SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: February 28, 2027 Certificate Number: 1741.18

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, 11]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters[3] – Fixed Points	4 pH 7 pH 10 pH	0.03 pH 0.029 pH 0.039 pH	Standard pH solutions .
Conductivity Meters[3]	10 µS/cm 100 µS/cm 1000 µS/cm 10 000 µS/cm	0.63 µS/cm 2.2 µS/cm 5.2 µS/cm 47 µS/cm	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Pin Gages[3] – Class Z & ZZ	Up to 1.0 in	43 µin	Micrometer
Calipers[3]	Up to 60 in	(4.5 + 9.9) µin + 0.6*R*	Gage blocks
Coating Thickness Gages[3]	Up to 60 mils	0.14 mils	Coating thickness standards

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Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Micrometers[3]	Up to 1 in (1 to 40) in	8µin + 0.6R (9.8 + 3*L*) µin + 0.6R	Gage blocks
Height Gages[3]	Up to 48 in	(6.2 + 9.5*L*) µin + 0.6R	Gage blocks
Feeler/Thickness Gages[3]	Up to 1 in	44 µin	Micrometer
Linear Indicators[3] – Dial & Test	Up to 4 in	(6.3 + 8.5*L*) µin + 0.6*R*	Gage blocks
Steel Rules[3]	Up to 72 in	(3 + 13*L*) µin + 0.6*R*	Gage blocks
Tape Measures[3]	Up to 25 ft	(3 + 13*L*) µin + 0.6*R*	Gage blocks
Length – 1D[3]	Up to 12 in	0.0021 in	Digital caliper
Hand Tools[3] – Depth Gages, Snap Gages, Fixture Gages, Thickness Gages	Up to 4 in	(6 + 4.6*L*) µin + 0.6R	Gage blocks
Optical Comparator[3] –			
X-Y Linearity	Up to 6 in	180 µin	Glass scale
Magnification	10x to 250x	0.012 in	Glass ruler
Angle	Up to 90°	0.06°	Angle block set
Angle – Measure	Up to 360°	0.26°	Vision machine
Radius Gages	Up to 2 in	280 µin	Vision machine
Ultrasonic Thickness Gages[3]	(0.01 to 1) in (1 to 8) in	0.0034 in 0.023 in	Gage blocks
Microscope Reticles[3]	Up to 10 mm	0.013 mm + 0.6*R*	Stage micrometer

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Protractor & Angle Indicators[3]	1°, 2°, 3°, 4°, 5°, 10°, 15°, 20°, 25°, 30°, 45°, 60°, 75°, 90°	0.04°	Angle block set
Surface Plates[3] – Grades AA, A, & B			
Repeatability/Local Flatness	0.002 in	40 µin	Repeat-o-meter
Flatness	Up to 120 *DL* in	(33 + 0.54*DL*) µin	Mahr federal level systems
Surface Roughness Meters[3]	Ra (10 to 200)	1.1 µin	Precision roughness standard
Surface Roughness Specimens[3]	Ra (10 to 200)	3.2 µin	Profilometer w/reference specimen
Cylindrical Measure –			
Plain Rings			
Standard Calibration	Up to 5 in	(12+6.5L) µin	Supermicrometer
Master Calibration	Up to 10 in	(4.2+5.3L) µin	
Pins, Plain Plugs, Discs, Spheres – External Diameter	Up to 8 in	(6+3.5L) µin	
Micrometer Standards	Up to 5 in	(6+3.5L) µin	Supermicrometer
	Up to 20 in	(32 + 3.3*L*) µin	Gage blocks & probe
Thread Plugs –			
Major Diameter	Up to 4in	27 µin	Supermicrometer
Pitch Diameter	(2 to 108) TPI (0.25 to 8) mm	80 µin	Supermicrometer w/ thread wire set

