



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: September 30, 2023

Certificate Number: 1741.11

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 7}:

I. Chemical

Parameter/Equipment	Range	CMC ² (±)	Comments
pH Meters – Fixed Points	4 pH 7 pH 10 pH	0.03 pH 0.03 pH 0.04 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Cylindrical Gages – Pin, Plug, Disc Gages ³ Plain Rings	Up to 12.0 in Up to 7.0 in	(25 + 8.7L) μin (25 + 8.7L) μin	Universal measuring machine (UMM)
Micrometer Standards	Up to 4.0 in	(25 + 8.7L) μin	Universal measuring machine (UMM)
Calipers ³	Up to 40 in	(4.5 + 9.9L) μin + 0.6R	Gage blocks

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Micrometers ³	Up to 40 in	$(4.5 + 9.9L) \mu\text{in} + 0.6R$	Gage blocks
Steel Rules ³	Up to 72 in	$(1.5 + 10L) \mu\text{in} + 0.6R$	Gage blocks
Linear Indicators ³ – Dial & Test	Up to 4 in	$(3.0 + 9.4L) \mu\text{in} + 0.6R$	Gage blocks
Height Gages ³	Up to 20 in (20 to 48) in	$(2.5 + 10L) \mu\text{in} + 0.6R$ $(9.5 + 9.7L) \mu\text{in} + 0.6R$	Gage blocks
Tape Measures ³	Up to 25 ft	$(1.5 + 10L) \mu\text{in} + 0.6R$	Gage blocks
Angle Indicators & Protractors – Fixed Points	15°, 30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Feeler/Thickness Gages ³	Up to 1 in	80 μin	Universal measuring machine (UMM)
Diameter /Radius/Fixture Gages ³ – Diameter Radius Length	Up to 2.0 in Up to 2.0 in Up to 12.0 in Up to 25.0 ft	650 μin 650 μin 650 μin 0.094 in	Optical comparator Tape measure
Optical Comparators ³ – X-Y Linearity Magnification Angle	(0 to 12) in 10x to 250x (0 to 90)°	150 μin 0.014 in 0.1°	Glass master scales Angle block set

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Surface Plates ³ – Grades AA, A, & B			
Repeatability	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	Federal level systems

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 6} ($\pm$)	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 (1 to 6) kV (6 to 20) kV (20 to 35) kV (35 to 40) kV	7.8 μ V/V + 0.2 μ V 4.4 μ V/V + 0.3 μ V 4.4 μ V/V + 0.5 μ V 6.8 μ V/V + 30 μ V 7 μ V/V + 0.5 mV 1.2 % 2.4 % 1.2 % 2.4 %	Fluke 8588A Fluke 80K-6 & DMM Fluke 80K-40 & DMM
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 μ V/V + 1 μ V 14 μ V/V + 2 μ V 15 μ V/V + 15 μ V 22 μ V/V + 150 μ V 22 μ V/V + 1.5 mV	Fluke 5522A
DC Current – Measure ³	(0 to 10) μ A (10 to 100) μ A (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 100) A	28 μ A/A + 0.4 nA 10 μ A/A + 0.4 nA 10 μ A/A + 4 nA 15 μ A/A + 40 nA 58 μ A/A + 1 μ A 0.014 % + 0.1mA 0.024 % + 0.4 mA 0.056 % + 4.4 mA 0.25 %	Fluke 8588A Empro shunt w/ Agilent 34401A

