



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: 1387.01

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^{1,9}:

I. Acoustic

Parameter/Equipment	Range	CMC ² (±)	Comments
Sound Level Meters	94 dB @ 1000 Hz 114 dB @ 1000 Hz	0.63 dB 0.66 dB	Sound level calibrator

II. Chemical

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
pH– Measuring Equipment ³	4 pH 7 pH 10 pH	0.040 pH 0.04 pH 0.05 pH	pH buffer solutions

III. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Bore Micrometers	Up to 12 in	(11 + 8.9D) μin	Master rings

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Dial Bore Gages (Bore Gages w/ Indicator)	Up to 4 in	$(16 + 1.4L) \mu\text{in} + 0.6R$	Gage blocks, indicator calibrator
Calipers ³	Up to 6 in (6 to 12) in (12 to 24) in (24 to 48) in (48 to 80) in	$(20 + 0.93L) \mu\text{in} + 0.6R$ $(32 + 2.2L) \mu\text{in} + 0.6R$ $(34 + 2.7L) \mu\text{in} + 0.6R$ $(28 + 3.3L) \mu\text{in} + 0.6R$ $(5.3 + 5.6L) \mu\text{in} + 0.6R$	Gage blocks
Caliper Checkers	Up to 12 in	$(13 + 3.6L) \mu\text{in}$	Electronic indicator amplifier, gage blocks
Caliper Gage ³ – Internal, External	Up to 7.5 in	$(8.4 + 4.5L) \mu\text{in} + 0.6R$	Gage blocks
Depth Step Gages	(0.5 to 11.5) in	$(10 + 3.6L) \mu\text{in}$	Electronic indicator amplifier, gage blocks
Cylindrical Ring Gages ³	Up to 0.425 in (0.425 to 17) in	$(7.1 + 2.0D) \mu\text{in}$ $(6.6 + 2.0D) \mu\text{in}$	Universal length machine, master rings, gage blocks
	Up to 1800 mm	$(2.8 + 0.0035D) \mu\text{m}$	CMM
Disc, Plug, & Pin Gages ³	Up to 32 in	$(4.4 + 2.9L) \mu\text{in}$	Universal length machine
	Up to 1 in	$(41 + 0.12L) \mu\text{m}$	Laser micrometer
Electronic Indicator Amplifier ³	Up to 0.02 in	$(6.3 + 190L) \mu\text{in}$	Gage blocks, optical flats

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Optical Flats	Up to 6 in Up to 12 in	5.7 μin (1.3 + 1.8D) μin	Master optical flat Roundness machine
Sine Bars— Length Flatness Parallelism	Up to 10 in Up to 10 in Up to 10 in	35 μin 35 μin 35 μin	CMM
Cylindrical Square – Straightness Roundness Squareness	Up to 12 in Up to 10 in Up to 12 in	(4.2 + 1.8L) μin (4.2 + 1.8L) μin (4.2 + 1.8L) μin	Roundness machine
Glass Scales	Up to 12 in	(16 + 2.6L) μin	Vision system
Gage Blocks – Length Only	Up to 1 in (1 to 20) in	(4.4 + 1.3L) μin (4.0 + 1.5L) μin	Master gage block (direct comparison)
Height Gages ³	Up to 12 in (12 to 24) in (24 to 48) in	(7.3 + 4.5L) + 0.6R (11 + 3.7L) μin + 0.6R (16 + 3.5L) μin	Gage blocks, surface plate
Indicators/LVDTs ³	Up to 4 in	(15 + 4.4L) μin + 0.6R	Indicator calibrator

