



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

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 1387.03

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance to A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations and dimensional inspections^{1,9}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Bore Micrometers – 3 point	Up to 12 in	$(44 + 2.4D) \mu\text{in}$	Master rings
Dial Bore Gages (Bore Gage w/ Indicator)	Up to 4 in	$(18 + 1.4L) \mu\text{in} + 0.6R$	Gage blocks
Calipers ³	Up to 24 in (24 to 80) in	$(280 + 6.0L) \mu\text{in}$ $(330 + 4.2L) \mu\text{in}$	Long gage blocks, gage blocks
Caliper Checkers	Up to 24 in Up to 48 in	$(17 + 1.1L) \mu\text{in}$ $(56 + 2.8L) \mu\text{in}$	Electronic indicator, gage blocks CMM
Caliper Gage ³ – Internal, External	Up to 7.5 in	$(29 + 2.2L) \mu\text{in}$	Gage blocks, long blocks

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Depth Step Gages	(0.5 to 11.5) in	$(2.1 + 3.2L) \mu\text{in}$	Electronic indicator amplifier, gage blocks
Cylindrical Ring Gages ³	Up to 2 in (2 to 17) in	$(9.7 + 0.81D) \mu\text{in}$ $(2.8 + 4.2D) \mu\text{in}$	Universal length machine, master rings
	Up to 2 in (2 to 17) in	$(7.9 + 0.65D) \mu\text{in}$ $(4.0 + 2.7D) \mu\text{in}$	Universal length machine, gage blocks
Disc, Plug & Pin Gages ³	Up to 1 in	$(5.1 + 1.5D) \mu\text{in}$	Universal length machine (ULM)
	(1 to 32) in	$(3.9 + 2.8D) \mu\text{in}$	Universal length machine, gage blocks
	Up to 1 in	$(47 + 7.7L) \mu\text{in}$	Laser micrometer
Electronic Indicator Amplifier ³	Up to 0.02 in	9.4 μin	Gage blocks
Optical Flats	Up to 6 in	5.0 μin	Master optical flat
Sine Bars / Plates –			
Length	Up to 10 in	30 μin	Electronic indicator amplifier, gage blocks
Flatness	Up to 10 in	36 μin	
Parallelism	Up to 10 in	24 μin	
Glass Scales	Up to 10 in	$(77 + 0.49L) \mu\text{in}$	Vision system
Height Gages ³	Up to 12 in (12 to 24) in (24 to 40) in	$(50 + 0.36L) \mu\text{in} + 0.6R$ $(1.1 + 2.5L) \mu\text{in} + 0.6R$ $(7.6 + 3.2L) \mu\text{in} + 0.6R$	Gage blocks
Indicators/LVDTs ³	Up to 4 in	$(3.7 + 2.0L) \mu\text{in} + 0.6R$	Gage blocks
	Up to 2 in	$(120 + 2.6L) \mu\text{in} + 0.6R$	Indicator calibrator

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Length Standards ³	Up to 32 in	$(5.2 + 2.3L) \mu\text{in}$	Universal length machine (ULM), gage blocks
	Up to 40 in	$(84 + 6.8L) \mu\text{in}$	Gage blocks, electronic indicator amp
	Up to 48 in	$(83 + 4.6L) \mu\text{in}$	CMM
Levels ³	Up to 12 in	54 μin or 1.1 arc sec	Surface plate, sine bar, gage blocks
Micrometers ³ –			
Outside Micrometers	Up to 6 in	64 $\mu\text{in} + 68 \mu\text{in/in}$	Gage blocks
	(6 to 12) in	110 $\mu\text{in} + 0.27 \mu\text{in/in}$	
	(12 to 24) in	120 $\mu\text{in} + 5.1 \mu\text{in/in}$	
	(24 to 60) in	650 $\mu\text{in} + 3.6 \mu\text{in/in}$	
Groove	Up to 4 in	110 $\mu\text{in} + 0.31 \mu\text{in/in}$	Gage blocks
	(4 to 24) in	120 $\mu\text{in} + 5.1 \mu\text{in/in}$	
	(24 to 48) in	650 $\mu\text{in} + 3.6 \mu\text{in/in}$	
Depth	Up to 12 in	1200 $\mu\text{in} + (-0.67) \mu\text{in/in}$	Gage blocks
Inside	Up to 4 in	$(0.96 + 16L) \mu\text{in}$	Universal length machine
	Up to 12 in	$(580 + 3.3L) \mu\text{in}$	Gage blocks
Specialty Micrometers	Up to 2 in	$(6.6 + 3.8D) \mu\text{in} + 0.6R$	Master pins
Indicator Calibrators ³ (Mic Head Type)	Up to 2 in	17 μin	Universal length machine

