



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

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CALIBRATION

Valid To: October 31, 2023

Certificate Number: 2367.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 8}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Gage Blocks	0.050 in (> 0.050 to 4) in	7.3 µin (0.88L + 7.0) µin	Mahr federal comparator, master gage blocks
	Up to 4 in (5 to 10) in	(1.2L + 6.2) µin (0.15L + 21) µin	Labmaster 175 and gage blocks
Labmaster Universal Table Height	0.25 in	0.0017 in	Gage blocks and plug gage
Repeatability	1 in	9.5 µin	Gage blocks
Length Standards	(1 to 10) in	(5.7L + 70) µin	Gage blocks, Supermicrometer™
	(1 to 29) in	(5L + 32) µin	Gage blocks, gaging head with amplifier
Diameter – Measure			
External	Up to 6.5009 in	(5.9L + 53) µin	Supermicrometer™ and gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
Diameter – Measure (cont) Internal	Up to 1 in (> 1 to 8) in	$(12L + 7) \mu\text{in}$ $7L \mu\text{in}$	Labmaster 175 and gage blocks
Flatness – Optical Quality	Up to 2.5855 in Diameter	6.3 μin	Optical flats
Height Gages	Up to 24 in	$(0.2L + 700) \mu\text{in}$	Gage blocks, surface plate
Calipers – Outer Measurement Internal Measurement Depth, Step	Up to 24 in Up to 2.5 in Up to 4 in	$(20L + 200) \mu\text{in}$ 0.000 32 in 0.000 29 in	Gage blocks
Micrometers	Up to 1 in (1 to 6) in (6 to 20) in	$(-1L + 36) \mu\text{in}$ $(7L + 120) \mu\text{in}$ $(60L + 80) \mu\text{in}$	Gage blocks
Length Indicators – Dial, Digital Dial Test	Up to 1 in (> 1 to 4) in Up to 1 in (> 1 to 2) in Up to 0.060 in Up to 0.060 in	33 μin $(9L + 80) \mu\text{in}$ 0.000 16 in 0.000 18 in 60 μin 0.000 15 in	Gage blocks Dial indicator calibrator Dial indicator calibrator and gage blocks Gage blocks Dial indicator calibrator
Dial Indicator Calibrators Flatness	Up to 1 in Up to 0.3125 in	51 μin 6.3 μin	Gage blocks Optical flats

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Gage Head/Amplifier	(0.0001 to 0.01) in	17 μin	Gage blocks
Optical Comparators – X Axis Y Axis Protractor Screen to Table Alignment	2 in, 4 in, 6 in 1 in, 2 in, 3 in 90°, 180°, 270°, 360° X and Y	0.000 13 in 0.000 13 in 0.02° 0.01°	Magnification checker 0.1875 in sphere
Thread Plug – Pitch Diameter Major Diameter	(0.06 to 1.625) in (0.06 to 1.625) in	(2.4L + 97) μin (11L + 47) μin	Thread wires, gage blocks, and Supermicrometer™ (UMM) Gage blocks and Supermicrometer™ (UMM)
V Blocks – V Central V Parallel	Up to (2 ¼ x 2 ¼ x 3) in	58 μin 86 μin	Plain plug gage, electronic gaging amp granite surface plate, gaging amp, plain plug gage
Precision Levels – Concavity Left-Right Reading	0.0005 in/ft	17L μin 6.1L μin	Electronic gaging amp, granite surface plate, gage blocks
Supermicrometers	Linearity to 1 in	(0.08L + 25) μin	Gage blocks
Gage Block Comparator – Measuring Range Calibration Constant	(0.1001 to 0.1005) in 1 in	4.2 μin 0.000 58 in	Grade 00 gage blocks Grade 00 gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Federal Leveling System	(-900 to 990) arc sec	9.8 arc sec	Gage blocks, sine plate, surface plate
Surface Plates – Flatness	Up to (48 x 72) in	(1.1D + 8.6) µin	Federal leveling system