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 5, 6] (±)	Comments
DC Voltage[3] – Measure	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V (1 to 10) kV (10 to 100) kV	5.8 µV/V + 0.1 µV 4.7 µV/V + 0.4 µV 4.5 µV/V + 4.0 µV 6.2 µV/V + 40 µV 6.2 µV/V + 500 µV 0.05 % + 0.3 V 0.06 % + 0.3 V	Fluke 8508A Vitrek 4700 Vitrek 4700 w/ HVL-100
DC Voltage[3] – Generate	(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	11 µV/V + 0.4 µV 6.7 µV/V + 0.7 µV 5 µV/V + 2.5 µV 5.1 µV/V + 4.0 µV 6.7 µV/V + 40 µV 8.5 µV/V + 400 µV	Fluke 5720A
DC Current[3] – Measure	(0 to 200) µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A (1 to 100) A	13 µA/A + 0.4 nA 13 µA/A + 4.0 nA 15 µA/A + 40 nA 49 µA/A + 0.8 nA 0.019 % + 16 µA 0.041 % + 0.4 mA 0.1 %	Fluke 8508A GL 9230A/300 shunt w/ DMM
DC Current[3] – Generate	(0 to 220) µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (1.1 to 3) A (2 to 11) A (11 to 20.5) A (1 to 100) A	50 µA/A + 6.0 nA 44 µA/A + 7.0 nA 44 µA/A + 40 nA 55 µA/A + 0.7 µA 0.011 % + 12 µA 0.046 % + 40 µA 0.06 % + 500 µA 0.12 % + 750 µA 0.1 %	Fluke 5720A ± (200 I^2) µA/A for I >100 mA ± (10 I^2) µA/A for I > 1A Fluke 5522A GL 9230A/300 shunt w/ DMM & power supply

Parameter/Equipment	Range	CMC[2, 4, 6, 8] (±)	Comments
DC Current[3] – Generate Clamp-On-Meters	Up to 150 A 150 to 1000 A	0.51 % + 0.038 A 0.51 % + 0.51 A	Fluke 5522A w/ 5500/coil
Resistance[3] – Measure	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ (2 to 20) GΩ	18 μΩ/Ω + 4.0 μΩ 12 μΩ/Ω + 14 μΩ 10 μΩ/Ω + 50 μΩ 10 μΩ/Ω + 0.5 mΩ 10 μΩ/Ω + 5.0 mΩ 10 μΩ/Ω + 50 mΩ 11 μΩ/Ω + 1.0 Ω 21 μΩ/Ω + 100 Ω 0.013 % + 10 kΩ 0.016 % + 1 MΩ 0.016 % + 10 MΩ	Fluke 8508A
Resistance[3] – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 Ω to 1.1 kΩ (1.1 to 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	54 μΩ/Ω + 0.001 Ω 52 μΩ/Ω + 0.0015 Ω 35 μΩ/Ω + 0.0014 Ω 35 μΩ/Ω + 0.002 Ω 35 μΩ/Ω + 0.02 Ω 36 μΩ/Ω + 0.2 Ω 40 μΩ/Ω + 2 Ω 74 μΩ/Ω + 30 Ω 0.016 % + 50 Ω 0.03 % + 2.5 kΩ 0.06 % + 3 kΩ 0.36 % + 100 kΩ 1.8 % + 500 kΩ	Fluke 5522A
Resistance[3] – Generate Fixed Points	 0 Ω (1, 1.9) Ω (10, 19) Ω (100, 190) Ω (1, 1.9, 10, 19) kΩ (100, 190) kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	 50 μΩ 0.012 % 31 μΩ/Ω 13 μΩ/Ω 8.2 μΩ/Ω 11 μΩ/Ω 16 μΩ/Ω 22 μΩ/Ω 50 μΩ/Ω 59 μΩ/Ω 0.013 %	Fluke 5720A

Parameter/Equipment	Range	CMC[2, 4, 6, 8] (±)	Comments
Insulation Resistance[3] – Generate	10 Ω, 100 Ω, 1 kΩ 10 kΩ, 100 kΩ, 1 MΩ 10 MΩ, 100 MΩ, 1 GΩ, 10 GΩ, 100 GΩ	1.2 %	Standard resistor set
	10 kΩ to 1MΩ (1 to 10) MΩ 10 MΩ to 1 GΩ (1 to 10) GΩ 100 GΩ	0.25 % 0.37 % 0.6 % 1.2 % 3.6 %	Fluke 5322A
	350 MΩ to 99.99 GΩ (100 to 999.9) GΩ (1 to 10) TΩ	1.8 % 3.0 % 4.2 %	Fluke 5322A w/resistance multiplier adapter

