



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: May 31, 2025

Certificate Number: 1741.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 6</sup>:

I. Chemical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
pH Meters <sup>3</sup>	4 pH 7 pH 10 pH	0.03 pH 0.03 pH 0.03 pH	Standard pH solutions
Conductivity Meters <sup>3</sup> – Fixed Points	10 µS/cm 100 µS/cm 1413 µS/cm 10 000 µS/cm	1.5 µS/cm 2.5 µS/cm 6 µS/cm 46 µS/cm	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Angle Indicators & Protractors <sup>3</sup>	15°, 30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Calipers <sup>3</sup>	Up to 40 in	(3.6 + 9.3L) µin + 0.6R	Gage blocks
Feeler/Thickness Gages <sup>3</sup>	Up to 1 in	80 µin	Micrometer

Parameter/Equipment	Range	CMC <sup>2, 4</sup> ( $\pm$ )	Comments
Height Gages <sup>3</sup>	Up to 20 in (20 to 48) in	$(2.5 + 10L) \mu\text{in} + 0.6R$ $(9.5 + 9.7L) \mu\text{in} + 0.6R$	Gage blocks
Length 1D <sup>3</sup> – Fixture / Gap Gages	Up to 6 in Up to 24 in	0.0015 in 0.0027 in	Caliper
Linear Indicators <sup>3</sup> – Dial & Test	Up to 4 in	$(3.2 + 8.8L) \mu\text{in} + 0.6R$	Gage blocks
Micrometers <sup>3</sup>	Up to 40 in	$(3.6 + 9.3L) \mu\text{in} + 0.6R$	Gage blocks
Optical Comparators <sup>3</sup> – Magnification	10x to 50x	0.0015 in	Magnification scale & reticle
X-Y Linearity	Up to 12 in	140 $\mu\text{in}$	Glass master
Angle	30°, 45°, 60°, 90°	0.11°	Angle block set
Microscope <sup>3</sup> – Linearity	Up to 1 mm (1 to 10) mm	0.0015 mm + 0.6R 0.004 mm + 0.6R	Stage micrometer
Pin Gage <sup>3</sup> – Class Z & ZZ	Up to 1 in	43 $\mu\text{in}$	Micrometer
Steel Rules <sup>3</sup>	Up to 72 in	$(3.6 + 9.3L) \mu\text{in} + 0.6R$	Gage blocks
Tape Measures <sup>3</sup>	Up to 25 ft	$(3.6 + 9.3L) \mu\text{in} + 0.6R$	Gage blocks
Thickness/Snap Gages <sup>3</sup>	Up to 4 in	$(3.2 + 8.8L) \mu\text{in} + 0.6R$	Gage blocks
Surface Plates <sup>3</sup> – Grades AA, A, & B			
Repeatability/Local Flatness	0.002 in	40 $\mu\text{in}$	Repeat-o-meter
Flatness	Up to 60 DL in (> 60 to 120) DL in	$(31 + 0.2DL) \mu\text{in}$ $(30 + 0.3DL) \mu\text{in}$	Federal level systems

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Coating Thickness Gauges <sup>3</sup> (Film Ultrasonic)	Up to 60 mils	0.1 mils	Coating thickness standards

## II. Electrical – DC/Low Frequency

Parameter/Equipment	Frequency	CMC <sup>2,5</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			Fluke 5502A
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.24 % + 0.1 µA 0.18 % + 0.1 µA 0.15 % + 0.1 µA 0.36 % + 0.15 µA 0.096 % + 0.2 µA	L comp off
(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	0.24 % + 0.15 µA 0.15 % + 0.15 µA 0.12 % + 0.15 µA 0.24 % + 0.2 µA 0.6 % + 0.3 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	0.22 % + 2 µA 0.11 % + 2 µA 0.05 % + 2 µA 0.097 % + 2 µA 0.24 % + 3 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	0.22 % + 20 µA 0.11 % + 20 µA 0.05 % + 20 µA 0.12 % + 50 µA 0.24 % + 100 µA	
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 100 µA 0.12 % + 100 µA 0.72 % + 1 mA 3 % + 5 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 100 µA 0.074 % + 100 µA 0.72 % + 1 mA 3 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.074 % + 2 mA 0.12 % + 2 mA 3.6 % + 2 mA	