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Length Standards ³	Up to 40 in	$(11 + 3.2L) \mu\text{in}$	Universal length machine (ULM), gage blocks, electronic indicator amp
Levels ³	Up to 10 in	$45 \mu\text{in} + 0.6R$	Surface plate, sine bar, gage blocks
Micrometers ³ –	Up to 6 in (6 to 12) in (12 to 24) in (24 to 60) in	$(8.5 + 2.6L) \mu\text{in} + 0.6R$ $(9.1 + 2.9L) \mu\text{in} + 0.6R$ $(5.5 + 3.1L) \mu\text{in} + 0.6R$ $(11 + 3.4L) \mu\text{in} + 0.6R$	Gage blocks
Groove	Up to 4 in	$(110 + 3.2L) \mu\text{in}$	Gage blocks
Depth	Up to 12 in	$(290 + 2.2L) \mu\text{in}$	Gage blocks
Inside	Up to 20 in	$(9.6 + 2.0L) \mu\text{in} + 0.6R$	Universal length machine
Specialty Micrometers	Up to 4 in	$(59 + 1.9L) \mu\text{in}$	Gage blocks
Indicator Calibrators ³ (Mic Head Type)	Up to 4 in	$(15 + 4.4L) \mu\text{in}$	LVDT's
Parallels	Up to 20 in	$24 \mu\text{in}$	Electronic indicator amplifier
Protractor ³	Up to 90 °	20 arcsec	Sine plate, gage blocks
Snap Gage ³ – Flatness of Anvils Size	Up to 3 in Up to 20 in	$4.2 \mu\text{in}$ $(5.4 + 2.4L) \mu\text{in} + 0.6R$	Optical flat

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Steel Rules ³	Up to 39 in	0.0046 in	Direct comparison, gage blocks
Steel Tapes ³	Up to 26 ft	0.0049 in	Direct comparison, gage blocks
Thickness & Feeler Gage ³	Up to 2 in	$(11 + 1.9L) \mu\text{in}$	Universal length machine (ULM)
Thread Measuring Wires ³	(4 to 80) TPI	$(13 + 16L) \mu\text{in}$	Universal length machine, gage blocks, master pins
Chamfer Check Gages	Set Ring Effective Diameter	$(46 + 2.5D) \mu\text{in}$	Chamfer check master, set ring
	Gage Probe Angle	2.6 arcsec	Vision system
Screw Thread Micrometer Standards	Up to 12 in	$(76 + 1.3L) \mu\text{in}$	Vision system
Thread Plugs ³ –			
Major Diameter	Up to 8 in	$(12 + 1.5D) \mu\text{in}$	Universal length machine
Pitch Diameter	(0.05 to 80) TPI	$(31 + 0.15D) \mu\text{in}$	Universal length machine, thread measuring wires
Step	Up to 1 in	21 μin	Uni-micrometer
Universal Measuring Machines/Bench Micrometers ³	Up to 12 in	$(8 + 2.4L) \mu\text{in}$	Gage blocks

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
CMM/Articulating Arm CMM's ³ –			
Hysteresis	Up to 0.500 in	24 μ in	Indicator amp, gage blocks
Linear Accuracy	Up to 240 in	(36 + 17L) μ in	Laser system, step gage, ball bar, sphere
Volumetric Displacement	Up to 40 in	(16 + 0.098L) μ in	Step gage
Laser Micrometers ³	Up to 2 in	(10 + 11D) μ in	Class XXX master pins
NAPT Tapered Thread Rings –			
Standoff	Up to 1.5 in	350 μ in	Electronic indicator, master NPT plug
Ring Thickness	Up to 2.0 in	(9.8 + 1.7L) μ in	Universal length machine (ULM)
Vision Measurement System ³ –			
X, Y Axis	Up to 12 in	(6.7 + 1.0L) μ in	Calibration grid
Z-Axis	Up to 6 in	(7 + 1.9L) μ in	Gage blocks
Radius Gages	Up to 4 in	(130 to 8.6L) μ in	Vision system
Adjustable Thread Rings ⁸	Up to 2.5 in	240 μ in	Set using master plug gages. ASME/ANSI B1.2-1983 & ASME/ANSI B1.3-2007

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Geometry Measuring Machine ³ –			
Gage Head Amplifier	0.04 in	5.9 μin	Master sphere, gage blocks, cylindrical square, optical flat
Radial Accuracy	3 in	9.0 μin	
Parallelism of Column to Table Axis Accuracy	Up to 12 in	27 μin	
Straightness	Up to 12 in	30 μin	
Contour/Contour Systems ³ –			
Tracing Arm Length & Stylus Tip Height	Up to 14 in	(4.5 + 3.0L) μin	Gage blocks, pin gages, optical flats
Probe Deflection Repeatability	0 Base	5.8 μin	
Stylus Tip Form & Radius	3 mm	28 μin	
Surface Finish Measure ³	(2 to 500) in	2.4 μin	Direct comparison to master surface patch
Gage Block Comparator ³	Up to 4 in (4 to 20) in	(4.1 + 1.3L) μin (3.8 + 1.5L) μin	Master gage blocks
ID/OD Comparator ³	Up to 10 in	(5.0 + 3.1D) μin	Gage blocks
Bolt Protrusion Gauges	Up to 12 in	(77 + 0.4L) μin	Vision system