Parameter/Range	Frequency	CMC[2, 4, 5, 6] (±)	Comments
Capacitance – Generate[3]			
(220 to 399.9) pF	(10 to 10 000) Hz	0.88 % + 10 pF	Fluke 5522A w/ scope option
(0.4 to 1.0999) nF	(10 to 10 000) Hz	0.6 % + 0.01 nF	
(1.1 to 3.2999) nF	(10 to 3000) Hz	0.6 % + 0.01 nF	
(3.3 to 10.9999) nF	(10 to 1000) Hz	0.31 % + 0.1 nF	
(11 to 109.999) nF	(10 to 1000) Hz	0.31 % + 0.1 nF	
(110 to 329.999) nF	(10 to 1000) Hz	0.31 % + 0.3 nF	
(0.33 to 1.099 99) µF	(10 to 600) Hz	0.31 % + 1 nF	
(1.1 to 3.299 99) µF	(10 to 300) Hz	0.31 % + 3 nF	
(3.3 to 10.9999) µF	(10 to 150) Hz	0.31 % + 10 nF	
(11 to 32.9999) µF	(10 to 120) Hz	0.49 % + 30 nF	
(33 to 109.999) µF	(10 to 80) Hz	0.55 % + 100 nF	
(110 to 329.999) µF	(0 to 50) Hz	0.55 % + 300 nF	
(0.33 to 1.099 99) mF	(0 to 20) Hz	0.55 % + 1 µF	
(1.1 to 3.299 99) mF	(0 to 6) Hz	0.55 % + 3 µF	
(3.3 to 10.9999) mF	(0 to 2) Hz	0.56 % + 10 µF	
(11 to 32.9999) mF	(0 to 0.6) Hz	0.91 % + 30 µF	
(33 to 110) mF	(0 to 0.2) Hz	1.4 % + 100 µF	

Parameter/Range	Frequency	CMC[2, 4, 5, 6] (±)	Comments
AC Voltage[3] – Measure			
Up to 200 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.017 % + 14 µV 0.014 % + 4 µV 0.012 % + 4 µV 0.011 % + 2 µV 0.014 % + 4 µV 0.034 % + 8 µV 0.077 % + 20 µV	Fluke 8508A
200 mV to 2 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 0.12 mV 0.012 % + 0.02 mV 0.01 % + 0.02 mV 0.008 % + 0.02 mV 0.012 % + 0.02 mV 0.023 % + 0.04 mV 0.058 % + 0.2 mV 0.31 % + 2 mV 1 % + 20 mV	
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 1.2 mV 0.012 % + 0.2 mV 0.01 % + 0.2 mV 0.008 % + 0.2 mV 0.012 % + 0.2 mV 0.023 % + 0.4 mV 0.058 % + 2 mV 0.31 % + 20 mV 1 % + 0.2 V	
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 12 mV 0.012 % + 2 mV 0.01 % + 2 mV 0.008 % + 2 mV 0.012 % + 2 mV 0.023 % + 4 mV 0.058 % + 20 mV 0.31 % + 0.2 V 1 % + 2 V	
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.015 % + 70 mV 0.013 % + 20 mV 0.012 % + 20 mV 0.023 % + 40 mV 0.058 % + 0.2 V	
(1 to 10) kV	(50 to 60) Hz	0.15 % + 0.01 V	Vitrek 4670
(10 to 70) kV	(50 to 60) Hz	0.13 % + 0.6 V	Vitrek 4670 w/ HVL-70

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Voltage[3] – Generate			
(0.22 to 2.2) 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 500 kHz to 1 MHz	0.19 % + 4 µV 0.12 % + 4 µV 0.086 % + 4 µV 0.15 % + 4 µV 0.21 % + 5 µV 0.37 % + 10 µV 0.53 % + 20 µV 0.69 % + 20 µV	Fluke 5720A
(2.2 to 22) 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 500 kHz to 1 MHz	0.031 % + 4 µV 0.014 % + 4 µV 0.013 % + 4 µV 0.03 % + 4 µV 0.066 % + 5 µV 0.14 % + 10 µV 0.18 % + 20 µV 0.35 % + 20 µV	
(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 500 kHz to 1 MHz	0.03 % + 12 µV 0.011 % + 7 µV 0.01 % + 7 µV 0.025 % + 7 µV 0.056 % + 17 µV 0.11 % + 20 µV 0.17 % + 25 µV 0.34 % + 45 µV	
220 mV 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 500 kHz to 1 MHz	0.62 % + 40 µV 0.024 % + 15 µV 56 µV/V + 8 µV 93 µV/V + 10 µV 0.014 % + 30 µV 0.051 % + 80 µV 0.012 % + 200 µV 0.021 % + 300 µV	
(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 500 kHz to 1 MHz	0.029 % + 400 µV 0.12 % + 150 µV 58 µV/V + 50 µV 95 µV/V + 100 µV 0.013 % + 200 µV 0.035 % + 600 µV 0.12 % + 2 mV 0.19 % + 3.2 mV	

