SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

CROSS TECHNOLOGIES INC.
411 Industry Road, Suite 300
Louisville, KY 40208
Connie Foster Phone: 800 327 7727

CALIBRATION

Valid To: September 30, 2027 Certificate Number: 1741.19

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, 8]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters[3]	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 10 000 µS/cm	0.63 µS/cm 2.2 µS/cm 5.7 µS/cm 41 µS/cm	Standard conductivity solutions
Refractometers[3]	Up to 75 % Brix	0.033 % Brix	Sucrose solutions

II. Dimensional

Parameter/Equipment	Range	CMC [2, 5] (±)	Comments
Pin Gages [3]– Class ZZ	Up to 1 in	80 µin	Micrometer

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Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Calipers[3]	Up to 60 in	(4.6 + 9.8*L*) µin + 0.6*R*	Gage blocks
Micrometers[3]	Up to 60 in	(4.6 + 9.8*L*) µin + 0.6*R*	Gage blocks
Linear Indicators – Dial & Test[3]	Up to 4 in	(3 + 9.4*L*) µin + 0.6*R*	Gage blocks
Height Gages[3]	Up to 24 in (24 to 48) in	(38 + 8.6*L*) µin + 0.6*R* (38 + 9.2*L*) µin + 0.6*R*	Gage blocks w/surface plate
Steel Rules[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]	30°, 45°, 60°, 75°, 90°	0.03° + 0.6*R*	Angle block set
Feeler/Thickness Gages[3]	Up to 1 in	80 µin	Micrometer
Coating Thickness Gages – Film, Ultrasonic[3]	Up to 60 mils	0.1 mils	Coating thickness standards
Microscopes[3] – Reticles Linearity / Measuring	(0.1 to 10) mm	0.006 mm + 0.6*R*	Stage micrometer
Surface Plates Grades AA, A & B[3] –			
Repeatability	0.002 in	40 µin	Repeat-o-meter
Flatness	Up to 60 *DL* in (> 60 to 120) *DL* in	(31 + 0.2*DL*) µin (30 + 0.3*DL*) µin	Federal level system

III. Dimensional Testing/Calibration[9]

Parameter/Equipment	Range[5]	CMC[2, 4] (±)	Comments
One Dimensional – Measure[3]	Up to 12 in	0.0019 in	Caliper

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
DC Voltage – Measure[3]	(0 to 100) mV (0.1 to 1.0) V (1 to 10) V (10 to 100) V (100 to 1000) V (100 to 10) kV (10 to 100) kV	7.8 µV/V + 0.2 µV 3.4 µV/V + 0.3 µV 3.4 µV/V + 0.5 µV 4.7 µV/V + 30 µV 4.8 µV/V + 0.5 mV 0.03 % + 0.03 V 0.05 % + 0.3 V	Fluke 8588A Vitrek 4700 w/ HVL-100
DC Voltage – Generate[3]	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1020) V	25 µV/V + 1 µV 14 µV/V + 2 µV 15 µV/V + 15 µV 22 µV/V + 150 µV 22 µV/V + 1.5 mV	Fluke 5522A
DC Current – Measure[3]	(0 to 10) µA (10 to 100) µA (0.1 to 1.0) mA (1 to 10) mA (10 to 100) mA (0.1 to 1.0) A (1 to 10) A (1 to 30) A (1 to 1000) A	29 µA/A + 0.4 nA 10 µA/A + 0.4 nA 10 µA/A + 4 nA 15 µA/A + 40 nA 58 µA/A + 1 µA 0.014 % + 0.1mA 0.024 % + 0.4 mA 0.056 % + 4.4 mA 0.32 %	Fluke 8588A Empro shunt w/ Fluke 8588A
DC Clamp-On Meters[3]–	Up to 1000 A	0.65 % + 0.5 A	Fluke 5522A w/5500 coil

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
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 0.013 % + 0.25 µA 0.015 % + 2.5 µA 0.025 % + 40 µA 0.046 % + 40 µA 0.06 % + 500 µA 0.12 % + 750 µA	Fluke 5522A
DC Power – Generate[3] 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	 0.032 % 0.031 % 0.085 %	 Fluke 5522A
Resistance – Measure[3]	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ (1 to 10) GΩ	19 µΩ/Ω + 4.0 µΩ 11 µΩ/Ω + 14 µΩ 9.6 µΩ/Ω + 50 µΩ 9.4 µΩ/Ω + 0.5 mΩ 9.4 µΩ/Ω + 5.0 mΩ 9.6 µΩ/Ω + 50 mΩ 11 µΩ/Ω + 1 Ω 24 µΩ/Ω + 100 Ω 0.013 % + 10 kΩ 0.14 % + 1 MΩ 0.14 % + 10 MΩ	Fluke 8588A
Resistance – Generate[3]	Up 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 51 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 0.014 % + 50 Ω 0.03 % + 2.5 kΩ 0.06 % + 3 kΩ 0.36 % + 100 kΩ 1.8 % + 500 kΩ	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Insulation Resistance – Generate[3]			
Decade Steps	100 Ω to 1 GΩ (1 to 10) GΩ (1 to 100) GΩ	1.3 % 1.3 % 1.3 %	IET HRRS-F-7-100 IET RRS-F2-100M-5kV IET HRRS-F2-1G-5kV

