



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

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CALIBRATION

Valid To: August 31, 2027

Certificate Number: 2332.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations^{1, 8}:

I. Chemical Quantities

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
pH Meters – Measuring Equipment	4 pH 7 pH 10 pH	0.02 pH 0.02 pH 0.02 pH	Reference pH solutions, thermometer
Conductivity Meters – Measuring Equipment	100 µS 1413 µS 10 000 µS	2.1 µS 4.7 µS 43 µS	Reference conductivity solutions, thermometer

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
Angle – Measure	Up to 90°	10 arc sec	Vision system
Angle – Measuring Equipment ⁶ (Protractor, Inclinometer, Levels)	Up to 90°	1.8 arc sec	Master angle blocks, master 90° square
Bore Gages	Up to 4 in	(52 + 26L)	Ring gages, surface plate
Calipers ^{3, 6}	Up to 24 in (24 to 40) in	5 μ in/in + 4.6 μ in 4.7 μ in/in + 4.5 μ in	Gage blocks
Coating Thickness Gages	Up to 60 mils	0.13 % + 0.14 mils	Thickness standards
End Rods	Up to 40 in	2.3 μ in/in + 14 μ in	LMU1000A
Gage Blocks	(0.05 to 1) in (1 to 4) in (4 to 20) in	2.2 μ in/in + 2.4 μ in 1.4 μ in/in + 1.7 μ in 1.9 μ in/in + 0.6 μ in	Lab master, LMU1000A, master gage blocks
Height Gage	Up to 48 in	(50 + 4.1L) μ in	Gage blocks, surface plate
Indicators	Up to 2 in	16 μ in	Lab master, LMU1000A, master gage blocks
Measuring Microscopes – X-Y Axis	Up to 12 in	3 μ in/in + 65 μ in	6 x 12 glass grid

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Micrometer ³	Up to 1 in (1 to 4) in (4 to 24) in (24 to 40) in	4.0 μ in/in + 10 μ in 2.9 μ in/in + 43 μ in 2.9 μ in/in + 77 μ in 1.7 μ in/in + 400 μ in	Gage blocks
Optical Comparators ³ – Linear Accuracy Angle X/Y Perpendicularity Magnification	Up to 12 in 30 in chart (in decimal degree) Up to 3 in Up to 30 in chart	2.8 μ in/in + 76 μ in 0.022° 80 μ in 0.003 in	Max Levy glass grid
Pins, Plug Gages, & Master Disk	Up to 20 in	1.5 μ in/in + 9.3 μ in	Lab master, LMU1000A, master gage blocks
Radius Gages	Up to 8 in	360 μ in	Vision system
Ring Gages	(0.125 to 0.25) in (0.25 to 1) in (1 to 3) in (3 to 15) in	11 μ in 5.3 μ in/in + 9.8 μ in 1.0 μ in/in + 14 μ in 1.6 μ in/in + 14 μ in	LMU1000A, master ring
Surface Plates Grade AA, A, & B ³ – Flatness Repeat Reading	Up to 192 in <i>DL</i> Up to 0.002 in	5.3 μ in + 0.51 μ in/in 29 μ in	LDDM laser <i>DL</i> = diagonal length Repeat-o-meter
Surface Roughness Meters & Profilometer	(119.0 to 121.0) μ in Ra	2.1 μ in	Roughness specimen
Tape Measure	Up to 100 ft	0.004 % + 0.0014 in	LDDM laser, length calibration system

Parameter/Equipment	Range	CMC ² (±)	Comments
Thread Plugs – Simple Pitch Diameter Major Diameter	Up to 8 in Up to 12 in	96 µin 2 µin/in + 56 µin	LMU1000A, master gage blocks & thread wires
Video Measuring Systems ³ – X-Y Axis Z Axis TurnCheck Height (Z Axis) Width (X-Y Axis)	 Up to 12 in Up to 18 in Up to 24 in Up to 4 in Up to 600 mm Up to 130 mm	 3.7 µin/in + 34 µin 3.3 µin/in + 29 µin 3.2 µin/in + 35 µin 11 µin/in + 34 µin 0.71 µm 0.44 µm	 6 x 12 glass grid 12 x 12 glass grid 18 x 24 glass grid Gage blocks Turncheck height gage Turncheck width gage