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Parallels	Up to 20 in	20 μ in	Electronic gage amplifier
Protractor – Bevel Digital ³	Up to 180° Up to 90°	2.4 arcsec 16 arcsec	Vision system Sine plate, gage blocks
Steel Rules ³	Up to 12 in (12 to 72) in	(4600 + 0.03L) μ in (35 + 13L) μ in	Direct comparison Vision system
Steel Tapes ³	Up to 100 ft	0.05 in	Direct comparison
Thickness & Feeler Gages ³	Up to 2 in Up to 1 in	(14 + 2.0L) μ in (25 + 5.4L) μ in	Universal length machine (ULM) High resolution micrometer
Thread Measuring Wires ³	(4 to 120) TPI μ in	(11 + 18L) μ in	Universal length machine (ULM), gage blocks
Laser Micrometers ³	Up to 4 in	(25 + 0.57D) μ in	Master pin gages
Screw Thread Micrometer Standards	Up to 12 in	(76 + 1.3L) μ in	Vision system
Snap Gage ³ – Flatness of Anvils Size	Up to 3 in Up to 20 in	4.2 μ in (5.4 + 2.4L) μ in + 0.6R	Optical flat Gage blocks

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Universal Measuring Machines/Bench Micrometers ³	Up to 12 in	$(5.7 + 3.1L) \mu\text{in}$	Gage blocks
Radius Gages	Up to 4 in	$(110 + 0.59L) \mu\text{in}$	Vision system
Adjustable Thread Rings ⁸	Up to 4.75 in	240 μin	Set using master plug gages. ASME/ANSI B1.2-1983 & ASME/ANSI B1.3-2007
NPT Tapered Thread Rings – Standoff Ring Thickness	Up to 1.5 in Up to 2.0 in	350 μin $(9.8 + 1.7L) \mu\text{in}$	Electronic indicator, master NPT plug Universal length machine (ULM)
Video Measurement System ³ – X, Y Axis Z Axis	Up to 12 in Up to 6 in	$(11 + 0.9L) \mu\text{in}$ $(14 + 0.5L) \mu\text{in}$	Calibration grid Gage blocks
Surface Finish Testers ³	(2 to 500) μin	5.3 μin	Master surface finish patch
Angle Blocks	Up to 90°	2.6 arcsec	Vision system
Chamfer Check Gages	Set Ring Effective Diameter Gage Probe Angle	48 μin 2.6 arcsec	Chamfer check master, set ring Vision system

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Surface Finish Standards ³	(2 to 500) μ in	5.3 μ in	Direct comparison to master surface patch
Bolt Protrusion Gages	Up to 12 in	(77 + 0.4L) μ in	Vision system
Thread Plugs ³ – Major Diameter Pitch Diameter Tapered Thread Plug Gage – Pitch Diameter Step	Up to 8 in Up to 120 TPI Up to 4 in Up to 1 in	(22 + 2.0D) μ in (41 + 2.5D) μ in (41 + 4.5D) μ in 130 μ in	ULM ULM, thread measuring wires ULM, thread measuring wires Gage blocks, uni-micrometer
Crimping Tools ³	Go/No-Go Pullout Test	0.0006 in 0.13 lbf	Pin gages Force gage, master weights
Coating Thickness Gages	(1 to 669) mils	(9.6 + 0.000 38L) μ in	Master foils Foils/shims ULM
Spheres & Balls	Up to 6 in	30 μ in	ULM
Ultrasonic Thickness Gages ³	Up to 4 inches	(2.4 + 5.1L) μ in + 0.6R	Gage blocks

