



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

CAL-CERT COMPANY
5777 SE International Way
Milwaukie, OR 97222
Marshall Doyle Phone: 503 654 9620

CALIBRATION

Valid To: November 30, 2024

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. Chemical

Parameter/Equipment	Range	CMC ^{2, 9} (±)	Comments
pH – Measuring Instruments	4 pH 7 pH 10 pH	0.05 pH 0.05 pH 0.05 pH	Standard pH solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 6, 9} (±)	Comments
Micrometers ³	Up to 48 in	$0.6R + (3L + 10) \mu\text{in}$	CP-010, gage blocks
Calipers 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 12) in	$0.6R + 5.5 \mu\text{in}$ $0.6R + (4.3L + 2) \mu\text{in}$	CP-009, gage blocks and Certo vertical probe

Parameter/Equipment	Range	CMC ^{2, 6, 9} (±)	Comments
Extensometers/ Deflectometers ³	Up to 1 in	29 μin/in	CP-007, linear calibrator
Linear Displacement – Measure ³	Up to 24 in	(15L + 18) μin	CP-115, height gauge & stand
Surface Plates ³ – Grade AA, A, B Repeat-O-Meter	(6 to 150) ft ² Area Flatness Up to 6 ft ² Area Repeat Reading	(0.25DL + 15) μin 23 μin	CP-128, leveling system/planekator CP-128, repeat-o-meter
Pin Gages	Up to 4 in	(13L + 46) μin	CP-047, super mic, gage blocks, laser interferometer
Thread Plug Gages – Pitch Diameter	Up to 4 in	98 μin	CP-115, super mic, gage blocks, ULM
Plug Gages	Up to 4 in	(13L + 46) μin	CP-115, super mic, gage blocks, ULM
Precision Levels	Up to 12 in	0.000 42 in/10 in	CP-115, sine bar, surface plate, 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) μin	CP-115, gage blocks, ID comparator
Micrometer Standards	Up to 48 in	(15L + 17) μin	CP-115, laser interferometer with 48 in super mic

Parameter/Equipment	Range	CMC ^{2, 6, 9} (±)	Comments
Gage Blocks	Up to 4 in	$(0.31L + 7.2) \mu\text{in}$	CP-115 gage block comparator, 00 gage blocks
Thread Wires	(5 to 80) TPI	14 μin	CP-115, ULM laser interferometer
Height Gages ³	Up to 40 in	$0.6R + (8L + 220) \mu\text{in}$	CP-115, surface plates, gage blocks
Rulers ³	Up to 84 in	$(62L + 56) \mu\text{in}$	CP-115, laser interferometer
Tape Measures ³	Up to 100 ft	$0.6R + (16L + 2) \mu\text{in}$	CP-115, laser interferometer
Straight Edges ³	Up to 25 in	300 μin	CP-115, indicator & stand, tape & feeler gage
Optical Comparator ³ – Linear Measurement	8 in	270 μin	CP-064, gage blocks, glass scales

III. Construction Material Laboratory Equipment

Parameter/Equipment	Range	CMC ² (±)	Comments
CBR Mold & Spacer ³ – Dimensions	Up to 8 in	650 μin	ASTM D1883
Volume	Up to 184 in ³	0.13 in ³	

Parameter/Equipment	Range	CMC ² (±)	Comments
Conical Mold & Tamper ³ – Dimensions Weight	Up to 3.5 in Up to 340 g	650 μin 0.13 g	ASTM C128
Compactor Marshall & Proctor ³ – Height of Drop Weight Rammer Diameter	Up to 18 in Up to 10 lbs Up to 4 in	0.002 in 0.016 lbs 650 μin	ASTM D6926, ASTM D698, ASTM D1557, ASTM D1883
LA Abrasion Machine ³ – Inside Diameter Inside Length Average Dia. Of Charge Average Mass of Charge Rotation Per Minute	Up to 28 in Up to 20 in Up to 1.85 in Up to 455 g Up to 33 rpm	800 μin 400 μin 650 μin 0.13 g 0.08 rpm	ASTM C131, ASTM C535
Liquid Limit Device & Groover ³ – Dimensions Weight of Cup & Hanger	Up to 150 mm Up to 215 g	0.02 mm 0.13 g	ASTM D4318
Molds Cylinder ³ – Height Diameter	Up to 12 in Up to 6 in	650 μin 650 μin	ASTM C470