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Electronic Levels	Angular: +/- 990 arcsec Linear: +/- 0.005 in (Differential Mode)	1.0 arcsec 46 μ in	Surface plate, sine bar, gage blocks
Optical Comparators ³ – Length Accuracy Squareness Magnification – 10x to 100x	Up to 12 in Up to 12 in Up to 20 in image	14 μ in + 0.6 <i>R</i> 56 μ in 220 μ in	Glass meter Glass meter Glass master, 14’’ glass scale
Surface Plates ³ – Flatness Repeatability	Up to 245 in diagonal line Localized up to 245 in diagonal line	(21 + 0.7 <i>DL</i>) μ in (32 + 41 <i>L</i>) μ in	Electronic levels Repeat reading indicator
Spheres & Balls– Size Sphericity	Up to 2 in Up to 2 in	17 μ in 5.6 μ in	ULM Roundness machine
Length 1D – Dimensional Measurement	Up to 1800 mm	(3.7 + 0.0024 <i>L</i>) μ m	CMM
Length 2D – Dimensional Measurement Y X	Up to 1800 mm Up to 1800 mm	(3.7 + 0.0024 <i>L</i>) μ m (3.7 + 0.0024 <i>L</i>) μ m	CMM

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Volumetric Inspection	Volume: (900 x 1800 x 800) mm	$(1.6 + L/350) \mu\text{m}$	CMM
Ultrasonic Thickness Gages ³	Up to 5 in	$(5.1 + 2.4L + 0.6R) \mu\text{in}$	ULM/gage blocks

IV. Dimensional Testing/Calibration¹

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Surface Finish – Measure	(2 to 500) μin	2.4 μin	Master surface finish patch
Roundness – Measure	Up to 10 in	5.6 μin	Roundness machine
Flatness – Measure	Up to 20 in	31 μin	Electronic indicator
	Up to 6 in	3.9 μin	Optical flat
	Up to 1800 mm	$(1.6 + L/350) \mu\text{m}$	CMM
Parallelism – Measure	Up to 20 in	$(20 + 1.5L) \mu\text{in}$	Electronic indicator amplifier
Radius – Measure	Up to 4 in	$(130 + 8.6L) \mu\text{in}$	Vision system
Straightness – Measure	Up to 12 in	$(20 + 1.1L) \mu\text{in}$	Electronic indicator amplifier
Video Measurement ⁵ –			
X, Y Axis	Up to 12 in	$(6.7 + 1.0L) \mu\text{in}$	Calibration grid
Z-Axis	Up to 6 in	$(7 + 6.4L) \mu\text{in}$	

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Angular Measurements ⁵	Up to 360 °	2.4 arcsec	Zeiss O-Inspect
	Up to 360 °	2.4 arcsec	CMM
Geometric Measurements ⁵			
X	Up to 1800 mm	$(1.6 + L/350) \mu\text{m}$	CMM
Y	Up to 1800 mm	$(1.6 + L/350) \mu\text{m}$	
Z	Up to 600 mm	$(1.6 + L/350) \mu\text{m}$	

V. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
DC Voltage – Generate ³	(0 to 219.999) mV (0.220 to 2.1999) V (2.2 to 10.9999) V (11 to 21.9999) V (22 to 219.999) V (220 to 1100) V	1.3 $\mu\text{V/V} + 0.40 \mu\text{V}$ 5.8 $\mu\text{V/V} + 0.70 \mu\text{V}$ 3.8 $\mu\text{V/V} + 2.5 \mu\text{V}$ 3.8 $\mu\text{V/V} + 4.0 \mu\text{V}$ 5.5 $\mu\text{V/V} + 40 \mu\text{V}$ 6.3 $\mu\text{V/V} + 400 \mu\text{V}$	Fluke 5720A w/ Fluke 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	4.2 $\mu\text{V/V} + 0.30 \mu\text{V}$ 3.2 $\mu\text{V/V} + 0.30 \mu\text{V}$ 3.3 $\mu\text{V/V} + 0.50 \mu\text{V}$ 5.2 $\mu\text{V/V} + 30 \mu\text{V}$ 5.2 $\mu\text{V/V} + 0.10 \text{MV}$	Agilent 3458A opt 002
DC High Voltage – Measure ³	(1 to 10) kV	0.50 % + 0.40 V	Vitrek 4700
	(10 to 90) kV	1.0 % + 4.0 V	Vitrek 4700 w/ HL100 probe