III. Dimensional Testing/Calibration¹

Parameter/Equipment	Range	CMC ² (±)	Comments
Length – 1 Dimensional ⁹ – Measure	Up to 240 in	1.3 µin/in + 1.5 µin	LDDM laser
Length – 2 Dimensional ⁹ – Measure	Up to 24 in <i>DL</i>	6.7 µin/in + 89 µin	Vision system <i>DL</i> = diagonal length

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
DC Voltage ^{3, 6} – Generate	(0 to 329.9999) mV (0 to 3.299 999) V (0 to 32.999 99) V (30 to 329.9999) V (100 to 1020) V	20 nV/mV + 1000 nV 11 µV/V + 2 µV 12 µV/V + 20 µV 18 µV/V + 160 µV 18 µV/V + 1500 µV	Fluke 5520A
DC Voltage ³ – Measure	(0 to 120) mV (0 to 1.2) V (0 to 12) V (0 to 120) V (0 to 1050) V (0 to 10) kV (10 to 35) kV (35 to 70) kV (70 to 90) kV	6.4 nV/mV + 530 nV 5.2 µV/V + 0.53 µV 5.2 µV/V + 1.4 µV 7.4 µV/V + 53 µV 23 µV/V + 330 µV 0.05 % + 0.006 V 0.07 % + 0.06 V 0.12 % + 0.06 V 0.28 % + 0.1 V	Agilent 3458A opt 2 Vitretek 4700 Vitretek HVL-35 Vitretek HVL-70 Vitretek HVL-150
DC Current ^{3, 6} – Generate	(0 to 329.999) µA (0 to 3.299 99) mA (0 to 32.9999) mA (0 to 329.999) mA (0 to 1.099 99) A (1.1 to 2.999 99) A (0 to 10.9999) A (11 to 20.5) A	0.015 % + 20 nA 0.01 % + 0.05 µA 0.01 % + 0.25 µA 0.01 % + 2.5 µA 0.02 % + 0.04 mA 0.039 % + 0.032 mA 0.051 % + 0.5 mA 0.095 % + 1.6 mA	Fluke 5520A
Clamp-On Meters	(20 to 1000) A	0.29 % + 0.082 A	Fluke 5520A w/ 50 turn coil
DC Current ^{3, 6} – Measure	(0 to 120) nA (0 to 1.2) µA (0 to 12) µA (0 to 120) µA (0 to 1.2) mA (0 to 12) mA (0 to 120) mA (0 to 1.05) A	0.033 pA/nA + 52 pA 0.024 nA/µA + 0.052 nA 0.026 nA/µA + 0.087 nA 0.027 nA/µA + 0.76 nA 0.025 µA/mA + 0.0053 µA 0.026 µA/mA + 0.053 µA 0.046 µA/mA + 0.54 µA 0.13 mA/A + 0.012 mA	Agilent 3458A opt 2

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Resistance ^{3, 6} – Generate	(0 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) kΩ (1.1 to 3.299 999) kΩ (3.3 to 10.999 99) kΩ (11 to 32.999 99) kΩ (33 to 109.9999) kΩ (110 to 329.9999) kΩ (0.33 to 1.099 999) MΩ (1.1 to 3.299 999) MΩ (3.3 to 10.999 99) MΩ (11 to 32.999 99) MΩ (33 to 109.9999) MΩ (110 to 329.999) MΩ (330 to 1100) MΩ	45 μΩ/Ω + 1000 μΩ 32 μΩ/Ω + 1400 μΩ 29 μΩ/Ω + 1400 μΩ 27 μΩ/Ω + 2100 μΩ 29 mΩ/kΩ + 1.6 mΩ 27 mΩ/kΩ + 21 mΩ 29 mΩ/kΩ + 16 mΩ 27 mΩ/kΩ + 210 mΩ 29 mΩ/kΩ + 160 mΩ 33 mΩ/kΩ + 2000 mΩ 32 Ω/MΩ + 2.3 Ω 60 Ω/MΩ + 30 Ω 130 Ω/MΩ + 43 Ω 250 Ω/MΩ + 2600 Ω 520 Ω/MΩ + 2900 Ω 3000 Ω/MΩ + 110 000 Ω 15 000 Ω/MΩ + 570 000 Ω	Fluke 5520A
Fixed Points	1.0 mΩ 10.0 mΩ 100.0 mΩ 1.0 Ω 10.0 Ω 100.0 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ	0.000 25 mΩ 0.0025 mΩ 0.025 mΩ 0.000 25 Ω 0.0025 Ω 0.025 Ω 24 mΩ 240 Ω 2.5 Ω 30 Ω 10 kΩ 920 kΩ 9.2 MΩ 140 MΩ 3.9 GΩ	Fixed standard resistors
Resistance ^{3, 6} – Measure	(0 to 12) Ω (0 to 120) Ω (0 to 1.2) kΩ (0 to 12) kΩ (0 to 120) kΩ (0 to 1.2) MΩ (0 to 12) MΩ (0 to 120) MΩ (0 to 1.2) GΩ	18 μΩ/Ω + 70 μΩ 15 μΩ/Ω + 700 μΩ 12 mΩ/kΩ + 2.4 mΩ 12 mΩ/kΩ + 24 mΩ 12 mΩ/kΩ + 240 mΩ 18 Ω/MΩ + 3.3 Ω 61 Ω/MΩ + 120 Ω 610 Ω/MΩ + 2100 Ω 5700 kΩ/GΩ + 110 kΩ	Agilent 3458A opt 2

