



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: September 30, 2024

Certificate Number: 1395.06

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,9}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Calipers ³	Up to 5 in (5 to 48) in	(280 + 6L) μin (320 + 4L) μin	Gage blocks
Micrometers ³ –			
Flatness	Up to 1 in	12 μin	Optical parallels & monochromatic light
Parallelism	<0.001 in	9.6 μin	
Linearity	Up to 48 in	(6.9 + 2.8L) μin	
Height Gages ³	Up to 36 in	(69 + 1.5L) μin	Gage blocks, surface plates
Depth Gages ³ –			
Linearity	Up to 5 in (5 to 36) in	(62 + 10L) μin + 0.6R (80 + 6L) μin + 0.6R	Gage blocks, surface plates
Flatness	Up to 1 in	11 μin	

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Pin, Plug Gages	Up to 1 in	(26 + 4.5L) μin	Supermicrometer™, gage blocks
Digital & Dial Indicators ³	Up to 2 in	(7.3 + 10L) μin + 0.6R	Gage blocks & surface plates
	Up to 1 in	(36 + 4.5L) μin	Supermicrometer™
End Standards	Up to 5 in (5 to 12) in	(33 + 4.5L) μin (37 + 4.5L) μin	Gage blocks, Supermicrometer™
Surface Plates ³ –			
Flatness	Up to 180 in <i>DL</i>	(42 + 0.41 <i>DL</i>) μin	Leveling System
Repeatability	Up to 0.002 in	36 μin	Repeat-o-meter
Thread Plug Gages –			
Pitch Diameter	(4 to 80) TPI (0.3 to 6) mm	(65 + 7.4L) μin	Supermicrometer™, gage blocks & thread wires
Major Diameter	Up to 1 in (1 to 4) in	(52 + 7.4L) μin (56 + 7.4L) μin	
Protractors & Inclinometers ³	Up to 180°	0.00037° + 0.58R	Surface plate, gage blocks & sine bar
Crimpers ³ –			
Pull Force	Up to 50 kgf	0.67 kgf	Force gage
Go/NoGo	(0.011 to 0.250) in	(230 + 4.5L) μin	Plug gage sets

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 7, 8} (±)	Comments
DC Voltage – Generate ³	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	8 μV/V + 0.7 μV 7 μV/V + 1.6 μV 7 μV/V + 12 μV 7 μV/V + 13 μV 8 μV/V + 140 μV 9 μV/V + 1400 μV	Fluke 5700A/EP, 5725A
DC Voltage – Measure ³	± (0 to 100) mV ± (0.1 to 1) V ± (1 to 10) V ± (10 to 100) V ± (100 to 1000) V*	5.8 μV/V + 0.000 055 mV 4 μV/V + 0.000 14 mV 4 μV/V + 0.000 78 mV 6 μV/V + 0.018 mV 6 μV/V + 0.58 mV*	Agilent 3458A OPT-2 *add 12(V _{in} /1000) ² Parts in 10 ⁶ to all V _{in} >100
	(1000 to 10 000) V (10 000 to 60 000) V	0.13 % 0.16 %	Ross VD60-6.2-A- KB-AL & HP 34401A
DC Current – Generate ³	(20 to 220) μA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A (11 to 20.5) A (10 to 100) A	50 μA/A + 8.2 nA 50 μA/A + 43 nA 50 μA/A + 410 nA 60 μA/A + 4.4 μA 80 μA/A + 74 μA 0.036 % + 530 μA 0.079 % + 590 μA 0.06 %	Fluke 5700A/EP, 5725A Fluke 5520A/SC1100 Valhalla 2555A, L&N 4361 & Agilent 3458A
Clamp Meters to 1000 A	(20.5 to 1000) A	0.51 % + 0.75 A	Fluke 5500A/coil & 5520A/SC1100

