



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

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CALIBRATION

Valid To: November 30, 2022

Certificate Number: 4986.01

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, 6, 9} (\pm)	Comments
Micrometers ³	Up to 48 in	$0.6R + (3L + 10) \mu\text{in}$	CP-010, gage blocks
Calipers, Micrometers ³	Up to 60 in	$0.6R + (16L + 4.1) \mu\text{in}$	CP-008, CP-010, gage blocks
Dial Indicators ³	Up to 6 in	$(L + 33) \mu\text{in}$	CP-009, gage blocks
LVDTs ³	Up to 0.5 in (0.5 to 4) in	$0.6R + 5.5 \mu\text{in}$ $0.6R + (4.3L + 2) \mu\text{in}$	CP-009, gage blocks
Extensometers/ Deflectometers ³	Up to 1 in	$29 \mu\text{in/in}$	CP-007, linear calibrator
Linear Displacement – Measure ³	Up to 24 in	$(15L + 18) \mu\text{in}$	CP-115

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Surface Plates – (Metal and Granite) ³			
Grade AA, A, B	(6 to 150) ft ² Area Flatness	$(0.25DL + 15) \mu\text{in}$	CP-128, leveling system/planekator
Repeat-O-Meter	Up to 6 ft ² Area Repeat Reading	23 μin	CP-128, repeat-o- meter
Pin Gages	Up to 4 in	$(13L + 46) \mu\text{in}$	CP-047, super mic, gage blocks
Thread Plug Gages Pitch Diameter	Up to 4 in	98 μin	CP-115, super mic, gage blocks
Plug Gages	Up to 4 in	$(13L + 46) \mu\text{in}$	CP-115, super mic, gage blocks
Radius Gages, Angle	Up to 4 in	870 μin	CP-115, optical comparator, gage blocks
Internal Diameter/Ring Gages	Up to 6 in	$(11L + 22) \mu\text{in}$	CP-115, Gage blocks/ID /OD comparator
Micrometer Standards	Up to 20 in	$(15L + 17) \mu\text{in}$	CP-115, height gage, gage blocks, surface plate
Gage Blocks	Up to 4 in	$(0.31L + 7.2) \mu\text{in}$	CP-115 gage block comparator, master gage blocks
Height Gages ³	Up to 40 in	$0.6R + (8L + 220) \mu\text{in}$	CP-115, surface plates, gage blocks

Parameter/Equipment	Range	CMC ^{2, 6} (\pm)	Comments
Rulers ³	Up to 84 in	$(62L + 56) \mu\text{in}$	CP-115, gage blocks
Tape Measures ³	Up to 100 ft	$(0.6R + 16L + 2) \mu\text{in}$	CP-115, standard rule, gage blocks
Straight Edges ³	Up to 25 in	300 μin	CP-115, tape and feeler gage
Optical Comparator ³ – Linear Measurement	Various Ranges up to 50x	270 μin 450 μin	CP-064, standards

II. Dimensional Inspection

Parameter/Equipment	Range	CMC ² (\pm)	Comments
1-Dimensional Inspection – Measure ^{3, 4}	Up to 12 in	650 μin	CP-115, ASTM and AASHTO procedures, calipers, rulers, straight edges, gage blocks

III. Electrical DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 5} (\pm)	Comments
DC Current – Generate ³	Up to 3.299 99 mA (3.3 to 32.9999) mA (33 to 329.999) mA 330 mA to 2.199 99 A (2.2 to 11) A (11 to 16.5) A (16.5 to 150) A (150 to 550) A	130 nA/A + 52 nA 100 nA/A + 200 nA 100 $\mu\text{A}/\text{A} + 3.4 \mu\text{A}$ 290 $\mu\text{A}/\text{A} + 60 \mu\text{A}$ 590 $\mu\text{A}/\text{A} + 500 \mu\text{A}$ 2.5 mA/ A + 15 mA 2.5 mA + 70 mA 2.5 mA/A + 250 mA	CP-033, Fluke 5500A