Parameter/Equipment	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Generate <sup>3</sup> (Cont.)  (11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.15 % + 5 mA 0.18 % + 5 mA 3.6 % + 2 mA	Fluke 5502A  L comp off
AC Current – Generate  Clamp-On Meters –  (10 to 150) A  Toroidal  Non-Toroidal  (150 to 1025) A  Toroidal  Non-Toroidal	(45 to 65) Hz (65 to 440) Hz  (45 to 65) Hz (65 to 440) Hz  (45 to 65) Hz (65 to 440) Hz  (45 to 65) Hz (65 to 440) Hz	0.49 % + 0.025 A 1 % + 0.027 A  0.76 % + 0.25 A 1.3 % + 0.25 A  0.49 % + 0.09 A 1 % + 0.1 A  0.76 % + 0.9 A 1.3 % + 0.9 A	Fluke 5502A w/ 5500 coil
AC Power <sup>3</sup> – 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	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	0.17 % 0.12 % 0.17 % 0.12 % 0.16 % 0.14 % 0.16 % 0.14 %	Fluke 5522A

Parameter/Equipment	Frequency	CMC <sup>2, 5, 8</sup> (±)	Comments
AC Power <sup>3</sup> – Generate (Cont.)  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	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	0.15 % 0.1 % 0.15 % 0.1 % 0.14 % 0.11 % 0.15 %  0.12 %	Fluke 5522A
AC Current – Measure <sup>3</sup>  (0 to 100) µA  (1 to 100) mA  (0.1 to 1) A  (30 to 600) A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 Hz to 5 kHz  (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  (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  Up to 100 Hz	0.41 % + 0.03 % rng 0.16 % + 0.03 % rng 0.07 % + 0.03 % rng 0.07 % + 0.03 % rng  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  0.41 % + 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  2.8 %	Agilent 3458A           Fluke 376

Parameter/Equipment	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			
(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	0.19 % + 20 μV 0.13 % + 20 μV 0.19 % + 20 μV 0.25 % + 20 μV 0.43 % + 33 μV 1.2 % + 60 μV	Fluke 5502A
(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	0.06 % + 20 μV 0.036 % + 20 μV 0.085 % + 20 μV 0.12 % + 40 μV 0.28 % + 170 μV 0.6 % + 330 μV	
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	0.062 % + 60 μV 0.037 % + 60 μV 0.084 % + 60 μV 0.12 % + 60 μV 0.28 % + 200 μV 0.6 % + 900 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	0.063 % + 800 μV 0.037 % + 600 μV 0.085 % + 600 μV 0.12 % + 600 μV 0.28 % + 2 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.06 % + 3 mV 0.1 % + 9 mV 0.11 % + 9 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.07 % + 20 mV 0.1 % + 20 mV 0.12 % + 20 mV	

Parameter/Equipment	Frequency	CMC <sup>2, 5, 8</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			
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	1.2 %	Fluke 80K-6 & DMM
Capacitance – Generate <sup>3</sup>			
(220 to 399.9) pF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) μF (1.1 to 3.299 99) μF (3.3 to 10.9999) μF (11 to 32.9999) μF (33 to 109.999) μF	(10 to 10 000) Hz (10 to 10 000) Hz (10 to 3000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz	0.88 % + 10 pF 0.6 % + 0.01 nF 0.6 % + 0.01 nF 0.31 % + 0.1 nF 0.31 % + 0.1 nF 0.31 % + 0.3 nF 0.31 % + 1 nF 0.31 % + 3 nF 0.31 % + 10 nF 0.49 % + 30 nF 0.55 % + 100 nF	Fluke 5502A

