SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: May 31, 2027 Certificate Number: 1741.06

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 8]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters[3]	4 pH 7 pH 10 pH	0.04 pH 0.04 pH 0.05 pH	Standard pH solutions
Conductivity Meters[3]	10 µS/cm 100 µS/cm 1000 µS/cm 10 000 µS/cm 100 000 µS/cm	0.37 µS/cm 2.3 µS/cm 5.4 µS/cm 42 µS/cm 370 µS/cm	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Pin Gage[3] – Class Z & ZZ	Up to 1 in	35 µin	Micrometer
Angle Indicators & Protractors[3]	30°, 45°, 60°, 75°, 90°	0.037°	Angle block set
Calipers[3]	Up to 48 in	$(5.6 + 10L)$ µin + $0.6R$	Gage blocks

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Parameter/Equipment	Range	CMC[2, 6, 7] (±)	Comments
Linear Dial & Test Indicators[3]	Up to 12 in	(5.7 + 8.8*L)* µin + 0.6*R*	Gage blocks
Thickness/Snap Gages[3]	Up to 12 in	(5.7 + 8.8*L)* µin + 0.6*R*	Gage blocks
Steel Rules & Tapes Measures[3]	Up to 25 ft	(3.2 + 9.2*L*) µin + 0.6*R*	Gage blocks
Micrometers[3]	Up to 1 in (1 to 48) in	13 µin + 0.6*R* (9.8 + 3*L*) µin + 0.6*R*	Gage blocks
Length Standards	Up to 10 in Up to 250 mm (10 to 40) in (275 to 1000) mm	(41 + 3*L*) µin (1 + 0.004*L*) µm (150 + 3.1*L*) µin (3.6 + 0.004*L*) µm	Supermicrometer™ Tesa TT80 w/ lever probe
Height Gages[3]	Up to 48 in	(7.3 + 9.5*L*) µin + 0.6*R*	Gage blocks
Cylindrical Measure – Plain Plugs, Pins, Discs, External Diameter[3]	Up to 10 in	(33 + 6.8*L*) µin	Supermicrometer™
Optical Comparators[3]			
X-Y Linearity	Up to 12 in	180 µin	Glass master scales
Magnification	10x to 250x	0.014 in	
Angle	(0 to 90)°	0.06°	Angle block set
Feeler Gages, Thickness Films & Shims[3]	Up to 0.25 in	(41 + 3*L*) µin	Supermicrometer™
Surface Plates[3] – Grades AA, A, & B			
Repeatability	0.002 in	32 µin	Repeat-o-meter
Flatness	Up to 120*DL* in	(33 + 0.54*DL*) µin	Federal level systems

Parameter/Equipment	Range	CMC[2] (±)	Comments
Coating Thickness Gauges[3] – Film Ultrasonic	Up to 60 mils	0.064 mils	Coating thickness standards

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
DC Voltage – Measure[3]	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 6) kV (6 to 20) kV (20 to 35) kV (35 to 40) kV	11 µV/V + 0.3 µV 10 µV/V + 0.3 µV 10 µV/V + 0.5 µV 11 µV/V + 30 µV 27 µV/V + 100 µV 1.2 % 2.4 % 1.2 % 2.4 %	Agilent 3458A Fluke 80K-6 & DMM Fluke 80K-40 & DMM
DC Voltage – Generate[3]	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1020) V	17 µV/V + 1 µV 9 µV/V + 2 µV 10 µV/V + 15 µV 15 µV/V + 150 µV 15 µV/V + 1.5 mV	Fluke 5522A
DC Power[3] – Generate 33 mV to 1020 V: (0.33 to 329.99) mA (0.33 to 2.9999) A (3 to 20.5) A	 (0.01 to 330) W (0.33 to 3.3) kW (3.3 to 20.5) kW	 0.03 % 0.03 % 0.09 %	 Fluke 5522A
DC Current – Measure[3]	Up to 100 nA 100 nA to 1 µA (1 to 10) µA (10 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 100) A	32 µA/A + 0.04 nA 23 µA/A + 0.04 nA 23 µA/A + 0.1 nA 23 µA/A + 0.8 nA 23 µA/A + 5 nA 23 µA/A + 50 nA 37 µA/A + 0.5 µA 0.011 % + 10 µA 0.25 %	Agilent 3458A Empro shunt w/ Agilent 3458A

