SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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

Valid To: October 31, 2025 Certificate Number: 1741.23

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	0.027 pH 0.027 pH 0.027 pH	Standard pH solutions
Conductivity Meters[3]	10 µS/cm 100 µS/cm 1000 µS/cm 1413 µS/cm 10 000 µS/cm	0.56 µS 2.2 µS 3.9 µS 6 µS 39 µS	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Pin Gage[3] – Class Z & Class ZZ	Up to 1 in	82 µin	Micrometer

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Calipers[3]	Up to 40 in	(4.5 + 9.9*L*) µin + 0.6R	Gage blocks
Micrometers[3]	Up to 40 in	(4.5 + 9.9*L*) µin + 0.6R	Gage blocks
Height Gages[3]	Up to 20 in (20 to 48) in	(52 + 7.9*L*) µin + 0.6R (18 + 9.6*L*) µin + 0.6R	Gage blocks
Steel Rules[3]	Up to 72 in	(2.7 + 10*L*) µin + 0.6R	Gage blocks
Tape Measures[3]	Up to 25 ft	(2.7 + 10*L*) µin + 0.6R	Gage blocks
Angle Indicators & Protractors[3]	30°, 45°, 60°, 75°, 90°	0.032°	Angle block set
Feeler/Thickness Gages[3]	Up to 1 in	82 µin	Micrometer

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Voltage – Measure[3]	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 6) kV	0.011 % 0.0057 % 0.0049 % 0.0062 % 0.0067 % 1.3 %	Agilent 34401A Fluke 80K-6 & DMM
DC Voltage – Generate[3]	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (100 to 1000) V	25 µV/V + 1 µV 14 µV/V + 2 µV 15 µV/V + 20 µV 22 µV/V + 150 µV 22 µV/V + 1.5 mV	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Current – Measure[3]	Up to 10 mA (10 to 100) mA 100 mA to 1 A (1 to 50) A	0.039 % 0.043 % 0.1 % 0.31 %	Agilent 34401A Empro shunt w/ DMM
DC Current– Generate[3]	(0 to 330) µA (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	0.018 % + 0.02 µA 0.012 % + 0.05 µA 0.012 % + 0.25 µA 0.012 % + 2.5 µA 0.024 % + 40 µA 0.046 % + 40 µA 0.06 % + 500 µA 0.12 % + 750 µA	Fluke 5522A
Clamp-On Meters[3] –	(20.5 to 1000) A	0.65 % + 0.5 A	Fluke 5522A w/5500 coil
Resistance – Measure[3]	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
Resistance – Generate[3]	(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	49 µΩ/Ω + 0.001 Ω 37 µΩ/Ω + 0.0015 Ω 34 µΩ/Ω + 0.0014 Ω 34 µΩ/Ω + 0.002 Ω 34 µΩ/Ω + 0.02 Ω 34 µΩ/Ω + 0.2 Ω 39 µΩ/Ω + 2 Ω 73 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