Parameter/Equipment	Frequency	CMC <sup>2, 5, 8</sup> (±)	Comments
Capacitance – Generate <sup>3</sup> (cont)			
(110 to 329.999) μF	(0 to 50) Hz	0.55 % + 300 nF	Fluke 5502A
(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/Equipment	Range	CMC <sup>2, 5, 8</sup> (±)	Comments
DC Current <sup>3</sup> – Generate	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A (11 to 20.5) A	0.016 % + 0.05 μA 0.013 % + 0.25 μA 0.013 % + 3.3 μA 0.037 % + 44 μA 0.08 % + 330 μA 0.13 % + 750 μA	Fluke 5502A
DC Clamp-On Meters <sup>3</sup>	Up to 1000 A	0.65 % + 0.5 A	Fluke 5502A w/5500 coil
DC Current – Measure <sup>3</sup>	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  (30 to 600) 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  2.8 %	Agilent 3458A          Fluke 376
DC Voltage <sup>3</sup> – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1020) V	73 μV/V + 3 μV 61 μV/V + 5 μV 61 μV/V + 50 μV 67 μV/V + 500 μV 69 μV/V + 1.5 mV	Fluke 5502A



Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
DC Voltage – Measure <sup>3</sup>	(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	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 %	Agilent 3458A     Fluke 80K-6 & DMM
DC Power <sup>3</sup> – 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
Resistance – Generate <sup>3</sup>	(0 to 11) Ω (11 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ 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	0.015 % + 0.001 Ω 0.015 % + 0.0015 Ω 0.011 % + 0.002 Ω 0.011 % + 0.02 Ω 0.011 % + 0.2 Ω 0.014 % + 0.2 Ω 0.015 % + 2 Ω 0.019 % + 30 Ω 0.073 % + 50 Ω 0.13 % + 2.5 kΩ 0.61 % + 3 kΩ 0.61 % + 100 kΩ 1.8 % + 500 kΩ	Fluke 5502A
Resistance – Measure <sup>3</sup>	(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
RTD Electrical Simulation <sup>3</sup> – Generate  Pt 385, 100 Ω	(-200 to 100) °C (100 to 800) °C	0.07 °C 0.2 °C	Fluke 754

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
RTD Electrical Simulation <sup>3</sup> – Measure  Pt 385, 100 Ω	(-200 to 100) °C (0 to 800) °C	0.09 °C 0.26 °C	Fluke 754
Electrical Simulation of Thermocouples <sup>3</sup> –  Type E  Type J  Type K  Type R  Type S  Type T	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C  (-210 to -100) °C (-100 to 760) °C (760 to 1200) °C  (-200 to -100) °C (-100 to 1000) °C (1000 to 1372) °C  (0 to 250) °C (250 to 1000) °C (1000 to 1767) °C  (0 to 250) °C (250 to 1400) °C (1400 to 1767) °C  (-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.64 °C 0.38 °C 0.34 °C  0.4 °C 0.31 °C 0.36 °C  0.46 °C 0.39 °C 0.53 °C  0.72 °C 0.48 °C 0.53 °C  0.61 °C 0.5 °C 0.6 °C  0.79 °C 0.37 °C 0.3 °C	Fluke 5502A
Electrical Simulation of Thermocouples <sup>3</sup> –  Type J  Type K  Type T	(-200 to 1200) °C  (-200 to 1372) °C  (-250 to 400) °C	0.14 °C  0.23 °C  0.14 °C	Fluke 5502a w/ ice point reference

IV. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2, 8</sup> (±)	Comments
Fume Hoods – Air Velocity Only <sup>3</sup>	(20 to 200) ft/min	4.5 %	Anemometer
Viscosity Meters <sup>3</sup>	33 cP 66 cP 740 cP	1.4 cP 1.4 cP 2.6 cP	Standard viscosity solution w/ bath
Viscosity Dip Cups <sup>3</sup> (Kinematic Viscosity, Efflux Time)	(0 to 100) mm <sup>2</sup> /s (100 to 200) mm <sup>2</sup> /s	0.6 cSt 2.2 cSt	Certified viscosity oil

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 4, 7, 8</sup> (±)	Comments
Indirect Verification of Rockwell Hardness Testers <sup>3</sup>	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	0.84 HRC 0.84 HRC 0.81 HRC  0.84 HRBW 0.81 HRBW 0.81 HRBW	Indirect verification per ASTM E18
Force – Measuring Equipment <sup>3</sup>	Up to 1000 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	0.05 % + 0.6R  0.5 lb + 0.6R 1 lb + 0.6R 2 lb + 0.6R 5 lb + 0.6R 10 lb + 0.6R 50 lb + 0.6R	Class F weights  Load cells w/ indicator