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Current – Generate[3]	(0 to 330) µA (0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 1.1) A (1.1 to 3) A (0 to 11) A (11 to 21) A	0.012 % + 0.02 µA 0.008 % + 0.05 µA 0.01 % + 0.25 µA 0.011 % + 2.5 µA 0.016 % + 40 µA 0.028 % + 40 µA 0.04 % + 500 µA 0.08 % + 750 µA	Fluke 5522A
DC Clamp-On Meters[3]	Up to 150 A (150 to 1000) A	0.51 % + 0.038 A 0.51 % + 0.51 A	Fluke 5522A w/5500 coil
Resistance – Measure[3]	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	18 µΩ/Ω + 50 µΩ 15 µΩ/Ω + 0.5 mΩ 14 µΩ/Ω + 0.5 mΩ 12 µΩ/Ω + 5 mΩ 12 µΩ/Ω + 50 mΩ 17 µΩ/Ω + 2 Ω 51 µΩ/Ω + 100 Ω 0.051 % + 1 kΩ 0.11 % + 10 kΩ	Agilent 3458A
Resistance – Generate[3]	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 Ω to 1.1 kΩ 1.1 kΩ to 11 kΩ 11 kΩ to 110 kΩ 110 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	32 µΩ/Ω + 0.001 Ω 36 µΩ/Ω + 0.0015 Ω 22 µΩ/Ω + 0.0014 Ω 22 µΩ/Ω + 0.002 Ω 22 µΩ/Ω + 0.02 Ω 22 µΩ/Ω + 0.2 Ω 25 µΩ/Ω + 2 Ω 47 µΩ/Ω + 30 Ω 0.01 % + 50 Ω 0.02 % + 2.5 kΩ 0.039 % + 3 kΩ 0.24 % + 100 kΩ 1.2 % + 500 kΩ	Fluke 5522A
Fixed Points[3]	0.001Ω 0.01Ω 0.1Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ	0.25 µΩ 1.8 µΩ 19 µΩ 33 µΩ 630 µΩ 6.2 mΩ 62 mΩ 620 mΩ 6.2 Ω 65 Ω	Fixed resistors
Insulation Resistance[3]	(1M, 10M, 100M, 1G, 10G) Ω	1.3 %	High Voltage Resistor Box