II. Dimensional Testing/Calibration⁵

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Surface Finish ⁵ – Measure	(2 to 500) μ in	5.3 μ in	Master surface finish patch
Geometric Measurements ⁵ –	X (Up to 1016 mm) Y (Up to 1219.2 mm) Z (Up to 508 mm) Volumetric	(3.0 + 0.0031L) μ m (3.0 + 0.0032L) μ m (3.0 + 0.0029L) μ m (3.0 + 0.0033L) μ m	CMM
2D Optical Inspection ⁵ – Measure			
Horizontal Linearity	Up to 12 in	79 μ in	Vision system
Vertical Linearity	Up to 9 in	90.3 μ in	
Angle	Up to 180°	220 arcsec	
Flatness ⁵ – Measure	Up to 6 in	5.0 μ in	Optical flat
Parallelism ⁵ – Measure	Up to 20 in	(20 + 1.5L) μ in	Electronic gage amplifier
Radius ⁵ – Measure	Up to 12 in	64 μ in + 12 μ in/in	Vision system
Straightness ⁵ – Measure	Up to 12 in	(20 + 1.1L) μ in	Electronic indicator amplifier
Angular Devices – Measure ⁵	Up to 360 °	0.0026 °	Vision system

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 6} ($\pm$)	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	11 μ V/V + 0.30 μ V 10 μ V/V + 0.30 μ V 10 μ V/V + 0.50 μ V 11 μ V/V + 30 μ V 27 μ V/V + 100 μ V	Agilent 3458A opt 002
DC High Voltage – Measure ³	(1 to 10) kV (10 to 90) kV	0.52 % 0.14 %	Vitrek 4700 Vitrek 4700 w/ HL100 probe
DC Voltage – Generate	(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 (0 to 329.9999) mV 330 mV to 3.299 V (3.3 to 32.9999) V (30 to 329.9999) V (100 to 1000) V	0.0009 % + 0.47 μ V 0.0006 % + 0.9 μ V 0.0004 % + 2.9 μ V 0.0004 % + 4.1 μ V 0.0006 % + 50 μ V 0.0008 % + 250 μ V 24 μ V/V + 1.0 μ V 14 μ V/V + 2.0 μ V 15 μ V/V + 20 μ V 22 μ V/V + 150 μ V 22 μ V/V + 1.5 mV	Fluke 5720A Fluke 5520A
DC Current – Measure ³	100 nA 1 μ A 10 μ A 100 μ A 1 mA 10 mA 100 mA 1A	32 μ A/A + 0.04 nA 23 μ A/A + 0.04 nA 23 μ A/A + 0.1 nA 23 μ A/A + 0.8 nA 23 μ A/A + 5.0 nA 23 μ A/A + 50 nA 37 μ A/A + 0.5 μ A 0.011 % + 10 μ A	Agilent 3458A opt 002

Parameter/Equipment	Range	CMC ^{2, 6} ($\pm$)	Comments
High Current – Measure ³ DC Up to 60 Hz	(1 to 15) A (15 to 100) A (100 to 300) A (300 to 5000) A	1.9 mA/A + 4.5 μ A 0.029 % + 0.3 mA 0.015 % + 0.9 mA 0.012 % + 15 mA	Current shunt w/ 6.5 digit voltmeter
DC Current – Generate	(0 to 220) μ A (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	0.0046 % + 0.007 μ A 0.0043 % + 0.008 μ A 0.0041 % + 0.05 μ A 0.029 % + 0.83 μ A 0.012 % + 8.1 μ A 0.054 % + 9.5 mA	Fluke 5720A w/ 5725A
DC Current – Generate ³	(1 to 329.999) μ A (0.33 to 3.299 99) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.33 to 1.099 99) A (1.1 to 2.999 99) A (3 to 10.9999) A (11 to 20.5) A (10 to 16.499) A (16.5 to 149.999) A (150 to 950) A	0.018 % + 20 nA 0.012 % + 50 nA 0.013 % + 250 nA 0.015 % + 3.0 μ A 0.025 % + 40 μ A 0.046 % + 40 μ A 0.06 % + 500 μ A 0.12 % + 750 μ A 1.0 % + 50 mA 1.0 % + 75 mA 1.0 % + 75 mA	Fluke 5520A Fluke 5520A w/ Fluke 5500A coil
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	18 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 15 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 5 m Ω 12 $\mu\Omega/\Omega$ + 50m Ω 17 $\mu\Omega/\Omega$ + 2 Ω 51 $\mu\Omega/\Omega$ + 100 Ω 0.051 % + 1k Ω	Agilent 3458A opt 002