Parameter/Range	Frequency	CMC ^{2, 5} (\pm)	Comments
DC Voltage – Generate ³	Up to 329.9999 mV 330 mV to 3.299 999 V (3.3 to 32.999 99) V (33 to 329.9999) V (330 to 1020) V	59 μ V/V + 3.2 μ V 50 μ V/V + 5 μ V 47 μ V/V + 100 μ V 53 μ V/V + 1 mV 53 μ V/V + 4.3 mV	CP-033, Fluke 5500A
AC Voltage – Generate ³			
(1.0 to 32.99) 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	0.35 % + 20 μ V 0.15 % + 20 μ V 0.2 % + 20 μ V 0.25 % + 20 μ V 0.35 % + 33 μ V 0.92 % + 88 μ V	CP-033, Fluke 5500A
(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	0.25 % + 50 μ V 0.057 % + 25 μ V 0.1 % + 21 μ V 0.16 % + 41 μ V 0.24 % + 170 μ V 0.7 % + 330 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	0.15 % + 330 μ V 0.029 % + 68 μ V 0.08 % + 97 μ V 0.14 % + 320 μ V 0.24 % + 1.7 mV 0.5 % + 3.3 mV	
(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	0.15 % + 660 μ V 0.04 % + 0.7 mV 0.08 % + 2.8 mV 0.19 % + 5.1 mV 0.24 % + 17 mV	
(33 to 329.999) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.05 % + 1.6 mV 0.08 % + 1.6 mV 0.09 % + 1.2 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.05 % + 180 μ V 0.2 % + 120 μ V 0.2 % + 570 μ V	

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
AC Current – Generate ³			
(0.029 to 0.329 99) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.24 % + 0.15 µA 0.13 % + 0.15 µA 0.13 % + 0.25 µA 0.4 % + 0.15 µA 1.3 % + 0.15 µA	CP-033, Fluke 5500A
(0.33 to 3.2999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.17 % + 1.6 µA 0.1 % + 0.3 µA 0.1 % + 0.32 µA 0.2 % + 0.32 µA 0.6 % + 0.3 µA	
(3.3 to 32.999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.2 % + 5 µA 0.1 % + 4 µA 0.09 % + 3.4 µA 0.2 % + 3.1 µA 0.6 % + 3 µA	
(33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 86 µA 0.074 % + 140 µA 0.09 % + 32 µA 0.2 % + 32 µA 0.69 % + 35 µA	
(0.33 to 2.199 99) A	(10 to 20) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.19 % + 530 µA 0.1 % + 300 µA 0.75 % + 320 µA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.06 % + 2200 µA 0.1 % + 2100 µA 0.33 % + 2000 µA	
(11 to 16.5) A	(45 to 65) Hz (65 to 440) Hz	2.9 mA/A + 2 mA 2.8 mA/A + 15 mA	CP-033, 50 turn coil
(16.5 to 150) A	(45 to 65) Hz (65 to 400) Hz	5.3 mA/A + 370 mA 9 mA/A + 350 mA	
(150 to 550) A	(45 to 65) Hz (65 to 400) Hz	5 mA/A + 900 mA 10 mA/A + 890 mA	

Parameter/Range	Frequency	CMC ^{2, 5} (\pm)	Comments
AC Voltage – Measure ³			
Up to 200 mV	(10 to 50) Hz (50 to 100) Hz (100 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz	0.25 % + 30 μ V 0.06 % + 30 μ V 0.02 % + 20 μ V 0.02 % + 20 μ V 0.025 % + 20 μ V 0.034 % + 71 μ V 0.3 % + 30 μ V 0.75 % + 50 μ V 2 % + 200 μ V 5 % + 400 μ V	CP-033, Keithley 2002
200 mV to 2 V	(10 to 50) Hz (50 to 100) Hz (100 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz	0.035 % + 300 μ V 0.025 % + 300 μ V 0.035 % + 300 μ V 0.02 % + 200 μ V 0.025 % + 200 μ V 0.05 % + 210 μ V 0.3 % + 300 μ V 0.75 % + 500 μ V 2 % + 2 mV 5 % + 4 mV	
(2 to 20) V	(20 to 50) Hz (50 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz	0.06 % + 3.2 mV 0.035 % + 3.2 mV 0.03 % + 3.2 mV 0.04 % + 3.3 mV 0.05 % + 3.1 mV 0.01 % + 76 mV 0.3 % + 3.1 mV 0.75 % + 5 mV 4 % + 40 mV 7 % + 40 mV	
(20 to 200) V	(1 to 10) Hz (10 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	0.13 % + 30 mV 0.09 % + 30 mV 0.05 % + 30 mV 0.05 % + 30 mV 0.06 % + 30 mV 0.065 % + 71 mV 0.10 % + 30 mV 0.50 % + 30 mV	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage – Measure ³ (cont) (200 to 1000) V	(20 to 50) Hz (50 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	0.09 % + 110 mV 0.05 % + 110 mV 0.05 % + 110 mV 0.06 % + 110 mV 0.08 % + 110 mV 0.1 % + 130 mV 0.5 % + 110 mV	CP-033, Keithley 2002

