SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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

Valid To: September 30, 2025 Certificate Number: 1741.10

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 8]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters[3] – Fixed Points	4 pH 7 pH 10 pH	0.04 pH 0.04 pH 0.07 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Pin Gage[3] – Class Z & Class ZZ	Up to 1.0 in	80 µin	Micrometer
Calipers[3]	Up to 40 in	$(4.5 + 9.9L)$ µin + $0.6R$	Gage blocks
Micrometers[3]	Up to 40 in	$(4.5 + 9.9L)$ µin + $0.6R$	Gage blocks
Linear Indicators[3] – Dial & Test	Up to 4 in	$(3 + 9.4L)$ µin + $0.6R$	Gage blocks
Height Gages[3]	Up to 48 in	$(53 + 8.9L)$ µin + $0.6R$	Gage blocks w/ surface plate

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Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Coating Thickness Gages – (Film, Ultrasonic)[3]	Up to 20 mil	0.12 mil	Coating thickness standards
Surface Roughness Meters & Profilometers[3]	(10 to 200) µin	1.6 µin	Precision roughness standard
Steel Rulers[3]	Up to 72 in	(1.5 + 10*L*) µin + 0.6*R*	Gage blocks
Tape Measures[3]	Up to 25 ft	(1.5 + 10*L*) µin + 0.6*R*	Gage blocks
Angle Indicators & Protractors[3]	15°, 30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Cylindrical Measure –			
Plain Rings, Pins, Plain Plugs, Discs, Spheres – External Only Diameter	(0.02 to 8) in	(21 + 1.8*L*) µin	Mahr 828 ULM
Thread Plugs –			
Pitch Diameter	(0.02 to 4) in	76 µin	Mahr 828 ULM w/ thread wires
Major Diameter	(0.02 to 4) in	(16 + 2.1*L*) µin	
Thread Rings –			
Simple Pitch Diameter	(0.02 to 4) in	260 µin	Set plugs
Optical Comparator[3] –			
X-Y Linearity	Up to 6 in	150 µin	Glass master scales
Magnification	10x to 250x	0.014 in	
Angle	0° to 90°	0.1°	Angle block set
Feeler/Thickness Gages[3]	Up to 1 in	80 µin	Micrometer

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Surface Plates[3] – Grades AA, A & B			
Repeatability/Local Flatness	0.002 in	40 µin	Repeat-o-meter
Flatness	Up to 60 in (>60 to 120) in	(31 + 0.2*DL*) µin (30 + 0.3*DL*) µin	Federal level systems

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Voltage[3] – 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 5500A
DC Voltage[3] – Measure (Power Sources, Supplies, Hipot Testers)	(0 to 50) mV (50 to 500) mV 500 mV to 5 V (5 to 50) V (50 to 500) V (500 to 1000) V (1 to 6) kV	0.06 % + 0.02 mV 0.03 % + 0.02 mV 0.03 % + 0.2 mV 0.03 % + 2 mV 0.036 % + 20 mV 0.036 % + 0.2 V 1.2 %	Fluke 287 Fluke 80K-6 & DMM
DC Current[3] – 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	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
DC Current[3] – Measure (Process Devices, Loop Calibrators)	(0 to 5) mA (5 to 50) mA (50 to 400) mA 400 mA to 10 A	0.1 % + 0.2 µA 0.07 % + 0.01 mA 0.19 % + 0.02 mA 0.37 % + 2 mA	Fluke 287

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Voltage[3] – Generate			
(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
(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	
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[3] – Measure (Hipot Testers)			
(5 to 50) V	(45 to 65) Hz 65 Hz to 10 kHz (10 to 20) kHz	0.37 % + 0.025 V 0.49 % + 0.025 V 0.85 % + 0.04 V	Fluke 287
(50 to 500) V	(45 to 65) Hz 65 Hz to 10 kHz	0.37 % + 0.25 V 0.49 % + 0.25 V	
(500 to 1000) V	(45 to 65) Hz 65 Hz to 10 kHz	0.37 % + 2.5 V 0.49 % + 2.5 V	
(1 to 6) kV	60 Hz	1.2 %	High voltage probe