Parameter/Equipment	Range	CMC ^{2, 6} ($\pm$)	Comments
Resistance – Generate, 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	0.000 10 Ω 0.000 18 Ω 0.000 25 Ω 0.000 45 Ω 0.0010 Ω 0.0020 Ω 0.0089 Ω 0.018 Ω 0.088 Ω 0.18 Ω 1.2 Ω 2.6 Ω 21 Ω 42 Ω 420 Ω 960 Ω 10 k Ω	Fluke 5720A
Resistance – Generate ³	(1 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (0.33 to 1.099 999) k Ω (1.1 to 10.999 99) k Ω (11 to 109.9999) k Ω 110k to 1.099 999 M Ω (1.1 to 3.299 99) M Ω (3.3 to 10.999 99) M Ω (11 to 32.999 99) M Ω (33 to 109.9999) M Ω (110 to 329.9999) M Ω (330 to 1100) M Ω	54 $\mu\Omega/\Omega$ + 1 m Ω 52 $\mu\Omega/\Omega$ + 1.5 m Ω 35 $\mu\Omega/\Omega$ + 1.4 m Ω 35 $\mu\Omega/\Omega$ + 2.0 m Ω 35 $\mu\Omega/\Omega$ + 2.0 m Ω 35 $\mu\Omega/\Omega$ + 20 m Ω 36 $\mu\Omega/\Omega$ + 200 m Ω 40 $\mu\Omega/\Omega$ + 2.0 Ω 74 $\mu\Omega/\Omega$ + 30 Ω 0.016 % + 50 Ω 0.031 % + 2500 Ω 0.061 % + 3000 Ω 0.37 % + 100 k Ω 1.8 % + 500 k Ω	Fluke 5520A

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
AC Voltage – Generate			
Up 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	0.022 % + 4.2 μ V 0.005 % + 4.2 μ V 0.010 % + 4.2 μ V 0.020 % + 4.1 μ V 0.047 % + 5.2 μ V 0.11 % + 10 μ V 0.14 % + 20 μ V 0.27 % + 20 μ V	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	0.024 % + 4.0 μ V 0.009 % + 4.0 μ V 0.009 % + 4.6 μ V 0.020 % + 4.1 μ V 0.058 % + 4.7 μ V 0.13 % + 12 μ V 0.17 % + 23 μ V 0.32 % + 23 μ V	
(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	0.027 % + 1.5 μ V 0.011 % + 8.0 μ V 0.009 % + 8.1 μ V 0.023 % + 8.1 μ V 0.053 % + 20 μ V 0.11 % + 23 μ V 0.17 % + 29 μ V 0.32 % + 52 μ V	
(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 500 kHz to 1 MHz	0.028 % + 4.6 μ V 0.011 % + 17 μ V 0.005 % + 9.3 μ V 0.009 % + 12 μ V 0.013 % + 35 μ V 0.049 % + 92 μ V 0.12 % + 230 μ V 0.2 % + 350 μ V	
(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	0.028 % + 450 μ V 0.010 % + 170 μ V 0.005 % + 5.8 μ V 0.009 % + 120 μ V 0.012 % + 230 μ V 0.032 % + 680 μ V 0.12 % + 2.3 mV 0.18 % + 3.7 mV	

