



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: May 31, 2021

Certificate Number: 1741.06

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Chemical

Parameter/Equipment	Range	CMC ² (±)	Comments
pH Meters ³	4 pH 7 pH 10 pH	0.04 pH 0.04 pH 0.05 pH	Standard pH solutions
Conductivity Meters ³	1 µS/cm 10 µS/cm 100 µS/cm 1000 µS/cm 10 000 µS/cm 100 000 µS/cm	0.56 µS/cm 0.37 µS/cm 2.3 µS/cm 5.4 µS/cm 42 µS/cm 370 µS/cm	Standard conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Angle Indicators & Protractors ³	30°, 45°, 60°, 75°, 90°	0.03°	Angle block set
Calipers ³	Up to 48 in	(3.2 + 9.2L) µin + 0.6R	Gage blocks

Parameter/Equipment	Range	CMC ^{2,6} (\pm)	Comments
Coating Thickness Gauges ³ (Film Ultrasonic)	Up to 60 mils	0.1 mils	Coating thickness standards
Linear Dial & Test Indicators ³	Up to 12 in	$(5.9 + 11L) \mu\text{in} + 0.6R$	Gage blocks
Thickness/Snap Gages ³	Up to 12 in	$(5.9 + 11L) \mu\text{in} + 0.6R$	Gage blocks
Steel Rules & Tapes Measures ³	Up to 25 ft	$(3.2 + 9.2L) \mu\text{in} + 0.6R$	Gage blocks
Micrometers ³	Up to 48 in	$(3.2 + 9.2L) \mu\text{in} + 0.6R$	Gage blocks
Length Standards	Up to 10 in Up to 250 mm (10 to 40) in (275 to 1000) mm	$(41 + 3L) \mu\text{in}$ $(1 + 0.004L) \mu\text{m}$ $(150 + 3.1L) \mu\text{in}$ $(3.6 + 0.004L) \mu\text{m}$	Universal measuring machine (UMM) Tesa TT80 w/ lever probe
Height Gages ³	Up to 48 in	$(3.2 + 9.2L) \mu\text{in} + 0.6R$	Gage blocks
Cylindrical Measure – Plain Plugs, Pins, Discs, External Diameter ³	Up to 10 in	$(33 + 6.8L) \mu\text{in}$	Supermicrometer TM
Optical Comparators ³			
X-Y Linearity	Up to 12 in	160 μin	Glass master scales
Magnification	10x to 250x	0.014 in	
Angle	0° to 90°	0.1°	Angle block set

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Surface Plates ³ – Grades AA, A, and B			
Repeatability	0.002 in	42 μin	Repeat-o-meter
Flatness	Up to 60DL in (>60 to 120DL) in	(31 + 0.2DL) μin (30 + 0.3DL) μin	Federal level systems

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
DC Voltage – Measure ³	(0 to 100) mV 100 mV to 1 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	11 μV/V + 0.3 μV 10 μV/V + 0.3 μV 10 μV/V + 0.5 μV 11 μV/V + 30 μV 27 μV/V + 100 μV 1.2 % 2.4 % 1.2 % 2.4 %	Agilent 3458A 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 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	Up to 100 nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 100) A	32 μA/A + 0.04 nA 23 μA/A + 0.04 nA 23 μA/A + 0.1 nA 23 μA/A + 0.8 nA 23 μA/A + 5 nA 23 μA/A + 50 nA 37 μA/A + 0.5 μA 0.011 % + 10 μA 0.25 %	Agilent 3458A Empro shunt w/ Agilent 3458A