Parameter/Equipment	Range	CMC ^{2,7} ($\pm$)	Comments
DC Current – Generate ³	Up to 200 μ A (0.2 to 2) mA (2 to 20) mA (20 to 200) mA 200 mA to 2.2 A (0 to 11) A	0.005 % + 6 nA 0.0039 % + 7 nA 0.0039 % + 40 nA 0.0047 % + 0.7 μ A 0.0081 % + 12 μ A 0.037 % + 480 μ A	Fluke 5700/5725A
DC Current –Measure ³	(10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	20 μ A/A + 0.80 nA 19 μ A/A + 5.0 nA 17 μ A/A + 50 nA 37 μ A/A + 0.50 μ A 0.013 % + 10 μ A	Agilent 3458A opt 002
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 290 μ A/A + 0.3 mA 150 μ A/A + 0.9 mA 120 μ A/A + 15 mA	Current shunt w/ 6.5-digit voltmeter

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
AC Voltage - Generate ³			
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	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	Fluke 5700A
(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	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	
(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	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	
220 mV 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	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	
(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	0.028 % + 450 μ V 0.011 % + 170 μ V 0.005 % + 9.3 μ V 0.009 % + 120 μ V 0.013 % + 230 μ V 0.049 % + 680 μ V	
(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	0.024 % + 4.0 mV 0.011 % + 1.5 mV 0.006 % + 0.60 mV 0.009 + 1.0 mV 0.017 % + 2.5 mV 0.095 % + 19 mV	
(220 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz	0.032 % + 18 mV 0.074 % + 4 mV	w/ Fluke 5725

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
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	0.030 % + 3.0 μ V 0.020 % + 1.1 μ V 0.040 % + 1.1 μ V 0.11 % + 1.1 μ V 0.51 % + 1.1 μ V 4.1 % + 2.0 μ V	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 to 1) MHz (1 to 2) MHz	0.0080 % + 4.0 μ V 0.0080 % + 2.0 μ V 0.016 % + 2.0 μ V 0.031 % + 2.0 μ V 0.081 % + 2.0 μ V 0.34 % + 10 μ V 1.1 % + 10 μ V 1.6 % + 10 μ V	
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	0.0090 % + 40 μ V 0.0070 % + 20 μ V 0.017 % + 20 μ V 0.036 % + 20 μ V 0.82 % + 20 μ V 0.31 % + 100 μ V 1.1 % + 100 μ V 1.6 % + 100 μ V	
(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 to 1) MHz	0.0080 % + 0.40 mV 0.0080 % + 0.20 mV 0.015 % + 0.20 mV 0.031 % + 0.20 mV 0.080 % + 0.20 mV 0.30 % + 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	0.030 % + 4.0 mV 0.030 % + 2.0 mV 0.030 % + 2.0 mV 0.040 % + 2.0 mV 0.13 % + 2.0 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	0.040 % + 4.0 mV 0.040 % + 2.0 mV 0.060 % + 2.0 mV 0.14 % + 2.0 mV 0.40 % + 2.0 mV	

Parameter/Range	Frequency	CMC ^{2, 7} (±)	Comments
AC High Voltage – Measure ³			
(1 to 10) kV	60 Hz	0.90 % + 0.40 V	Vitretek 4700
(10 to 90) kV	60 Hz	1.6 % + 6.0 V	Vitretek 4700 w/ HL100 probe
AC Current – Generate ³			
(29 to 330) µA	(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 µA 0.15 % + 0.15 µA 0.15 % + 0.25 µA 0.28 % + 0.15 µA 1.5 % + 0.15 µA	Fluke 5700A
330 µA 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 µA 0.12 % + 0.30 µA 0.12 % + 0.30 µA 0.24 % + 0.30 µA 0.72 % + 0.30 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	0.24 % + 3.0 µA 0.12 % + 3.0 µA 0.11 % + 30 µA 0.24 % + 30 nA 0.74 % + 30 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	0.24 % + 30 µA 0.12 % + 30 µA 0.11 % + 30 µA 0.24 % + 30 µA 0.72 % + 30 µA	
330 mA to 3.3 A	(10 to 45) Hz 40 Hz to 1 kHz (1 to 5) kHz	0.24 % + 300 µA 0.12 % + 300 µA 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 5700 w/ 50 turn coil
(110 to 550) A	50 Hz	0.66 % + 1.1 A	