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
Capacitance – Generate[3]			
(220.0 to 399.9) pF	(10 to 10 000) Hz	0.39 % + 10 pF	Fluke 5522A
(0.4 to 1.0999) nF	(10 to 10 000) Hz	0.39 % + 0.01 nF	
(1.1 to 3.2999) nF	(10 to 3000) Hz	0.39 % + 0.01 nF	
(3.3 to 10.9999) nF	(10 to 1000) Hz	0.2 % + 0.1 nF	
(11 to 109.999) nF	(10 to 1000) Hz	0.2 % + 0.1 nF	
(110 to 329.999) nF	(10 to 1000) Hz	0.2 % + 0.3 nF	
(0.33 to 1.099 99) µF	(10 to 600) Hz	0.2 % + 1 nF	
(1.1 to 3.299 99) µF	(10 to 300) Hz	0.2 % + 3 nF	
(3.3 to 10.9999) µF	(10 to 150) Hz	0.2 % + 10 nF	
(11 to 32.9999) µF	(10 to 120) Hz	0.32 % + 30 nF	
(33 to 109.999) µF	(10 to 80) Hz	0.36 % + 100 nF	
(110 to 329.999) µF	Up to 50 Hz	0.36 % + 300 nF	
(0.33 to 1.099 99) mF	Up to 20 Hz	0.36 % + 1 µF	
(1.1 to 3.299 99) mF	Up to 6 Hz	0.37 % + 3 µF	
(3.3 to 10.9999) mF	Up to 2 Hz	0.37 % + 10 µF	
(11 to 32.9999) mF	Up to 0.60 Hz	0.6 % + 30 µF	
(33 to 110) mF	Up to 0.20 Hz	0.87 % + 100 µF	
AC Voltage – Generate[3]			
(1 to 33) mV	(10 to 45) Hz	0.063 % + 6 µV	Fluke 5522A
	45 Hz to 10 kHz	0.014 % + 6 µV	
	(10 to 20) kHz	0.017 % + 6 µV	
	(20 to 50) kHz	0.078 % + 6 µV	
	(50 to 100) kHz	0.28 % + 12 µV	
	(100 to 500) kHz	0.63 % + 50 µV	
(33 to 330) mV	(10 to 45) Hz	0.024 % + 8 µV	
	45 Hz to 10 kHz	0.012 % + 8 µV	
	(10 to 20) kHz	0.013 % + 8 µV	
	(20 to 50) kHz	0.028 % + 8 µV	
	(50 to 100) kHz	0.063 % + 32 µV	
	(100 to 500) kHz	0.16 % + 70 µV	
330 mV to 3.3 V	(10 to 45) Hz	0.024 % + 50 µV	
	45 Hz to 10 kHz	0.012 % + 60 µV	
	(10 to 20) kHz	0.015 % + 60 µV	
	(20 to 50) kHz	0.024 % + 50 µV	
	(50 to 100) kHz	0.055 % + 130 µV	
	(100 to 500) kHz	0.19 % + 600 µV	

Parameter/Range	Frequency	CMC[2, 4, 5] (±)	Comments
AC Voltage – Generate[3] (continued)			
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 650 µV 0.012 % + 600 µV 0.019 % + 600 µV 0.028 % + 600 µV 0.07 % + 1.6 mV	Fluke 5522A
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 2 mV 0.016 % + 6 mV 0.02 % + 6 mV 0.024 % + 6 mV 0.16 % + 50 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.024 % + 10 mV	
AC Voltage – Measure[3]			
Up to 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	0.031 % + 0.03 % of rng 0.021 % + 0.011 % of rng 0.031 % + 0.011 % of rng 0.11 % + 0.011 % of rng 0.51 % + 0.011 % of rng 4.1 % + 0.02 % of rng	Agilent 3458A
10 mV to 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	0.008 % + 0.004 % of rng 0.008 % + 0.002 % of rng 0.015 % + 0.002 % of rng 0.031 % + 0.002 % of rng 0.081 % + 0.002 % of rng 0.31 % + 0.01 % of rng	
(10 to 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	0.021 % + 0.004 % of rng 0.021 % + 0.002 % of rng 0.021 % + 0.002 % of rng 0.036 % + 0.002 % of rng 0.13 % + 0.002 % of rng 0.41 % + 0.01 % of rng	
(100 to 600) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.041 % + 0.004 % of rng 0.041 % + 0.002 % of rng 0.061 % + 0.002 % of rng 0.13 % + 0.002 % of rng 0.31 % + 0.002 % of rng	
(1 to 6) kV	60 Hz	1.8 %	Fluke 80K-6 & DMM
(6 to 40) kV	60 Hz	6.1 %	Fluke 80K-40 & DMM

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Clamp-On Meters[3]–			
Up to 150 A:			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.29 % + 0.026 A 0.8 % + 0.28 A	Fluke 5522A w/ 5500 coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.57 % + 0.25 A 1 % + 0.25 A	
(150 to 1025) A:			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.3 % + 0.27 A 0.8 % + 0.27 A	Fluke 5522A w/ 5500 coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.57 % + 0.94 A 1 % + 0.94 A	
AC Current – Generate[3]			
(0 to 0.33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.1 µA 0.12 % + 0.1 µA 0.097 % + 0.1 µA 0.24 % + 0.15 µA 0.63 % + 0.2 µA 1.3 % + 0.4 µA	Fluke 5522A
(0.33 to 3.3) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.15 µA 0.097 % + 0.15 µA 0.078 % + 0.15 µA 0.16 % + 0.2 µA 0.39 % + 0.3 µA 0.78 % + 0.6 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 2 µA 0.07 % + 2 µA 0.032 % + 2 µA 0.063 % + 2 µA 0.16 % + 3 µA 0.32 % + 4 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 20 µA 0.07 % + 20 µA 0.032 % + 20 µA 0.078 % + 50 µA 0.16 % + 100 µA 0.32 % + 200 µA	

