SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: August 30, 2027 Certificate Number: 1741.11

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, 7]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters[3] – Fixed Points	4 pH 7 pH 10 pH	0.03 pH 0.03 pH 0.03 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Pin Gages[3] – Class ZZ	Up to 1.0 in	90 µin	Micrometer
Calipers[3]	Up to 40 in	$(4.5 + 9.9L)$ µin + $0.6R$	Gage blocks
Micrometers[3]	Up to 40 in	$(4.8 + 9.5L)$ µin + $0.6R$	Gage blocks
Steel Rules[3]	Up to 72 in	$(2.5 + 10L)$ µin + $0.6R$	Gage blocks
Linear Indicators[3] – Dial & Test	Up to 4 in	$(3.0 + 9.4L)$ µin + $0.6R$	Gage blocks

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Height Gages[3]	Up to 20 in (20 to 48) in	(52 + 7.9*L*) µin + 0.6*R* (19 + 9.2*L*) µin + 0.6*R*	Gage blocks
Tape Measures[3]	Up to 25 ft	(2.5 + 10*L*) µin + 0.6*R*	Gage blocks
Angle Indicators & Protractors[3] – Fixed Points	30°, 45°, 60°, 75°, 90° Up to 60°	0.03° 7.3 Arc Seconds	Angle block set Sine Bar w/ Gage blocks
Feeler/Thickness Gages[3]	Up to 1 in	90 µin	Micrometer
Diameter /Radius/Fixture Gages[3] –			
Diameter	Up to 1 in Up to 8 in	90 µin 0.0013 µin	Micrometer Calipers
Length	Up to 25.0 ft	0.090 in	Tape measure
Optical Comparators[3] –			
X-Y Linearity	Up to 6 in	130 µin	Glass master scales
Magnification	10x to 62.5x	0.012 in	
Angle	Up to 90°	0.06°	Angle block set
Surface Plates[3] – Grades AA, A, & B			
Repeatability	0.001 in	40 µin	Repeat-o-meter
Flatness	Up to 120 *DL* in	(33 + 0.54*DL*) µin	Federal level systems

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Voltage – Measure[3]	(0 to 100) mV (0.1 to 1.0) 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	7.8 µV/V + 0.2 µV 4.4 µV/V + 0.3 µV 4.4 µV/V + 0.5 µV 6.8 µV/V + 30 µV 7 µV/V + 0.5 mV 1.2 % 2.4 % 1.2 % 2.4 %	Fluke 8588A 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 Current – Measure[3]	(0 to 10) µA (10 to 100) µA (0.1 to 1.0) mA (1 to 10) mA (10 to 100) mA (0.1 to 1.0) A (1 to 10) A (1 to 30) A (1 to 100) A	28 µA/A + 0.4 nA 10 µA/A + 0.4 nA 10 µA/A + 4 nA 15 µA/A + 40 nA 58 µA/A + 1 µA 0.014 % + 0.1mA 0.024 % + 0.4 mA 0.056 % + 4.4 mA 0.25 %	Fluke 8588A Empro shunt w/ Agilent 34401A
DC Current – Generate[3]	(0 to 330) ⌈A (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

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Clamp-On Meters[3] – Non-Toroidal	 Up to 150 A (150 to 1025) A	 0.51 % + 0.038 A 0.51 % + 0.51 A	 Fluke 5522A w/5500 coil
Resistance – Measure[3]	(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 (1 to 10) GΩ	19 μΩ/Ω + 4.0 μΩ 11 μΩ/Ω + 14 μΩ 9.6 μΩ/Ω + 50 μΩ 9.4 μΩ/Ω + 0.5 mΩ 9.4 μΩ/Ω + 5.0 mΩ 9.6 μΩ/Ω + 50 mΩ 11 μΩ/Ω + 1 Ω 24 μΩ/Ω + 100 Ω 0.013 % + 10 kΩ 0.14 % + 1 MΩ 0.14 % + 10 MΩ	Fluke 8588A
Resistance – Generate[3]	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 Ω to 1.1 kΩ (1.1to 11) kΩ (11 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
DC Power – Generate[3] 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