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTDs 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	0.08 °C 0.08 °C 0.09 °C 0.11 °C 0.12 °C 0.14 °C 0.24 °C	Fluke 5520A
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	0.08 °C 0.08 °C 0.1 °C 0.11 °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	0.26 °C 0.07 °C 0.08 °C 0.09 °C 0.1 °C 0.1 °C 0.11 °C 0.12 °C 0.24 °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	0.07 °C 0.07 °C 0.07 °C 0.08 °C 0.17 °C 0.16 °C 0.16 °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	0.07 °C 0.08 °C 0.08 °C 0.09 °C 0.1 °C 0.1 °C 0.11 °C 0.13 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTDs 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	0.07 °C 0.07 °C 0.07 °C 0.08 °C 0.09 °C 0.09 °C 0.09 °C 0.24 °C	Fluke 5520A
Ni 120, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.1 °C 0.1 °C 0.15 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.32 °C	
Electrical Simulation of Thermocouples ³ –			
Type B	(250 to 349) °C (350 to 444) °C (445 to 579) °C (580 to 749) °C (750 to 999) °C (1000 to 1820) °C	0.95 °C 0.74 °C 0.58 °C 0.45 °C 0.37 °C 0.29 °C	Ectron 1140A
Type C	(0 to 249) °C (250 to 999) °C (1000 to 1499) °C (1500 to 1799) °C (1800 to 1999) °C (2000 to 2249) °C (2250 to 2315) °C	0.20 °C 0.16 °C 0.18 °C 0.21 °C 0.23 °C 0.29 °C 0.32 °C	
Type E	(-270 to -244) °C (-245 to -194) °C (-195 to -154) °C (-155 to -90) °C (-90 to 14) °C (15 to 889) °C (890 to 1000) °C	1.20 °C 0.18 °C 0.10 °C 0.08 °C 0.07 °C 0.06 °C 0.07 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples ³ – (cont)			
Type J	(-210 to -179) °C (-180 to -119) °C (-120 to -49) °C (-50 to 989) °C (990 to 1200) °C	0.12 °C 0.10 °C 0.08 °C 0.07 °C 0.07 °C	Ectron 1140A
Type K	(-270 to -254) °C (-255 to -194) °C (-195 to -114) °C (-115 to -54) °C (-55 to 999) °C (1000 to 1372) °C	2.20 °C 0.70 °C 0.12 °C 0.09 °C 0.07 °C 0.08 °C	
Type N	(-270 to -259) °C (-260 to -199) °C (-200 to -139) °C (-140 to -69) °C (-70 to 24) °C (25 to 159) °C (160 to 1300) °C	5.0 °C 1.0 °C 0.23 °C 0.15 °C 0.12 °C 0.10 °C 0.09 °C	
Type R	(-50 to -29) °C (-30 to 44) °C (45 to 159) °C (160 to 379) °C (380 to 774) °C (775 to 1768) °C	0.65 °C 0.55 °C 0.40 °C 0.30 °C 0.26 °C 0.22 °C	
Type S	(-50 to -29) °C (-30 to 44) °C (45 to 159) °C (160 to 379) °C (380 to 774) °C (775 to 1768) °C	0.62 °C 0.56 °C 0.40 °C 0.33 °C 0.29 °C 0.26 °C	
Type T	(-270 to -254) °C (-255 to -239) °C (-240 to -209) °C (-210 to -149) °C (-150 to -39) °C (-40 to 99) °C (100 to 400) °C	1.8 °C 0.49 °C 0.30 °C 0.18 °C 0.12 °C 0.08 °C 0.07 °C	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage ^{3, 6} – Generate			
(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	0.079 % + 6 µV 0.015 % + 6 µV 0.021 % + 6.1 µV 0.1 % + 6.1 µV 0.36 % + 12 µV 0.79 % + 50 µV	Fluke 5520A
(33 to 329.999) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.031 % + 7.8 µV 0.014 % + 8.2 µV 0.016 % + 8.8 µV 0.034 % + 8.9 µV 0.081 % + 32 µV 0.2 % + 74 µV	
(330 mV to 3.3) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.029 % + 0.0o mV 0.015 % + 0.06 mV 0.019 % + 0.068 mV 0.029 % + 0.056 mV 0.069 % + 0.13 mV 0.24 % + 0.6 mV	
(3.3 to 32.9999) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.031 % + 0.67 mV 0.015 % + 0.6 mV 0.024 % + 0.6 mV 0.034 % + 0.67 mV 0.089 % + 1.7 mV	
(33 to 329.999) V	(45 to 1000) Hz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.019 % + 2.2 mV 0.02 % + 6.4 mV 0.025 % + 5.7 mV 0.032 % + 5.6 mV 0.2 % + 54 mV	
(330 to 1020) V	(45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.03 % + 9.6 mV 0.026 % + 9.8 mV 0.03 % + 9.6 mV	
AC Voltage ^{3, 6} – Measure			
(1.2 to 12) mV	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.034 % + 3.5 µV 0.023 % + 1.2 µV 0.034 % + 1.3 µV 0.11 % + 1.3 µV 0.58 % + 1.2 µV 4.6 % + 2.2 µV	Agilent 3458A opt 2