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Pressure Gages and Transducers ³	Up to 36 PSI Up to 1000 PSI Up to 3000 PSI Up to 10 000 PSI	0.14 % 0.04 % 0.17 % 0.11 %	CP-003, pressure calibrator
Pressure Gages – Nitrogen	Up to 3000 psi	0.20 %	CP-003, pressure calibrator
Vacuum ³	Up to 30 in-Hg	0.32 %	CP-005, digital manometers
Manometers, Absolute Pressure ³	(1000 to 5) mmHg ABS	0.29 mmHg	CP-005, digital manometers
Force – Load Cells Compression	(0 to 2000) lbf (2000 to 10 000) lbf (10 000 to 50 000) lbf (50 000 to 100 000) lbf (100 000 to 600 000) lbf	0.039 % 0.042 % 0.039 % 0.038 % 0.059 %	CP-030, ASTM E74, load cells/weights
Force – Load Cells Tension	Up to 2000 lbf (2000 to 10 000) lbf (10 000 to 50 000) lbf (50 000 to 100 000) lbf	0.039 % 0.042 % 0.039 % 0.038 %	CP-030, ASTM E74, load cells/weights

Parameter/Equipment	Range	CMC ^{2, 6, 7, 9} (±)	Comments
Force Devices and Machines – Compression ³	(0 to 2000) lbf (2000 to 10 000) lbf (10 000 to 50 000) lbf (50 000 to 100 000) lbf (100 000 to 600 000) lbf (600 000 to 1 000 000) lbf	0.19 % 0.19 % 0.19 % 0.19 % 0.2 % 0.45 %	CP-001, ASTM E4, load cells/weights
Force Devices and Machines – Tension ³	Up to 2500 lbf (2500 to 25 000) lbf (25 000 to 100 000) lbf (100 000 to 200 000) lbf	0.2 % 0.19 % 0.19 % 0.19 %	CP-001, ASTM E4, load cells/weights
Torque – Wrenches, Screw Drivers, and Multipliers ³	Up to 50 lbf·in (>50 to 750) lbf·in (25 to 250) lbf·ft (>250 to 1000) lbf·ft	0.55 % 0.55 % 0.56 % 0.59 %	CP-006 torque transducers
Torque Transducers	Up to 100 lbf·in (>100 to 750) lbf·in (0 to 250) lbf·ft (>250 to 1000) lbf·ft	0.3 % 0.15 % 0.07 % 0.5 %	CP-006, weights and arms
Balances/Scales ³	Up to 150 kg Up to 5000 lb	0.6R + 0.0003 % 0.6R + 0.01 %	CP-002, class 1, 4, and F weights
Volume – Volume Measuring Equipment ³	Up to 0.1 ft ³ (0.1 to 1.5) ft ³	0.01 % 0.013 %	CP-038 thermometer, balance
Indirect Verification of Rockwell Hardness ³	HRA: Low Medium High HRB: Low Medium High	0.26 HRA 0.24 HRA 0.20 HRA 0.36 HRB 0.37 HRB 0.44 HRB	CP-004 Rockwell hardness blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness ³ (cont)	<p>HRC:</p> <p>Low Medium High</p> <p>HRE:</p> <p>Low Medium High</p> <p>HRF:</p> <p>Low Medium High</p> <p>HR15N:</p> <p>Low Medium High</p> <p>HR30N:</p> <p>Low Medium High</p> <p>HR45N:</p> <p>Low Medium High</p> <p>HR15T:</p> <p>Low Medium High</p> <p>HR30T:</p> <p>Low Medium High</p> <p>HR45T:</p> <p>Low Medium High</p>	<p>0.54 HRC 0.48 HRC 0.48 HRC</p> <p>0.64 HRE 0.64 HRE 0.65 HRE</p> <p>0.53 HRF 0.61 HRF 0.60 HRF</p> <p>0.47 HR15N 0.29 HR15N 0.30 HR15N</p> <p>0.46 HR30N 0.44 HR30N 0.32 HR30N</p> <p>0.50 HR45N 0.23 HR45N 0.24 HR45N</p> <p>0.46 HR15T 0.40 HR15T 0.38 HR15T</p> <p>0.58 HR30T 0.39 HR30T 0.40 HR30T</p> <p>0.64 HR45T 0.64 HR45T 0.46 HR45T</p>	CP-004 Rockwell hardness blocks
Indirect Verification of Micro Hardness – Knoop ³	(100 to 600) HV (>600 to 1100) HV	25 HV 19 HV	CP-004, blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Brinell Hardness ³	HBW (126 to 758)	7.5 HBW	CP-014 Brinell hardness blocks