Parameter/Equipment	Range	CMC ^{2,4,5} (\pm)	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 0.015 % + 2.5 μ A 0.025 % + 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)	(20.5 to 1000) A	0.39 % + 0.5 A	Fluke 5522A w/5500 Coil
(Non-Toroidal)	(20.5 to 1000) A	0.65 % + 0.5 A	
Resistance – Measure ³	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω 100 M Ω to 1 G Ω	18 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 15 $\mu\Omega/\Omega$ + 0.5 m Ω 14 $\mu\Omega/\Omega$ + 0.5 m Ω 12 $\mu\Omega/\Omega$ + 5 m Ω 12 $\mu\Omega/\Omega$ + 50 m Ω 17 $\mu\Omega/\Omega$ + 2 Ω 51 $\mu\Omega/\Omega$ + 100 Ω 0.051 % + 1 k Ω 0.11 % + 10 k Ω	Agilent 3458A
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 Ω to 1.1 k Ω 1.1 k Ω to 11 k Ω 11 k Ω 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	54 $\mu\Omega/\Omega$ + 0.001 Ω 52 $\mu\Omega/\Omega$ + 0.0015 Ω 35 $\mu\Omega/\Omega$ + 0.0014 Ω 35 $\mu\Omega/\Omega$ + 0.002 Ω 35 $\mu\Omega/\Omega$ + 0.02 Ω 36 $\mu\Omega/\Omega$ + 0.2 Ω 40 $\mu\Omega/\Omega$ + 2 Ω 74 $\mu\Omega/\Omega$ + 30 Ω 0.016 % + 50 Ω 0.031 % + 2.5 k Ω 0.061 % + 3 k Ω 0.37 % + 100 k Ω 1.8 % + 500 k Ω	Fluke 5522A

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
Capacitance – Generate ³ (220.0 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 1.09999) μF (1.1 to 3.29999) 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 1.09999) mF (1.1 to 3.29999) 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 0.60) Hz (0 to 0.20) Hz	0.88 % + 10 pF 0.67 % + 0.01 nF 0.62 % + 0.01 nF 0.35 % + 0.1 nF 0.32 % + 0.1 nF 0.32 % + 0.3 nF 0.32 % + 1 nF 0.31 % + 3 nF 0.32 % + 10 nF 0.49 % + 30 nF 0.56 % + 100 nF 0.56 % + 300 nF 0.57 % + 1 μF 0.56 % + 3 μF 0.56 % + 10 μF 0.91 % + 30 μF 1.4 % + 100 μF	Fluke 5522A
AC Voltage – Generate ³ (1 to 33) mV (33 to 330) mV 330 mV to 3.3 V (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 (100 to 500) kHz (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 (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 (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.11 % + 6 μV 0.024 % + 6 μV 0.029 % + 6 μV 0.13 % + 6 μV 0.43 % + 12 μV 0.97 % + 50 μV 0.04 % + 8 μV 0.018 % + 8 μV 0.02 % + 8 μV 0.043 % + 8 μV 0.097 % + 32 μV 0.25 % + 70 μV 0.04 % + 50 μV 0.019 % + 60 μV 0.023 % + 60 μV 0.036 % + 50 μV 0.085 % + 125 μV 0.29 % + 600 μV 0.04 % + 650 μV 0.019 % + 600 μV 0.029 % + 600 μV 0.043 % + 600 μV 0.11 % + 1.6 mV	Fluke 5522A

Parameter/Range	Frequency	CMC ^{2,4,5} (\pm)	Comments
AC Voltage – Generate ³ (cont)			
(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	Fluke 5522A
(330 to 1020) V	45 Hz to 10 kHz	0.037 % + 10 mV	
AC Voltage – Measure ³			
Up to 10 mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.031 % + 0.03 % of rng 0.021 % + 0.011 % of rng 0.031 % + 0.011 % of rng 0.11 % + 0.011 % of rng 0.51 % + 0.011 % of rng 4.1 % + 0.02 % of rng	Agilent 3458A
10 mV to 10 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.008 % + 0.004 % of rng 0.008 % + 0.002 % of rng 0.015 % + 0.002 % of rng 0.031 % + 0.002 % of rng 0.081 % + 0.002 % of rng 0.31 % + 0.01 % of rng	
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.021 % + 0.004 % of rng 0.021 % + 0.002 % of rng 0.021 % + 0.002 % of rng 0.036 % + 0.002 % of rng 0.13 % + 0.002 % of rng 0.41 % + 0.01 % of rng	
(100 to 600) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.041 % + 0.004 % of rng 0.041 % + 0.002 % of rng 0.061 % + 0.002 % of rng 0.13 % + 0.002 % of rng 0.31 % + 0.002 % of rng	
(1 to 6) kV	60 Hz	1.8 %	Fluke 80K-6 & DMM
(6 to 40) kV	60 Hz	6.1 %	Fluke 80K-40 & DMM

