



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

CROSS TECHNOLOGIES, INC. dba CROSS (FORMERLY J.A. KING)
124 S. 147th East Avenue
Tulsa, OK 74116
Connie Foster Phone: 800 327 7727

CALIBRATION

Valid To: May 31, 2025

Certificate Number: 1741.18

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 11}:

I. Chemical

Parameter/Equipment	Range	CMC ² (±)	Comments
pH Meters ³ – Fixed Points	4 pH 7 pH 10 pH	0.03 pH 0.029 pH 0.039 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 5.2 µS/cm 47 µS/cm	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Pin Gages ³ – Class Z and ZZ	Up to 1.0 in	43 µin	Micrometer
Calipers ³	Up to 60 in	(4.5 + 9.9) µin + 0.6R	Gage blocks
Coating Thickness Gages ³	Up to 60 mils	0.14 mils	Coating thickness standards

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Micrometers ³	Up to 40 in	$(4.5 + 9.9L) \mu\text{in} + 0.6R$	Gage blocks
Height Gages ³	Up to 48 in	$(53 + 8.9L) \mu\text{in}$	Gage blocks
Feeler/Thickness Gages ³	Up to 1 in	140 μin	Bench micrometer
Linear Indicators ³ – Dial & Test	Up to 4 in	$(3 + 9.4L) \mu\text{in} + 0.6R$	Gage blocks
Steel Rules ³	Up to 72 in	$(1.5 + 10L) \mu\text{in} + 0.6R$	Gage blocks
Tape Measures ³	Up to 25 ft	$(1.5 + 10L) \mu\text{in} + 0.6R$	Gage blocks
Length – 1D ³	Up to 12 in	0.0021 in	Digital caliper
Hand Tools ³ – Depth Gages, Snap Gages, Fixture Gages, Thickness Gages	Up to 4 in	$(6.4 + 3.1L) \mu\text{in}$	Gage blocks
Optical Comparator ³ – X-Y Linearity Magnification Angle	Up to 6 in 10x to 250x Up to 90°	86 μin 0.014 in 0.1°	Glass scale Glass ruler Angle block set
Angle - Measure	Up to 360°	0.26°	Vision Machine
Radius Gages	Up to 2 in	280 μin	Vision machine
Ultrasonic Thickness Gages ³	(0.01 to 1) in (1 to 8) in	0.0034 in 0.023 in	Gage blocks
Microscope Reticles ³	Up to 10 mm	0.013 mm + 0.6R	Stage micrometer

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Protractor & Angle Indicators ³	1°, 2°, 3°, 4°, 5°, 10°, 15°, 20°, 25°, 30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Surface Plates ³ – Grades AA, A, & B			
Repeatability/Local Flatness	0.002 in	40 μ in	Repeat-o-meter
Flatness	Up to 60 <i>DL</i> in (> 60 to 120) <i>DL</i> in	(31 + 0.2 <i>DL</i>) μ in (30 + 0.3 <i>DL</i>) μ in	Mahr federal level systems
Surface Roughness Meters ³	Ra (10 to 200)	1.1 μ in	Precision roughness standard
Surface Roughness Specimens ³	Ra (10 to 200)	3.2 μ in	Profilometer w/reference specimen

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} ($\pm$)	Comments
DC Voltage ³ – Measure	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V (1 to 10) kV (10 to 100) kV	5.8 μ V/V + 0.1 μ V 4.7 μ V/V + 0.4 μ V 4.5 μ V/V + 4.0 μ V 6.2 μ V/V + 40 μ V 6.2 μ V/V + 500 μ V 0.05 % + 0.3 V 0.06 % + 0.2 V	Fluke 8508A Vitretek 4700 Vitretek 4700 w/ HVL-100
DC Voltage ³ – Generate	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	11 μ V/V + 0.4 μ V 6.7 μ V/V + 0.7 μ V 5 μ V/V + 2.5 μ V 5.1 μ V/V + 4.0 μ V 6.7 μ V/V + 40 μ V 8.5 μ V/V + 400 μ V	Fluke 5720A