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
Capacitance – Generate[3]			
(220 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	(0 to 50) Hz	0.36 % + 300 nF	
(0.33 to 1.099 99) mF	(0 to 20) Hz	0.36 % + 1µF	
(1.1 to 3.299 99) mF	(0 to 6) Hz	0.37 % + 3µF	
(3.3 to 10.9999) mF	(0 to 2) Hz	0.37 % + 10 µF	
(11 to 32.9999) mF	(0 to 0.6) Hz	0.6 % + 30 µF	
(33 to 110) mF	(0 to 0.2) Hz	0.87 % + 100 µF	
Capacitance – Measure[3]			
(0.1 to 1) nF	(50 to 60) Hz	0.23 % + 0.1 nF	Fluke 8588A
(1 to 10) nF	(50 to 60) Hz	0.13 % + 0.2 nF	
(10 to 100) nF	(50 to 60) Hz	0.1 % + 0.01 nF	
(0.1 to 1) µF	(50 to 60) Hz	0.1 % + 0.1 nF	
(1 to 10) µF	(50 to 60) Hz	0.1 % + 0.1 nF	
(10 to 100) µF	(50 to 60) Hz	0.11 % + 0.01 µF	
(0.1 to 1) mF	(50 to 60) Hz	0.11 % + 0.1 µF	
(1 to 10) mF	(50 to 60) Hz	0.12 % + 1 µF	
(10 to 100) mF	(50 to 60) Hz	0.12 % + 0.1 mF	
AC Voltage – Measure[3]			
(0 to 10) mV	1 Hz to 2 kHz	0.034 % + 1.1 µV	Fluke 8588A
	(2 to 10) kHz	0.041 % + 1.1 µV	
	(10 to 30) kHz	0.042 % + 1.1 µV	
	(30 to 100) kHz	0.031 % + 1.1 µV	
	(100 to 300) kHz	1.1 % + 4 µV	
	(0.3 to 1) MHz	2.1 % + 4 µV	
(10 to 100) mV	1 Hz to 2 kHz	0.01 % + 0.5 µV	
	(2 to 10) kHz	0.014 % + 0.4 µV	
	(10 to 30) kHz	0.024 % + 1 µV	
	(30 to 100) kHz	0.054 % + 5 µV	
	(100 to 300) kHz	0.22 % + 30 µV	
	(0.3 to 1) MHz	1.2 % + 0.1 mV	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Voltage – Measure[3] (cont)			Fluke 8588A
(0.1 to 1) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.008 % + 5 µV 0.013 % + 5 µV 0.024 % + 10 µV 0.054 % + 50 µV 0.22 % + 0.3 mV 1.1 % + 1 mV	
(1 to 10) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.008 % + 50 µV 0.013 % + 50 µV 0.024 % + 0.1 mV 0.054 % + 0.5 mV 0.22 % + 3 mV 1.1 % + 10 mV	
(10 to 100) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.016 % + 0.5mV 0.017 % + 0.5mV 0.027 % + 1 mV 0.061 % + 5 mV 0.38 % + 50 mV 1.2 % + 0.5 V	
(100 to 1000) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.012 % + 25 mV 0.012 % + 25 mV 0.025 % + 25 mV 0.06 % + 0.1 V	
(1 to 6) kV	Up to 60 Hz	1.2 %	Fluke 80K-6 & DMM
(6 to 40) kV	Up to 60 Hz	6 %	Fluke 80K-40 & DMM
AC Voltage – Generate[3]			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.063 % + 6 µV 0.014 % + 6 µV 0.017 % + 6 µV 0.078 % + 6 µV 0.28 % + 12 µV 0.63 % + 50 µV	Fluke 5522A