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
DC Current – Generate ³	(0 to 330) μ A (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 μ A 0.012 % + 0.05 μ A 0.013 % + 0.25 μ A 0.014 % + 2.5 μ A 0.024 % + 40 μ A 0.046 % + 40 μ A 0.06 % + 500 μ A 0.12 % + 750 μ A	Fluke 5522A
DC Clamp-On Meters ³ – Toroidal Non-Toroidal	(20.5 to 1000) A (20.5 to 1000) A	0.39 % + 0.5 A 0.65 % + 0.5 A	Fluke 5522A w/5500 coil
Resistance – Measure ³	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω (0.1 to 1) G Ω (1 to 10) G Ω	19 $\mu\Omega/\Omega$ + 4.0 $\mu\Omega$ 11 $\mu\Omega/\Omega$ + 14 $\mu\Omega$ 9.6 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 9.4 $\mu\Omega/\Omega$ + 0.5 m Ω 9.4 $\mu\Omega/\Omega$ + 5.0 m Ω 9.6 $\mu\Omega/\Omega$ + 50 m Ω 11 $\mu\Omega/\Omega$ + 1 Ω 24 $\mu\Omega/\Omega$ + 100 Ω 0.013 % + 10 k Ω 0.14 % + 1 M Ω 0.14 % + 10 M Ω	Fluke 8588A
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 Ω to 1.1 k Ω (1.1 to 11) k Ω (11 to 110) k Ω 110 k Ω to 1.1 M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1100) M Ω	49 $\mu\Omega/\Omega$ + 0.001 Ω 51 $\mu\Omega/\Omega$ + 0.0015 Ω 34 $\mu\Omega/\Omega$ + 0.0014 Ω 34 $\mu\Omega/\Omega$ + 0.002 Ω 34 $\mu\Omega/\Omega$ + 0.02 Ω 34 $\mu\Omega/\Omega$ + 0.2 Ω 39 $\mu\Omega/\Omega$ + 2 Ω 73 $\mu\Omega/\Omega$ + 30 Ω 0.014 % + 50 Ω 0.03 % + 2.5 k Ω 0.06 % + 3 k Ω 0.36 % + 100 k Ω 1.8 % + 500 k Ω	Fluke 5522A

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
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	 0.03 % 0.03 % 0.09 %	 Fluke 5522A
Capacitance – Generate ³ (220 to 399.9) pF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF (110 to 329.999) µF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	 (10 to 10 000) Hz (10 to 10 000) Hz (10 to 3000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	 0.88 % + 10 pF 0.6 % + 0.01 nF 0.6 % + 0.01 nF 0.31 % + 0.1 nF 0.31 % + 0.1 nF 0.31 % + 0.3 nF 0.31 % + 1 nF 0.31 % + 3 nF 0.31 % + 10 nF 0.49 % + 30 nF 0.55 % + 100 nF 0.55 % + 300 nF 0.55 % + 1µF 0.55 % + 3µF 0.56 % + 10 µF 0.91 % + 30 µF 1.4 % + 100 µF	 Fluke 5522A
Capacitance – Measure ³ (0.1 to 1) nF (1 to 10) nF (10 to 100) nF (0.1 to 1) µF (1 to 10) µF (10 to 100) µF (0.1 to 1) mF (1 to 10) mF (10 to 100) mF	 (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz (50 to 60) Hz	 0.23 % + 0.1 nF 0.13 % + 0.2 nF 0.1 % + 0.01 nF 0.1 % + 0.1 nF 0.1 % + 0.1 nF 0.11 % + 0.01 µF 0.11 % + 0.1 µF 0.12 % + 1 µF 0.12 % + 0.1 mF	 Fluke 8588A

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage – Generate ³ (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	0.1 % + 6 µV 0.021 % + 6 µV 0.027 % + 6 µV 0.12 % + 6 µV 0.42 % + 12 µV 0.96 % + 50 µV	Fluke 5522A
AC Current – Measure ³ (0 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 10) A (10 to 30) A	1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz 10 Hz to 2 kHz (2 to 10) kHz 10 Hz to 2 kHz (2 to 10) kHz	0.21 % + 2.5 nA 0.21 % + 2.5 nA 0.21 % + 2.5 nA 0.029 % + 5 nA 0.054 % + 5 nA 0.075 % + 5 nA 0.41 % + 10 nA 0.029 % + 50 nA 0.054 % + 50 nA 0.075 % + 50 nA 0.41 % + 0.1 µA 0.029 % + 0.5 µA 0.054 % + 0.5 µA 0.075 % + 0.5 µA 0.41 % + 1 µA 0.029 % + 5 µA 0.053 % + 5 µA 0.075 % + 5 µA 0.031 % + 0.1 mA 0.056 % + 0.1 mA 0.08 % + 0.1 mA 0.085 % + 0.5 mA 0.085 % + 0.5 mA 0.085 % + 12 mA 0.13 % + 12 mA	Fluke 8588A

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
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	
(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	
(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 6) kV	Up to 60 Hz	1.2 %	Fluke 80K-6 & DMM
(6 to 40) kV	Up to 60 Hz	6 %	Fluke 80K-40 & DMM