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ^{3,6} – Measure (cont)			
(12 to 120) mV	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.0096 % + 4.4 µV 0.009 % + 2.2 µV 0.017 % + 2.2 µV 0.041 % + 2.1 µV 0.098 % + 2.2 µV 0.35 % + 12 µV 1.2 % + 11 µV 1.7 % + 11 µV	Agilent 3458A opt 2
(0.12 to 1.2) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.0096 % + 0.044 mV 0.009 % + 0.022 mV 0.065 % + 0.0089 mV 0.037 % + 0.022 mV 0.098 % + 0.022 mV 0.35 % + 0.12 mV 1.2 % + 0.11 mV 1.7 % + 0.11 mV	
(1.2 to 12) V	(1 to 40) Hz (40 to 100) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz	0.0096 % + 0.44 mV 0.009 % + 0.22 mV 0.017 % + 0.22 mV 0.036 % + 0.22 mV 0.089 % + 0.33 mV 0.35 % + 1.1 mV 1.2 % + 1.1 mV 1.7 % + 1.1 mV	
(12 to 120) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.024 % + 4.6 mV 0.023 % + 2.3 mV 0.024 % + 2.3 mV 0.041 % + 2.2 mV 0.14 % + 2.2 mV 0.47 % + 11 mV 1.7 % + 11 mV	
(70 to 700) V	(1 to 40) Hz (40 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.048 % + 46 mV 0.047 % + 23 mV 0.07 % + 23 mV 0.14 % + 23 mV 0.35 % + 22 mV	
Up to 10 kV	(30 to 200) Hz	0.16 % + 0.006 V	Vitretek 4700
(10 to 30) kV	(30 to 200) Hz	0.14 % + 0.06 V	Vitretek HVL-35