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Molds Marshall ³ – Dimensions	Up to 4 in	650 μin	ASTM D6926
Molds Mortar Cubes ³ – Dimensions	Up to 2 in	650 μin	ASTM C109
Molds Proctor ³ – Volume Dimensions	Up to 3000 ml Up to 5.9 in	0.01 % 650 μin	ASTM D698, ASTM D1557
Graduated Cylinder ³ – Volume	Up to 0.1 ft ³	0.01 %	ASTM E542
Slump Cone & Tamping Rod ³ – Cone Diameter Cone Height Cone Thickness Rod Diameter Rod Length	Up to 8 in Up to 12 in Up to 0.12 in Up to 0.63 in Up to 24 in	650 μin 650 μin 650 μin 650 μin 0.002 in	ASTM C143
Concrete Air Meter (Pressure Method) ³	Up to 10 % of Air in Concrete	0.82 %	ASTM C231
Sieve ³	(0.4 to 4) in	650 μin	Caliper

IV. Dimensional Inspection

Parameter/Equipment	Range	CMC ^{2,9} (±)	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

V. Electrical DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	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	19 μV/V + 1 μV 11 μV/V + 2 μV 12 μV/V + 100 μV 18 μV/V + 0.2 mV 18 μV/V + 1.9 mV	CP-033, Fluke 5522A
DC Voltage – Measure ³	Up to 209.999 999 mV 210 mV to 2.099 999 99 V (2.1 to 20.999 9999) V (21 to 209.999 999) V (210 to 1000) V	13 μV/V + 1.3 μV 10 μV/V + 1.8 μV 3.3 μV/V + 300 μV 18 μV/V + 1.5 mV 51 μV/V + 3.8 mV	CP-033, Keithley 2002
DC Current – Generate ³	Up to 329.999 μA 330 μA to 3.2999 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 20.5) A	0.014 % + 56 nA 0.009 % + 80 nA 0.01 % + 0.2 μA 0.01 % + 3.4 μA 0.03 % + 60 μA 0.05 % + 0.5 mA 0.1 % + 0.8 mA	CP-033, Fluke 5522A
Clamp-On Meters	Up to 150 A (150 to 1000) A	2.5 mA + 70 mA 2.5 mA/A + 250 mA	CP-033, Fluke 5522A/50 turn coil

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
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	0.08 % + 6 μV 0.015 % + 6 μV 0.2 % + 6 μV 0.1 % + 6 μV 0.35 % + 12 μV 0.8 % + 50 μV	CP-033, Fluke 5522A
(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	0.03 % + 8 μV 0.015 % + 9 μV 0.018 % + 9 μV 0.035 % + 8 μV 0.08 % + 32 μV 0.2 % + 70 μV	
(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	0.03 % + 56 μV 0.15 % + 67 μV 0.019 % + 64 μV 0.3 % + 24 μV 0.07 % + 100 μV	
(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	0.03 % + 0.7 mV 0.015 % + 0.6 mV 0.024 % + 0.6 mV 0.035 % + 0.6 mV 0.09 % + 1.6 mV	
(33 to 329.999) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.19 % + 2.8 mV 0.19 % + 7.9 mV 0.025 % + 6.3 mV 0.03 % + 6 mV 0.2 % + 50 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.03 % + 14 mV 0.25 % + 10 mV 0.3 % + 10 mV	