Parameter/Equipment	Range	CMC ^{2, 5, 7, 8, (±)}	Comments
DC Current – Measure ³	(0 to 100) nA (0.1 to 1) μA (1 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 100) A	30 μA/A + 70 pA 20 μA/A + 70 pA 20 μA/A + 120 pA 20 μA/A + 0.8 μA 20 μA/A + 5 nA 20 μA/A + 50 nA 35 μA/A + 0.5 μA 110 μA/A + 10 μA 0.06 % 0.1 %	Agilent 3458A OPT-2 L&N 4361 & Agilent 3458A OPT-2
Resistance – Measure ³	(0 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 1.0) GΩ	15 μΩ/Ω + 52 μΩ 12 μΩ/Ω + 0.51 mΩ 10 μΩ/Ω + 0.56 mΩ 10 μΩ/Ω + 5.8 mΩ 10 μΩ/Ω + 62 mΩ 15 μΩ/Ω + 2.2 Ω 50 μΩ/Ω + 100 Ω 0.05 % + 1.4 kΩ 0.50 % + 11 kΩ	Agilent 3458A OPT-2
Resistance – Generate ³ , Fixed Points	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	51 μΩ 95 μΩ/Ω + 12 μΩ 95 μΩ/Ω + 20 μΩ 28 μΩ/Ω + 43 μΩ 27 μΩ/Ω + 80 μΩ 17 μΩ/Ω + 290 μΩ 17 μΩ/Ω + 560 μΩ 13 μΩ/Ω + 2300 μΩ 13 μΩ/Ω + 4500 μΩ 12 μΩ/Ω + 36 000 μΩ 12 μΩ/Ω + 43 mΩ 12 μΩ/Ω + 640 mΩ 14 μΩ/Ω + 1200 mΩ 20 μΩ/Ω + 6200 mΩ 21 μΩ/Ω + 12 000 mΩ 40 μΩ/Ω + 190 000 mΩ 47 μΩ/Ω + 360 Ω 0.011 % + 2200 Ω	Fluke 5700A/EP

Parameter/Equipment	Range	CMC ^{2, 5, 7, 8} (±)	Comments
Resistance – Generate ³ (cont)	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (0.33 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 (0.33 to 1.1) GΩ	31 μΩ/Ω + 0.78 mΩ 23 μΩ/Ω + 1.2 mΩ 22 μΩ/Ω + 1.1 mΩ 22 μΩ/Ω + 1.6 mΩ 22 μΩ/Ω + 1.7 mΩ 22 μΩ/Ω + 16 mΩ 22 μΩ/Ω + 17 mΩ 22 μΩ/Ω + 160 mΩ 22 μΩ/Ω + 170 mΩ 25 μΩ/Ω + 1.6 Ω 25 μΩ/Ω + 1.7 Ω 47 μΩ/Ω + 24 Ω 0.01 % + 200 Ω 0.019 % + 2.9 kΩ 0.039 % + 9.4 kΩ 0.24 % + 110 kΩ 1.2 % + 1400 kΩ	Fluke 5520A/SC1100
Electrical Simulation of Thermocouples Indicating Devices – Generate & Measure ³			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.14 °C 0.12 °C 0.14 °C 0.17 °C	Fluke 5520A/SC1100
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.22 °C 0.14 °C 0.12 °C 0.14 °C 0.19 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.16 °C 0.14 °C 0.21 °C 0.32 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.20 °C 0.14 °C 0.12 °C	

Parameter/Equipment	Range	CMC ^{2,4,8} (\pm)	Comments
Electrical Simulation of RTD ³ – Pt 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.13 °C 0.10 °C 0.13 °C 0.11 °C 0.15 °C 0.15 °C 0.25 °C	Fluke 5520A/SC1100
Waveform – Measure ³ Amplitude: (0 to 40) V Time/Frequency Rise & Fall Time	 DC to 1 GHz DC to 1 GHz 350 ps to 1 s	 1.7 % 120 x 10 ⁶ Hz 57 ps	 Tektronix TDS684C
Oscilloscopes ³ – Level Sine Wave 5 mV to 5.5 V _(p-p) Level Sine Flatness 5 mV to 5.5 V _(p-p) Relative to 50 kHz Reference DC Signal 50 Ω , (0.01 to 10) kHz 1 M Ω , (0.01 to 10) kHz Square Wave Signal 50 Ω , (0.01 to 10) kHz 1 M Ω , (1 to 10) kHz Time Marker Output Into 50 Ω Pulse Rise Time – Generate Rep Rate: 1 kHz to 10 MHz	 50 kHz reference (0.05 to 100) MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz 1 mV to 6.6 V 1 mV to 130 V 1 mV to 6.6 V _(p-p) 1 mV to 130 V _(p-p) 2 ns to 20 ms 50 ms to 5 s < 350 ps	 1.6 % + 250 μ V 1.7 % + 110 μ V 2 % + 110 μ V 3.3 % + 110 μ V 3.2 % + 110 μ V 0.2 % + 40 μ V 0.06 % + 40 μ V 0.2 % + 40 μ V 0.08 % + 40 μ V 11 x 10 ⁶ s 120 x 10 ⁶ s 78 ps	 Fluke 5520A/SC1100, See RF Power/Flatness – generate for oscilloscopes above 1 GHz