Parameter/Range	Frequency	CMC[2, 4, 5] (±)	Comments
AC Current – Generate[3] (cont)			Fluke 5522A
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 100 µA 0.039 % + 100 µA 0.47 % + 1 mA 2 % + 5 mA	
(1.1 to 3.0) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 100 µA 0.047 % + 100 µA 0.47 % + 1 mA 2 % + 5 mA	
(3.0 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.047 + 2mA 0.078 % + 2 mA 2.4 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.094 % + 5mA 0.12 % + 5 mA 2.4 % + 5 mA	
AC Current – Measure[3]			
(0 to 100) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 Hz to 5 kHz	0.41 % + 0.03 % rng 0.16 % + 0.03 % rng 0.07 % + 0.03 % rng 0.07 % + 0.03 % rng	Agilent 3458A
(1 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.41 % + 0.02 % rng 0.16 % + 0.02 % rng 0.07 % + 0.02 % rng 0.04 % + 0.02 % rng 0.07 % + 0.02 % rng 0.41 % + 0.04 % rng 0.56 % + 0.15 % rng	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.41 % + 0.02 % rng 0.17 % + 0.02 % rng 0.09 % + 0.02 % rng 0.11 % + 0.02 % rng 0.31 % + 0.02 % rng 1.1 % + 0.04 % rng	
(1 to 100) A	DC to 60 Hz	0.27 %	Empro shunt w/ Agilent 3458A

Parameter/Range	Range	CMC[2, 4, 5] (±)	Comments
AC Power[3] – Generate (45 to 65) Hz; PF=1 (33 to 330) mV Range (3.3 to 8.99) mA (9 to 32.99) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 20.5) A 330 mV to 1020 V Range (3.3 to 8.99) mA (9 to 32.99) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 20.5) A	 110 µW to 3 mW (3 to 11) mW (1.1 to 30) mW (3 to 110) mW (11 to 300) mW (30 to 730) mW 73 mW to 1.5 W 150 mW to 6.8 W 1.1 mW to 9 W 3 mW to 33 W 11 mW to 90 W 30 mW to 330 W 110 mW to 900 W 300 mW to 2200 W 730 mW to 4500 W (1.5 to 20.9) kW	 0.11 % 0.08 % 0.11 % 0.08 % 0.11 % 0.09 % 0.11 % 0.11 % 0.1 % 0.07 % 0.1 % 0.07 % 0.09 % 0.08 % 0.1 % 0.1 %	Fluke 5522A
RTD[3] – Generate, Pt 385, 100 Ω	(-200 to 0) °C (0 to 400) °C (400 to 630) °C (630 to 800) °C	0.08 °C 0.12 °C 0.14 °C 0.24 °C	Fluke 5522A
RTD[3] – Measure, Pt 385, 100 Ω	(-200 to 100) °C (100 to 800) °C	0.11 °C 0.04 % + 0.05 °C	Fluke 754