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
AC Voltage – 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 (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.028 % + 4.7 mV 0.011 % + 1.7 mV 0.006 % + 640 μ V 0.009 % + 1.1 mV 0.017 % + 2.9 mV 0.095 % + 19 mV 0.45 % + 45 mV 0.85 % + 85 mV	Fluke 5720A
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.035 % + 18 mV 0.008 % + 4 mV	
AC Voltage – Generate ³			
(1 to 32.999) 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	0.11 % + 6.0 μ V 0.024 % + 6.0 μ V 0.029 % + 6.0 μ V 0.13 % + 6.0 μ V 0.43 % + 12 μ V 0.97 % + 50 μ V	Fluke 5520A
(33 to 329.999) 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	0.04 % + 8.0 μ V 0.018 % + 8.0 μ V 0.02 % + 8.0 μ V 0.043 % + 8.0 μ V 0.097 % + 32 μ V 0.25 % + 70 μ V	
(0.33 to 3.299 99) 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 % + 50 μ V 0.019 % + 60 μ V 0.023 % + 60 μ V 0.036 % + 50 μ V 0.085 % + 130 μ V 0.29 % + 600 μ V	
(3.3 to 32.9999) V	10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.04 % + 650 μ V 0.019 % + 600 μ V 0.029 % + 600 μ V 0.043 % + 600 μ V 0.11 % + 1.6 mV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate ³ (cont)			
(33 to 329.999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 2.0 mV 0.025 % + 6.0 mV 0.03 % + 6.0 mV 0.038 % + 6.0 mV 0.25 % + 50 mV	Fluke 5520A
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.037 % + 10 mV 0.03 % + 10 mV 0.037 % + 10 mV	
AC High Voltage – Measure ³			
(1 to 10) kV	60 Hz	0.16 %	Vitretek 4700
1 kV	400 Hz	0.49 %	
(10 to 90) kV	60 Hz	0.19 %	W/ HL100 probe
AC Voltage – Measure ³			
(1 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 % Rdg + 3.0 µV 0.021 % Rdg + 1.1 µV 0.031 % Rdg + 1.1 µV 0.011 % Rdg + 1.0 µV 0.051 % Rdg + 1.1 µV 4.1 % + 2.0 µV	Agilent 3458A opt 002
(10 to 100) 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 300 kHz to 1 MHz (1 to 2) MHz	0.008 % + 4.0 µV 0.008 % + 2.0 µV 0.015 % + 2.0 µV 0.031 % + 2.0 µV 0.081 % + 2.0 µV 0.31 % + 10 µV 1.1 % + 10 µV 1.6 % + 10 µV	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Measure ³ (cont)			
100 mV to 1 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 300 kHz to 1 MHz (1 to 2) MHz	0.008 % + 40 µV 0.008 % + 20 µV 0.015 % + 20 µV 0.031 % + 20 µV 0.081 % + 20 µV 0.31 % + 100 µV 1.1 % + 100 µV 1.6 % + 100 µV	Agilent 3458A opt 002
(1 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 300 kHz to 1 MHz	0.008 % + 400 µV 0.008 % + 200 µV 0.015 % + 200 µV 0.031 % + 200 µV 0.081 % + 200 µV 0.31 % + 1.0 mV 1.0 % + 1.0 mV	
(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 % + 4.0 mV 0.021 % + 2.0 mV 0.021 % + 2.0 mV 0.036 % + 2.0 mV 0.13 % + 2.0 mV 0.41 % + 10 mV	
(100 to 750) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.041 % + 4.0 mV 0.041 % + 20 mV 0.061 % + 20 mV 0.13 % + 20 mV 0.31 % + 2.0 mV	