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5,6} (±)	Comments
DC Voltage ³ – Generate	(0 to 330) mV (0 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1000) V	55 µV/V + 1.2 µV 20 µV/V + 2.4 µV 21 µV/V + 24 µV 24 µV/V + 180 µV 29 µV/V + 1.8 mV	Fluke 5520A/SC1100
	(0 to 220) mV (0.22 to 2.2) V (2.2 to 22) V (22 to 220) V	14 µV/V + 0.4 µV 7 µV/V + 0.7 µV 5 µV/V + 2.5 µV 7 µV/V + 40 µV	Fluke 5720A
	1000 V	8 µV/V + 400 µV	
DC Voltage ³ – Measure	(0 to 100) mV 100.1 mV to 1 V (1.1 to 10) V (10.1 to 100) V (100.1 to 1000) V	26 µV/V + 0.3 µV 12 µV/V + 0.3 µV 9.3 µV/V + 0.5 µV 12 µV/V + 30 µV 15 µV/V + 0.1 mV	HP 3458A
	(1 to 5) kV	3.6 VDC	Fluke 80E-10
DC Current ³ – Generate	330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A	0.02 % + 0.024 µA 0.02 % + 0.024 µA 0.02 % + 0.024 µA 0.04 % + 47 µA 0.06 % + 47 µA 0.14 % + 580 µA	Fluke 5520A/SC1100 multifunction calibrator
	220 µA 2 mA 20 mA	84 µA/A + 6 nA 80 µA/A + 7 nA 65 µA/A + 40 nA	Fluke 5720A

Parameter/Equipment	Range	CMC ^{2, 5, 6, 7} (±)	Comments
DC Current ³ – Generate (cont)	200 mA 1 A	73 μ A/A + 0.7 nA 0.012 % + 12 μ A	Fluke 5720A
DC Current ³ – Measure	Up to 100 μ A 100.1 μ A to 1 mA (1.1 to 10) mA (10.1 to 100) mA 100.1 mA to 1 A	0.04 mA/A + 0.8 nA 0.07 mA/A + 5 nA 0.03 mA/A + 50 nA 0.05 mA/A + 0.5 μ A 0.14 mA/A + 10 μ A	HP 3458A multimeter
Resistance ³ – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω 330 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	0.02 % + 0.0012 Ω 0.01 % + 0.0017 Ω 0.01 % + 0.0016 Ω 34 $\mu\Omega/\Omega$ + 0.0023 Ω 40 $\mu\Omega/\Omega$ + 0.0023 Ω 0.01 % + 0.024 Ω 41 $\mu\Omega/\Omega$ + 0.024 Ω 0.01 % + 0.24 Ω 41 $\mu\Omega/\Omega$ + 0.24 Ω 0.01 % + 2.6 Ω 47 $\mu\Omega/\Omega$ + 3 Ω 0.01 % + 37 Ω 0.02 % + 64 Ω 0.05 % + 3 k Ω 0.07 % + 3.6 k Ω	Fluke 5520A/SC1100
Fixed Points	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	0.012 % 0.012 % 29 $\mu\Omega/\Omega$ 31 $\mu\Omega/\Omega$ 13 $\mu\Omega/\Omega$ 14 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 11 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 13 $\mu\Omega/\Omega$ 13 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$ 25 $\mu\Omega/\Omega$ 47 $\mu\Omega/\Omega$ 56 $\mu\Omega/\Omega$ 0.013 %	Fluke 5720A
Resistance ³ – Measure	Up to 10 Ω (10.1 to 100) Ω 100.1 Ω to 1 k Ω	31 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 22 $\mu\Omega/\Omega$ + 0.05 m Ω 14 $\mu\Omega/\Omega$ + 0.5 m Ω	HP 3458A

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Resistance ³ – Measure (cont)	(1.1 to 10) kΩ (10.1 to 100) kΩ 100.1 kΩ to 1 MΩ (1.1 to 10) MΩ (10.1 to 100) MΩ	14 μΩ /Ω + 5 mΩ 16 μΩ /Ω + 50 mΩ 27 μΩ /Ω + 20 Ω 78 μΩ /Ω + 0.1 kΩ 600 μΩ /Ω + 1 kΩ	HP 3458A