V. Nuclear Density

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Nuclear Density Gages ³	110 PCF 129 PCF 167 PCF Low Range: 20.03 PCF	0.25 % 0.57 % 0.15 % 1.0 %	Density blocks; moisture blocks

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Ovens, Freezers, Environmental Chambers, Autoclaves, Water Baths, and Sealers ³ – Measure	(-100 to 0) °C (0 to 100) °C (100 to 200) °C (200 to 400) °C (400 to 600) °C	0.30 °C 0.11 °C 0.14 °C 0.16 °C 0.17 °C	CP-011, thermocouple/RTD meters
Thermocouples – Generate and Measure ³			
Type B	(600 to 1820) °C	0.47 °C	CP-013, Fluke 5500A
Type E	(-250 to 1000) °C	0.51 °C	
Type J	(-210 to 1200) °C	0.30 °C	
Type K	(-200 to 1372) °C	0.41 °C	
Type N	(-200 to 1300) °C	0.41 °C	
Type R	(0 to 1767) °C	0.85 °C	
Type S	(0 to 1767) °C	0.79 °C	
Type T	(-250 to 400) °C	0.64 °C	

Parameter/Equipment	Range ⁶	CMC ^{2, 6, 9} (±)	Comments
Thermometers ³	(-100 to 50) °C (50 to 100) °C (100 to 200) °C (200 to 400) °C (400 to 600) °C	0.062 °C 0.028 °C 0.043 °C 0.050 °C 0.066 °C	CP-012 RTD meters, probes, baths
RTD's Pt 385, 100 Ω Pt 3926, 100Ω Pt 3916, 100Ω Pt 385, 200Ω Pt 385, 500 Ω Pt 385, 1000Ω PtNi 385, 120Ω	(-200 to 630) °C (-200 to 630) °C (-200 to -190) °C (-190 to 600) °C (-200 to 600) °C (-200 to 600) °C (-200 to 600) °C (-80 to 260) °C	0.12 °C 0.16 °C 0.25 °C 0.10 °C 0.19 °C 0.14 °C 0.15 °C 0.17 °C	CP-013, Fluke 5500A
IR Thermometers/ Pyrometers ³	(28 to 500) °C	1.2 °C	CP-012, black body, PRT, reference pyrometer
Temperature Uniformity (Up to 60 Channels) ³ – Measure	(-196 to 0) °C (0 to 1093) °C (1093 to 1315) °C	0.82 °C 0.98 °C 1.9 °C	CP-011, data loggers, thermocouples AMS 2750 and CQI-9
Relative Humidity ³ – Measure	(20 to 75) % (75 to 95) %	1.5 % 1.9 %	CP-031, digital hygrometer
Hydrometry – Specific Gravity, Hydrometers and Equivalent Values in Other Hydrometer Scales	(>0.631 to 2) SG	0.000 54 SG	CP-020 hydrometer standards, PRT, and ASTM E126

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
Timers, Stop Watches ³	Up to 10 hrs Up to 24 hrs	34 ms	CP-032 digital stopwatch CP-032 VWR bench timer/stopwatch/data logger
RPM (Indirect) ³	Up to 7200 RPM (7200 to 72 000) RPM (72 000 to 99 999) RPM	0.0028 % + 0.07 RPM 0.001 % + 0.2 RPM 0.0003 % + 1 RPM	CP-033, Fluke 5500A

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 This laboratory performs field calibration activities for the parameter(s).

⁴ Dimensional Inspection refers to the measurement and verification of Sieves, liquid limit devices, grooving tools, followers, plunger, metal specimens, Kelly ball, LA Abrasion, Marshall and proctor hammers, platens, expansion racks, slump cones, tampers, 123 blocks, and sample splitters

⁵ 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.

⁶ In the statement of CMC, SG is the numerical value of the specific gravity, R is the resolution of the unit under test, DL is the diagonal length of the device measured in inches, and L is the numerical value of the nominal length of the device measured in inches.

⁷ In the statement of CMC, percentages are percentages 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

CAL-CERT COMPANY

Milwaukie, OR

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/NCCL 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 21st day of January 2021

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

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4986.01
Valid to November 30, 2022

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