Parameter/Range	Frequency	CMC ^{2, 7} (±)	Comments
AC Current – Measure ³			
(0 to 100) μ A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.45 % + 0.030 μ A 0.17 % + 0.030 μ A 0.070 % + 0.030 μ A 0.10 % + 0.003 μ A	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	0.47 % + 20 μ A 0.18 % + 20 μ A 0.080 % + 20 μ A 0.050 % + 20 μ A 0.080 % + 20 μ A 0.50 % + 40 μ A 0.70 % + 150 μ A	
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	0.47 % + 200 μ A 0.19 % + 200 μ A 0.10 % + 200 μ A 0.12 % + 200 μ A 0.37 % + 20 μ A 1.2 % + 40 μ A	

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Resistance – Generate ³	(0 to 10.999) Ω (11 to 32.999) Ω (33 to 109.999) Ω (110 to 329.999) Ω (0.330 to 1.099 99) k Ω (1.1 to 3.299 99) k Ω (3.3 to 10.9999) k Ω (11 to 32.9999) k Ω (33 to 109.999) k Ω (110 to 329.999) k Ω	0.014 % + 8.0 m Ω 0.014 % + 15 m Ω 0.14 % + 15 m Ω 0.11 % + 15 m Ω 0.12 % + 60 m Ω 0.11 % + 60 m Ω 0.12 % + 600 m Ω 0.11 % + 600 m Ω 0.13 % + 6.0 Ω 0.15 % + 6.0 Ω	Fluke 5500A, 4-wire
	(0.33 to 1.099 99) M Ω (1.1 to 3.299 99) M Ω (3.3 to 10.9999) M Ω (11 to 32.9999) M Ω (33 to 109.999) M Ω	0.20 % + 55 Ω 0.20 % + 55 Ω 0.70 % + 550 Ω 1.4 % + 550 Ω 5.9 % + 5.5 k Ω	Fluke 5500A, 2-wire

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Resistance – Generate (Fixed Points) ³	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1.0 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	51 $\mu\Omega$ 110 $\mu\Omega$ 110 $\mu\Omega$ 280 $\mu\Omega$ 550 $\mu\Omega$ 1.3 m Ω 2.3 m Ω 9.9 m Ω 19 m Ω 99 m Ω 190 m Ω 1.3 Ω 2.5 Ω 24 Ω 47 Ω 470 Ω 1.1 k Ω 12 k Ω	Fluke 5700A
Resistance – Measure ³	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 k Ω (1 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 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 11 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 11 $\mu\Omega/\Omega$ + 50 m Ω 16 $\mu\Omega/\Omega$ + 2.0 Ω 53 $\mu\Omega/\Omega$ + 100 Ω 0.070 % + 1.0 k Ω	Agilent 3458A opt 002
Fixed Points	0.0001 Ω 0.001 Ω 0.01 Ω 0.1 Ω 1 Ω 100 Ω 1000 Ω 10 M Ω	92 $\mu\Omega$ 21 $\mu\Omega$ 20 $\mu\Omega$ 22 $\mu\Omega$ 25 $\mu\Omega$ 18 $\mu\Omega$ 32 $\mu\Omega$ 2.6 m Ω	L & N resistors