Parameter/Equipment	Range	CMC <sup>2, 4, 7, 8</sup> (±)	Comments
Pressure <sup>3</sup> – Measure & Measuring Equipment	Up to 30 psig	0.05 %	Fluke 754 w/ 750 series modules
	Up to 100 psig	0.06 %	Fluke 717
	(30 to 300) psig	0.06 %	Fluke 754 w/ 750 series modules
	(300 to 3000) psig	0.07 %	Druck DPI-104-3K
	(3000 to 10 000) psig	0.07 %	Druck DPI-104-10K
Speed <sup>3</sup> – Measure			
Optic/Non-Contact: RPM Totalizer/Rate Meters	(5 to 200 000) rpm (2 to 3300) fpm	0.017 % 0.017 %	Monarch PLT200
Contact: RPM Totalizer/Rate Meters	(0.5 to 12 000) rpm (2 to 3300) fpm	0.22 % 0.22 %	
Totalize Meters <sup>3</sup> – (Length Counters & Totalizers)			
Distance Measure	Up to 2000 yards	0.7 %	Monarch PLT200 w/ encoder wheel

Parameter/Equipment	Range	CMC <sup>2, 4, 7, 8</sup> ( $\pm$ )	Comments
Scales & Balances <sup>3</sup>	(1 to 20 000) g (> 20 to 5000) kg  Up to 1000 lb  (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 (> 1000) g	0.017 % + 0.6R 0.017 % per 20 kg + 0.6R  0.017 % + 0.6R  0.041 mg + 0.6R 0.06 mg + 0.6R 0.089 mg + 0.6R 0.14 mg + 0.6R 0.3 mg + 0.6R 0.6 mg + 0.6R 0.9 mg + 0.6R 1.4 mg + 0.6R 3 mg + 0.6R 3 mg per 1000 g + 0.6R	Class F weights (applied load)    Class 1 weights (applied load)
Torque <sup>3</sup> – Click, Adjustable, Dial & Screwdriver Wrenches	5 lbf·in to 600 lbf·ft	0.65 %	CDI Suretest 5000- ST
Torque Testers <sup>3</sup>	Up to 250 lbf·ft	0.08 %	Class F weights & arm
Rotary Torque Tools <sup>3</sup> – Pneumatic, DC, Pulse	(0.5 to 750) N·m	1.4 %	Transducers w/ display
Atmospheric Pressure (Vacuum) <sup>3</sup> – Measure & Measuring Equipment	(0.01 to 28) in·Hg	0.042 in·Hg	Fluke 754 w/750 series module

## VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Plate Temperature – Infrared Devices <sup>3</sup>	Up 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 <sup>3</sup> – Measure	(10 to 90) % RH	1.4 % RH	Vaisala MI-70 w/ MP76B probe
Temperature – Measure <sup>3</sup>	(-196 to 420) °C  (200 to 450) °C (450 to 700) °C (700 to 950) °C (950 to 1200) °C	0.07 °C  2.4 °C 2.7 °C 3.3 °C 3.9 °C	Fluke 1524 w/ PRT probe  Fluke 754 w/ thermocouple probe
Temperature – Measuring Equipment, Direct Method <sup>3</sup>	(-30 to 125) °C  (-30 to 125) °C  (50 to 350) °C  (-15 to 350) °C	0.36 °C  0.08 °C  0.74 °C  0.14 °C	Hart Scientific 7103  Hart Scientific 7103 w/ Fluke 1524 & PRT probe  Hart Scientific 9009  Hart Scientific 9009 w/ Fluke 1524 & PRT probe

## VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Frequency – Measuring Equipment <sup>3</sup>	0.01 Hz to 2 MHz	31 μHz/Hz + 15 mHz	Fluke 5502A
Timers & Stopwatches <sup>3</sup>	(1 to 3600) s	0.2 s	Monarch tachometer & timer

SATELLITE

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I. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Calipers <sup>3</sup>	Up to 12 in	$(3.6 + 9.3L) \mu\text{in} + 0.6R$	Gage blocks
Linear Indicators <sup>3</sup> – Dial & Test	Up to 4 in	$(3.2 + 8.8L) \mu\text{in} + 0.6R$	Gage blocks
Micrometers <sup>3</sup>	Up to 12 in	$(3.6 + 9.3L) \mu\text{in} + 0.6R$	Gage blocks

II. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			Fluke 5502A
(29 to 330) $\mu\text{A}$	(10 to 20) Hz	0.24 % + 0.1 $\mu\text{A}$	L comp off
	(20 to 45) Hz	0.18 % + 0.1 $\mu\text{A}$	
	45 Hz to 1 kHz	0.15 % + 0.1 $\mu\text{A}$	
	(1 to 5) kHz	0.36 % + 0.15 $\mu\text{A}$	
	(5 to 10) kHz	0.096 % + 0.2 $\mu\text{A}$	
(0.33 to 3.3) mA	(10 to 20) Hz	0.24 % + 0.15 $\mu\text{A}$	
	(20 to 45) Hz	0.15 % + 0.15 $\mu\text{A}$	
	45 Hz to 1 kHz	0.12 % + 0.15 $\mu\text{A}$	
	(1 to 5) kHz	0.24 % + 0.2 $\mu\text{A}$	
	(5 to 10) kHz	0.6 % + 0.3 $\mu\text{A}$	

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Generate <sup>3</sup> (cont) (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	0.22 % + 2 μA 0.11 % + 2 μA 0.05 % + 2 μA 0.097 % + 2 μA 0.24 % + 3 μA\	Fluke 5502A  L comp off
(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	0.22 % + 20 μA 0.11 % + 20 μA 0.05 % + 20 μA 0.12 % + 50 μA 0.24 % + 100 μA	
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 100 μA 0.12 % + 100 μA 0.72 % + 1 mA 3 % + 5 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 100 μA 0.074 % + 100 μA 0.72 % + 1 mA 3 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.074 % + 2 mA 0.12 % + 2 mA 3.6 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.15 % + 5 mA 0.18 % + 5 mA 3.6 % + 2 mA	
AC Current – Generate Clamp-On Meters –			
(10 to 150) A: Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.025 A 1 % + 0.027 A	Fluke 5502A w/ 5500 coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.76 % + 0.25 A 1.3 % + 0.25 A	
(150 to 1025) A: Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.09 A 1 % + 0.1 A	
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.76 % + 0.9 A 1.3 % + 0.9 A	



Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Measure			
(0 to 10) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.4 % + 3 nA 0.4 % + 3 nA 0.4 % + 3 nA	Fluke 8558A
(10 to 100) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.046 % + 10 nA 0.09 % + 10 nA 0.12 % + 10 nA 0.67 % + 15 nA	
(1.1 to 1) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.046 % + 100 nA 0.09 % + 100 nA 0.12 % + 100 nA 0.67 % + 150 nA	
(1 to 10) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.046 % + 1 µA 0.09 % + 1 µA 0.12 % + 1 µA 0.67 % + 1.5 µA	
(10 to 100) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.046 % + 10 µA 0.09 % + 10 µA 0.12 % + 10 µA	
(0.1 to 1) A	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.046 % + 0.15 mA 0.078 % + 0.15 mA 0.13 % + 0.15 mA	
AC Voltage – Generate <sup>3</sup>			
(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	0.19 % + 20 µV 0.13 % + 20 µV 0.19 % + 20 µV 0.25 % + 20 µV 0.43 % + 33 µV 1.2 % + 60 µV	Fluke 5502A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz	0.06 % + 20 µV 0.036 % + 20 µV	

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Voltage <sup>3</sup> – Generate (cont)			
(33 to 330) mV	(10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.085 % + 20 μV 0.12 % + 40 μV 0.28 % + 170 μV 0.6 % + 330 μV	Fluke 5502A
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	0.062 % + 60 μV 0.037 % + 60 μV 0.084 % + 60 μV 0.12 % + 60 μV 0.28 % + 200 μV 0.6 % + 900 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	0.063 % + 800 μV 0.037 % + 600 μV 0.085 % + 600 μV 0.12 % + 600 μV 0.28 % + 2 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.06 % + 3 mV 0.1 % + 9 mV 0.11 % + 9 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.07 % + 20 mV 0.1 % + 20 mV 0.12 % + 20 mV	
AC Voltage – Measure			
(0 to 10) mV	1 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	0.064 % + 2 μV 0.049 % + 2 μV 0.05 % + 2 μV 0.44 % + 2 μV 1.7 % + 6 μV 2.6 % + 6 μV	Fluke 8558A
(10 to 100) mV	1 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	0.012 % + 1 μV 0.016 % + 1 μV 0.026 % + 2 μV 0.059 % + 20 μV 0.28 % + 50 μV 1.5 % + 2 mV	