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 8 µV 0.012 % + 8 µV 0.013 % + 8 µV 0.028 % + 8 µV 0.063 % + 32 µV 0.16 % + 70 µV	Fluke 5522A
330 mV to 3.3 V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 50 µV 0.012 % + 60 µV 0.015 % + 60 µV 0.024 % + 50 µV 0.055 % + 130 µV 0.19 % + 600 µV	
(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	
(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 Current – Measure[3]			
(0 to 10) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.21 % + 2.5 nA 0.21 % + 2.5 nA 0.21 % + 2.5 nA	Fluke 8588A
(10 to 100) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 5 nA 0.054 % + 5 nA 0.075 % + 5 nA 0.41 % + 10 nA	
(0.1 to 1) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 50 nA 0.054 % + 50 nA 0.075 % + 50 nA 0.41 % + 0.1 µA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Measure[3] (cont)			Fluke 8588A
(1 to 10) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 0.5 µA 0.054 % + 0.5 µA 0.075 % + 0.5 µA 0.41 % + 1 µA	
(10 to 100) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.029 % + 5 µA 0.053 % + 5 µA 0.075 % + 5 µA	
(0.1 to 1) A	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.031 % + 0.1 mA 0.056 % + 0.1 mA 0.08 % + 0.1 mA	
(1 to 10) A	10 Hz to 2 kHz (2 to 10) kHz	0.085 % + 0.5 mA 0.085 % + 0.5 mA	
(10 to 30) A	10 Hz to 2 kHz (2 to 10) kHz	0.085 % + 12 mA 0.13 % + 12 mA	
AC Clamp-On Meters[3]–			Fluke 5520A w/ 5500 coil
Toroidal			
Up to 150 A	(45 to 65) Hz (65 to 440) Hz	0.29 % + 0.026 A 0.8 % + 0.028 A	
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.3 % + 0.27 A 0.8 % + 0.27 A	
Non-Toroidal			
Up to 150 A	(45 to 65) Hz (65 to 440) Hz	0.57 % + 0.25 A 1 % + 0.25 A	
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.57 % + 0.94 A 1 % + 0.94 A	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
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	0.13 % + 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	
(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 Hz 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 Hz to 100 Hz 100 Hz to 1 kHz (1 to 5) kHz	0.094 % + 5mA 0.12 % + 5 mA 2.4 % + 5 mA	

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
AC Power – Generate[3]			
(45 to 65) Hz; PF=1			
(33 to 330) mV Range			
(3.3 to 8.99) mA	110 µW to 3 mW	0.17 %	Fluke 5522A
(9 to 32.99) mA	(3 to 11) mW	0.12 %	
(33 to 89.99) mA	(1.1 to 30) mW	0.17 %	
(90 to 329.99) mA	(3 to 110) mW	0.12 %	
(0.33 to 0.8999) A	(11 to 300) mW	0.16 %	
(0.9 to 2.1999) A	(30 to 730) mW	0.14 %	
(2.2 to 4.4999) A	73 mW to 1.5 W	0.16 %	
(4.5 to 20.5) A	150 mW to 6.8 W	0.14 %	
330 mV to 1020 V Range			
(3.3 to 8.99) mA	1.1 mW to 9 W	0.15 %	
(9 to 32.99) mA	3 mW to 33 W	0.1 %	
(33 to 89.99) mA	11 mW to 90 W	0.15 %	
(90 to 329.99) mA	30 mW to 330 W	0.1 %	
(0.33 to 0.8999) A	110 mW to 900 W	0.14 %	
(0.9 to 2.1999) A	300 mW to 2200 W	0.11 %	
(2.2 to 4.4999) A	730 mW to 4500 W	0.15 %	
(4.5 to 20.5) A	(1.5 to 20.9) kW	0.12 %	
Oscilloscopes[3] –			Fluke 5522A w/ SC1100
Square Wave Signal:			
50 Ω Load @ 1 kHz	1 mV to 6.6 $V_{pk - pk}$	0.26 % + 40 µV	
1 MΩ Load @ 1 kHz	1 mV to 130 $V_{pk - pk}$	0.12 % + 40 µV	
DC Volt Amplitude:			
50 Ω Load	(0 to 6.6) V	0.26 % + 40 µV	
1 MΩ Load	(0 to 130) V	0.05 % + 40 µV	

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Oscilloscopes[3] – (cont)			Fluke 5522A w/ SC1100
Level Sine Wave:			
Frequency	Up to 1100 MHz	2.8 µHz/Hz	
Amplitude	50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (300 to 1100) MHz	2 % + 300 µV 3.5 % + 300 µV 4 % + 300 µV 6 % + 300 µV 7 % + 300 µV	
Flatness (Bandwidth)	Up to 100 MHz (100 to 300) MHz (300 to 600) MHz (300 to1100) MHz	1.5 % + 100 µV 2 % + 100 µV 4 % + 100 µV 5 % + 100 µV	
Time Markers:			
Into a 50 Ω Load	5 s to 50 ms 20 ms to 2 ns	(26 + 1000*t*) µs/s 2.9 µs/s	t = time in seconds
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	≤ 300 ps ≤ 350 ps	110 ps 110 ps	
Thermocouple Simulation & Measure[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	0.41 °C 0.18 °C 0.21 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.24 °C 0.18 °C 0.18 °C 0.18 °C 0.22 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.29 °C 0.19 °C 0.19 °C 0.24 °C 0.34 °C	