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
AC Current – Generate ³			
(29 to 330) μ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.30 % + 0.15 μ A 0.15 % + 0.15 μ A 0.15 % + 0.25 μ A 0.28 % + 0.15 μ A 1.5 % + 0.15 μ A	Fluke 5720A
330 μ A 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	0.24 % + 0.30 μ A 0.12 % + 0.30 μ A 0.12 % + 0.30 μ A 0.24 % + 0.30 μ A 0.72 % + 0.30 μ A	
(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	0.24 % + 3.0 μ A 0.12 % + 3.0 μ A 0.11 % + 30 μ A 0.24 % + 30 nA 0.74 % + 30 μ A	
(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	0.24 % + 30 μ A 0.12 % + 30 μ A 0.11 % + 30 μ A 0.24 % + 30 μ A 0.72 % + 30 μ A	
330 mA to 3.3 A	(10 to 45) Hz 40 Hz to 1 kHz (1 to 5) kHz	0.24 % + 300 μ A 0.12 % + 300 μ A 0.40 % + 2.0 mA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.080 % + 2.0 mA 0.12 % + 2.0 mA 0.40 % + 2.0 mA	
(11 to 110) A	50 Hz	1.3 % + 1.9 mA	Fluke 5720 w/ 50 turn coil
(110 to 550) A	50 Hz	0.66 % + 1.1 A	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Current – Generate ³ (cont)			
(20 to 150) A (151 to 1000) A	50 Hz 50 Hz	1.3 % + 1.9 mA 0.66 % + 1.1 A	Fluke 5520 w/ 50 turn coil
AC Current – Measure ³			
(0 to 100) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.41 % + 0.03 µA 0.16 % + 0.03 µA 0.07 % + 0.03 µA 0.07 % + 0.03 µA	Agilent 3458A opt 002
(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 % + 20 µA 0.16 % + 20 µA 0.07 % + 20 µA 0.04 % + 20 µA 0.07 % + 20 µA 0.41 % + 40 µA 0.56 % + 150 µA	
100 mA 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 % + 20 µA 0.17 % + 20 µA 0.09 % + 20 µA 0.11 % + 20 µA 0.31 % + 20 µA 1.1 % + 40 µA	

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Capacitance – Generate ³	(0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 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 109.9999) µF (110 to 329.999) µF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF	0.88 % + 10 pF 0.67 % + 10 pF 0.62 % + 10 pF 0.35 % + 10 pF 0.31 % + 100 pF 0.32 % + 100 pF 0.32 % + 300 pF 0.32 % + 1.0 nF 0.32 % + 3.0 nF 0.32 % + 10 nF 0.49 % + 30 nF 0.56 % + 100 nF 0.56 % + 300 nF 0.57 % + 1.0 µF 0.56 % + 3.0 µF	Fluke 5520

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.50 °C 0.35 °C 0.35 °C 0.34 °C	Fluke 5520A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.30 °C 0.28 °C 0.31 °C 0.55 °C 0.90 °C	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.50 °C 0.23 °C 0.22 °C 0.23 °C 0.27 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.32 °C 0.23 °C 0.17 °C 0.20 °C 0.25 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.37 °C 0.25 °C 0.23 °C 0.31 °C 0.42 °C	
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.40 °C 0.31 °C 0.24 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.42 °C 0.28 °C 0.26 °C 0.25 °C 0.32 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ – (cont)			
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.60 °C 0.40 °C 0.37 °C 0.42 °C	Fluke 5520A
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.48 °C 0.39 °C 0.40 °C 0.50 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.65 °C 0.25 °C 0.20 °C 0.15 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.32 °C	
Electrical Calibration of RTD Indicating System 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	0.040 °C 0.040 °C 0.060 °C 0.080 °C 0.080 °C 0.10 °C 0.18 °C	
Pt 3926, 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	0.040 °C 0.040 °C 0.060 °C 0.080 °C 0.080 °C 0.10 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.090 °C 0.090 °C 0.15 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.30 °C	