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage ^{3,6} – Measure (cont)			
(30 to 50) kV (50 to 70) kV	(30 to 100) Hz < 65 Hz	0.16 % + 0.06 V 0.69 % + 0.06 V	Vitrek HVL-70 Vitrek HVL-150
AC Current ^{3,6} – Generate			
(29 to 329.99) µA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 75 nA 0.12 % + 76 nA 0.096 % + 82 nA 0.24 % + 110 nA 0.62 % + 160 nA 1.2 % + 310 nA	Fluke 5520A
(0.33 to 3.2999) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.15 % + 0.12 µA 0.096 % + 0.12 µA 0.078 % + 0.13 µA 0.16 % + 0.17 µA 0.39 % + 0.22 µA 0.77 % + 0.44 µA	
(3.3 to 32.999) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 1.6 µA 0.071 % + 1.6 µA 0.031 % + 1.7 µA 0.062 % + 1.7 µA 0.16 % + 2.3 µA 0.33 % + 2.2 µA	
(33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 16 µA 0.071 % + 16 µA 0.031 % + 17 µA 0.079 % + 39 µA 0.15 % + 79 µA 0.32 % + 160 µA	
(0.33 to 1.099 99) A	(10 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.086 mA 0.039 % + 0.081 mA 0.47 % + 0.76 mA 1.9 % + 3.6 mA	
(1.1 to 2.999 99) A	(10 to 45) Hz (45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.037 mA 0.047 % + 0.079 mA 0.48 % + 0.63 mA 1.9 % + 3.6 mA	
(3 to 10.9999) A	(10 to 45) Hz (45 to 1000) Hz (1 to 5) kHz	0.048 % + 1.6 mA 0.076 % + 1.6 mA 2.4 % + 1.5 mA	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current ³ – Generate (cont)			
(11 to 20.5) A	(10 to 45) Hz (45 to 1000) Hz (1 to 5) kHz	0.095 % + 3.6 mA 0.12 % + 4.3 mA 2.3 % + 5.3 mA	
Clamp Meters: (20 to 1000) A	(45 to 65) Hz	0.4 % + 0.078 A	Fluke 5520A & 50 turn coil
AC Current ^{3, 6} – Measure			
(6 to 120) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 35 nA 0.17 % + 35 nA 0.071 % + 35 nA 0.071 % + 35 nA	Agilent 3458A opt 2
(0.06 to 1.2) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.47 % + 0.23 µA 0.17 % + 0.24 µA 0.073 % + 0.23 µA 0.036 % + 0.23 µA 0.073 % + 0.23 µA 0.47 % + 0.46 µA 0.65 % + 1.7 µA	
(0.6 to 12) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.47 % + 2.3 µA 0.17 % + 2.4 µA 0.073 % + 2.3 µA 0.036 % + 2.3 µA 0.073 % + 2.3 µA 0.47 % + 4.6 µA 0.65 % + 17 µA	
(6 to 120) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.47 % + 23 µA 0.17 % + 24 µA 0.073 % + 23 µA 0.036 % + 23 µA 0.073 % + 23 µA 0.47 % + 46 µA 0.65 % + 170 µA	
(0.0525 to 1.05) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 0.24 mA 0.19 % + 0.23 mA 0.092 % + 0.23 mA 0.11 % + 0.23 mA 0.35 % + 0.24 mA 1.2 % + 0.47 mA	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
Capacitance ³ – Generate			Fluke 5520A
(0.19 to 0.3999) nF	10 Hz to 10 kHz	0.5 % + 0.01 nF	
(0.4 to 1.0999) nF	10 Hz to 10 kHz	0.5 % + 0.01 nF	
(1.1 to 3.2999) nF	10 Hz to 3 kHz	0.5 % + 0.01 nF	
(3.3 to 10.999) nF	10 Hz to 1 kHz	0.25 % + 0.01 nF	
(11 to 32.9999) nF	10 Hz to 1 kHz	0.25 % + 0.1 nF	
(33 to 109.999) nF	10 Hz to 1 kHz	0.25 % + 0.1 nF	
(110 to 329.999) nF	10 Hz to 1 kHz	0.25 % + 0.3 nF	
(0.33 to 1.099 99) µF	(10 to 600) Hz	0.25 % + 1.0 nF	
(1.1 to 3.299 99) µF	(10 to 300) Hz	0.25 % + 3.0 nF	
(3.3 to 10.9999) µF	(10 to 150) Hz	0.25 % + 10 nF	
(11 to 32.9999) µF	(10 to 120) Hz	0.4 % + 30 nF	
(33 to 109.999) µF	(10 to 80) Hz	0.45 % + 100 nF	
(110 to 329.999) µF	(10 to 50) Hz	0.45 % + 300 nF	
(0.33 to 1.0999) mF	(0 to 20) Hz	0.45 % + 1.0 µF	
(1.1 to 3.2999) mF	(0 to 6) Hz	0.45 % + 3.0 µF	
(3.3 to 10.9999) mF	(0 to 2) Hz	0.45 % + 10 µF	
(11 to 32.999) mF	(0 to 0.6) Hz	0.75 % + 30 µF	
(33 to 110) mF	(0 to 0.2) Hz	1.1 % + 100 µF	