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6, 8} ($\pm$)	Comments
DC Current ³ – Measure	(0 to 200) μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A (1 to 100) A	13 μ A/A + 0.4 nA 13 μ A/A + 4.0 nA 15 μ A/A + 40 nA 49 μ A/A + 0.8 nA 0.019 % + 16 μ A 0.041 % + 0.4 mA 0.073 %	Fluke 8508A GL 9230A/300 shunt w/ DMM
DC Current ³ – Generate	(0 to 220) μ A 220 μ A to 2.2 mA (2.2 to 22) mA 22 mA to 220 mA 220 mA to 2.2 A (1.1 to 3) A (2 to 11) A (11 to 20.5) A (1 to 100) A	50 μ A/A + 6.0 nA 44 μ A/A + 7.0 nA 44 μ A/A + 40 nA 55 μ A/A + 0.7 μ A 0.011 % + 12 μ A 0.046 % + 40 μ A 0.06 % + 500 μ A 0.12 % + 750 μ A 0.073 %	Fluke 5720A $\pm (200 I^2)$ μ A/A for $I > 100$ mA $\pm (10 I^2)$ μ A/A for $I > 1$ A Fluke 5522A GL 9230A/300 shunt w/ DMM and power supply
DC Current ³ – Generate Clamp-On-Meters	Up to 1000 A	0.65 % + 0.5 A	Fluke 5522A w/ 5500/coil
Resistance ³ – Measure	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 k Ω (2 to 20) k Ω (20 to 200) k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω (2 to 20) G Ω	18 $\mu\Omega/\Omega$ + 4.0 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 14 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 0.5 m Ω 10 $\mu\Omega/\Omega$ + 5.0 m Ω 10 $\mu\Omega/\Omega$ + 50 m Ω 11 $\mu\Omega/\Omega$ + 1.0 Ω 21 $\mu\Omega/\Omega$ + 100 Ω 0.013 % + 10 k Ω 0.016 % + 1 M Ω 0.016 % + 10 M Ω	Fluke 8508A

Parameter/Equipment	Range	CMC ^{2, 4, 6, 8} (±)	Comments
Resistance ³ – Generate	(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	54 μΩ/Ω + 0.001 Ω 52 μΩ/Ω + 0.0015 Ω 35 μΩ/Ω + 0.0014 Ω 35 μΩ/Ω + 0.002 Ω 35 μΩ/Ω + 0.02 Ω 36 μΩ/Ω + 0.2 Ω 40 μΩ/Ω + 2 Ω 74 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
Resistance ³ – Generate Fixed Points	0 Ω (1, 1.9) Ω (10, 19) Ω (100, 190) Ω (1, 1.9, 10, 19) kΩ (100, 190) kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	50 μΩ 0.012 % 31 μΩ/Ω 13 μΩ/Ω 8.2 μΩ/Ω 11 μΩ/Ω 16 μΩ/Ω 22 μΩ/Ω 50 μΩ/Ω 59 μΩ/Ω 0.013 %	Fluke 5720A
Insulation Resistance ³ – Generate	10 Ω, 100 Ω, 1 kΩ 10 kΩ, 100 kΩ, 1 MΩ 10 MΩ, 100 MΩ, 1 GΩ, 10 GΩ, 100 GΩ 10 kΩ to 1MΩ (1 to 10) MΩ 10 MΩ to 1 GΩ (1 to 10) GΩ 100 GΩ 350 MΩ to 99.99 GΩ (100 to 999.9) GΩ (1 to 10) TΩ	1.2 % 0.25 % 0.37 % 0.6 % 1.2 % 3.6 % 1.8 % 3.0 % 4.2 %	Standard resistor set Fluke 5322A Fluke 5322A w/resistance multiplier adapter

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
AC Voltage ³ – Measure (cont.)			
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 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	0.015 % + 1.2 mV 0.012 % + 0.2 mV 0.01 % + 0.2 mV 0.008 % + 0.2 mV 0.012 % + 0.2 mV 0.023 % + 0.4 mV 0.058 % + 2 mV 0.31 % + 20 mV 1 % + 0.2 V	Fluke 8508A
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 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	0.015 % + 12 mV 0.012 % + 2 mV 0.01 % + 2 mV 0.008 % + 2 mV 0.012 % + 2 mV 0.023 % + 4 mV 0.058 % + 20 mV 0.31 % + 0.2 V 1 % + 2 V	
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.015 % + 70 mV 0.013 % + 20 mV 0.012 % + 20 mV 0.023 % + 40 mV 0.058 % + 0.2 V	
(1 to 10) kV	60 Hz	0.013 % + 0.01 V	Vitrek 4670
(10 to 70) kV	60 Hz	0.013 % + 0.4 V	Vitrek 4670 w/ HVL-70