Parameter/Range	Frequency	CMC[2, 4] (±)	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]			
(1 to 33) mV	(10 to 45) Hz	0.1 % + 6 µV	Fluke 5522A
	45 Hz to 10 kHz	0.021 % + 6 µV	
	(10 to 20) kHz	0.027 % + 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	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate[3] (cont)			
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	0.04 % + 50 µV 0.019 % + 60 µV 0.023 % + 60 µV 0.036 % + 50 µV 0.085 % + 130 µV 0.29 % + 600 µV	Fluke 5522A
(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	0.04 % + 650 µV 0.019 % + 600 µV 0.029 % + 600 µV 0.043 % + 600 µV 0.11 % + 1.6 mV	
(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	0.024 % + 2 mV 0.025 % + 6 mV 0.03 % + 6 mV 0.038 % + 6 mV 0.25 % + 50 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.037 % + 10 mV	
AC Voltage – Measure[3]			
(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 (0.3 to 1) MHz	0.034 % + 1.1 µV 0.041 % + 1.1 µV 0.042 % + 1.1 µV 0.031 % + 1.1 µV 1.1 % + 4 µV 2.1 % + 4 µV	Fluke 8588A
(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 (0.3 to 1) MHz	0.01 % + 0.5 µV 0.014 % + 0.4 µV 0.024 % + 1 µV 0.054 % + 5 µV 0.22 % + 30 µV 1.2 % + 0.1 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure[3] (cont)			
(0.1 to 1) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.008 % + 5 µV 0.013 % + 5 µV 0.024 % + 10 µV 0.054 % + 50 µV 0.22 % + 0.3 mV 1.1 % + 1 mV	Fluke 8588A
(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 (0.3 to 1) MHz	0.008 % + 50 µV 0.013 % + 50 µV 0.024 % + 0.1 mV 0.054 % + 0.5 mV 0.22 % + 3 mV 1.1 % + 10 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 (0.3 to 1) MHz	0.016 % + 0.5mV 0.017 % + 0.5mV 0.027 % + 1 mV 0.061 % + 5 mV 0.38 % + 50 mV 1.2 % + 0.5 V	
(100 to 1000) V	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.012 % + 25 mV 0.012 % + 25 mV 0.025 % + 25 mV 0.06 % + 0.1 V	
(1 to 10) kV (10 to 70) kV	(50 to 60) Hz (50 to 60) Hz	0.15 % + 0.1 V 0.15 % + 0.6 V	Vitrek 4700 w/transfer probe

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Clamp-On Meters[3] –			
Up 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 – Generate[3]			
Up 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	0.25 % + 0.1 µA 0.18 % + 0.1 µA 0.16 % + 0.1 µA 0.37 % + 0.15 µA 0.97 % + 0.2 µA 1.9 % + 0.4 µA	Fluke 5522A
(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 0.15 % + 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 0.1 % + 2 µA 0.25 % + 3 µA 0.49 % + 4 µA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Generate[3] (cont)			
(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 0.13 % + 50 µA 0.25 % + 100 µA 0.49 % + 200 µA	Fluke 5522A
(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 0.063 % + 100 µA 0.73 % + 1 mA 3 % + 5 mA	
(1.1 to 3.0) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 100 µA 0.08 % + 100 µA 0.73 % + 1 mA 3 % + 5 mA	
(3.0 to 11) A	45 Hz to 1 kHz (1 to 5) kHz	0.13 % + 2 mA 3.6 % + 2 mA	
(11 to 20.5) A	45 Hz to 1 kHz (1 to 5) kHz	0.19 % + 5 mA 3.6 % + 5 mA	
AC Current – Measure[3]			
(0 to 10) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.21 % + 2.5 nA 0.21 % + 2.5 nA 0.21 % + 2.5 nA	Fluke 8588A
(10 to 100) µA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 5 nA 0.054 % + 5 nA 0.075 % + 5 nA 0.41 % + 10 nA	
(0.1 to 1) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 50 nA 0.054 % + 50 nA 0.075 % + 50 nA 0.41 % + 0.1 µA	