Parameter/Range	Frequency	CMC ^{2,5} (±)	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 μV 0.06 % + 30 μV 0.02 % + 20 μV 0.02 % + 20 μV 0.025 % + 20 μV 0.034 % + 71 μV 0.3 % + 30 μV 0.75 % + 50 μV 2 % + 200 μV 5 % + 400 μV	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 μV 0.025 % + 300 μV 0.035 % + 300 μV 0.02 % + 200 μV 0.025 % + 200 μV 0.05 % + 210 μV 0.3 % + 300 μV 0.75 % + 500 μV 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	
(200 to 700) V	(20 to 50) Hz (50 to 100) Hz (100 to 2000) Hz (2 to 10) kHz	0.09 % + 110 mV 0.05 % + 110 mV 0.05 % + 110 mV 0.06 % + 110 mV	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage – Measure ³ (cont) (200 to 700) V	(10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	0.08 % + 110 mV 0.1 % + 130 mV 0.5 % + 110 mV	CP-033, Keithley 2002
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 (10 to 30) kHz	0.2 % + 0.1 µA 0.15 % + 0.1 µA 0.125 % + 0.1 µA 0.3 % + 0.15 µA 0.8 % + 0.2 µA 1.6 % + 0.4 µA	CP-033, Fluke 5522A
(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 (10 to 30) kHz	0.17 % + 1.6 µA 0.125 % + 0.16 µA 0.1 % + 0.16 µA 0.2 % + 0.20 µA 0.5 % + 0.3 µA 1.0% + 0.6 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 (10 to 30) kHz	0.18 % + 2 µA 0.09 % + 2 µA 0.04 % + 2 µA 0.08 % + 2 µA 0.2 % + 3 µA 0.4 % + 4 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 (10 to 30) kHz	0.18 % + 0.22 µA 0.09 % + 20 µA 0.04 % + 21 µA 0.1 % + 50 µA 0.16 % + 100 µA 0.32 % + 200 µA	
(0.33 to 1.099 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 230 µA 0.05 % + 200 µA 0.6 % + 100 µA 2.5 % + 500 µA	
(1.1 to 2.999 99) A	10 to 45) Hz (45 to 1) kHz 1 kHz to 5 kHz (5 to 10) kHz	0.19 %+ 530µA 0.06 % + 200 µA 0.6 % + 1000 µA 2.5 % + 5000 µA	
(3 to 10.9999) A	(45 to 100) Hz (100 to 1) kHz 1 kHz to 5 kHz	0.06 % + 2.1 mA 0.1 % + 2 mA 3 % + 2 mA	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Generate ³ (cont)			
(11 to 20.5) A	(45 to 100) Hz (100 to 1) kHz (100 to 5) kHz	0.12 % + 5 mA 0.15 % + 5 mA 3 % + 5 mA	CP-033, Fluke 5522A
Clamp-on Meters:			
Non-Toroidal ³ (50 to 150) A	(45 to 65) Hz (65 to 400) Hz	5.3 mA/A + 370 mA 9 mA/A + 350 mA	CP-033, 5522A w/ 50 turn coil
(150 to 1000) A	(45 to 65) Hz (65 to 400) Hz	5 mA/A + 900 mA 10 mA/A + 890 mA	
AC Current – Measure ³			
(29 to 200) µA	(20 to 50) Hz (50 to 200) Hz (0.200 to 1) kHz (1 to 10) kHz	0.38 % + 19 nA 0.021 % + 19 nA 0.045 % + 18 nA 0.57 % + 18 nA	CP-033, multimeter
(0.20 to 2) mA	(20 to 50) Hz (50 to 200) Hz (0.200 to 1) kHz (1 to 10) kHz	0.33 % + 19 µA 0.16 % + 19 µA 0.14 % + 18 µA 0.14 % + 18 µA	
(2 to 20) mA	(20 to 50) Hz (50 to 200) Hz (0.200 to 1) kHz (1 to 10) kHz	0.35 % + 17 µA 0.17 % + 17 µA 0.14 % + 17 µA 0.14 % + 17 µA	
(20 to 200) mA	(20 to 50) Hz (50 to 200) Hz (0.200 to 1) kHz (1 to 10) kHz	0.35 % + 17 µA 0.17 % + 17 µA 0.14 % + 17 µA 0.17 % + 17 µA	
(0.20 to 2.0) A	(20 to 50) Hz (50 to 200) Hz (0.200 to 1) kHz (1 to 10) kHz	0.4 % + 17 mA 0.23 % + 17 mA 0.35 % + 17 mA 0.52 % + 17 mA	
(2 to 10) A	(0.01 to 5) kHz	0.17 % + 69 mA	

Parameter/Range	Frequency	CMC ^{2,5} (\pm)	Comments
Capacitance – Generate (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) μ F (1.1 to 3.299 99) μ F (3.3 to 10.9999) μ F (11 to 32.9999) μ F (33 to 109.999) μ F (110 to 329.999) μ F (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	(10 to 10 000) Hz (10 to 3000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	0.6 % + 0.01 nF 0.6 % + 0.01 nF 0.31 % + 0.1 nF 0.31 % + 0.1 nF 0.31 % + 0.3 nF 0.31 % + 1 nF 0.31 % + 3 nF 0.31 % + 10 nF 0.49 % + 30 nF 0.55 % + 100 nF 0.55 % + 300 nF 0.55 % + 1 μ F 0.55 % + 3 μ F 0.56 % + 10 μ F 0.91 % + 30 μ F 1.4 % + 100 μ F	CP-033, Fluke 5522A
Oscilloscopes – DC: 50 Ω 1 M Ω Square Wave: 50 Ω 1 M Ω Level Sine Wave: Amplitude (50 kHz Reference) Flatness (50 kHz Reference) Time Marker	(0 to +/- 6.6) V (0 to +/- 130) V (0 to +/- 6.6) V 10 Hz to 10 kHz (0 to +/- 130) V 10 Hz to 10 kHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 2 ns to 20 ms 50 ms to 5 s	0.26 % + 40 μ V 0.06 % + 40 μ V 0.26 % + 40 μ V 0.2 % + 40 μ V 2.0 % + 300 μ V 2.5 % + 300 μ V 5.0 % + 300 μ V 2.0 % + 100 μ V 3.0 % + 100 μ V 5.0 % + 100 μ V 3 μ s/s (30 + 1000 <i>t</i>) μ s/s	Fluke 5522A w SC600 * <i>t</i> represents the time