Parameter/Range	Frequency	CMC ^{2, 4, 5, 8} (±)	Comments
AC Current – Measure ³			
(10 to 100) μA	45 Hz to 1 kHz	0.069 % + 0.035 μA	Agilent 3458A OPT-2
(0.1 to 1) mA	(45 to 100) Hz (0.1 to 5) kHz	0.069 % + 230 nA 0.035 % + 230 nA	
(1 to 10) mA	(45 to 100) Hz (0.1 to 5) kHz	0.069 % + 2.3 μA 0.035 % + 2.3 μA	
(10 to 100) mA	(45 to 100) Hz (0.1 to 5) kHz	0.069 % + 23 μA 0.035 % + 23 μA	
(0.1 to 1) A	(45 to 100) Hz (0.1 to 5) kHz	0.092 % + 230 μA 0.12 % + 230 μA	Valhalla Scientific 2575A & Agilent 3458A
(1 to 2) A (>2 to 100) A	(0.4 to 1) kHz (0.4 to 1) kHz	0.043 % 0.15 %	
AC Current – Generate ³			
(0.22 to 2.2) mA	(>40 to 1000) Hz (1 to 5) kHz	0.014 % + 53 nA 0.06 % + 400 nA	Fluke 5700A/EP, 5725A
(2.2 to 22) mA	(>40 to 1000) Hz (1 to 5) kHz	0.014 % + 810 nA 0.06 % + 4100 nA	
(22 to 220) mA	(>40 to 1000) Hz (1 to 5) kHz	0.014 % + 7.9 μA 0.06 % + 41 μA	
(0.22 to 2.2) A	(>40 to 1000) Hz (1 to 5) kHz	0.065 % + 87 μA 0.075 % + 110 μA	
(2.2 to 11) A	(>40 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.046 % + 710 μA 0.095 % + 780 μA 0.36 % + 1000 μA	Fluke 5520A/SC1100 LCOMP OFF
(33 to 330) μA	(>45 to 1000) Hz (1 to 5) kHz	0.097 % + 0.078 μA 0.24 % + 0.12 μA	
(11 to 20.5) A	(>0.1 to 1) kHz (1 to 5) kHz	0.12 % + 3.9 mA 2.3 % + 3.9 mA	
(10 to 100) A	(10 to 60) Hz	0.15 %	
			Valhalla 2555A, L&N 4361 & Agilent 3458A

Parameter/Range	Frequency	CMC ^{2, 7, 8} (±)	Comments
AC Current – Generate ³ (cont) Clamp Meters to 1000 A (20.5 to 1000) A	(45 to 400) Hz	1.5 % + 0.36 A	Fluke 5500A/coil & 5520A/SC1100 LCOMP OFF
AC Voltage – Generate ³ (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 (0.5 to 1) MHz	0.055 % + 5 μV 0.021 % + 5 μV 0.011 % + 5 μV 0.037 % + 5.4 μV 0.085 % + 8 μV 0.11 % + 15 μV 0.17 % + 27 μV 0.34 % + 28 μV	Fluke 5700A/EP & 5725A
(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 (0.5 to 1) MHz	0.055 % + 8 μV 0.021 % + 7 μV 0.011 % + 12 μV 0.037 % + 12 μV 0.085 % + 11 μV 0.11 % + 20 μV 0.17 % + 32 μV 0.34 % + 42 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 (0.5 to 1) MHz	0.055 % + 21 μV 0.021 % + 18 μV 0.011 % + 11 μV 0.032 % + 17 μV 0.085 % + 41 μV 0.11 % + 55 μV 0.17 % + 78 μV 0.34 % + 190 μV	
(0.22 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 (0.5 to 1) MHz	0.05 % + 140 μV 0.016 % + 49 μV 0.0075 % + 42 μV 0.012 % + 78 μV 0.025 % + 130 μV 0.043 % + 330 μV 0.11 % + 560 μV 0.22 % + 1700 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	0.05 % + 1.4 mV 0.016 % + 0.54 mV 0.0075 % + 0.48 μV 0.012 % + 0.8 μV 0.025 % + 1.3 μV 0.05 % + 3.7 mV	