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC Voltage ³ – Generate			
(0.22 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.19 % + 4 µV 0.12 % + 4 µV 0.086 % + 4 µV 0.15 % + 4 µV 0.21 % + 5 µV 0.37 % + 10 µV 0.53 % + 20 µV 0.69 % + 20 µV	Fluke 5720A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.031 % + 4 µV 0.014 % + 4 µV 0.013 % + 4 µV 0.03 % + 4 µV 0.066 % + 5 µV 0.14 % + 10 µV 0.18 % + 20 µV 0.35 % + 20 µV	
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.03 % + 12 µV 0.011 % + 7 µV 0.01 % + 7 µV 0.025 % + 7 µV 0.056 % + 17 µV 0.11 % + 20 µV 0.17 % + 25 µV 0.34 % + 45 µV	
220 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.62 % + 40 µV 0.024 % + 15 µV 56 µV/V + 8 µV 93 µV/V + 10 µV 0.014 % + 30 µV 0.051 % + 80 µV 0.012 % + 200 µV 0.021 % + 300 µV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.029 % + 400 µV 0.12 % + 150 µV 58 µV/V + 50 µV 95 µV/V + 100 µV 0.013 % + 200 µV 0.035 % + 600 µV 0.12 % + 2 mV 0.19 % + 3.2 mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} ($\pm$)	Comments
AC Voltage ³ – Generate (cont)			
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.029 % + 4 mV 0.012 % + 1.5 mV 66 μ V/V + 0.6 mV 0.011 % + 1 mV 0.019 % + 2.5 mV	Fluke 5720A
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.037 % + 16 mV 58 μ V/V + 3.5 mV	
AC Current ³ – Measure			
(0 to 200) μ A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.051 % + 0.02 μ A 0.051 % + 0.02 μ A 0.072 % + 0.02 μ A 0.41 % + 0.02 μ A	Fluke 8508A
(0.2 to 2) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 0.2 μ A 0.031 % + 0.2 μ A 0.072 % + 0.2 μ A 0.41 % + 0.2 μ A	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 2 μ A 0.031 % + 2 μ A 0.072 % + 2 μ A 0.41 % + 2 μ A	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.032 % + 0.02 mA 0.031 % + 0.02 mA 0.063 % + 0.02 mA	
(0.2 to 2) A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.063 % + 0.2 mA 0.074 % + 0.2 mA 0.31 % + 0.2 mA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.083 % + 2 mA 0.26 % + 2 mA	

Parameter/Range	Frequency	CMC ^{2, 4, 6} ($\pm$)	Comments
AC Current – Generate ³			
(10 to 220) μ A	(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 0.020 % + 10 nA 0.014 % + 8 nA 0.029 % + 12 nA 0.14 % + 65 nA	Fluke 5720A
(33 to 330) μ A	(10 to 30) kHz	2 % + 0.4 μ A	Fluke 5522A
220 μ A 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 0.020 % + 35 nA 0.013 % + 35 nA 0.025 % + 110 nA 0.14 % + 650 nA	Fluke 5720A
(0.33 to 3.3) mA	(10 to 30) kHz	1.2 % + 0.6 μ A	Fluke 5522A
(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 0.020 % + 350 nA 0.013 % + 350 nA 0.025 % + 550 nA 0.14 % + 5 μ A	Fluke 5720A
(3.3 to 33) mA	(10 to 30) kHz	0.5 % + 4 μ A	Fluke 5522A
(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 μ A 0.020 % + 3.5 μ A 0.013 % + 2.5 μ A 0.025 % + 3.5 μ A 0.14 % + 10 μ A	Fluke 5720A
(33 to 330) mA	(10 to 30) kHz	0.5 % + 200 μ A	Fluke 5522A
220 mA to 2.2 A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.03 % + 35 μ A 0.055 % + 80 μ A 0.85 % + 160 μ A	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.056 % + 170 μ A 0.12 % + 380 μ A 0.44 % + 750 μ A	
(11 to 20.5) A	45 Hz to 1 kHz	0.19 % + 5 mA	Fluke 5522A