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
Capacitance – Generate[3]			
(220 to 399.9) pF	(10 to 10 000) Hz	0.88 % + 10 pF	Fluke 5522A
(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	
AC Voltage – Generate[3]			
(0 to 33) mV	(10 to 45) Hz	0.096 % + 6 µV	Fluke 5522A
	45 Hz to 10 kHz	0.022 % + 6 µV	
	(10 to 20) kHz	0.026 % + 6 µV	
	(20 to 50) kHz	0.12 % + 6 µV	
	(50 to 100) kHz	0.42 % + 12 µV	
	(100 to 500) kHz	0.96 % + 50 µV	
(33 to 330) mV	(10 to 45) Hz	0.036 % + 8 µV	
	45 Hz to 10 kHz	0.018 % + 8 µV	
	(10 to 20) kHz	0.02 % + 8 µV	
	(20 to 50) kHz	0.042 % + 8 µV	
	(50 to 100) kHz	0.096 % + 32 µV	
	(100 to 500) kHz	0.24 % + 70 µV	
(0.33 to 3.3) V	(10 to 45) Hz	0.036 % + 50 µV	
	45 Hz to 10 kHz	0.019 % + 60 µV	
	(10 to 20) kHz	0.023 % + 60 µV	
	(20 to 50) kHz	0.036 % + 50 µV	
	(50 to 100) kHz	0.084 % + 130 µV	
	(100 to 500) kHz	0.29 % + 600 µV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
(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	0.036 % + 650 µV 0.019 % + 600 µV 0.029 % + 600 µV 0.042 % + 600 µV 0.11 % + 1.6 mV	Fluke 5522A
(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	0.023 % + 2 mV 0.025 % + 6 mV 0.03 % + 6 mV 0.036 % + 6 mV 0.24 % + 50 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.036 % + 10 mV	
AC Voltage – Measure[3]			
(330 to 1020) V	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	60 Hz	1.6 %	Fluke 80K-6 & DMM
AC Current – Generate[3]			
(0 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 0.02 % + 10 nA 0.014 % + 8 nA 0.029 % + 12 nA 0.14 % + 65 nA	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 0.02 % + 35 nA 0.013 % + 35 nA 0.025 % + 110 nA 0.14 % + 650 nA	
(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 0.02 % + 350 nA 0.013 % + 350 nA 0.025 % + 550 nA 0.14 % + 5 µA	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Current – Generate[3] (cont)			
(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 0.02 % + 3.5 µA 0.013 % + 2.5 µA 0.025 % + 3.5 µA 0.14 % + 10 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	
(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	0.24 % + 0.1 µA 0.18 % + 0.1 µA 0.15 % + 0.1 µA 0.36 % + 0.15 µA 0.96 % + 0.2 µA 2 % + 0.4 µA	
(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	0.24 % + 0.15 µA 0.16 % + 0.15 µA 0.13 % + 0.15 µA 0.25 % + 0.2 µA 0.6 % + 0.3 µA 1.2 % + 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	0.22 % + 2 µA 0.11 % + 2 µA 0.05 % + 2 µA 0.097 % + 2 µA 0.24 % + 3 µA 0.48 % + 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	0.22 % + 20 µA 0.11 % + 20 µA 0.05 % + 20 µA 0.12 % + 50 µA 0.24 % + 100 µA 0.48 % + 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	0.22 % + 100 µA 0.06 % + 100 µA 0.72 % + 1 mA 3 % + 5 mA	

Parameter/Range	Frequency	CMC[2, 4, 6, 7] (±)	Comments
AC Current – Generate[3] (cont)			
(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 0.073 % + 100 µA 0.72 % + 1 mA 3 % + 5 mA	
(3 to 11) A	45 Hz to 1 kHz (1 to 5) kHz	0.12 % + 2 mA 3.6 % + 2 mA	
(11 to 20.5) A	45 Hz to 1 kHz (1 to 5) kHz	0.18 % + 5 mA 3.6 % + 5 mA	
Clamp-On Meters[3]–			
(10 to 150) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.025 A 1 % + 0.027 A	Fluke 5522A 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	
AC Current – Measure[3]			
Up to 1 A	10 Hz to 5 kHz	0.18 %	Agilent 34401A
(1 to 3) A	10 Hz to 5 kHz	0.26 %	

Parameter/Equipment	Range	CMC [2, 4] (±)	Comments
Thermocouple Simulation[3] –			
Type B	(600 to 800) °C (800 to 1820) °C	0.53 °C 0.43 °C	Fluke 5522A
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.61 °C 0.21 °C 0.26 °C	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.33 °C 0.21 °C 0.28 °C	
Type K	(-200 to -100) °C (-100 to 1000) °C (1000 to 1372) °C	0.40 °C 0.32 °C 0.48 °C	
Type N	(-200 to -100) °C (-100 to 410) °C (410 to 1300) °C	0.50 °C 0.29 °C 0.35 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.58 °C 0.46 °C 0.57 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.76 °C 0.30 °C 0.21 °C	
Electrical Calibration of RTD's[3] –			
Pt 385-100			
Measure	(-200 to 100) °C (100 to 800) °C	0.11 °C 0.26 °C	Fluke 754 series
Simulation	(-200 to 100) °C (100 to 800) °C	0.07 °C 0.17 °C	

Parameter/Equipment	Range	CMC [2, 4] (±)	Comments
Oscilloscopes[3] –			
Square Wave Signal:			
50 Ω Load @ 1 kHz	1 mV to 6.6 V_{pk-pk}	0.31 % + 40 µV	Fluke 5522A w/ SC1100
1 MΩ Load @ 1 kHz	1 mV to 130 V_{pk-pk}	0.14 % + 40 µV	
DC Volt Amplitude:			
50 Ω Load	(0 to 6.6) V	0.3 % + 40 µV	
1 MΩ Load	(0 to 130) V	0.06 % + 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 (300 to 1100) MHz	2.4 % + 300 µV 4.2 % + 300 µV 4.8 % + 300 µV 7.2 % + 300 µV 8.4 % + 300 µV	
Flatness (Bandwidth)	Up to 100 MHz (100 to 300) MHz (300 to 600) MHz (300 to 1100) MHz	1.8 % + 100 µV 2.4 % + 100 µV 4.8 % + 100 µV 6 % + 100 µV	
Time Markers:			
Into a 50 Ω Load	5 s to 50 ms 20 ms to 2 ns	(30 + 1000t) 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	