Parameter/Range	Frequency	CMC ^{2, 5, 7, 8} (±)	Comments
AC Voltage – Generate ³ (cont)			
(2.2 to 22) V	(300 to 500) kHz (0.5 to 1) MHz	0.13 % + 7.7 mV 0.27 % + 21 mV	Fluke 5700A/EP & 5725A
(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	0.05 % + 48 mV 0.016 % + 17 mV 0.008 % + 0.8 mV* 0.022 % + 3.5 mV 0.05 % + 8 mV	*Subject to 2.2 x 10 ⁷ V Hz limitation
(220 to 1100) V	(15 to 50) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 30) kHz	0.04 % + 42 mV 0.008 % + 39 mV 0.017 % + 110 mV 0.06 % + 110 mV	
(250 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.06 % + 230 mV 0.23 % + 230 mV	
AC Voltage – Measure ³			
(1 to 10) mV	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.035 % + 3.5 μV 0.023 % + 1.3 μV 0.035 % + 1.3 μV 0.12 % + 1.3 μV 0.58 % + 1.3 μV 4.6 % + 2.3 μV	Agilent 3458A OPT-2
(10 to 100) mV	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.0081 % + 5.2 μV 0.0081 % + 3.3 μV 0.016 % + 3.2 μV 0.035 % + 3.2 μV 0.092 % + 3.2 μV 0.35 % + 12 μV 1.2 % + 13 μV	
(0.1 to 1) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.0081 % + 48 μV 0.0081 % + 26 μV 0.016 % + 24 μV 0.035 % + 28 μV 0.092 % + 30 μV 0.35 % + 120 μV 1.2 % + 280 μV	
(1 to 10) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.0081 % + 0.50 mV 0.0081 % + 0.27 mV 0.016 % + 0.27 mV 0.035 % + 0.31 mV 0.092 % + 0.32 mV 0.35 % + 1.2 mV 1.2 % + 3.1 mV	

Parameter/Range	Frequency	CMC ^{2, 5, 7, 8} (±)	Comments
AC Voltage – Measure ³ (cont)			
(10 to 100) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.023 % + 2.7 mV 0.023 % + 2.7 mV 0.023 % + 2.8 mV 0.04 % + 3.1 mV 0.14 % + 3.7 mV	Agilent 3458A OPT-2
(100 to 700) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz	0.046 % + 48 mV 0.069 % + 27 mV 0.069 % + 27 mV	
(700 to 10 000) V (10 000 to 42 000) V	(50 to 60) Hz (50 to 60) Hz	0.60 % 0.62 %	Ross VD60-6.2-A- KB-AL & HP 34401A
Capacitance – Generate ³ 2-Wire			
(0.19 to <3.3) nF	(0.01 to 10) kHz	0.58 % + 12 pF	Fluke 5520A/ SC1100
(3.3 to <11) nF	(0.01 to 1) kHz	0.29 % + 8.5 pF	
(11 to 110) nF	(0.01 to 1) kHz	0.29 % + 130 pF	
(110 to <330) nF	(0.01 to 1) kHz	0.29 % + 410 pF	
(0.33 to <1.1) μF	(10 to 600) kHz	0.29 % + 1.4 nF	
(1.1 to <3.3) μF	(10 to 300) kHz	0.29 % + 4.0 nF	
(3.3 to <11) μF	(10 to 150) Hz	0.29 % + 15 nF	
(11 to <33) μF	(10 to 120) Hz	0.46 % + 45 nF	
(33 to <110) μF	(10 to 80) Hz	0.52 % + 170 nF	
(110 to <330) μF	(10 to 50) Hz	0.52 % + 490 nF	
(0.33 to <1.1) mF	(0 to 20) Hz	0.52 % + 1.7 μF	
(1.1 to <3.3) mF	(0 to 6) Hz	0.52 % + 3.6 μF	
(3.3 to <11) mF	(0 to 2) Hz	0.52 % + 13 μF	
(11 to <33) mF	(0 to 0.6) Hz	0.87 % + 39 μF	
(33 to <110) mF	(0 to 0.2) Hz	1.3 % + 120 μF	