Parameter/Range	Frequency	CMC[2, 4, 5, 6] (±)	Comments
AC Voltage[3] – Generate (cont)			
(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	0.029 % + 4 mV 0.012 % + 1.5 mV 66 µV/V + 0.6 mV 0.011 % + 1 mV 0.019 % + 2.5 mV	Fluke 5720A
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.037 % + 16 mV 58 µV/V + 3.5 mV	
AC Current[3] – Measure			
(0 to 200) µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.051 % + 0.02 µA 0.051 % + 0.02 µA 0.072 % + 0.02 µA 0.41 % + 0.02 µA	Fluke 8508A
(0.2 to 2) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 0.2 µA 0.031 % + 0.2 µA 0.072 % + 0.2 µA 0.41 % + 0.2 µA	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 2 µA 0.031 % + 2 µA 0.072 % + 2 µA 0.41 % + 2 µA	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.032 % + 0.02 mA 0.031 % + 0.02 mA 0.063 % + 0.02 mA	
(0.2 to 2) A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.063 % + 0.2 mA 0.074 % + 0.2 mA 0.31 % + 0.2 mA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.083 % + 2 mA 0.26 % + 2 mA	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Current – Generate[3]			
(10 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.031 % + 16 nA 0.020 % + 10 nA 0.014 % + 8 nA 0.029 % + 12 nA 0.14 % + 65 nA	Fluke 5720A
(33 to 330) µA	(10 to 30) kHz	2 % + 0.4 µA	Fluke 5522A
220 µA 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	0.031 % + 40 nA 0.020 % + 35 nA 0.013 % + 35 nA 0.025 % + 110 nA 0.14 % + 650 nA	Fluke 5720A
(0.33 to 3.3) mA	(10 to 30) kHz	1.2 % + 0.6 µA	Fluke 5522A
(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	0.033 % + 400 nA 0.020 % + 350 nA 0.013 % + 350 nA 0.025 % + 550 nA 0.14 % + 5 µA	Fluke 5720A
(3.3 to 33) mA	(10 to 30) kHz	0.5 % + 4 µA	Fluke 5522A
(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	0.033 % + 4 µA 0.020 % + 3.5 µA 0.013 % + 2.5 µA 0.025 % + 3.5 µA 0.14 % + 10 µA	Fluke 5720A
(33 to 330) mA	(10 to 30) kHz	0.5 % + 200 µA	Fluke 5522A
220 mA to 2.2 A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.03 % + 35 µA 0.055 % + 80 µA 0.85 % + 160 µA	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.056 % + 170 µA 0.12 % + 380 µA 0.44 % + 750 µA	
(11 to 20.5) A	45 Hz to 1 kHz	0.19 % + 5 mA	Fluke 5522A

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Clamp-On-Meters[3] –			
(10 to 150) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.29 % + 0.026 A 0.8 % + 0.028 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	Fluke 5522A w/ 5500 coil
(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	Fluke 5522A w/ 5500 coil
Oscilloscopes[3] –			
Square Wave Amplitude:			
50 Ω at 1 kHz	1.0 mV to 6.6 $V_{pk - pk}$	0.32 % + 40 µV	Fluke 5522A/SC1100
1 MΩ at 1 kHz	1.0 mV to 130 $V_{pk - pk}$	0.16 % + 40 µV	
DC Voltage Amplitude:			
50 Ω Load	(0 to ± 6.6) V	0.30 % + 40 µV	
1 MΩ Load	(0 to ± 130) V	0.07 % + 40 µV	
Level Sine Wave:			
Frequency	Up to 1100 MHz	3.3 µHz/Hz	
Amplitude	50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.4 % + 300 µV 4.4 % + 300 µV 4.9 % + 300 µV 7.3 % + 300 µV 8.4 % + 300 µV	