Parameter/Range	Frequency	CMC ^{2, 4, 6} ($\pm$)	Comments
AC 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	Fluke 5522A w/ 5500 coil
(150 to 1025) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.09 A 1 % + 0.1 A	Fluke 5522A w/ 5500 coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.76 % + 0.9 A 1.3 % + 0.9 A	Fluke 5522A w/ 5500 coil
Oscilloscopes ³ –			
Square Wave Amplitude:			
50 Ω at 1 kHz	1.0 mV to 6.6 V _{pk - pk}	0.32 % + 40 μ V	Fluke 5522A/SC1100
1 M Ω at 1 kHz	1.0 mV to 130 V _{pk - pk}	0.16 % + 40 μ V	
DC Voltage Amplitude:			
50 Ω Load	(0 to $\pm$ 6.6) V	0.30 % + 40 μ V	
1 M Ω Load	(0 to $\pm$ 130) V	0.07 % + 40 μ V	
Level Sine Wave:			
Frequency	Up to 1100 MHz	3.3 μ Hz/Hz	
Amplitude	50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.4 % + 300 μ V 4.4 % + 300 μ V 4.9 % + 300 μ V 7.3 % + 300 μ V 8.4 % + 300 μ V	

Parameter/Equipment	Range	CMC ^{2, 6, 9} ($\pm$)	Comments
Oscilloscopes ³ – (cont)			
Flatness (Bandwidth)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.1 % + 100 μ V 2.6 % + 100 μ V 4.9 % + 100 μ V 6 % + 100 μ V	Fluke 5522A/SC1100
Time Markers:			
Into a 50 Ω load	5 s to 50 ms 20 ms to 2 ns	(30 + 1000t) μ s/s 3.5 μ s/s	
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	$\leq$ 300 ps $\leq$ 350 ps	130 ps 130 ps	
Thermocouple Simulation ³ –			
Type E	(-250 to 1000) $^{\circ}$ C	0.15 $^{\circ}$ C	Fluke 5522A w/ ice point reference
Type J	(-210 to 1200) $^{\circ}$ C	0.15 $^{\circ}$ C	
Type K	(-200 to 1372) $^{\circ}$ C	0.16 $^{\circ}$ C	
Type R	(0 to 1767) $^{\circ}$ C	0.30 $^{\circ}$ C	
Type S	(0 to 1767) $^{\circ}$ C	0.29 $^{\circ}$ C	
Type T	(-250 to 400) $^{\circ}$ C	0.15 $^{\circ}$ C	
Type N	(-270 to 1300) $^{\circ}$ C	0.16 $^{\circ}$ C	
Electrical Calibration of RTD Indicators & Indicating Systems ³ –			
Pt 385, 100 Ω	(-200 to 0) $^{\circ}$ C (0 to 100) $^{\circ}$ C (100 to 300) $^{\circ}$ C (300 to 400) $^{\circ}$ C (400 to 630) $^{\circ}$ C (630 to 800) $^{\circ}$ C	0.07 $^{\circ}$ C 0.092 $^{\circ}$ C 0.11 $^{\circ}$ C 0.13 $^{\circ}$ C 0.15 $^{\circ}$ C 0.28 $^{\circ}$ C	Fluke 5522A

IV. Fluid Quantities

Parameter/Equipment	Range	CMC ^{2, 6} ($\pm$)	Comments
Viscosity – Measure ³ Cups and Dip Cups (Kinematic Viscosity, Efflux Time)	Up to 100 mm ² /s (100 to 1000) mm ² /s	2.2 cSt 2.2 cSt	Certified viscosity standards

V. Mechanical

Parameter/Equipment	Range	CMC ^{2, 7, 8, 10} ($\pm$)	Comments
Scales & Balances ³	(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 1 g to 20 kg (20 to 900) kg Up to 1000 lb (1000 to 16 000) lb	0.041 mg + 0.6R 0.06 mg + 0.6R 0.09 mg + 0.6R 0.14 mg + 0.6R 0.3 mg + 0.6R 0.6 mg + 0.6R 0.9 mg + 0.6R 1.5 mg + 0.6R 3 mg + 0.6R 0.017 % + 0.6R 0.017 % per 20 kg + 0.6R 0.017 % + 0.6R 0.017 % per 1000 lb + 0.6R	ASTM Class 1 weights (applied load) Class F weights
Torque ³ – Measuring Equipment (Wrenches)	(10 to 100) foz·in (5 to 600) lbf·ft	0.84 % 0.65 %	CDI 1001-O-DTT CDI Suretest 5000-ST
Pressure ³ – Measuring Equipment	(-14.5 to 300) psi (50 to 500) psi (100 to 1000) psi (1000 to 5000) psi (1000 to 10 000) psi (1500 to 15 000) psi (3000 to 30 000) psi	0.04 % FS 0.07 % FS 0.04 % FS 0.03 % FS 0.1 % FS 0.07 % FS 0.13 % FS	Druck DPI 611 Fluke 700 series pressure modules Druck PM620-16G Additel 672 Fluke 744 w/700 series module Druck DPI 104 Additel 681