Parameter/Range	Frequency	CMC[2, 4, 6] (±)	Comments
AC Current – Measure[3] (cont)			
(1 to 10) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 0.5 µA 0.054 % + 0.5 µA 0.075 % + 0.5 µA 0.41 % + 1 µA	Fluke 8588A
(10 to 100) mA	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.029 % + 5 µA 0.053 % + 5 µA 0.075 % + 5 µA	
(0.1 to 1) A	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.031 % + 0.1 mA 0.056 % + 0.1 mA 0.08 % + 0.1 mA	
(1 to 10) A	10 Hz to 2 kHz (2 to 10) kHz	0.085 % + 0.5 mA 0.085 % + 0.5 mA	
(10 to 30) A	10 Hz to 2 kHz (2 to 10) kHz	0.085 % + 12 mA 0.13 % + 12 mA	
(1 to 100) A	60 Hz	0.32 %	Empro shunt

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
AC Power – Generate[3]			
(45 to 65) Hz; PF=1 (33 to 330) mV			
(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	Range	CMC[2, 4, 6] (±)	Comments
AC Power – Generate[3] (45 to 65) Hz; PF=1 330 mV to 1020 V (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
Thermocouple Simulation & Measure[3] – Type J Type K Type N Type S Type T	 (-210 to -100) °C (-100 to 760) °C (760 to 1200) °C (-200 to -100) °C (-100 to 600) °C (600 to 1372) °C (-250 to -200) °C (-200 to -100) °C (-100 to 1300) °C (-50 to 0) °C (0 to 200) °C (200 to 1768) °C (-250 to -100) °C (-100 to 0) °C (0 to 400) °C	 0.35 °C 0.24 °C 0.34 °C 0.4 °C 0.27 °C 0.45 °C 1.8 °C 0.55 °C 0.39 °C 1.2 °C 0.84 °C 0.79 °C 0.9 °C 0.22 °C 0.2 °C	 Additel 226
RTD Simulation & Measure [3] Pt 100 (385, 391, 3926, 3916)	 (-200 to 200) °C (-200 to 600) °C (600 to 850) °C	 0.16 °C 0.25 °C 0.32 °C	 Additel 226

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Oscilloscopes[3] –			
Square Wave Signal:			
50 Ω Load @ 1 kHz	1 mV to 6.6 $V_{pk - pk}$	0.32 % + 40 µV	Fluke 5522A w/ SC1100
1 MΩ Load @ 1 kHz	1 mV to 130 $V_{pk - pk}$	0.16 % + 40 µV	
DC Volt Amplitude:			
50 Ω Load	(0 to 6.6) V	0.3 % + 40 µV	
1 MΩ Load	(0 to 130) V	0.07 % + 40 µV	
Level Sine Wave:			
Frequency	Up to 1100 MHz	3.3 µHz/Hz	
Level Sine Wave:			
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 4.4 % + 300 µV 4.9 % + 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 to1100) MHz	2.1 % + 100 µV 2.6 % + 100 µV 4.9 % + 100 µV 6.1 % + 100 µV	
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	*t* = time in seconds
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	≤ 300 ps ≤ 350 ps	130 ps 130 ps	Fluke 5522A w/ SC1100

V. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Fume Hoods – Air Velocity Only[3]	(20 to 200) ft/min	4.6 %	Anemometer RCC-561
Flow Meters[3] – Totalizers	Up to 50 gallons	0.7 %	Gravimetric method
Viscosity Meters[3]	Up to 35 000 cP	0.7 %	Standard viscosity solution w/ bath

VI. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 5, 6] (±)	Comments
Force – Measuring Equipment[3]	Up to 500 lbf Up to 500 lbf (100 to 1000) lbf (1000 to 10 000) lbf (2500 to 25 000) lbf	0.03 % + 0.6*R* 0.31 % 0.31 % 0.31 % 0.31 %	Class F weights Load cells w/ indicator
Scales & Balances[3]	Up to 20 000 g Up to 1000 lb (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 15) kg	0.017 % + 0.6*R* 0.017 % + 0.6*R* 0.013 mg + 0.6*R* 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*	Class F weights (applied load) Class 1 weights

