



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: September 30, 2023

Certificate Number: 1741.15

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 8</sup>:

I. Chemical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
pH Meters <sup>3</sup> – Fixed Points	4 pH 7 pH 10 pH	0.046 pH 0.033 pH 0.043 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Pin Gage <sup>3</sup> – Class Z, ZZ	Up to 1.0 in	40 µin	Micrometer
Calipers <sup>3</sup>	Up to 40 in	(4.5 + 9.9L) µin + 0.6R	Gage blocks
Micrometers <sup>3</sup>	Up to 40 in	(4.5 + 9.9L) µin + 0.6R	Gage blocks
Linear Indicators <sup>3</sup> – Dial & Test	Up to 4 in	(3 + 9.4L) µin + 0.6R	Gage blocks
Height Gages <sup>3</sup>	Up to 48 in	(53 + 8.9L) µin + 0.6R	Gage blocks w/surface plate

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Steel Rules <sup>3</sup>	Up to 72 in	(1.5 + 10L) μin + 0.6R	Gage blocks
Tape Measures <sup>3</sup>	Up to 25 ft	(1.5 + 10L) μin + 0.6R	Gage blocks
Angle Indicators & Protractors <sup>3</sup> – Fixed Points	30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Feeler/Thickness Gages <sup>3</sup>	Up to 1 in	40 μin	Micrometer
Surface Plates <sup>3</sup> – Grades AA, A, & B			
Repeatability/Local Flatness	0.002 in	48 μin	Repeat-o-meter
Flatness	Up to 60 DL in (>60 to 120) DL in	(31 + 0.2DL) μin (30 + 0.3DL) μin	Federal level systems
Coating Thickness Gages <sup>3</sup> (Film, Ultrasonic)	Up to 60 mils	100 μin	Coating thickness standards

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	(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 5500A

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	Comments
DC Voltage – Measure <sup>3</sup>	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.011 % 0.0057 % 0.0049 % 0.0062 % 0.0067 %	Agilent 34401A
	(1 to 6) kV	1.3 %	Fluke 80K-6 & DMM
DC Current – Generate <sup>3</sup>	(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	0.016 % + 0.05 µA 0.013 % + 0.25 µA 0.013 % + 3.3 µA 0.037 % + 44 µA 0.08 % + 330 µA	Fluke 5500A
Clamp-On Meters <sup>3</sup>	Toroidal	Up to 550 A	Fluke 5500A w/5500 coil
	Non-Toroidal	Up to 550 A	
DC Current – Measure <sup>3</sup>	(1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.039 % 0.043 % 0.1 %	Agilent 34401A
	(1 to 10) A	0.37 % + 2 mA	Fluke 287

Parameter/Range	Frequency	CMC <sup>2, 4</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	0.43 % + 20 µV 0.19 % + 20 µV 0.25 % + 20 µV 0.31 % + 20 µV 0.43 % + 33 µV 1.2 % + 60 µV	Fluke 5500A

Parameter/Range	Frequency	CMC <sup>2, 4, 6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (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	0.3 % + 50 µV 0.06 % + 20 µV 0.12 % + 20 µV 0.2 % + 40 µV 0.29 % + 170 µV 0.84 % + 330 µV	Fluke 5500A
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	0.18 % + 250 µV 0.037 % + 60 µV 0.097 % + 60 µV 0.17 % + 300 µV 0.29 % + 1.7 mV 0.6 % + 3.3 mV	
(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	0.19 % + 2.5 mV 0.05 % + 600 µV 0.1 % + 2.6 mV 0.23 % + 5 mV 0.29 % + 17 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.06 % + 6.6 mV 0.1 % + 15 mV 0.11 % + 33 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.07 % + 80 mV 0.25 % + 100 mV 0.25 % + 500 mV	
AC Voltage – Measure <sup>3</sup>			
Up to 750V	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.12 % 0.21 % 0.82 %	Agilent 34401A
(1 to 6) kV – Fixed Point	60 Hz	1.6 %	Fluke 80K-6 & DMM

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			
(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	0.3 % + 0.15 μA 0.15 % + 0.15 μA 0.15 % + 0.25 μA 0.48 % + 0.15 μA 1.5 % + 0.15 μA	Fluke 5500A
(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 % + 0.3 μA 0.12 % + 0.3 μA 0.12 % + 0.3 μA 0.24 % + 0.3 μA 0.72 % + 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	0.24 % + 3 μA 0.12 % + 3 μA 0.11 % + 3 μA 0.24 % + 3 μA 0.72 % + 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	0.24 % + 30 μA 0.12 % + 30 μA 0.11 % + 30 μA 0.24 % + 30 μA 0.72 % + 30 μA	
330 mA to 2.2 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.24 % + 300 μA 0.12 % + 300 μA 0.9 % + 300 μA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.08 % + 2 mA 0.12 % + 2 mA 0.4 % + 2 mA	

Parameter/Range	Frequency	CMC <sup>2, 4, 6</sup> ( $\pm$ )	Comments
Clamp-On Meters <sup>3</sup> – (Up to 150) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.025 A 1 % + 0.027 A	Fluke 5500A 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 550) A			
Toroidal	(45 to 65) Hz	0.49 % + 0.09 A	
Non-Toroidal	(45 to 65) Hz	0.76 % + 0.9 A	
AC Current – Measure <sup>3</sup>			
Up to 1 A (1 to 3) A	10 Hz to 5 kHz 10 Hz to 5 kHz	0.18 % 0.26 %	Agilent 34401A
(3 to 10) A	45 Hz to 1 kHz	0.97 % + 5 mA	Fluke 287
Capacitance – Generate <sup>3</sup>			
(0.33 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) $\mu$ F (1.1 to 3.3) $\mu$ F	(50 to 1000) Hz	1 % + 0.01 nF 0.32 % + 0.1 nF 0.32 % + 0.3 nF 0.32 % + 1 nF 0.43 % + 3 nF	Fluke 5500A
(3.3 to 11) $\mu$ F (11 to 33) $\mu$ F	(50 to 400) Hz	0.44 % + 10 nF 0.5 % + 30 nF	
(33 to 110) $\mu$ F	(50 to 200) Hz	0.63 % + 100 nF	
(110 to 330) $\mu$ F 330 $\mu$ F to 1.1 mF	(50 to 100) Hz	0.86 % + 300 nF 1.3 % + 300 nF	