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1800) °C	0.77 °C 0.72 °C 0.70 °C 0.71 °C	CP-013, Fluke 5522A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.32 °C 0.27 °C 0.32 °C 0.50 °C 0.84 °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 0.18 °C 0.15 °C 0.17 °C 0.23 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.28 °C 0.21 °C 0.15 °C 0.19 °C 0.24 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.34 °C 0.19 °C 0.17 °C 0.27 °C 0.41 °C	
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.43 °C 0.31 °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	0.40 °C 0.21 °C 0.20 °C 0.20 °C 0.28 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments	
Electrical Simulation of Thermocouples (cont) –				
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.85 °C 0.72 °C 0.71 °C 0.75 °C	CP-013, Fluke 5522A	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.55 °C 0.35 °C 0.33 °C 0.40 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.25 °C 0.17 °C 0.15 °C		
Electrical Simulation of RTDs ³				
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C (630 to 800) °C	0.07 °C 0.09 °C 0.10 °C 0.12 °C 0.25 °C		CP-013, Fluke 5522A
Pt 3926, 100Ω	(-200 to 0) °C (0 to 300) °C (300 to 630) °C	0.11 °C 0.14 °C 0.16 °C		
Pt 3916, 100Ω	(-200 to -190) °C (-190 to 0) °C (0 to 260) °C (260 to 600) °C (600 to 630) °C	0.25 °C 0.05 °C 0.07 °C 0.10 °C 0.23 °C		
Pt 385, 200	(-200 to 260) °C 260 °C to 600 °C (600 to 630) °C	0.14 °C 0.18 °C 0.21 °C		
Pt 385, 500 Ω	(-200 to 260) °C (260 to 400) °C (400 to 630) °C	0.12 °C 0.13 °C 0.15 °C		

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTDs ³ (cont)			
Pt 385, 1000Ω	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.14 °C 0.15 °C 0.27 °C	CP-013, Fluke 5522A
Pt Ni, 120Ω	(-80 to 100) °C (100 to 260) °C	0.13 °C 0.17 °C	

VI. Fluid Quantities

Parameter/Equipment	Range	CMC ^{2, 7, 9} (±)	Comments
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
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

VII. Ionizing Radiation & Radioactivity

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

VIII. Mechanical

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Pressure Gages & 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	Up 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
Force Devices & Machines – Compression ³	Up 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 & 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

Parameter/Equipment	Range	CMC ^{2, 6, 7} (±)	Comments
Torque – Wrenches, Screw Drivers, & 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 Up 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
Indirect Verification of Rockwell Hardness ³	HRA: Low Medium High HRB: Low Medium High HRC: Low Medium High HRE: Low Medium High HRF: Low Medium High HR15N: Low Medium High	0.26 HRA 0.24 HRA 0.20 HRA 0.36 HRB 0.37 HRB 0.44 HRB 0.54 HRC 0.48 HRC 0.48 HRC 0.64 HRE 0.64 HRE 0.65 HRE 0.53 HRF 0.61 HRF 0.60 HRF 0.47 HR15N 0.29 HR15N 0.30 HR15N	CP-004 Rockwell hardness blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness ³ (cont)	HR30N: Low Medium High HR45N: Low Medium High HR15T: Low Medium High HR30T: Low Medium High HR45T: Low Medium High	0.46 HR30N 0.44 HR30N 0.32 HR30N 0.50 HR45N 0.23 HR45N 0.24 HR45N 0.46 HR15T 0.40 HR15T 0.38 HR15T 0.58 HR30T 0.39 HR30T 0.40 HR30T 0.64 HR45T 0.64 HR45T 0.46 HR45T	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
Brinell Hardness ³	HBW (126 to 758)	7.5 HBW	CP-014 Brinell hardness blocks

IX. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Ovens, Freezers, Environmental Chambers, Autoclaves, Water Baths, & 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

Parameter/Equipment	Range ⁶	CMC ^{2, 9} (\pm)	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
IR Thermometers/ Pyrometers ³	(28 to 500) °C	1.2 °C	CP-012, black body, PRT, reference pyrometer, $\epsilon = 0.95$, $\lambda = (8 \text{ to } 14) \mu\text{m}$
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	(10 to 95) % RH	1.0 % RH	CP-031, digital hygrometer

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 7} (\pm)	Comments
Frequency – Measuring Instruments	(0.01 to 600) MHz	3 $\mu\text{Hz}/\text{Hz} + 6 \mu\text{Hz}$	Multifunction calibrator, scope calibrator
Frequency – Measure ³	(10 to 999) Hz (1 to 99) kHz 100 kHz to 100 MHz (100 to 600) MHz	1 Hz 0.1 Hz 1.2 Hz 2 Hz	Frequency counter

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
Timers, Stop Watches ³	Up to 10 hrs	34 ms	CP-032 digital stopwatch
	Up to 24 hrs	34 ms	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 5522A

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 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 28th day of November 2022

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, 2024

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