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness Testers ³	HRA		Indirect verification per ASTM E18
	Low	0.75 HRA	
	Medium	0.73 HRA	
	High	0.8 HRA	
	HRBW		
	Low	0.4 HRBW	
	Medium	0.45 HRBW	
	High	0.38 HRBW	
	HRC		
	Low	0.43 HRC	
	Medium	0.43 HRC	
	High	0.38 HRC	
	HREW		
	Low	0.77 HREW	
	Medium	0.77 HREW	
	High	0.77 HREW	
	HR15N		
	Low	0.42 HR15N	
	Medium	0.42 HR15N	
	High	0.42 HR15N	
	HR30N		
	Low	0.58 HR30N	
	Medium	0.5 HR30N	
	High	0.6 HR30N	
	HR45N		
	Low	0.48 HR45N	
	Medium	0.48 HR45N	
	High	0.49 HR45N	
	HR15TW		
	Low	0.4 HR15TW	
	Medium	0.4 HR15TW	
	High	0.42 HR15TW	
	HR30TW		
	Low	0.41 HR30TW	
	Medium	0.42 HR30TW	
	High	0.42 HR30TW	
	HR45TW		
	Low	0.93 HR45TW	
	Medium	0.5 HR45TW	
	High	0.6 HR45TW	

Parameter/Equipment	Range	CMC ^{2, 8, 10} (±)	Comments
Indirect Verification of Brinell Hardness Testers ³ HBW 10/3000/15	170 HBW 240 HBW 528 HBW	4.5 HBW 4.5 HBW 6 HBW	Indirect verification per ASTM E10, ASTM E110
Pipettes ³	(2 to 20) µL (20 to 200) µL (200 to 2000) µL (2000 to 10000) µL	0.11 µL 0.33 µL 2.9 µL 13 µL	Gravimetric Method
Speed - Measure ³ Optical/Non-Contact	(6 to 200 000) RPM	0.018 %	Monarch Tachometer
Speed /RPM/Rate Simulation ³	(6 to 200 000) rpm	0.0041 %	Agilent 33120A

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 8, 10} (±)	Comments
Humidity – Measuring Equipment ³	(20 to 80) % RH	1.5 %	Vaisala hygrometer w/ enclosure/chamber
Humidity – Measure ³	(5 to 95) % RH	1.5 %	Vaisala hygrometer
Temperature – Measure ³	(-197 to 420) °C	0.065 °C	Fluke 1523 w/5615 PRT
Plate Temperature – Infrared Devices 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
Temperature – Measuring Equipment ³	(-15 to 350) °C	0.15 °C	Temperature source w/ external probe

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 10} ($\pm$)	Comments
Timers & Stopwatches ³	(1 to 3600) s	0.05 s	HP 53132A
	Up to 24 Hrs	0.064 s/24 Hr	Timometer 4500
Frequency ³ – Measuring Equipment	0.01 Hz to 2 MHz	5.6 μ Hz/Hz + 5 μ Hz	Fluke 5522A
	Up to 1100 MHz	3.3 μ Hz/Hz	Fluke 5522A/SC1100
Frequency ³ – Measure	0.01 Hz to 10MHz (10 to 225) MHz 225MHz to 3 GHz	67 μ Hz/Hz 0.45 μ Hz/Hz 0.26 μ Hz/Hz	Agilent 53132A Opt 030

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 Based on using the standard at the temperature the Fluke 5720A, Fluke 5520A was calibrated ($t_{cal} \pm 5$ °C) and assuming the instrument is zeroed at least every seven days or when the ambient temperature changes more than 5 °C. For resistance, a zero calibration is performed at least every 12 hours within ± 1 °C of use.

⁵ Based on using the standard at the temperature the 8508A was calibrated ($t_{cal} \pm 5$ °C).

⁶ 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.

⁷ The statement of Calibration and Measurement Capability, L is the numerical value of the nominal length of the device measured in inches. In the Calibration and Measurement Capability, R is the numerical value of the resolution of the device. DL is the length of the diagonal in inches.

⁸ Unless otherwise noted, percentage refers to percent of reading.

⁹ In the statement of CMC, t represents the time in seconds.

¹⁰ 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.

¹¹ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

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

Tulsa, OK

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 15th day of May 2023.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.18
Valid to May 31, 2025
Revised August 23, 2023

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