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Voltage – Measure (cont)			
(0 to 1) V	1 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	0.011 % + 10 µV 0.015 % + 10 µV 0.026 % + 20 µV 0.059 % + 200 µV 0.28 % + 0.5 mV 1.5 % + 2 mV	Fluke 8558A
(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 300 kHz to 1 MHz	0.011 % + 100 µV 0.015 % + 100 µV 0.026 % + 0.2 mV 0.059 % + 2 mV 0.28 % + 5 mV 1.5 % + 20 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 300 kHz to 1 MHz	0.017 % + 1 mV 0.02 % + 1 mV 0.029 % + 2 mV 0.066 % + 20 mV 0.45 % + 0.1 V 1.6 % + 0.5 V	
(100 to 1000) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.017 % + 30 mV 0.019 % + 30 mV 0.034 % + 30 mV 0.065 % + 0.2 V	
Capacitance – Generate <sup>3</sup>			
(220 to 399.9) pF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF	(10 to 10 000) Hz (10 to 10 000) Hz (10 to 3000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz	0.88 % + 10 pF 0.6 % + 0.01 nF 0.6 % + 0.01 nF 0.31 % + 0.1 nF 0.31 % + 0.1 nF 0.31 % + 0.3 nF 0.31 % + 1 nF 0.31 % + 3 nF 0.31 % + 10 nF 0.49 % + 30 nF 0.55 % + 100 nF	Fluke 5502A

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
DC Current <sup>3</sup> – Generate	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A (11 to 20.5) A	0.016 % + 0.05 μA 0.013 % + 0.25 μA 0.013 % + 3.3 μA 0.037 % + 44 μA 0.08 % + 330 μA 0.13 % + 750 μA	Fluke 5502A
DC Clamp-On Meters	(20.5 to 1000) A	0.65 % + 0.5 A	5502 w/ 5500A coil
DC Current – Measure	(0 to 10) μA (10 to 100) μA (1.1 to 1.0) mA (1 to 10) mA (10 to 100) mA (1.1 to 1.0) A	32 μA/A + 0.4 nA 13 μA/A + 0.5 nA 12 μA/A + 5 nA 16 μA/A + 50 nA 60 μA/A + 1.5 μA 0.016 % + 0.15 mA	Fluke 8558A
DC Voltage <sup>3</sup> – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1020) V	73 μV/V + 3 μV 61 μV/V + 5 μV 61 μV/V + 50 μV 67 μV/V + 500 μV 69 μV/V + 1.5 mV	Fluke 5502A
DC Voltage – Measure	(0 to 100) mV (0.1 to 1.0) V (1 to 10) V (10 to 100) V (100 to 1000) V	8.5 μV/V + 0.2 μV 5.6 μV/V + 0.4 μV 5.6 μV/V + 0.6 μV 8.7 μV/V + 40 μV 8.8 μV/V + 1.3 mV	Fluke 8558A
Resistance – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 3.3 MΩ (3.3 to 11) MΩ	0.015 % + 0.008 Ω 0.015 % + 0.015 Ω 0.011 % + 0.015 Ω 0.011 % + 0.06 Ω 0.011 % + 0.6 Ω 0.014 % + 6 Ω 0.015 % + 6 Ω 0.019 % + 55 Ω 0.073 % + 550 Ω	Fluke 5502A