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Capacitance – Generate ³	(0.33 to 0.499) nF (0.5 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.999) nF (11 to 32.999) nF (33 to 109.99) nF (110 to 329.99) nF (0.33 to 1.0999) µF (1.1 to 3.2999) µF (3.3 to 10.999) µF (11 to 32.999) µF (33 to 109.99) µF (110 to 329.99) µF 330 µF to 1.1 mF	0.58 % + 0.010 nF 0.58 % + 0.010 nF 0.61 % + 0.010 nF 0.58 % + 0.010 nF 0.33 % + 0.10 nF 0.29 % + 0.10 nF 0.27 % + 0.30 nF 0.29 % + 1.0 nF 0.41 % + 3.0 nF 0.41 % + 10 nF 0.47 % + 30 nF 0.58 % + 100 nF 0.94 % + 300 nF 1.2 % + 300 nF	Fluke 5500A
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	0.59 °C 0.45 °C 0.39 °C 0.39 °C	Fluke 5500A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.37 °C 0.32 °C 0.38 °C 0.59 °C 0.97 °C	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.57 °C 0.19 °C 0.16 °C 0.18 °C 0.24 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.31 °C 0.19 °C 0.16 °C 0.20 °C 0.27 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ – (cont)			
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 0.21 °C 0.19 °C 0.30 °C 0.46 °C	Fluke 5500A
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.43 °C 0.30 °C 0.20 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.45 °C 0.27 °C 0.22 °C 0.21 °C 0.31 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.70 °C 0.43 °C 0.40 °C 0.43 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.58 °C 0.44 °C 0.44 °C 0.51 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.70 °C 0.28 °C 0.19 °C 0.16 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.65 °C 0.31 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicating Systems 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	0.060 °C 0.060 °C 0.090 °C 0.11 °C 0.12 °C 0.14 °C 0.26 °C	Fluke 5500A
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	0.060 °C 0.060 °C 0.090 °C 0.10 °C 0.12 °C 0.14 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.29 °C 0.050 °C 0.060 °C 0.070 °C 0.090 °C 0.090 °C 0.10 °C 0.12 °C 0.26 °C	
Pt 385, 200 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.050 °C 0.050 °C 0.050 °C 0.060 °C 0.15 °C 0.17 °C 0.18 °C 0.19 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.050 °C 0.070 °C 0.070 °C 0.080 °C 0.10 °C 0.10 °C 0.10 °C 0.12 °C	

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Electrical Calibration of RTD Indicating Systems ³ – (cont)			
Pt 385, 1000 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.040 °C 0.040 °C 0.050 °C 0.070 °C 0.070 °C 0.090 °C 0.090 °C 0.27 °C	Fluke 5500A
PtNi 385, 120 Ω (Ni120)	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.10 °C 0.10 °C 0.17 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.35 °C	
Welding Devices ³	(0 to 350) ADC (0 to 100) VDC	1.0 % 0.05 VDC	Loadbank & DMM

VI. Mechanical

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Pressure – Measuring Equipment ³	(0 to 1) psi (0 to 5) psi (0 to 50) psi (0 to 100) psi (0 to 300) psi Up to 10 000 psi	0.0016 psi 0.0041 psi 0.0089 psi 0.019 psi 0.036 psi 0.16 % of range	Multifunction calibrator Pressure gauge
Vacuum – Measuring Equipment ³	(-30 to 0) in Hg	0.030 in Hg	Multifunction calibrator

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Force Gages ³ – Tension & Compression	Up to 500 lbf Up to 500 lbf (500 to 2000) lbf (2000 to 10 000) lbf (10 000 to 25 000) lbf (25 000 to 50 000) lbf (50 000 to 75 000) lbf (75 000 to 100 000) lbf	(0.015 % + 0.058) lbf (0.016 % + 0.24) lbf (0.082 % + 0.23) lbf (0.0046 % + 1.6) lbf (0.013 % + 0.75) lbf (0.03 % + 1.1) lbf (0.01 % + 4.4) lbf (0.04 % + 4.4) lbf	Weights Moorehouse load cell
Torque Wrenches ³	(4 to 50) lbf·in (30 to 400) lbf·in (80 to 1000) lbf·in (0 to 250) lbf·ft (60 to 600) lbf·ft (250 to 2000) lbf·ft	0.14 % + 0.29 lbf·in 0.39 % + 0.32 lbf·in 0.44 % + 0.87 lbf·in 0.44 % + 0.37 lbf·ft 0.28 % + 1 lbf·ft 0.56 % + 0.79 lbf·ft	Torque transducers
Torque Transducers	(20 to 200) ozf·in (0 to 50) lbf·in (> 50 to 400) lbf·in (250 to 1000) lbf·in (0 to 250) lbf·ft (250 to 2000) lbf·ft	0.23 % 0.15 % 0.000 013 lbf·in 0.056 % + 0.000 43 lbf·in 0.049 % + 0.0001 lbf·in 0.049 % + 0.0078 lbf·ft 0.075 %	Torque arms, weights