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Torque – Measuring Equipment[3]			
Wrenches & Screwdrivers	5 ozf·in to 600 lbf·ft	0.65 %	CDI Suretest 5000-ST
Rotary Torque Tools[3]			
Pneumatic, DC, Pulse	(0.56 to 1.12) N·m (1.12 to 5.6) N·m (1 to 10) N·m (2 to 20) N·m (7.5 to 75) N·m (18 to 180) N·m (50 to 500) N·m	1.4 % 1.8 % 0.13 N·m 0.26 N·m 0.98 N·m 2.4 N·m 6.5 N·m	Mountz BMX50i w/PTT - 2000 & rundown adapters Rotary transducers w/ display
Torque Testers[3]	Up to 250 lbf-ft	0.13 %	Class F weights & arms
Atmospheric Pressure Vacuum[3] – Measuring Equipment	(0.01 to 28.5) inHg	0.015 inHg	Heise ST-2H w/HQS series modules
Pressure – Measuring Equipment[3]			
Differential	(-0.25 to 0.25) in·H_2O (-0.5 to 0.5) in·H_2O (-7.5 to 7.5) in·H_2O (0 to 50) in·H_2O	0.0019 in·H_2O 0.002 in·H_2O 0.012 in·H_2O 0.038 in·H_2O	Heise ST-2H w/ HQS series modules
Pneumatic	(1 to 10) psig (5 to 50) psig (10 to 100) psig (50 to 500) psig	0.0043 psi 0.019 psi 0.038 psi 0.16 psi	Heise ST-2H w/ HQS series modules
Hydraulic	(150 to 1500) psig (-12 to 1000) psig (500 to 5000) psig (1000 to 10 000) psig	0.55 psi 0.25 psi 1.3 psi 6.1 psi	Heise ST-2H w/ HQS series modules Fluke 2700G-BG7M Fluke 2700G-G35M Druck DPI-104

Parameter/Equipment	Range	CMC[2, 4, 5, 6] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRC: Low Medium High HRBW: Low Medium High HRA: Low Medium High HR45W: Low Medium High	 0.77 HRC 0.77 HRC 0.76 HRC 0.9 HRBW 0.87 HRBW 0.81 HRBW 0.79 HRA 0.77 HRA 0.76 HRA 0.81 HR45TW 0.81 HR45TW 0.81 HR45TW	Indirect verification per ASTM E18
Speed – Measure[3] Optic/Non-Contact: RPM Totalizer/Rate Meters Contact: RPM Totalizer/Rate Meters	 (5 to 200 000) rpm (2 to 3300) fpm (0.5 to 12 000) rpm (2 to 3300) fpm	 0.017 % 0.017 % 0.22 % 0.22 %	Monarch PLT200
Speed/RPM/Rate Simulation[3]	(6 to 200 000) rpm	0.003 %	Agilent 33120A
Totalize Meters[3] – Distance – Measure Mechanical Counter/Totalizers	 Up to 200 ft Up to 999 999 counts	 0.64 % 0.02 % + 0.6*R*	Monarch PLT200 w/ 10 cm wheel

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Tensile Testers[3] –			
Speed / Rate	Up to 50 in/min	0.025 %	Timer & caliper
Displacement	Up to 20 in	0.000 25 in	Gage blocks w/ indicator
Mass – Field Check Weight Comparison[3]			
Load Fixtures, Hangers, Package & Check Weights	Up to 50 lbs	0.024 %	Scale w/ weights

VII. Optical Quantities

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Light Booths[3] –			
Illuminance	Up to 6000 Lux	2.6 %	Illuminance spectrophotometer
Color Temperature (CCT)	(1700 to 6500) K	60 K	

IX. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Relative Humidity – Measure[3]	(15 to 95) % RH	1.3 % RH	Vaisala M170 w/HMP76
Relative Humidity Measuring Equipment[3]	(15 to 95) % RH	1.4 % RH	Vaisala M170 w/ HMP76 w/ controller environment
Plate Temperature – Infrared Measuring Equipment[3]	35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.84 °C 1 °C 1.2 °C 1.7 °C 2.3 °C	Fluke 4181

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Temperature – Measure[3]	(-200 to 660) °C	0.08 °C	Fluke 1523 w/5609 PRT
Temperature – Measuring Equipment[3]	(-30 to 125) °C (50 to 660) °C	0.087 °C 0.26 °C	Fluke 7103 micro bath w/ reference probe Fluke 9144 w/reference probe PAD-3183
Ovens, Furnaces, Refrigerators, Freezers, Incubators, Baths, Environmental Chambers & Dry Blocks[3] – System Accuracy Tests Uniformity Surveys: Temperature	Up to 600 °C	2.6 °C	Graphtec GL840 w/ thermocouple probe

X. Time & Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Timers & Stopwatches[3]	(1 to 3600) s	0.2 s	Stopwatch
Frequency – Measuring Equipment[3]	0.01 Hz to 2 MHz Up to 15 MHz	5.6 µHz/Hz + 5 µHz 0.003 %	Fluke 5522A HP 33120A
Frequency – Measure[3]	Up to 3 GHz	0.33 µHz/Hz	Agilent 53181A

[1] This laboratory offers commercial calibration and field calibration services, where noted.

[2] Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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] The statement of the 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 the statement of the Range or the CMC, *DL* is the diagonal length of the device in inches.

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

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

[9] This laboratory meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

Accredited Laboratory

A2LA has accredited

CROSS TECHNOLOGIES INC

Louisville, KY

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 21st day of October, 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.19
Valid to September 30, 2027

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