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Oscilloscopes[3] –			
Square Wave Signal:			
50 Ω Load @ 1 kHz 1 MΩ Load @ 1 kHz	1.0 mV to 6.6 $V_{pk - pk}$ 1.0 mV to 130 $V_{pk - pk}$	0.26 % + 40 µV 0.12 % + 40 µV	Fluke 5522A w/ SC600
DC Volt Amplitude:			
50 Ω Load 1 MΩ Load	(0 to 6.6) V (0 to 130) V	0.25 % + 40 µV 0.05 % + 40 µV	
Level Sine Wave:	(0 to 600) MHz	3.3 µHz/Hz	
Frequency	50 kHz Reference 50 kHz to 100 MHz	2 % + 300 µV 3.5 % + 300 µV	
Amplitude	(100 to 300) MHz (300 to 600) MHz	4 % + 300 µV 6 % + 300 µV	
Flatness (Bandwidth)	0 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	1.5 % + 100 µV 2 % + 100 µV 4 % + 100 µV	
Time Markers:			
Into a 50 Ω Load	5 s to 50 ms 20 ms to 2 ns	(25 + 1000*t*) µs/s 2.5 µs/s	
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	≤ 300 ps ≤ 350 ps	(+ 0 / -110) ps	

Parameter/Range	Range	CMC[2] (±)	Comments
Electrical Simulation of Thermocouples[3] –			
Type B	(600 to 800) °C (800 to 1820) °C	0.35 °C 0.29 °C	Fluke 5522A
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.40 °C 0.14 °C 0.18 °C	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.22 °C 0.15 °C 0.19 °C	
Type K	(-200 to -100) °C (-100 to 1000) °C (1000 to 1372) °C	0.27 °C 0.21 °C 0.32 °C	
Type R	(-200 to -100) °C (-100 to 410) °C (410 to 1300) °C	0.34 °C 0.31 °C 0.24 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1767) °C	0.46 °C 0.30 °C 0.34 °C	
Type T	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C (-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.39 °C 0.32 °C 0.38 °C 0.50 °C 0.20 °C 0.14 °C	

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Fume Hoods – Air Velocity Only[3]	(70 to 200) ft/min	Greater of 4.6 % or 4.6 ft/min	Anemometer
Viscosity[3] - Measuring Instruments	Up to 150 000 cP	0.9 %	Viscosity reference solutions

V. Mechanical

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
Scales & Balances[3]	(1 to 500) mg Up to 5 g Up to 10 g Up to 30 g Up to 50 g Up to 100 g Up to 200 g Up to 300 g Up to 500 g Up to 1000 g (> 1 to 35) kg (5 to 10) g (10 to 500) g 501 g to 20 kg (> 20 to 750) kg Up to 1000 lb (1000 to 120 000) lb	0.013 mg + 0.6*R* 0.043 mg + 0.6*R* 0.062 mg + 0.6*R* 0.096 mg + 0.6*R* 0.17 mg + 0.6*R* 0.31 mg + 0.6*R* 0.63 mg + 0.6*R* 0.92 mg + 0.6*R* 1.5 mg + 0.6*R* 3.1 mg + 0.6*R* 3.1 mg per 1000 g + 0.6*R* 0.04 % + 0.6*R* 0.025 % + 0.6*R* 0.017 % + 0.6*R* 0.017 % per 20 kg + 0.6*R* 0.017 % + 0.6*R* 0.017 % per 1000 lb + 0.6*R*	ASTM Class 1 weights (applied load) Class F weights (applied load)
Mass – Field Check Weight Comparison[3] –	Up to 20 kg	0.013 %	Scale w/ Class F weights
Force – Tension & Compression[3]	Up to 100 lbf Up to 5000 lbf 50 to 500 lbf 100 to 1000 lbf 200 to 2000 lbf 500 to 5000 lbf 1000 to 10 000 lbf 5000 to 50 000 lbf	(0.038 % + 0.6*R*) lbf (0.038 % + 0.6*R*) lbf 0.3 % 0.3 % 0.3 % 0.3 % 0.3 % 0.3 %	Class F weights Tension only using Class F weights Load cells w/ indicator
Torque Testers[3]	Up to 2000 lbf·ft	0.18 %	Class F weights & torque arms
Torque Wrenches[3]	4 lbf·in to 2000 lbf·ft	0.8 %	CDI suretest
Speed[3] – Measuring Equipment (Simulation) RPM/Totalizer/Rate Meters	(6 to 100 000) rpm	0.004 %	Agilent 33220A frequency synthesizer