Parameter/Range	Frequency	CMC ^{2, 5, 7} (±)	Comments
Capacitance ³ – Generate			
(0.19 to 0.4) nF (0.4 to 1.1) nF	10 Hz to 10 kHz	4.5 % + 0.012 nF 3.4 % + 0.012 nF	Fluke 5520A/SC1100 multifunction calibrator
(1.1 to 3.3) nF	10 Hz to 3 kHz	1.4 % + 0.012 nF	
(3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF	10 Hz to 1 kHz	0.57 % + 0.012 nF 1 % + 0.12 nF 0.47 % + 0.12 nF 0.54 % + 0.35 nF	
330 nF to 1.1 μF (1.1 to 3.3) μF	(10 to 600) Hz	0.47 % + 1.2 nF 0.54 % + 3.5 nF	
(3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF	(10 to 150) Hz (10 to 120) Hz (10 to 80) Hz Up to 50 Hz	0.6 % + 12 nF 0.74 % + 35 nF 0.87 % + 120 nF 0.82 % + 350 nF	
AC Voltage ³ – Generate			
(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	0.13 % + 7 μV 0.05 % + 7 μV 0.05 % + 7 μV 0.16 % + 7 μV 0.52 % + 14 μV 1.3 % + 58 μV	Fluke 5520A/SC1100
(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	0.05 % + 9.3 μV 0.03 % + 9.3 μV 0.03 % + 9.3 μV 0.06 % + 9.3 μV 0.14 % + 37 μV 0.33 % + 81 μV	

Parameter/Range	Frequency	CMC ^{2, 5, 7} (±)	Comments
AC Voltage ³ – Generate (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 % + 9.3 μV 0.03 % + 9.3 μV 0.03 % + 9.3 μV 0.05 % + 9.3 μV 0.11 % + 37 μV 0.37 % + 81 μV	Fluke 5520A/SC1100
(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 % + 760 μV 0.02 % + 700 μV 0.04 % + 700 μV 0.05 % + 700 μV 0.13 % + 2.4 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	0.03 % + 2.4 mV 0.04 % + 7 mV 0.04 % + 7 mV 0.05 % + 7 mV 0.32 % + 59 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.04 % + 12 mV 0.04 % + 12 mV 0.04 % + 12 mV	
2.2 mV	40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	1.3 % + 4 μV 3.9 % + 4 μV 1.1 % + 5 μV	Fluke 5720A
22 mV	40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.05 % + 4 μV 0.09 % + 4 μV 0.15 % + 5 μV 0.19 % + 10 μV 0.3 % + 20 μV	
200 mV	(10 to 20) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.042 % + 12 μV 0.018 % + 7 μV 0.032 % + 7 μV 0.1 % + 17 μV 0.13 % + 20 μV 0.2 % + 25 μV	
2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz	31 μV/V + 40 μV 0.013 % + 15 μV 74 μV/V + 8 μV	

Parameter/Range	Frequency	CMC ^{2, 5, 6, 7} (\pm)	Comments
AC Voltage ³ – Generate (cont)			
2.2 V	(20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.012 % + 10 μ V 0.019 % + 30 μ V 0.07 % + 80 μ V 0.15 % + 200 μ V	Fluke 5720A
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	0.034 % + 400 μ V 0.013 % + 150 μ V 0.007 % + 50 μ V 0.012 % + 100 μ V 0.017 % + 200 μ V 0.05 % + 600 μ V 0.15 % + 2 V	
220 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.034 % + 4 mV 0.013 % + 1.5 mV 78 μ V/V + 0.6 mV 0.014 % + 1 mV 0.023 % + 2.5 mV	
1100 V	(15 to 50) Hz 50 Hz to 1 kHz	0.04 % + 16 mV 95 μ V/V + 3.5 mV	
AC Voltage ³ – Measure			
Up to 10 mV	(1 to 40) Hz 40.1 Hz to 1 kHz (1.1 to 20) kHz (20.1 to 50) kHz (50.1 to 100) kHz (100.1 to 300) kHz	0.048 % + 3 μ V 0.046 % + 1.1 μ V 0.055 % + 1.1 μ V 0.59 % + 1.1 μ V 0.59 % + 1.1 μ V 4.6 % + 2 μ V	HP 3458A
(10 to 100) mV	(1 to 40) Hz 40.1 Hz to 1 kHz (1.1 to 20) kHz (20.1 to 50) kHz (50.1 to 100) kHz (100.1 to 300) kHz	0.011 % + 4 μ V 0.011 % + 2 μ V 0.019 % + 2 μ V 0.095 % + 2 μ V 0.095 % + 2 μ V 0.36 % + 10 μ V	
100 mV to 1 V	(1 to 40) Hz 40.1 Hz to 1 kHz	0.026 % + 40 μ V 0.011 % + 20 μ V	