Parameter/Equipment	Range	CMC ^{2, 7, 8} ($\pm$)	Comments
Pressure – Measuring Equipment ³			
Absolute	(80 to 120) kPa (11.6 to 17.4) psia	(0.058 + 0.000 033p) kPa 0.0087 psia + 0.6R	Multifunction calibrator
Gauge	Up to 100 psia Up to 1000 psia Up to 3000 psia Up to 10 000 psig Up to 20 000 psig Up to 40 000 psig (-75 to 75) inH ₂ O (-5 to 5) inH ₂ O (-1 to 1) inH ₂ O (0 to 30 psi) (30 to 100) psi (100 to 200) psi (200 to 300) psi	0.012 psia + 0.6R (0.033 + 0.000 08p) psia (0.2 + 0.000 06p) psia 0.03 % + 0.6R 0.06 % + 0.6R 0.06 % + 0.6R 0.011 in H ₂ O 0.000 64 in H ₂ O 0.000 48 in H ₂ O 0.011 psi 0.11 psi 0.15 psi 0.21 psi	Digital pressure modules; all uncertainties: (+0.6R) Primary pressure standard Multifunction calibrator
Torque Transducers ³	(20 to 200) in·ozf (0 to 50) in·lbf (50 to 250) in·lbf (250 to 1000) in·lbf (0 to 250) ft·lbf (250 to 2000) ft·lbf	0.23 % of full scale 0.81 % of full scale 0.18 % of full scale 0.051 % of full scale 0.20 % of full scale 0.075 % of full scale	Torque arms, weights
Torque Wrenches ³	(4 to 50) in·lbf (40 to 400) in·lbf (100 to 1000) in·lbf (25 to 250) ft·lbf (400 to 4000) ft·lbf Up to 2000 ft·lbf (2000 to 4000) ft lbf	0.68 % of full scale 0.48 % of full scale 0.53 % of full scale 0.52 % of full scale 0.12 % of full scale 0.76 % of indicated value 0.91 % of indicated value	Torque transducers, display unit
Vacuum – Measuring Equipment ³	(-30 to 0) in·Hg	0.013 %	Primary vacuum standard

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Air Velocity – Measuring Equipment	(500 to 8000) fpm	$(1.1 + 0.012V)$ fpm	Comparison of standard probe w/ UUT using wind tunnel

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 5, 7, 8} ($\pm$)	Comments
Relative Humidity – Measure ³	Up to 50 % RH (50 to 90) % RH	0.73 % RH 0.85 % RH	Rotronic HygroPalm
Temperature – Measure	(-196 to 660) °C	0.0052 % + 0.024 °C	PRT w/ indicator
Temperature – IR Measuring Equipment ³	35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.74 °C 0.92 °C 1.1 °C 1.6 °C 2.1 °C	Fluke 4181 $\varepsilon = 0.9$ to 1.0 $\lambda = (8$ to 14) μm

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 6, 7} ($\pm$)	Comments
Tachometers	Up to 10 000 RPM	0.030 %	Frequency counter
Tachometers – Non-Contact ³	Up to 199 999 RPM	0.030 %	Function generator
Stop Watches/Time Measurements ³	Up to 24 hours	0.35 s 0.04 s	Comparison Totalize w/GPS

Parameter/Equipment	Range	CMC ^{2, 6, 7} ($\pm$)	Comments
Frequency – Measure	10 Hz to 20 MHz (20 to 100) MHz	0.000 44 Hz 0.000 22 Hz	Frequency counter
Frequency – Source ³	0.01 Hz to 2 MHz 2 MHz to 1.1 GHz	3.4 μ Hz/Hz + 5.0 μ Hz 5.0 μ Hz/Hz	Fluke 5520A Fluke 5520A w/ SC1100

¹ This laboratory offers commercial dimensional testing/calibration service and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) uncertainty 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. CMC's 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 uncertainty 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 numerical value of the nominal length of the device measured in inches or millimeters. DL is the diagonal length measured in inches or millimeters. R is the resolution of the unit under test. D is the numerical value of the nominal diameter of the device measured in inches or millimeters. V is the velocity of the reading. H is the Humidity of the reading. M is the mass of the reading in grams or pounds. T is the temperature of the measure in Celsius.

⁵ This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

⁶ The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMC uncertainties are expressed as either a specific value that covers the full range or as a percent/fraction of the reading plus a fixed floor specification.

⁷ In the statement of CMC, percentage (%) refers to percent of reading, unless otherwise noted.

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.

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



Accredited Laboratory

A2LA has accredited

MSI-VIKING GAGE, LLC

N. Charleston, SC

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 18th day of April 2024.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1387.03
Valid to September 30, 2025

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