Parameter/Equipment	Range	CMC <sup>2, 5, 8</sup> ( $\pm$ )	Comments
Resistance – Measure	(0 to 1) $\Omega$ (1 to 10) $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ (0.1 to 1) M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ (0.1 to 1) G $\Omega$ (1 to 10) G $\Omega$	23 $\mu\Omega/\Omega$ + 4.5 $\mu\Omega$ 16 $\mu\Omega/\Omega$ + 20 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 0.6 m $\Omega$ 13 $\mu\Omega/\Omega$ + 6.0 m $\Omega$ 13 $\mu\Omega/\Omega$ + 60 m $\Omega$ 14 $\mu\Omega/\Omega$ + 1.5 $\Omega$ 32 $\mu\Omega/\Omega$ + 150 $\Omega$ 0.014 % + 15 k $\Omega$ 0.15 % + 1.5 M $\Omega$ 0.14 % + 10 M $\Omega$	Fluke 8558A
RTD Electrical Simulation– Generate  Pt 385, 100 $\Omega$	(-200 to 100) $^{\circ}\text{C}$ (100 to 800) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$ 0.2 $^{\circ}\text{C}$	Fluke 754
RTD Electrical Simulation– Measure  Pt 385, 100 $\Omega$	(-200 to 100) $^{\circ}\text{C}$ (0 to 800) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$ 0.26 $^{\circ}\text{C}$	Fluke 754
Electrical Simulation of Temperature Displays & Readouts <sup>3</sup> –  Type K  Type T	(-200 to -100) $^{\circ}\text{C}$ (-100 to 1000) $^{\circ}\text{C}$ (1000 to 1372) $^{\circ}\text{C}$  (-250 to -150) $^{\circ}\text{C}$ (-150 to 0) $^{\circ}\text{C}$ (0 to 400) $^{\circ}\text{C}$	0.46 $^{\circ}\text{C}$ 0.39 $^{\circ}\text{C}$ 0.53 $^{\circ}\text{C}$  0.79 $^{\circ}\text{C}$ 0.37 $^{\circ}\text{C}$ 0.3 $^{\circ}\text{C}$	Fluke 5502A
AC Power – Measure <sup>3</sup> (Watt/Hour)  P.F. +/- 0.5 to 1	(> 0 to 90) kWh	0.06 %	Radian Research RM-10

IV. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2, 7</sup> (±)	Comments
Liquid Flow <sup>3</sup> – Measuring Equipment	Up to 60 lpm	0.12 %	Coriolis flow meter
Totalize	Up to 100 gallons	0.4 %	Coriolis flow meter w/stopwatch

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 7, 8</sup> (±)	Comments
Pressure <sup>3</sup> – Measure & Measuring Equipment	Up to 9 psig	0.003 psi	Crystal nVision modules
	(9 to 30) psig	0.03 %	
	(30 to 300) psig	0.3 psi	
	(300 to 1000) psig	0.12 %	
Atmospheric Pressure (Vacuum) <sup>3</sup> – Measure & Measuring Equipment	(0.01 to 28) in·Hg	0.023 in·Hg	Crystal nVision module
Barometric Pressure	(22 to 34) in·Hg	0.04 %	Mensor 2104

VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 7</sup> (±)	Comments
Temperature – Measure <sup>3</sup>	(-196 to 420) °C	0.07 °C	Fluke 1524 w/ PRT probe
Temperature – Measuring Equipment, Direct Method <sup>3</sup>	(-30 to 155) °C	0.06 °C	Ametek RTC-156 B

VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 7</sup> (±)	Comments
Frequency – Measuring Equipment <sup>3</sup>	Up to 2 MHz	31 μHz/Hz + 15mHz	Fluke 5502A
Timers & Stopwatches	(1 to 3600) s	0.2 s	Monarch tachometer & timer

<sup>1</sup> This laboratory offers commercial calibration service and field calibration service.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in inches. In the statement of CMC,  $R$  is the resolution of the device.  $DL$  is the diagonal length of the device in inches.

<sup>5</sup> 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.

<sup>6</sup> This scope meets A2LA’s *P112 Flexible Scope Policy*.

<sup>7</sup> 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.

<sup>8</sup> In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.



# Accredited Laboratory

A2LA has accredited

**CROSS TECHNOLOGIES, INC DBA CROSS (FORMERLY J.A. KING)**

*Pelham, AL*

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 12<sup>th</sup> day of December 2022.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1741.03  
Valid to May 31, 2025  
Revised March 6, 2023

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