Parameter/Range	Frequency	CMC ^{2, 5, 6, 7} (±)	Comments
AC Voltage ³ – Measure (cont)			
100 mV to 1 V	(1.1 to 20) kHz (20.1 to 50) kHz (50.1 to 100) kHz (100.1 to 300) kHz (300 to 500) kHz	0.019 % + 20 μV 0.037 % + 20 μV 0.097 % + 20 μV 0.36 % + 0.1 mV 1.2 % + 0.1 mV	HP 3458A
(1 to 10) V	(1 to 40) Hz 40.1 Hz to 1 kHz (1.1 to 20) kHz (20.1 to 50) kHz (50.1 to 100) kHz (100.1 to 300) kHz (300 to 500) kHz	0.011 % + 0.4 mV 0.011 % + 0.2 mV 0.019 % + 0.2 mV 0.037 % + 0.2 mV 0.095 % + 0.2 mV 0.36 % + 1 mV 1.2 % + 1 mV	
(10 to 100) V	(1 to 40) Hz 40.1 Hz to 1 kHz (1.1 to 20) kHz (20.1 to 50) kHz (50.1 to 100) kHz	0.026 % + 4 mV 0.026 % + 2 mV 0.026 % + 2 mV 0.043 % + 2 mV 0.14 % + 2 mV	
(100 to 700) V	1 Hz to 1 kHz	0.05 % + 0.02 V	
AC Current ³ – Generate			
(29 to 330) μA	10 Hz 20 Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.31 % + 0.12 μA 0.24 % + 0.12 μA 0.24 % + 0.12 μA 0.21 % + 0.12 μA 0.47 % + 0.17 μA 1.2 % + 0.23 μA 2.4 % + 0.46 μA	Fluke 5520A/SC110
330 μA to 3.3 mA	10 Hz 20 Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.27 % + 0.17 μA 0.17 % + 0.17 μA 0.14 % + 0.17 μA 0.28 % + 0.23 μA 0.68 % + 21 μA 1.4 % + 0.69 μA 1.4 % + 0.69 μA	
(3.3 to 33) mA	10 Hz 20 Hz	0.25 % + 2.4 μA 0.13 % + 2.4 μA	

Parameter/Range	Frequency	CMC ^{2, 5, 7} (\pm)	Comments	
AC Current ³ – Generate (cont)				
(3.3 to 33) mA	(20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.06 % + 2.4 μ A 0.12 % + 2.4 μ A 0.28 % + 3.5 μ A 0.55 % + 4.7 μ A 0.55 % + 4.7 μ A	Fluke 5520A/SC110	
(33 to 330) mA	10 Hz 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 % + 24 μ A 0.13 % + 24 μ A 0.06 % + 24 μ A 0.19 % + 58 μ A 0.31 % + 120 μ A 0.62 % + 240 μ A 0.62 % + 240 μ A		
330 mA to 1.1 A	(10 to 45) Hz 45 Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.25 % + 120 μ A 0.08 % + 120 μ A 0.21 % + 1200 μ A 4 % + 5.8 mA 4 % + 5.8 mA		
(1.1 to 3) A	(10 to 45) Hz 45 Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.25 % + 120 μ A 0.08 % + 120 μ A 0.85 % + 1.2 mA 3.6 % + 5.8 mA 3.6 % + 5.8 mA		
(3 to 11) A	45 Hz (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.12 % + 2.4 mA 0.17 % + 2.4 mA 4.1 % + 2.4 mA 4.1 % + 2.4 mA		
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.25 % + 5.8 mA 0.29 % + 5.8 mA 4.1 % + 5.8 mA		
(22 to 220) μ A	40 Hz 1 kHz 5 kHz	0.026 % + 8 nA 0.048 % + 12 nA 0.21 % + 65 nA		Fluke 5720A
(0.22 to 2.2) mA	40 Hz 1 kHz 5 kHz	99 μ A/A + 35 nA 0.037 % + 110 nA 0.21 % + 650 nA		
(2.3 to 22) mA	40 Hz 1 kHz 5 kHz	0.017 % + 350 nA 0.017 % + 350 nA 0.03 % + 550 nA		