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Electrical Simulation of Temperature Displays and Readouts <sup>3</sup> –			
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.4 °C 0.31 °C 0.36 °C	Fluke 5500A
Type K	(-200 to -100) °C (-100 to 1000) °C (1000 to 1372) °C	0.46 °C 0.39 °C 0.53 °C	
Type R	(0 to 250) °C (250 to 1000) °C (1000 to 1767) °C	0.72 °C 0.48 °C 0.53 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.61 °C 0.5 °C 0.6 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.79 °C 0.37 °C 0.3 °C	
Electrical Calibration of RTD's <sup>3</sup> –			
Generate	(-200 to 0) °C (0 to 400) °C (400 to 800) °C	0.13 °C 0.25 °C 0.49 °C	Beamex MC2-MF
Measure	(-200 to 0) °C (0 to 400) °C (400 to 800) °C	0.37 °C 0.61 °C 0.97 °C	

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	Comments
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	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 0.12 % + 550 Ω 0.61 % + 5.5 kΩ 0.61 % + 17 kΩ	Fluke 5500A
Resistance – Measure <sup>3</sup>	Up 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	0.017 % 0.014 % 0.014 % 0.014 % 0.014 % 0.05 % 0.98 %	Agilent 34401A

#### IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> (±)	Comments
Scales & Balances <sup>3</sup>	(1 to 20 000) g (>20 to 5000) kg	0.017 % + 0.6R 0.017 % per 20 000 g + 0.6R	Class F weights (applied load)
	Up to 1000 lb (1000 to 120 000) lb	0.017 % + 0.6R 0.017 % per 20 000 lb + 0.6R	
Scales & Balances <sup>3</sup>	(1 to 5) g	0.043 mg + 0.6R	ASTM Class 1 weights
	Up to 10 g	0.062 mg + 0.6R	
	Up to 30 g	0.092 mg + 0.6R	
	Up to 50 g	0.17 mg + 0.6R	
	Up to 100 g	0.31 mg + 0.6R	
	Up to 200 g	0.63 mg + 0.6R	
	Up to 300 g	0.93 mg + 0.6R	
	Up to 500 g	1.5 mg + 0.6R	
	Up to 1000 g	3.1 mg + 0.6R	
	> 1000 g	3.1 mg per 1000 g + 0.6R	



Parameter/Equipment	Range	CMC <sup>2, 5, 6, 7</sup> (±)	Comments
Force – Measure, Measuring Equipment <sup>3</sup>	Up to 1000 lb	0.017 % + 0.6R	ASTM Class F weights
Torque – Measure Wrenches <sup>3</sup>	5 in·lbf to 600 ft·lbf	0.65 %	CDI Suretest 5000-ST
Pressure – Measuring Equipment <sup>3</sup>			
Pneumatic	(0.01 to 100) psig (0 to 1000) psig (0 to 10 000) psig  (0 to 2400) psig	0.035 % Full Scale 0.15 % Full Scale 0.15 % Full Scale  0.07 % Full Scale	Fluke 2700G   Beamex MC2
Atmospheric Pressure (Vacuum) – Measure, Measuring Equipment <sup>3</sup>	(0.01 to 24) in·Hg	0.035 % Full Scale	Fluke 2700G
Speed <sup>3</sup> –			
Optic/Non-contact: Totalizer/Rate Meters	(6 to 100 000) rpm (2 to 3300) fpm	0.017 % 0.017 %	Monarch PLT200

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 7</sup> (±)	Comments
Relative Humidity – Measure, Measuring Equipment <sup>3</sup>	(10 to 90) % RH	1.2 % RH	Vaisala M170 w/ HMP- 76
Temperature – Measure <sup>3</sup>	(-196 to 420) °C	0.34 °C	Beamex MC2 w/ PRT

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Temperature – Measuring Equipment <sup>3</sup>	(-15 to 110) °C	0.3 °C	Fluke 9009
	(50 to 350) °C	0.75 °C	
	(-10 to 100) °C	0.34 °C	Bath w/ ext probe

## VI. Time and Frequency

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Frequency – Measuring Equipment <sup>3</sup>	0.01 Hz to 11.99 kHz	31 parts in 10 <sup>6</sup> + 1 mHz	Fluke 5500A
	12 kHz to 2 MHz	31 parts in 10 <sup>6</sup> + 15 mHz	
Timers & Stopwatches <sup>3</sup>	(1 to 3600) s	0.2 s	Stopwatch

<sup>1</sup> This laboratory offers commercial calibration and field calibration services, where noted.

<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> 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.

<sup>5</sup> The statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in inches,  $R$  is the resolution of the device,  $DL$  is the numerical value of the diagonal length of the device measured in inches.

<sup>6</sup> Unless otherwise noted, percentage refers to percent of reading.

<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> This scope meets A2LA's *P112 Flexible Scope Policy*.



## Accredited Laboratory

A2LA has accredited

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

*Olive Branch, MS*

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 11<sup>th</sup> day of August 2021.

A blue ink signature of a man, written over a horizontal line.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1741.15  
Valid to September 30, 2023

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