Parameter/Equipment	Range	CMC[2, 5, 6, 7] (±)	Comments
Speed[3] – Measure Optic/Non-contact: RPM Totalizer/Rate Meters Contact: RPM Totalizer/Rate Meters	 (5 to 200 000) rpm (2 to 3300) fpm (0.5 to 12 000) rpm (2 to 3300) fpm	 0.017 % 0.017 % 0.22 % 0.22 %	 Monarch PLT200
Rotary Torque Measure[3] – Pneumatic, DC, Pulse	(2.5 to 25) N·m (25 to 75) N·m (75 to 180) N·m (180 to 500) N·m	0.33 N·m 1.0 N·m 2.5 N·m 6.6 N·m	Aimco ADTS w/ rotary transducers
Totalize Meters[3] – Distance Measure Mechanical Counter/Totalizers	 Up to 200 ft Up to 999 999 counts	 0.64 % (0.02 % + 0.6*R*)	 Monarch PLT200
Pressure[3] – Measure & Measuring Equipment	Up to 28 in·H_2O Up to 138 in·H_2O (-15 to 30) psig Up to 100 psig Up to 300 psig Up to 1000 psig Up to 3000 psig Up to 10 000 psig	0.017 in·H_2O 0.084 in·H_2O 0.028 psig 0.063 psig 0.18 psig 0.58 psig 1.8 psig 5.7 psig	Merriam M2000 Fluke 754 w/ 700 & 750 series modules
Indirect Verification of Rockwell Hardness Testers[3]	HRC: (20 to 30) HRC (35 to 55) HRC (60 to 65) HRC HRBW: (40 to 59) HRBW (60 to 79) HRBW (80 to 100) HRBW	 0.83 HRC 0.81 HRC 0.81 HRC 0.87 HRBW 0.81 HRBW 0.82 HRBW	Indirect verification per ASTM E18

VI. Thermodynamics

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Temperature – Measuring Instruments[3]	(-30 to 125) °C (125 to 420) °C (400 to 550) °C (550 to 600) °C	0.12 °C 0.21 °C 0.72 °C 0.83 °C	Fluke 7103 w/external probe Fluke 9011 w/external probe Fluke 9011
Temperature – Measure[3]	(-196 to 200) °C (201 to 420) °C	0.10 °C 0.16 °C	Hart Scientific 1560/5627A
Plate Temperature – Infrared Devices[3]	(35 to 100) °C Up to 200 °C Up to 350 °C Up to 500 °C	1 °C 1.2 °C 1.7 °C 2.3 °C	Fluke 4181
Relative Humidity[3] – Measure	(10 to 90) % RH	1.5 % RH	Vaisala MI-70 w/ HMP77 probe
Relative Humidity[3] – Measuring Equipment	(20 to 80) % RH	1.6 % RH	Vaisala MI-70 w/ HMP77 probe

VII. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5, 7] (±)	Comments
Frequency[3] – Measure	(1 to 40) Hz 40 Hz to 10 MHz 0.1 to 350 MHz	0.06 % 0.012 % 1.7 µHz/Hz + 0.0001 Hz	Agilent 3458A Keysight 53210A
Frequency[3] – Measuring Equipment	0.01 Hz to 1100 MHz	3.3 µHz/Hz	Fluke 5522A/SC1100
Timers & Stopwatches[3]	(1 to 3600) s	0.32 s	Monarch tachometer & timer

[1] This laboratory offers commercial calibration and field calibration services.

[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. 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. CMCs 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 a percentage denotes a percent of reading unless otherwise noted.

[6] 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, *DL* is the length of the diagonal in inches and *t* represents the time.

[7] 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.

[8] This scope meets A2LA's *P112 Flexible Scope Policy.*

Accredited Laboratory

A2LA has accredited

CROSS TECHNOLOGIES, INC

Chattanooga, TN

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 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 16th day of June 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.06
Valid to May 31, 2027

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