Parameter/Range	Frequency	CMC ^{2, 5, 6} (\pm)	Comments
AC Current ³ – Generate (cont)			
(22.1 to 220) mA	40 Hz 1 kHz 5 kHz	0.017 % + 3.5 nA 0.017 % + 2.5 nA 0.028 % + 3.5 nA	Fluke 5720A
1 A	40 Hz 1 kHz 5 kHz	0.037 % + 35 μ A 0.063 % + 80 μ A 0.063 % + 80 μ A	
1.5 A	40 Hz 1 kHz 5 kHz	0.034 % + 35 μ A 0.059 % + 80 μ A 0.059 % + 80 μ A	
AC Current ³ – Measure			
Up to 100 μ A	(10 to 20) Hz (20.1 to 45) Hz (45.1 to 100) Hz 100.1 Hz to 1 kHz	0.5 % + 0.03 μ A 0.21 % + 0.03 μ A 0.11 % + 0.03 μ A 0.11 % + 0.03 μ A	HP 3458A
100 μ A to 1 mA	(10 to 20) Hz (20.1 to 45) Hz (45.1 to 100) Hz 100.1 Hz to 5 kHz (5.1 to 20) kHz	0.49 % + 0.2 μ A 0.2 % + 0.2 μ A 0.09 % + 0.2 μ A 0.06 % + 0.2 μ A 0.07 % + 0.2 μ A	
(1 to 10) mA	(10 to 20) Hz (20.1 to 45) Hz (45.1 to 100) Hz 100.1 Hz to 5 kHz (5.1 to 20) kHz	0.49 % + 2 μ A 0.2 % + 2 μ A 0.09 % + 2 μ A 0.06 % + 2 μ A 0.09 % + 2 μ A	
(10 to 100) mA	(10 to 20) Hz (20.1 to 45) Hz (45.1 to 100) Hz 100.1 Hz to 5 kHz	0.49 % + 20 μ A 0.2 % + 20 μ A 0.09 % + 20 μ A 0.06 % + 20 μ A	
100 mA to 1 A	(10 to 20) Hz (20.1 to 45) Hz (45.1 to 100) Hz 100.1 Hz to 5 kHz	0.49 % + 0.2 mA 0.21 % + 0.2 mA 0.12 % + 0.2 mA 0.14 % + 0.2 mA	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples Generate and Measure ³ –			
Type E	(-250 to -100) °C (-99.9 to -25) °C (-24.9 to 350) °C (350.1 to 650) °C (650.1 to 1000) °C	0.59 °C 0.21 °C 0.18 °C 0.20 °C 0.25 °C	Fluke 5520A/SC1100
Type J	(-210 to -100) °C (-99.9 to -30) °C (-29.9 to 150) °C (150.1 to 760) °C (760.1 to 1200) °C	0.32 °C 0.23 °C 0.21 °C 0.21 °C 0.28 °C	
Type K	(-200 to -100) °C (-99.9 to -25) °C (-24.9 to 120) °C (120.1 to 1000) °C (1000.1 to 1372) °C	0.39 °C 0.22 °C 0.20 °C 0.22 °C 0.47 °C	
Type R	(0 to 250) °C (250.1 to 400) °C (400.1 to 1000) °C (1000.1 to 1767) °C	0.67 °C 0.41 °C 0.41 °C 0.48 °C	
Type S	(0 to 250) °C (250.1 to 1000) °C (1000.1 to 1400) °C (1400.1 to 1767) °C	0.57 °C 0.48 °C 0.45 °C 0.56 °C	
Type T	(-250 to -150) °C (-149.9 to 0) °C (0.1 to 120) °C (120.1 to 400) °C	0.74 °C 0.29 °C 0.20 °C 0.18 °C	