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
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	0.25 % + 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	
(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	
(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	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (\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
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	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	
AC Current – Measure ³			
(0 to 100) μ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 Hz to 5 kHz	0.41 % + 0.03 % rng 0.16 % + 0.03 % rng 0.07 % + 0.03 % rng 0.07 % + 0.03 % rng	Agilent 3458A
(1 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.41 % + 0.02 % rng 0.16 % + 0.02 % rng 0.07 % + 0.02 % rng 0.04 % + 0.02 % rng 0.07 % + 0.02 % rng 0.41 % + 0.04 % rng 0.56 % + 0.15 % rng	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.41 % + 0.02 % rng 0.17 % + 0.02 % rng 0.09 % + 0.02 % rng 0.11 % + 0.02 % rng 0.31 % + 0.02 % rng 1.1 % + 0.04 % rng	
(1 to 100) A	DC to 60Hz	0.27 %	Empro shunt w/ Agilent 3458A

Parameter/Equipment	Range	CMC ^{2, 4, 5} (\pm)	Comments
Oscilloscopes ³ – Square Wave Signal: 50 Ω Load @ 1 kHz 1 M Ω Load @ 1 kHz DC Volt Amplitude: 50 Ω Load 1 M Ω Load Level Sine Wave: Frequency Amplitude Flatness (Bandwidth) Time Markers: Into a 50 Ω load Rise Time: 1 kHz to 2 MHz (2 to 10) MHz	 1.0 mV to 6.6 V _{pk - pk} 1.0 mV to 130 V _{pk - pk} (0 to 6.6) V (0 to 130) V (0 to 1100) MHz 50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz 0 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz 5 s to 50 ms 20 ms to 1 ns \leq 130 ps \leq 130 ps	 0.26 % + 40 μ V 0.12 % + 40 μ V 0.25 % + 40 μ V 0.05 % + 40 μ V 3.3 μ Hz/Hz 2 % + 300 μ V 3.5 % + 300 μ V 4 % + 300 μ V 6 % + 300 μ V 8.4 % + 300 μ V 1.5 % + 100 μ V 2 % + 100 μ V 4 % + 100 μ V 6 % + 100 μ V (25 + 1000t) μ s/s 2.5 μ s/s (+ 0 / -110) ps	Fluke 5522A w/ SC1100
RTD ³ – Generate, Pt 385, 100 Ω	(-200 to 0) °C (0 to 400) °C (400 to 630) °C (630 to 800) °C	0.08 °C 0.12 °C 0.14 °C 0.24 °C	Fluke 5522A
RTD ³ – Measure, Pt 385, 100 Ω	(-200 to 0) °C (0 to 400) °C (400 to 800) °C	0.37 °C 0.61 °C 0.97 °C	Fluke 754

Parameter/Equipment	Range	CMC ² (±)	Comments
Thermocouple Simulation ³ –			
Type B	(600 to 800) °C (800 to 1820) °C	0.58 °C 0.47 °C	Fluke 5522A
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.64 °C 0.38 °C 0.34 °C	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.4 °C 0.31 °C 0.36 °C	
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	

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 5, 6} (\pm)	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	0.013 mg + 0.6R 0.043 mg + 0.6R 0.062 mg + 0.6R 0.096 mg + 0.6R 0.17 mg + 0.6R 0.31 mg + 0.6R 0.63 mg + 0.6R 0.92 mg + 0.6R 1.5 mg + 0.6R 3.1 mg + 0.6R 3.1 mg per 1000 g + 0.6R	ASTM Class 1 weights (applied load)
	(5 to 10) g (10 to 500) g 501 g to 20 kg (> 20 to 750) kg	0.04 % + 0.6R 0.025 % + 0.6R 0.017 % + 0.6R 0.017 % per 20 kg + 0.6R	Class F weights (applied load)
	Up to 1000 lb (1000 to 120 000) lb	0.017 % + 0.6R 0.017 % per 1000 lb + 0.6R	
Force – Tension & Compression ³	Up to 10 lbf Up to 20 lbf Up to 50 lbf Up to 100 lbf Up to 200 lbf	(0.002 + 0.6R) lbf (0.003 + 0.6R) lbf (0.008 + 0.6R) lbf (0.017 + 0.6R) lbf (0.034 + 0.6R) lbf	Class F weights
	Up to 500 lbf Up to 1000 lbf Up to 2000 lbf	(0.085 + 0.6R) lbf (0.17 + 0.6R) lbf (0.34 + 0.6R) lbf	Tension only using Class F weights
	Up to 100 lbf Up to 250 lbf Up to 2500 lbf Up to 10 000 lbf	0.1 lbf 0.42 lbf 4.2 lbf 18 lbf	Load cells w/ indicator
	Up to 20 000 lbf	24 lbf	Tension only using load cells w/ indicator
	Up to 50 000 lbf Up to 200 000 lbf	65 lbf 320 lbf	Compression Only using load cells w/ indicator
Torque Testers ³	Up to 250 ft·lbf	0.095 %	Class F weights & torque arms