Parameter/Equipment	Range	CMC ^{2,8} (±)	Comments
Scales & Balances ³	Up to 50 lb	0.011 % + 0.000 21 lbs	Weights Class F
	50 to 500 lb	0.64 % + 0.000 000 14 lbs	
	500 to 1000 lb	0.51 % - 1.9 lbs	
	Up to 2000 lb	0.85 lbs	
	50 lb	0.48 lbs	Class E1 & 1 weights
	500 lb	0.67 lbs	
	Up to 500 mg	0.0050 mg	
	(0.5 to 1) g	0.0058 mg	
	(1 to 2) g	0.0063 mg	
	(2 to 5) g	0.0098 mg	
	(5 to 10) g	0.017 mg	
	(10 to 20) g	0.030 mg	
	(20 to 50) g	0.072 mg	
	(50 to 100) g	0.15 mg	
	(100 to 200) g	0.29 mg	
	(200 to 500) g	30 mg	
	(0.5 to 1) kg	30 mg	
	(1 to 2) kg	49 mg	
	(2 to 5) kg	120 mg	
	(5 to 10) kg	230 mg	
	(10 to 20) kg	460 mg	

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness Testers ³	HRA:		ASTM E18 Indirect method
	(60 to 69) HRA	0.78 HRA	
	(70 to 79) HRA	0.36 HRA	
	(80 to 93) HRA	0.29 HRA	
	HRB:		
	(1 to 50) HRB	0.73 HRB	
	(51 to 79) HRB	0.93 HRB	
	(80 to 130) HRB	0.95 HRB	
	HRC:		
	(20 to 39) HRC	0.60 HRC	
	(40 to 59) HRC	0.61 HRC	
	(60 to 70) HRC	0.75 HRC	
	HR30N:		
	(40 to 59) HR30N	0.56 HR30N	
	(60 to 76) HR30N	0.65 HR30N	
	(77 to 85) HR30N	0.67 HR30N	
	HR30T:		
	(20 to 49) HR30T	0.50 HR30T	
	(50 to 56) HR30T	0.48 HR30T	
	(57 to 85) HR30T	0.48 HR30T	
	HR15N:		
	(40 to 79) HR15N	0.59 HR15N	
	(80 to 89) HR15N	0.46 HR15N	
	(90 to 95) HR15N	0.44 HR15N	
	HR15T:		
	(20 to 79) HR15T	0.57 HR15T	
	(80 to 87) HR15T	0.45 HR15T	
	(88 to 100) HR15T	0.36 HR15T	
	HR45N:		
	(10 to 49) HR45N	0.94 HR45N	
	(50 to 66) HR45N	0.42 HR45N	
	(67 to 75) HR45N	0.75 HR45N	
	HR45T:		
	(1 to 39) HR45T	0.64 HR45T	
	(40 to 49) HR45T	0.71 HR45T	
	(50 to 75) HR45T	0.98 HR45T	

Parameter/Equipment	Range	CMC ² (±)	Comments
Rockwell Hardness Testing ³	HRA: (60 to 69) HRA (70 to 79) HRA (80 to 93) HRA HRB: (1 to 50) HRB (51 to 79) HRB (80 to 130) HRB HRC: (20 to 39) HRC (40 to 59) HRC (60 to 70) HRC HR30N: (40 to 59) HR30N (60 to 76) HR30N (77 to 85) HR30N HR30T: (20 to 49) HR30T (50 to 56) HR30T (57 to 85) HR30T HR15N: (40 to 79) HR15N (80 to 89) HR15N (90 to 95) HR15N HR15T: (20 to 79) HR15T (80 to 87) HR15T (88 to 100) HR15T HR45N: (10 to 49) HR45N (50 to 66) HR45N (67 to 75) HR45N HR45T: (1 to 39) HR45T (40 to 49) HR45T (50 to 75) HR45T	0.78 HRA 0.36 HRA 0.29 HRA 0.73 HRB 0.93 HRB 0.95 HRB 0.60 HRC 0.61 HRC 0.75 HRC 0.56 HR30N 0.65 HR30N 0.67 HR30N 0.50 HR30T 0.48 HR30T 0.48 HR30T 0.59 HR15N 0.46 HR15N 0.44 HR15N 0.57 HR15T 0.45 HR15T 0.36 HR15T 0.94 HR45N 0.42 HR45N 0.75 HR45N 0.64 HR45T 0.71 HR45T 0.98 HR45T	Master hardness test blocks using in-house procedure