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage – Generate ³ (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	0.036 % + 8 µV 0.018 % + 8 µV 0.02 % + 8 µV 0.042 % + 8 µV 0.096 % + 32 µV 0.24 % + 70 µV	Fluke 5522A
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	0.036 % + 50 µV 0.018 % + 60 µV 0.023 % + 60 µV 0.036 % + 50 µV 0.084 % + 130 µV 0.29 % + 600 µV	
(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 0.018 % + 600 µV 0.029 % + 600 µV 0.042 % + 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	0.023 % + 2 mV 0.024 % + 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 Current – Generate ³			
(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 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 0.12 % + 0.15 µA 0.24 % + 0.2 µA 0.6 % + 0.3 µA 1.2 % + 0.6 µA	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current – Generate ³ (cont)			
(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 0.24 % + 3 µA 0.48 % + 4 µA	Fluke 5522A
(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	
(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 0.073 % + 100 µA 0.72 % + 1 mA 3 % + 5 mA	
(3.0 to 11) A	45 Hz to 1 kHz (1 to 5) kHz	0.2 % + 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	
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
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.76 % + 0.25 A 1.3 % + 0.25 A	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Clamp-On Meters ³ – (cont)			
(150 to 1025) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.49 % + 0.09 A 1 % + 0.1 A	Fluke 5520A w/ 5500 coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.76 % + 0.9 A 1.3 % + 0.9 A	

Parameter/Equipment	Range	CMC ^{2, 4, 6} (±)	Comments
AC Power – Generate ³			
(45 to 65) Hz; PF=1			
(33 to 330) mV Range			
(3.3 to 8.99) mA	110 µW to 3 mW	0.17 %	Fluke 5522A
(9 to 32.99) mA	(3 to 11) mW	0.12 %	
(33 to 89.99) mA	(1.1 to 30) mW	0.17 %	
(90 to 329.99) mA	(3 to 110) mW	0.12 %	
(0.33 to 0.8999) A	(11 to 300) mW	0.16 %	
(0.9 to 2.1999) A	(30 to 730) mW	0.14 %	
(2.2 to 4.4999) A	73 mW to 1.5 W	0.16 %	
(4.5 to 20.5) A	150 mW to 6.8 W	0.14 %	
330 mV to 1020 V Range			
(3.3 to 8.99) mA	1.1 mW to 9 W	0.15 %	
(9 to 32.99) mA	3 mW to 33 W	0.1 %	
(33 to 89.99) mA	11 mW to 90 W	0.15 %	
(90 to 329.99) mA	30 mW to 330 W	0.1 %	
(0.33 to 0.8999) A	110 mW to 900 W	0.14 %	
(0.9 to 2.1999) A	300 mW to 2200 W	0.11 %	
(2.2 to 4.4999) A	730 mW to 4500 W	0.15 %	
(4.5 to 20.5) A	(1.5 to 20.9) kW	0.12 %	

Parameter/Equipment	Range	CMC ^{2, 4, 6} (±)	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	(0 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)	0 kHz 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	t = time in seconds
Rise Time:			
1 kHz to 2 MHz (2 to 10) MHz	≤ 300 ps ≤ 350 ps	130 ps 130 ps	

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Electrical Simulation of Thermocouples 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	0.56 °C 0.2 °C 0.26 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.33 °C 0.2 °C 0.17 °C 0.21 °C 0.28 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.4 °C 0.22 °C 0.2 °C 0.32 °C 0.48 °C	
Type N	(-210 to -100) °C (-100 to 410) °C (410 to 1300) °C	0.50 °C 0.30 °C 0.36 °C	
Type R	(0 to 250) °C (250 to 1000) °C (1000 to 1767) °C	0.7 °C 0.42 °C 0.5 °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 0.3 °C 0.21 °C	