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Thermocouple Simulation & Measure[3] – (cont)			
Type N	(-210 to -100) °C (-100 to 410) °C (410 to 1300) °C	0.34 °C 0.21 °C 0.24 °C	Fluke 5522A
Type R	(0 to 250) °C (250 to 1000) °C (1000 to 1767) °C	0.59 °C 0.37 °C 0.42 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.49 °C 0.39 °C 0.48 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.64 °C 0.25 °C 0.18 °C	
RTD[3] –			
Simulation			Fluke 5522A
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.052 °C 0.064 °C 0.071 °C 0.085 °C 0.1 °C 0.19 °C	
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.052 °C 0.064 °C 0.071 °C 0.085 °C 0.1 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to -0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.2 °C 0.064 °C 0.052 °C 0.058 °C 0.064 °C 0.071 °C 0.078 °C 0.085 °C 0.19 °C	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
RTD[3] – (cont)			
Simulation			Fluke 5522A
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.041 °C 0.046 °C 0.052 °C 0.058 °C 0.064 °C 0.064 °C 0.19 °C	
Measure			Beamex MC2-MF
Pt 385, 100Ω, PT3 851 000Ω	(-200 to 200) °C	0.19 °C	
Pt 3926, 100Ω	(200 to 600) °C	0.25 °C	
Pt 3916, 100Ω	(600 to 800) °C	0.43 °C	

IV. 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	0.014 mg + 0.6*R* 0.044 mg + 0.6*R* 0.063 mg + 0.6*R* 0.091 mg + 0.6*R* 0.17 mg + 0.6*R* 0.31 mg + 0.6*R* 0.65 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*	ASTM Class 1 weights (applied load)
	(5 to 10) g (10 to 500) g 501 g to 20 kg (> 20 to 5000) kg Up to 1000 lb (1000 to 12 000) lb	0.04 % + 0.6*R* 0.025 % + 0.6*R* 0.017 % + 0.6*R* 0.017 % + 0.6*R* 0.017 % + 0.6*R* 0.017 % per 1000 lb + 0.6*R*	Class F weights (applied load)

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
Truck & Rail Scales[3,9]	Up to 200 000 lb	0.017 % + 0.6*R*	Class F weights & test cart
Check Weight Comparison[3] – Load Fixtures, Hangers, Package & Check Weights	Up to 160 g Up to 16 000 g Up to 35 kg	0.005 g + 0.6*R* 0.01 % + 0.34 g + 0.6*R* 0.013 kg + 0.6*R*	Scale w/ Class 1 weights Scale w/ Class F weights
Force – Measuring Equipment[3]	Up to 3000 lbf Up to 25 lbf Up to 500 lbf Up to 2000 lbf Up to 5000 lbf Up to 20 000 lbf	0.017 % + 0.6*R* 0.025 lbf + 0.6*R* 0.37 lbf + 0.6*R* 1.5 lbf + 0.6*R* 3.7 lbf + 0.6*R* 15 lbf + 0.6*R*	ASTM Class F weights 25lb load cell w/indicator 500lb load cell w/indicator 2K load cell w/indicator 5K load cell w/indicator 20K load cell w/ indicator
Torque – Measure[3] Wrenches – Click, Dial, Adjustable, Screwdriver	(1 to 2) lbf·in 2 lbf·in to 600 lbf·ft	1.2 % 0.63 %	Mountz EZ3-10i Mountz EZ3-10i / CDI Sure Test
Rotary Torque – Measure[3] Tools – Pneumatic, DC, Pulse	(2.5 to 25) N·m (> 25 to 75) N·m (> 75 to 180) N·m	0.32 N·m 0.95 N·m 2.3 N·m	AIMCO Display w/Transducers
Torque – Measuring Equipment[3] – Testers	Up to 600 lbf·ft	0.13 %	Standard weights & torque arm