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Current[3] – Generate			
(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	Range	CMC[2, 4, 6] (±)	Comments
AC Current[3] – Measure			
45 Hz to 1 kHz	(0 to 500) µA (0.5 to 5) mA (5 to 50) mA (50 to 400) mA (0.4 to 10) A	0.74 % + 0.2 µA 0.74 % + 0.5 µA 0.73 % + 0.02 mA 0.73 % + 0.05 mA 0.97 % + 5 mA	Fluke 287

Parameter/Range	Range	CMC[2, 4, 6] (±)	Comments
Capacitance[3] – Generate			
(50 to 1000) Hz	(0.33 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF 330 µF to 1.1 mF	1 % + 0.01 nF 0.32 % + 0.1 nF 0.32 % + 0.3 nF 0.32 % + 1 nF 0.43 % + 3 nF 0.44 % + 10 nF 0.5 % + 30 nF 0.63 % + 100 nF 0.86 % + 300 nF 1.3 % + 300 nF	Fluke 5500A
Resistance[3] – 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 (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[3]	(0 to 50) Ω (50 to 500) Ω (500 to 5000) Ω (5 to 50) kΩ (50 to 500) kΩ 500 kΩ to 5 MΩ (5 to 30) MΩ (30 to 50) MΩ (50 to 100) MΩ	0.18 % + 0.02 Ω 0.06 % + 0.1 Ω 0.06 % + 0.2 Ω 0.06 % + 2 Ω 0.06 % + 20 Ω 0.19 % + 400 Ω 1.8 % + 4 kΩ 1.8 % + 40 kΩ 3.6 % + 200 kΩ	Fluke 287
Electrical Simulation of Temperature Displays & Readouts[3] –			
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.64 °C 0.38 °C 0.34 °C	Fluke 5500A

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Electrical Simulation of Temperature Displays & Readouts[3] – (cont)			
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 Simulation of RTDs[3]–			
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 (Pt50 to Pt1000)
Measure	(-200 to 0) °C (0 to 400) °C (400 to 800) °C	0.37 °C 0.61 °C 0.97 °C	

IV. Mechanical

Parameter/Equipment	Range	CMC[2, 5, 6, 7] (±)	Comments
Scales & Balances[3]	1 to 20 000) g (>20 to 5000) kg Up to 1000 lb (1000 to 120 000) lb	0.017 % + 0.6*R* 0.017 % per 20 000 g + 0.6*R* 0.017 % + 0.6*R* 0.017 % per 20 000 lb + 0.6*R*	Class F weights (applied load)

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Scales & Balances[3] – (cont)	(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	0.043 mg + 0.6*R* 0.062 mg + 0.6*R* 0.092 mg + 0.6*R* 0.17 mg + 0.6*R* 0.31 mg + 0.6*R* 0.63 mg + 0.6*R* 0.93 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)
Force[3] – Measuring Equipment	Up to 1000 lb Up to 10 000 lb	0.017 % + 0.6*R* 0.32 % of Applied Force	ASTM class F weights Load cells w/ indicator
Torque[3] – Measuring Equipment (Wrenches)	5 in·lbf to 600 lbf-ft	0.65 %	CDI Suretest 5000-ST
Pressure[3] – Measuring Equipment	(0.01 to 300) psig (0 to 3000) psig (5 to 10 000) psig	0.07 % Full Scale 0.07 % Full Scale 0.07 % Full Scale	Beamex MC2-IPM20C Druck DPI-3000 Druck DPI-10K
Atmospheric Pressure (Vacuum)[3]	(0.01 to 30) in·Hg	0.02 in·Hg	Beamex MC2-IPM2C

V. Thermodynamics

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

VI. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Timers & Stopwatches[3]	(1 to 3600) s	0.2 s	Stopwatch
Frequency – Generate	0.01 Hz to 2 MHz	31 µHz/Hz + 15mHz	Fluke 5500A

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

[5] 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 in micro inches, and *DL* is the length of the diagonal in inches.

[6] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

[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. DBA CROSS (FORMERLY J.A. KING)

Des Moines, IA

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 9th day of October 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.10
Valid to September 30, 2025

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