Parameter/Equipment	Range	CMC[2, 6, 9] (±)	Comments
Oscilloscopes[3] – (cont)			
Flatness (Bandwidth)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.1 % + 100 µV 2.6 % + 100 µV 4.9 % + 100 µV 6 % + 100 µV	Fluke 5522A/SC1100
Time Markers:			
Into a 50 Ω load	5 s to 50 ms 20 ms to 2 ns	(30 + 1000*t*) µs/s 3.5 µs/s	
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	≤300 ps ≤350 ps	130 ps 130 ps	
Thermocouple Simulation[3] –			
Type E	(-250 to 1000) °C	0.15 °C	Fluke 5522A w/ ice point reference
Type J	(-210 to 1200) °C	0.15 °C	
Type K	(-200 to 1372) °C	0.16 °C	
Type R	(0 to 1767) °C	0.30 °C	
Type S	(0 to 1767) °C	0.29 °C	
Type T	(-250 to 400) °C	0.15 °C	
Type N	(-270 to 1300) °C	0.16 °C	
Electrical Calibration of RTD Indicators & Indicating Systems[3] –			
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	0.07 °C 0.092 °C 0.11 °C 0.13 °C 0.15 °C 0.28 °C	Fluke 5522A

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Viscosity – Measure[3] Cups & Dip Cups (Kinematic Viscosity, Efflux Time)	Up to 1000 cSt	1 % + 0.2 cSt	Certified viscosity standards

V. Mechanical

Parameter/Equipment	Range	CMC[2, 7, 8, 10] (±)	Comments
Scales & Balances[3]	(1 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 g to 20 kg (20 to 900) kg Up to 1000 lb (1000 to 16 000) lb	0.041 mg + 0.6*R* 0.06 mg + 0.6*R* 0.09 mg + 0.6*R* 0.14 mg + 0.6*R* 0.3 mg + 0.6*R* 0.6 mg + 0.6*R* 0.9 mg + 0.6*R* 1.5 mg + 0.6*R* 3 mg + 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
Force – Measuring Equipment[3]	Up to 500 lbf	0.04 % + 0.6R	Class F Weights
Torque[3] – Measuring Equipment (Wrenches)	(10 to 100) ozf·in 5 lbf·in to 600 lbf·ft	0.84 % 0.8 %	CDI 1001-O-DTT CDI Suretest 5000-ST
Pressure[3]– Measuring Equipment	(-10 to 10) inH_2O (-1 to 1) psig (0 to 30) psig (-14.5 to 300) psig Up to 500 psig Up to 1000 psig Up to 5000 psig Up to 10 000 psig Up to 15 000 psig Up to 30 000 psig	0.013 inH_2O 0.0007 psi 0.006 psi 0.11 psi 0.15 psi 0.45 psi 1 psi 6.9 psi 11 psi 39 psi	Digital pressure gauges/modules

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRA Low Medium High HRBW Low Medium High HRC Low Medium High HREW Low Medium High HR15N Low Medium High HR30N Low Medium High HR45N Low Medium High HR15TW Low Medium High HR30TW Low Medium High	 0.82 HRA 0.81 HRA 0.81 HRA 0.81 HRBW 0.81 HRBW 0.81 HRBW 0.85 HRC 0.85 HRC 0.81 HRC 0.81 HREW 0.81 HREW 0.81 HREW 0.81 HR15N 0.85 HR15N 0.81 HR15N 0.81 HR30N 0.82 HR30N 0.81 HR30N 0.81 HR45N 0.81 HR45N 0.82 HR45N 0.83 HR15TW 0.82 HR15TW 0.81 HR15TW 0.81 HR30TW 0.82 HR30TW 0.81 HR30TW	Indirect verification per ASTM E18