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Indirect Verification of Brinell Hardness Testers at Test Conditions ³ – HBW 5/750 HBW 10/3000	(200 to 400) HBW (400 to 750) HBW	2.1 HBW 6.1 HBW	ASTM E10 Indirect method
Indirect Verification of Brinell Hardness Testing – HBW 5/750 HBW 10/3000	(200 to 400) HBW (400 to 750) HBW	2.1 HBW 6.1 HBW	Master hardness test blocks using an in-house procedure
Indirect Verification of Vickers Hardness Testers ³ (@ 500 gf)	(200 to 400) HV (400 to 750) HV	15 HV 20 HV	ASTM E92 Indirect method
Indirect Verification of Vickers Hardness Testing (@ 500 gf)	(200 to 400) HV (400 to 750) HV	15 HV 20 HV	Master hardness test blocks using in-house procedure
Indirect Verification of Knoop Hardness Testers ³ (@ 500 gf)	(100 to 250) HK Above 250 HK	14 HK 20 HK	ASTM E92 Indirect method
Indirect Verification of Knoop Hardness Testing (@ 500 gf)	(100 to 250) HK Above 250 HK	14 HK 20 HK	Master hardness test blocks using an in-house procedure
Mass – Measure	Up to 5 g (5 to 210) g (210 to 30 000) g	14 μ g (0.2 + 0.0075M) mg (350 + 0.000 28M) mg	Electronic balance

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Durometer Calibration: (A, B, C, D, DO, E, M, O, OO, OOO) –			ASTM D2240
Indenter Extension & Shape –	Up to 0.2 in	65 μ in	Optical inspection under magnification
Extension Diameter	Diameter of the base of the frustum: 0.5 in	45 μ in	
	Diameter of the top of the frustum: 0.5 in	45 μ in	
	Diameter of the base of the cone: 0.5 in	45 μ in	
Angle 35° Right Circular Conical Frustum	Cone angle	0.015°	
30° Cone	Cone angle	0.015°	
Radius	Tip radius: 0.25 in	16 μ in	
Indenter Display	Indenter thickness Indenter radius	45 μ in 16 μ in	Balance or electronic force cell
Spring Calibration –	(0 to 100) duro units	0.4 duro	
Force	(0 to 5000) gf	0.3 gf	

VII. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Relative Humidity – Measuring Equipment, Fixed Points ³	11 % RH 35 % RH 75 % RH 90 % RH	0.52 % RH 0.66 % RH 0.72 % RH 0.85 % RH	Rotronic HygroGen2
Relative Humidity – Measure ³	Up to 90 % RH	0.87 % RH	Rotronic HygroPalm

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Temperature – Measuring Equipment, Glass Thermometers ³	(-78 to 0) °C (0 to 660) °C	0.0052 % + 0.024 °C	Dry block w/ RTD
Temperature / Humidity Recorders ³	(-196 to 660) °C (11 to 90) % RH	0.0052 % + 0.024 °C 1.4 % RH	Temperature meter, Rotronic HygroPalm
Temperature – Measure Ovens, Furnaces, & Freezers ³	(-196 to 660) °C	0.0052 % + 0.024 °C	RTD w/ indicator
Temperature – IR Measuring Equipment ³	(35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.23 % + 0.66 °C 0.7 % + 1.8 °C 0.31 % + 0.56 °C 0.43 % + 0.14 °C	Fluke 4181

VIII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 6, 8} (±)	Comments
Tachometers	Up to 199,999 RPM	0.006 %	Function generator
Stop Watches/Time Measurement ³	Up to 24 hours	0.03 s 0.04 s	Comparison Totalize w/GPS
Frequency – Measuring Equipment Fixed Point	10 Hz to 20.999 999 MHz (21 to 60.999 999) MHz 10 MHz	0.029 + 0.013 μ Hz/Hz 4.0 parts in 10 ⁸ Hz/Hz 6.0 parts in 10 ¹¹ Hz/Hz	HP 3325A sync w/GPS Novis NR2310 GPS
Frequency – Measure ³	0.01 Hz to 100 MHz	1.2 parts in 10 ⁸ Hz/Hz	HP 5334B

¹This laboratory offers commercial dimensional testing/calibration and on-site calibration services.

²Calibration 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.

⁴In 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 in inches. 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. Pitch diameter is measured by the three-wire method. Major diameter is calibrated by direct measurement. In the statement of CMC, T indicates temperature in degrees Celsius. In the statement of CMC, H is the Humidity of the reading. In the statement of CMC, M is the applied mass in grams or pounds.

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 In the statement of CMC, a percent refers to a percentage of reading unless otherwise noted.

⁷ 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.

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.

Duncan, 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 17th 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 1387.01
Valid to September 30, 2025

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