Parameter/Equipment	Range	CMC ^{2, 5, 6, 7} (±)	Comments
Torque Wrenches ³	4 in·lbf to 250 ft·lbf (250 to 2000) ft·lbf	0.8 % 1.0 %	CDI suretest 5000-ST
Speed ³ – Measuring Equipment (Simulation) RPM/Totalizer/Rate Meters	(6 to 100 000) rpm	0.003 %	Agilent 33220A frequency synthesizer
Speed ³ – Measure 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
Totalize Meters ³ – Distance Measure Mechanical Counter/Totalizers	Up to 200 ft Up to 999 999 counts	0.64 % (0.02 % + 0.6R)	Monarch PLT200
Pressure ³ – Measure & Measuring Equipment	(0 to 1) in H ₂ O (0 to 4) in H ₂ O (0 to 10) in H ₂ O (0 to 40) in H ₂ O (0.01 to 30) psig (0.01 to 100) psig (0.1 to 1000) psig (1 to 3000) psig (1 to 10 000) psig (10 to 10 000) psi	0.65 % of full scale 0.65 % of full scale 0.65 % of full scale 0.65 % of full scale 0.07 % of full scale 0.07 % of full scale 0.07 % of full scale 0.05 % of full scale 0.05 % of full scale 0.13 %	Dwyer Manometers Fluke 754 w/ 700 and 750 series modules Ametek dead weight tester

Parameter/Equipment	Range	CMC ^{2, 5, 6, 7} (±)	Comments
Atmospheric Pressure ³ (Vacuum) – Measure	(0 to 28.5) in Hg	0.07 %	Fluke 754 w/ 700 series modules
Indirect Verification of Rockwell Hardness Testers ³	HRC: (20 to 30) HRC (35 to 55) HRC (60 to 65) HRC HRBW: (40 to 59) HRBW (60 to 79) HRBW (80 to 100) HRBW	0.83 HRC 0.81 HRC 0.81 HRC 0.87 HRBW 0.81 HRBW 0.82 HRBW	Indirect verification per ASTM E18

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Temperature – Measuring Instruments ³	(-30 to 125) °C (125 to 420) °C (420 to 550) °C (550 to 600) °C	0.33 °C 0.46 °C 0.56 °C 0.67 °C	Fluke 7103 Fluke 9144
Temperature – Measure ³	(-196 to 200) °C (201 to 420) °C	0.07 °C 0.09 °C	Hart Scientific 1502A/5627A
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
Relative Humidity ³ – Measure	(10 to 90) % RH	1.5 % RH	Vaisala MI-70 w/ HMP77 probe

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,5,7} (\pm)	Comments
Frequency – Measure	(1 to 40) Hz 40 Hz to 10 MHz	0.06 % 0.012 %	Agilent 3458A
Frequency – Measuring Equipment	0.01 Hz to 1100 MHz	3.3 μ Hz/Hz	Fluke 5522A/SC1100
Timers & Stopwatches ³	(1 to 3600) s	0.32 s	Monarch tachometer and timer

¹ This laboratory offers commercial calibration and field calibration services.

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 and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. 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 a percentage denotes a percent of reading unless otherwise noted.

⁶ 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 length of the diagonal in inches and t represents the time.

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.



Accredited Laboratory

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Chattanooga, TN

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 1st day of May 2019.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1741.06
Valid to May 31, 2021

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