Parameter/Equipment	Range	CMC ^{2, 5, 6, 8} ($\pm$)	Comments
Force – Measuring Equipment ³	Up to 3000 lbf Up to 25 lbf Up to 500 lbf Up to 2000 lbf Up to 5000 lbf Up to 20 000 lbf	0.017 % + 0.6 <i>R</i> 0.025 lbf + 0.6 <i>R</i> 0.37 lbf + 0.6 <i>R</i> 1.5 lbf + 0.6 <i>R</i> 3.7 lbf + 0.6 <i>R</i> 15 lbf + 0.6 <i>R</i>	ASTM Class F weights 25lb load cell w/indicator 500lb load cell w/indicator 2K load cell w/indicator 5K load cell w/indicator 20K load cell w/ indicator
Torque – Measure ³ Wrenches – Click, Dial, Adjustable, Screwdriver	1 lbf·in to 2 lbf·in 2 lbf·in to 600 lbf·ft	1.3 % 0.65 %	Mountz EZ3-10i Mountz EZ3-10i / CDI Sure Test
Rotary Torque –Measure ³ Tools – Pneumatic, DC, Pulse	(0 to 180) N·m	1.3 % Full Scale	Crane-torque star w/ rotary transducers
Torque – Measuring Equipment ³ – Testers	Up to 600 lbf·ft	0.13 %	Standard weights & torque arm
Atmospheric Pressure (Vacuum) – Measuring Equipment ³	Up to 30 in·Hg	0.04 in·Hg	Additel 680
Pressure – Measuring Equipment ³ – Absolute Differential Pneumatic Hydraulic	(0 to 17) psia (0 to 28) in·H ₂ O (0 to 15) psig (0.01 to 300) psig (0 to 1000) psig (0 to 2400) psig (5 to 10 000) psig	0.012 psia + 0.6 <i>R</i> 0.03 % Full Scale 0.07 % Full Scale 0.07 % Full Scale 0.81 psig + 0.6 <i>R</i> 0.07 % Full Scale 0.13 %	Meriam ZM200LS Meriam M200LS Additel 680 Beamex IPM20C Druck DPI-104 Beamex EXT160 Ametek T-100/C

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Speed – Measuring Equipment ³ Optic/Non-Contact: RPM Totalizer/Rate Meters Contact: RPM Totalizer/Rate Meters	(6 to 100 000) rpm (2 to 3300) fpm (6 to 20 000) rpm (2 to 3300) fpm	0.018 % 0.018 % 0.22 % 0.22 %	Monarch PLT200
Totalize Meters ³ – Distance Measure	Up to 1000 yds	0.64 %	Monartch PLT200
Indirect Verification of Rockwell Hardness Testers ³	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HR15TW: Low Medium High	0.79 HRA 0.77 HRA 0.76 HRA 0.84 HRBW 0.80 HRBW 0.84 HRBW 0.84 HRC 0.82 HRC 0.81 HRC 0.79 HR15TW 0.79 HR15TW 0.87 HR15TW	Indirect verification per ASTM E18

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 5, 8} ($\pm$)	Comments
Infrared Temperature Indicators ³ (Optical Pyrometers)	@ 35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.53 °C + 0.6R 0.7 °C + 0.6R 1.1 °C + 0.6R 1.7 °C + 0.6R 2.5 °C + 0.6R	Fluke 4181 (8 to 14) μ m
Temperature – Measuring Equipment ³	(-25 to 150) °C (150 to 350) °C	0.08 °C 0.75 °C	Fluke 9142P w/ PRT Fluke 9009
Relative Humidity – Measure ³	(0 to 90) % RH (90 to 95) % RH	1.5 % RH 2.5 % RH	Vaisala HMI-41 w/ HMP-46
Relative Humidity – Measuring Equipment ³	(0 to 90) % RH (90 to 95) % RH	1.5 % RH 2.6 % RH	Vaisala HMI-41 w/ HMP-46, w/ controlled environment
Temperature – Measure ³	(-196 to 420) °C (350 to 800) °C (800 to 1450) °C	0.08 °C 1.6 °C 2.4 °C	9142P w/ PRT Fluke 724 w/ 5650-20 type S probe

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 5, 8} ($\pm$)	Comments
Frequency – Generate	0.01 Hz to 2 MHz	6 μ Hz/Hz + 5 μ Hz	Fluke 5522A
Frequency - Measure	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz	0.13 Hz 0.061 Hz 0.037 Hz 0.21 Hz	Agilent 34401A
Timers & Stopwatches ³	(1 to 3600) s (3600 to 86 400) s	0.2 s (2 + 0.0001T) s + 0.6R	Monarch tachometer & timer 24-hour traceable stopwatch

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 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, and R is the numerical value of the resolution of the device under test, T is the numerical value of the nominal time in seconds. In the statement of the CMC or Range, DL is the length of the diagonal in inches.

⁶ Unless otherwise noted, percentage refers to percent of reading.

⁷ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁸ 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.



Accredited Laboratory

A2LA has accredited

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

Charlotte, NC

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 7th day of September 2021.

A blue ink signature of a person, likely the Vice President of Accreditation Services, written over a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.11
Valid to September 30, 2023

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