Parameter/Equipment	Range	CMC[2, 8, 10] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] (cont)	HR45TW Low Medium High HRFW Low Medium High	 0.81 HR45TW 0.81 HR45TW 0.81 HR45TW 0.76 HRFW 0.76 HRFW 0.76 HRFW	Indirect verification per ASTM E18
Indirect Verification of Brinell Hardness Testers[3] HBW 10/3000/15	 239 HBW 290 HBW 528 HBW	 4.5 HBW 4.5 HBW 6 HBW	 Indirect verification per ASTM E10, ASTM E110
Mass - Fixed Points	1mg 2mg 3mg 5mg 10mg 20mg 30mg 50mg 100mg 200mg 300mg 500mg 1g 2g 3g 5g 10g 20g 25g 30g 40g 50g 100g 200g 300g 500g 1000g 2000g 3000g 5000g	0.0051 mg 0.0038 mg 0.0039 mg 0.0033 mg 0.0035 mg 0.0052 mg 0.0038 mg 0.0033 mg 0.0053 mg 0.0034 mg 0.0032 mg 0.0038 mg 0.01 mg 0.01 mg 0.01 mg 0.01 mg 0.012 mg 0.014 mg 0.015 mg 0.013 mg 0.016 mg 0.022 mg 0.033 mg 0.1 mg 0.12 mg 0.21 mg 0.34 mg 2.4 mg 2.5 mg 5.6 mg	By Comparison w/ ultra-class weights

Parameter/Equipment	Range	CMC[2, 8, 10] (±)	Comments
Pipettes[3]	(2 to 20) µL (20 to 200) µL (200 to 2000) µL (2000 to 10 000) µL	0.11 µL 0.33 µL 2.9 µL 13 µL	Gravimetric method
Speed – Measure[3] Optical/Non-Contact	(6 to 200 000) RPM	0.018 %	Monarch tachometer
Speed /RPM/Rate Simulation[3]	(6 to 200 000) rpm	0.0041 %	Agilent 33120A

VI. Thermodynamics

Parameter/Equipment	Range	CMC[2, 8, 10] (±)	Comments
Humidity – Measuring Equipment[3]	(20 to 80) % RH	1.5 %	Vaisala hygrometer w/ enclosure/chamber
Humidity – Measure[3]	(10 to 95) % RH	1.5 %	Vaisala hygrometer
Temperature – Measure[3]	(-197 to 420) °C (420 to 660) °C	0.065 °C 0.11 °C	Fluke 1523 w/5615 PRT
Parameter/Equipment	Range	CMC[2, 10] (±)	Comments
Plate Temperature – Infrared Devices[3]	35 °C (>35 to 100) °C (>100 to 200) °C (>200 to 350) °C (>350 to 500) °C	0.8 °C 1.1 °C 1.3 °C 2.1 °C 2.5 °C	Fluke 4181 ε = 0.95 λ= (8 to 14) µm
Temperature – Measuring Equipment[3]	(-15 to 660) °C (35 to 200) °C	0.15 °C 0.08 °C	Dry block w/ref probe Bath w/ref probe

VII. Time & Frequency

Parameter/Equipment	Range	CMC[2, 10] (±)	Comments
Timers & Stopwatches[3]	(1 to 3600) s Up to 24 h	0.05 s 0.064 s/24 h	HP 53132A Timometer 4500
Frequency[3] – Measuring Equipment	0.01 Hz to 2 MHz Up to 1100 MHz	5.6 µHz/Hz + 5 µHz 3.3 µHz/Hz	Fluke 5522A Fluke 5522A/SC1100
Frequency[3] – Measure	0.01 Hz to 10MHz (10 to 225) MHz 225MHz to 3 GHz	67 µHz/Hz 0.45 µHz/Hz 0.26 µHz/Hz	Agilent 53132A Opt 030

[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] Based on using the standard at the temperature the Fluke 5720A, Fluke 5520A was calibrated (tcal ± 5 °C) and assuming the instrument is zeroed at least every seven days or when the ambient temperature changes more than 5 °C. For resistance, a zero calibration is performed at least every 12 hours within ± 1 °C of use.

[5] Based on using the standard at the temperature the 8508A was calibrated (tcal ± 5 °C).

[6] 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 fraction/percentage of the reading plus a fixed floor specification.

[7] The statement of Calibration and Measurement Capability, *L* is the numerical value of the nominal length of the device measured in inches. In the Calibration and Measurement Capability, *R* is the numerical value of the resolution of the device. *DL* is the length of the diagonal in inches.

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

[9] In the statement of CMC, *t* represents the time in seconds.

[10] 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.

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

Accredited Laboratory

A2LA has accredited

CROSS TECHNOLOGIES, INC

Tulsa, OK

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 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 24th day of March 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.18
Valid to February 28, 2027
Revised January 23, 2026

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