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 8, 10} (±)	Comments
RF Power ³ – Generate (+20 to -100) dBm (<-100 to -127) dBm	9 kHz to 3200 MHz (>3200 to 4000) MHz (9 to <100) kHz (0.1 to 2500) MHz (>2500 to 4000) MHz	1.2 dB 2.3 dB 3.5 dB 1.2 dB 3.5 dB	HP 8648D OPT-1E2, 1E5, 1EA HP 8648D OPT-1E2, 1E5, 1EA
RF Power/Flatness ³ – Generate (+20 to -20) dBm	(100 to 300) kHz (0.3 to 1) MHz (0.001 to 4.2) GHz	0.2 dB 0.19 dB 0.19 dB	HP 8648D, 11667B, 8482A & E4419B
RF Power ³ – Measure (+20 to -20) dBm	(100 to 300) kHz (0.3 to 1) MHz (0.001 to 4.2) GHz	0.080 dB 0.058 dB 0.057 dB	HP 8482A & E4419B
Distortion ³ – Measure ≤ -80 dB ≤ -65 dB	20 Hz to 20 kHz (20 to 100) kHz	1.2 dB 2.3 dB	HP 8903B

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 6, 8, 10} (±)	Comments
Scales & Balances ³	(1 to 500) mg (1 to 5) g (5 to 10) g (10 to 20) g (20 to 200) g (0.2 to 10) kg (10 to 20) kg (20 to 35) kg (0 to 500) lb	0.0093 mg + 0.58R 0.04 mg + 0.58R 0.058 mg + 0.58R 0.086 mg + 0.58R 0.000 29 % + 0.58R 0.000 29 % + 0.58R 83 mg + 0.58R 88 mg + 0.58R 0.011 % + 0.58R	Class 1 weights Class F weights

Parameter/Equipment	Range	CMC ^{2, 6, 8, 10} (±)	Comments
Torque Wrenches & Screwdrivers – Measure	(5 to 50) ozf·in (1 to 10) lbf·in (10 to 50) lbf·in	0.75 % + 0.58R 0.6 % + 0.58R 0.65 % + 0.58R	AWS torque system
	(50 to 250) lbf·in (15 to 150) lbf·ft (150 to 500) lbf·ft (500 to 1000) lbf·ft	0.61 % + 0.58R 0.63 % + 0.58R 0.72 % + 0.58R 3.1 lbf·ft + 0.58R	Mountz torque system
Torque Wrenches & Screwdrivers – Measure ³	(5 to 50) ozf·in (1 to 10) lbf·in (10 to 50) lbf·in	0.75 % + 0.58R 0.6 % + 0.58R 0.65 % + 0.58R	AWS torque system
	(50 to 250) lbf·in	0.61 % + 0.58R	Mountz torque system
Torque Transducers & Analyzers – Measuring Equipment ³	(0 to 250) lbf·in	0.11 % + 0.58R	Class F weights & torque wheels
Force ³ – Measuring Equipment, Tension & Compression	(0 to 300) lbf	0.032 % + 0.58R	Class F weights
Pressure & Vacuum – Measuring Equipment	(0.9 to 3.16) psia (3.16 to 7.53) psia (7.53 to 23) psia (23 to 97) psia (97 to 300) psia	0.00034 psia + 0.58R 0.01 % + 0.58R 0.01 % + 0.58R 0.0091 psia + 0.58R 0.01 % + 0.58R	Fluke PPC4
	(-14.7 to -12.3) psig (-12.3 to -7.9) psig (-7.9 to 8) psig (8 to 86.7) psig (86.7 to 300) psig	0.001 psig + 0.58R 0.01 % + 0.58R 0.011 % + 0.58R 0.0095 psig + 0.58R 0.011 % + 0.58R	
	(2 to 10 000) psi	0.036 % + 0.58R	Pressurements M2200-3-P
Pipettes	(2 to 10) µL (10 to 100) µL (100 to 500) µL (500 to 1000) µL (1000 to 5000) µL	0.099 µL 0.37 µL 0.55 µL 1.6 µL 2 µL	Gravimetric calibration using A&D AD-4212B-PT & Mettler AT200
Pressure & Vacuum – Measuring Equipment ³	(-14.7 to 300) psig (300 to 1000) psig (1000 to 10 000) psig	0.18 psig + 0.58R 1.2 psig + 0.58R 7.3 psig + 0.58R	Druck PM620 Druck DPI705