IV. Fluid Quantities

Parameter/Equipment	Range	CMC [2] (±)	Comments
Viscosity Meters[3]	1 cP 5 cP 50 cP 100 cP 500 cP	0.2 % + 0.6R 0.2 % + 0.6R 0.26 % + 0.6R 0.26 % + 0.6R 0.32 % + 0.6R	Standard viscosity solutions w/ bath

V. Mechanical

Parameter/Equipment	Range	CMC [2, 5, 6, 7] (±)	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 (5 to 10) g (10 to 500) g 501 g to 20 kg (> 20 to 5000) kg Up to 1000 lb (1000 to 120 000) lb	0.013 mg + 0.6*R* 0.043 mg + 0.6*R* 0.062 mg + 0.6*R* 0.096 mg + 0.6*R* 0.17 mg + 0.6*R* 0.31 mg + 0.6*R* 0.63 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* 0.04 % + 0.6*R* 0.025 % + 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 (applied load) Class F weights (applied load)
Force[3] – Measuring Equipment	Up to 100 lbf	0.017 % + 0.6*R*	Class F weights
Torque – Measure[3] – Wrenches – Click, Dial, Adjustable, Screwdrivers	5 lbf·in to 600 lbf·ft	0.65 %	CDI Suretest 5000-ST

Parameter/Equipment	Range	CMC [2, 5, 6, 7] (±)	Comments
Pressure – Measure & Measuring Equipment[3]			
Pneumatic	Up to 300 psig	0.19 psi	ADT-680 Series
Hydraulic	(300 to 3000) psig (5 to 10 000) psig	1.9 psi 6.3 psi	
Atmospheric Pressure – Measure & Measuring Equipment (Vacuum)[3]	(0.01 to 28.5) in Hg	0.39 in Hg	ADT-680 Series
Speed[3] –			
Optic/Non-contact:			
RPM	(6 to 100 000) rpm	0.017 %	Monarch PLT200
Totalizer/Rate Meters	(2 to 3300) fpm	0.017 %	
Contact:			
RPM	(6 to 20 000) rpm	0.22 %	Shimpo 105A
Totalizer/Rate Meters	(2 to 3300) fpm	0.22 %	
Totalize Meters[3] –			
Distance Measure Mechanical	Up to 200 ft	0.64 %	Monarch PLT200 w/ 10 cm wheel
Counter/Totalizers[3]	Up to 999 999 counts	(0.02 % + 0.6R)	

VI. Thermodynamics

Parameter/Equipment	Range	CMC [2, 7] (±)	Comments
Relative Humidity – Measure[3]	(10 to 80) % RH	1.3 % RH	Rotronic HP32A w/ HC2A-S probe
Relative Humidity Measuring Equipment[3]	(10 to 80) % RH	1.3 % RH	Humidity source w/ Rotronic HP32A w/ HC2A-S probe
Temperature – Measure[3]	(-40 to 660) °C	0.052 °C	Isotech TTI -10 w/PRT
Temperature – Measuring Equipment[3]	(-25 to 140) °C (50 to 650) °C	0.07 °C 0.1 °C	Isotech 4926 w/ PRT Isotech 650 w/PRT
Infrared Thermometry – Measuring Equipment[3]	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 λ = (8 to 14) µm, where ε = 0.95”

VII. Time & Frequency

Parameter/Equipment	Range	CMC [2] (±)	Comments
Timers & Stopwatches[3]	(1 to 3600) s	0.2 s	Monarch PLT 200
Frequency – Measuring Equipment[3]	0.01 Hz to 2 MHz	5.6 ppm + 5 µHz	Fluke 5522A

[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. 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.

[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, *DL* is the diagonal length of the device in inches.

[6] In the statement of CMC, percentages are percent 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)

North Charleston, SC

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 November 15th, 2023

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.23
Valid to October 31, 2025

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