers/Stop Watches	(0 to 24) hr	55 ms	Method totalize, using universal counter
Angular Frequency – Photo Tachometers	(1 to 1 000 000) rpm	0.000 43 %	Comparison to Fluke multi-calibrator with LED

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[1] This laboratory offers commercial dimensional testing/calibration service and field calibration service.

[2] Calibration and Measurement Capability Uncertainty (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. CMCs 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] 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.

[5] In the statement of CMC, *L* is the numerical value of the nominal length of the device measured in inches. Pitch diameter is measured by the three-wire method.

[6] In the statement of CMC, the value is defined as the percentage of reading.

[7] This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

[8] The CMC stated for calibrations performed in the laboratory is not applicable for calibrations performed in the field.

[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

MICRO PRECISION CALIBRATION DE MEXICO

Silao, Guanajuato, MEXICO

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 5th day of January 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 935.20
Valid to January 31, 2023

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