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Atmospheric Pressure (Vacuum) – Measuring Equipment[3]	Up to 28 in·Hg	0.04 in·Hg + 0.6*R*	Additel 680
Pressure – Measuring Equipment[3] –			
Absolute	Up to 17 psia	0.011 psia + 0.6*R*	Meriam ZM200LS
Differential	Up to 28 in·H_2O	0.009 inH_2O + 0.6*R*	Meriam M200LS
Pneumatic	Up to 15 psig	0.02 psig + 0.6*R*	Additel 680
	Up to 100 psig	0.07 psig + 0.6*R*	Druck DPI-104
	(0.01 to 300) psig	0.2 psig + 0.6R	Beamex IPM20C
Hydraulic	Up to 1000 psig	0.82 psig + 0.6*R*	Druck DPI-104
	Up to 2400 psig	1.5 psig	Beamex EXT160
	Up to 5000 psig	3.2 psig + 0.6*R*	Druck DPI-104
	(5 to 10 000) psig	6.6 psig + 0.6*R*	Druck DPI-104
Speed – Measure[3]			
Optic/Non-Contact:			
RPM	(6 to 100 000) rpm	0.018 %	Monarch PLT200
Totalizer/Rate Meters	(2 to 3300) fpm	0.018 %	
Contact:			
RPM	(6 to 20 000) rpm	0.21 %	
Totalizer/Rate Meters	(2 to 3300) fpm	0.21 %	
Speed/RPM/Rate[3] – Simulation	(2.5 to 100 000) rpm)	0.0028 % + 0.6*R*	Fluke 5522A
Totalize Meters[3] – Distance Measure	Up to 1000 yds	0.7 %	Monarch PLT200

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HR15TW: Low Medium High	 0.79 HRA 0.77 HRA 0.76 HRA 0.84 HRBW 0.80 HRBW 0.84 HRBW 0.84 HRC 0.82 HRC 0.81 HRC 0.79 HR15TW 0.79 HR15TW 0.87 HR15TW	Indirect verification per ASTM E18

V. Thermodynamics

Parameter/Equipment	Range	CMC[2, 5, 8] (±)	Comments
Infrared Temperature Indicators[3] (Optical Pyrometers)	@ 35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.53 °C + 0.6*R* 0.7 °C + 0.6*R* 1.1 °C + 0.6*R* 1.7 °C + 0.6*R* 2.5 °C + 0.6*R*	Fluke 4181 Wavelength (8 to 14) µm, emissivity = 0.95
Temperature – Measuring Equipment[3]	(-25 to 150) °C (-15 to 350) °C (150 to 350) °C	0.07 °C 0.16 °C 0.75 °C	Fluke 9142P w/ PRT Fluke 9009 w/ PRT Fluke 9009
Relative Humidity – Measure[3]	(15 to 90) % RH (90 to 95) % RH	1.5 % RH 2.5 % RH	Vaisala HMI-41 w/ HMP-46

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Relative Humidity – Measuring Equipment[3]	(20 to 90) % RH (90 to 95) % RH	1.5 % RH 2.6 % RH	Vaisala HMI-41 w/ HMP-46, w/ controlled environment
Temperature – Measure[3]	(-196 to 150) °C (150 to 420) °C (350 to 800) °C (800 to 1450) °C	0.05 °C 0.087 °C 2 °C 2.8 °C	9142P w/ PRT Fluke 724 w/ 5650-20 type S probe

VI. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5, 8] (±)	Comments
Frequency – Generate[3]	0.01 Hz to 2 MHz	6 µHz/Hz + 5 µHz	Fluke 5522A
Frequency – Measure[3]	0.1 Hz to 350 MHz	1.3 µHz/Hz	Keysight 53220A
Timers & Stopwatches[3]	(1 to 3600) s (3600 to 86 400) s Up to 24 Hrs	0.2 s $(2 + 0.0001T)$ s + $0.6R$ 0.064 s/24 Hr	Monarch tachometer & timer 24-hour traceable stopwatch Timometer 4500

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

[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] The statement of the CMC, *L* is the numerical value of the nominal length of the device measured in inches, and *R* is the numerical value of the resolution of the device under test, *T* is the numerical value of the nominal time in seconds. In the statement of the CMC or Range, *DL* is the length of the diagonal in inches.

[6] Unless otherwise noted, percentage refers to percent of reading.

[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] Maximum calibration capacity of the instrument. Calibration range limited to 42 000 lb in test weight.

Accredited Laboratory

A2LA has accredited

CROSS TECHNOLOGIES, INC.

Charlotte, NC

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 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 September 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.11
Valid to August 30, 2027

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