III. Mechanical

Parameter/Equipment	Range	CMC ^{2, 7, 9} (±)	Comments
Force – Measuring Equipment	(0 to 50) lbf (50.1 to 200) lbf	(0.004 % + 0.043) lbf (0.07 % + 0.064) lbf	Dead weight

Parameter/Equipment	Range	CMC ^{2, 7, 9} (\pm)	Comments
Gage Block Comparator – Lower Contact Pressure Upper Contact Pressure Labmaster Universal – Opening and Closing Force	25 g 85 g 14 g	0.58 g 1.4 g 2.6 g	Finger force gage
Scales and Balances ³	(1 to 10) g (10 to 500) g (0.5 to 100) lb (100.1 to 500) lb	0.037 g 0.016 % + 0.16 g 0.07 % + 0.022 lb 0.23 % + 0.51 lb	OIML Class E2 weights NIST Class F weights
Torque ³ – Measuring Equipment	Up to 100 lbf·ft Up to 600 lbf·ft 50 lbf·in (50.1 to 150) lbf·in (150.1 to 250) lbf·in (250.1 to 500) lbf·in Up to 30 lbf·ft (30.1 to 150) lbf·ft (150.1 to 250) lbf·ft	0.35 lbf·ft 3.7 lbf·ft 0.52 lbf·in 1.2 lbf·in 1.6 lbf·in 4.1 lbf·in 0.45 lbf·ft 1.1 lbf·ft 1.6 lbf·ft	AKO torque calibrator transducer C AKO torque calibrator transducer A AWS torque calibrator transducer B AWS torque calibrator transducer C
Pressure/Vacuum ³ – Measuring Equipment	(2 to 10) inwc (Inches Water Column) (10 to 100) psi (100.1 to 700) psi (700.1 to 1500) psi (1500.1 to 3000) psi (3000.1 to 5000) psi	0.014 inwc 0.11 psi 0.13 psi (0.0001 <i>P</i> + 0.1) psi (0.0002 <i>P</i> + 0.018) psi (0.0002 <i>P</i> + 0.003) psi	Mensor CPC 8000 Mensor CPC 8000 pressure calibrator <i>P</i> = measured pressure

IV. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 9} (\pm)	Comments
Temperature ³ – Measure	(20 to 70) °C (-40 to 0) °C (1 to 150) °C	$0.0036T + 0.19$ °C $-0.020T + 0.90$ °C $0.01T + 1.1$ °C	Vaisala HMI41/HMP46 Omega digital temperature calibrator
Temperature ³ – Measuring Equipment	(0 to 100) °C	$(-0.0002T + 0.70)$ °C	Omega digital temperature calibrator, monitoring Hart Scientific 7102 micro-bath
Micro-Bath	(0 to 100) °C	$(0.008T + 0.40)$ °C	Omega digital temperature calibrator
Relative Humidity ³ – Measuring Equipment	(22.2 to 90.1) % RH	$(0.017H + 1.2)$ % RH	Vaisala HMP76 or HMI41/ HMP46 with sealed chamber
Relative Humidity ³ – Measure	(35 to 75) % RH	$(0.015H + 2.1)$ % RH	Vaisala HMP76 or HMI41/ HMP46

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 In the statement of CMC, L is the length of the unit under test in inches, D is the diagonal length of the unit under test in inches, M is the mass of the unit under test in grams, T is the temperature in °C, and AF is applied force in pounds.
- ⁵ The measurands stated are generated with the Fluke 5520A and 5720A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.
- ⁶ The measurands stated are measured with the HP 3458A. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.
- ⁷ In the statement of CMC, the value is defined as the percentage of reading unless otherwise noted.
- ⁸ This scope meets A2LA's *P112 Flexible Scope Policy*.
- ⁹ 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

GLOBAL CALIBRATION SERVICES LLC

Tukwila, WA

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 16th day of June 2022.

A blue ink signature of Trace McIntruff.

Mr. Trace McIntruff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2367.01
Valid to October 31, 2023
Revised May 1, 2023

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