V. Thermodynamic

Parameter/Equipment	Range	CMC ^{2, 6, 8, 10} (\pm)	Comments
Temperature – Measuring Equipment	(-70 to 175) °C	0.040 °C + 0.58R	Hart Scientific 1502A, 5628 w/ temperature sources
Temperature – Measuring Equipment ³	(-5 to 125) °C (-15 to 350) °C	0.045 °C + 0.58R 0.12 °C + 0.58R	Hart Scientific 1502A, 5628 w/ temperature sources
Temperature – Measure ³	(-196 to 0) °C (0 to 100) °C (100 to 350) °C (350 to 660) °C	0.015 °C + 0.58R 0.017 °C + 0.58R 0.023 °C + 0.58R 0.036 °C + 0.58R	Hart Scientific 1502A, 5628
Relative Humidity – Measure & Measuring Equipment ³	(10 to 76) % RH 95 % RH	1.4 % RH 2.1 % RH	Vaisala HMI41/HMP46, MI70/HMP76 w/ humidity chamber

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 6, 10} (\pm)	Comments
Timers & Stopwatches ³	Up to 86 400 s		
	Totalize	64 ms	HP 53132A, HP 33220A phase locked to GPS
	Stopwatch to Stopwatch	98 ms	Stopwatch comparison
	(0 to 19.99) s/day	0.039 s/day	Timometer
Frequency Reference	10 MHz	1.5 pHz/Hz + 0.58R	Fluke 910R GPS
Frequency – Measuring Equipment ³	0.01 Hz to 600 MHz	1.5 pHz/Hz + 0.58R	Fluke 910R GPS & HP 53132A
	9 kHz to 4 GHz	30 pHz/Hz + 0.58R	HP 8648D phase locked to GPS
Frequency ³ – Measure	0.1 Hz to 3 GHz	1.5 pHz/Hz + 0.58R	Fluke 910R GPS & HP 53132A

Parameter/Equipment	Range	CMC ^{2, 6, 10} (\pm)	Comments
RPM – Measure	(0 to 100 000) rpm	0.012 % + 0.58R	Monarch PLT200
Tachometers	(10 to 200 000) rpm	1.9 μ rpm/rpm + 0.58R	HP 33220A phase locked to GPS

¹ This laboratory offers commercial calibration service and field calibration service.

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 5520A with SC1100 was calibrated ($t_{cal} \pm 5^\circ\text{C}$) 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 $\pm 1^\circ\text{C}$ of use. For AC Current, CMC are determined with LCOMP Off. CMC is based upon 1-year specifications and is read as ppm (parts per million) or percent output plus floor specification where defined.

⁵ Based on using the standard at the temperature the Agilent 3458A was calibrated ($t_{cal} \pm 5^\circ\text{C}$) and an auto-calibration (ACAL) was performed within the previous 24 hours ($\pm 1^\circ\text{C}$ of ambient temperature). CMC is based upon 1-year specifications and is read as ppm (parts per million) or percent output plus floor specification where defined.

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 diagonal length of the surface plate measured in inches.

⁷ Based on using the Fluke 5700A/5725A within 5°C of the temperature noted at the time of cal ($t_{cal} \pm 5^\circ\text{C}$) and assuming the zero calibration is performed every 30 days. CMC is based upon 1-year specifications and is read as ppm (parts per million, $\mu\text{V}/\text{V}$) or percent of output plus floor specification where defined. Includes stability. Resistance specifications apply only to the displayed resistance value using 4-wire configuration (except for 100 M Ω). Uncertainty specifications for 220 mA and 2.2 mA ranges are increased by a factor of 1.3 when supplied through 5725A terminals.

⁸ When percent (%) is present in the statement of CMC; the value is defined as the percentage of reading unless otherwise noted.

⁹ This scope meets A2LA's *P112 Flexible Scope Policy*.

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.



Accredited Laboratory

A2LA has accredited

SIMCO ELECTRONICS, INC.

San Diego, CA

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 ANSI/NCSL Z540-1-1994 and 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 8th day of August 2022.

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

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1395.06
Valid to September 30, 2024

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