Parameter/Equipment	Range	CMC ² (±)	Comments
Oscilloscope ³ –			
Amplitude – 50 Ω Load 1 MΩ Load	(-6.6 to 6.6) V (-130 to 130) V	0.25 % of output + 40 µV 0.05 % of output + 40 µV	Fluke 5522A/SC1100
Leveled Sine Wave Amplitude – 5 mV to 5.5 V	50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.0 % of output + 300 µV 3.5 % of output + 300 µV 4.0 % of output + 300 µV 6.0 % of output + 300 µV 6.0 % of output + 300 µV	
4 mV to 3.5 V			
Flatness – Relative to 50 kHz 5 mV to 5.5 V	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	1.5 % of output + 100 µV 2.0 % of output + 100 µV 4.0 % of output + 100 µV 5.0 % of output + 100 µV	
4 mV to 3.5 V			

Parameter/Equipment	Range	CMC ² (±)	Comments
Oscilloscope ³ – (cont)			
Time Marker ⁶ – 50 Ω Load	5 s to 50 ms 20 ms to 1 ns	$(25 + 1000t) \mu\text{s/s}$ 2.5 $\mu\text{s/s}$	Fluke 5520A/SC600 t = time in seconds
Edge ⁶ – Rise Time 50 Ω Load	1 kHz to 2 MHz (200 to 300) ps (2 to 10) MHz (200 to 350) ps	100 ps 100 ps	

V. Electrical – RF Microwave

Parameter/Equipment	Range	CMC ^{2, 5, 7} (±)	Comments
Amplitude Flatness ³ – Measure (Relative to 100 kHz)	(-3 to 0) dBm 100 kHz to 80 MHz	0.042 dB	R&S NRP-Z51 power sensor
Absolute Power ³ – Measure	(-13 to 20) dBm 100 kHz to 80 MHz	0.042 dB	R&S NRP-Z51 power sensor

VI. Mechanical

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Balance & Scales	Up to 30 kg Up to 1000 lb	0.0002 % + 0.026 mg 0.016 % + 0.000 05 lb	Class F weight

Parameter/Equipment	Range	CMC ^{2, 5, 7} (±)	Comments
Force Gauges – Measuring Equipment	Up to 500 lbf	± 0.01 % of rdg + 0.002 lbf	Direct comparison to ASTM Class 6 & 7 weights &/or load cells tension & compression
Load Cells – Measuring Equipment	Up to 25 lbf (26 to 250) lbf (251 to 1150) lbf (1101 to 2500) lbf (2501 to 11 500) lbf (10 001 to 50 000) lbf (50 001 to 100 000) lbf	0.021 lbf 0.10 lbf 0.48 lbf 1.1 lbf 4.3 lbf 30 lbf 63 lbf	Load cells tension & compression Compression only
Force Measurement Test Stands			
Length	(1 to 8) in (8 to 20) in	63 µin/in + 1200 µin 0.006 in	Grade AS2 or better gage blocks
Crosshead Speed	(0.005 to 20) in/min	0.24 % + 0.004 in/min	Steel rule, stopwatch
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers	HRBW: (40 to 59) HRBW (59 to 79) HRBW (79 to 100) HRBW HRC: (20 to 35) HRC (35 to 55) HRC (55 to 65) HRC HR15N: (70 to 77) HR15N (77 to 88) HR15N (88 to 92) HR15N HR30N: (40 to 54) HR30N (54 to 76) HR30N (76 to 86) HR30N	0.62 HRBW 0.55 HRBW 0.66 HRBW 0.34 HRC 0.27 HRC 0.28 HRC 0.53 HR15N 0.38 HR15N 0.36 HR15N 0.36 HR30N 0.36 HR30N 0.37 HR30N	Rockwell hardness test blocks

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers (cont)	HR15TW: (60 to 80) HR15TW (80 to 86) HR15TW (86 to 93) HR15TW HR30TW: (15 to 56) HR30TW (56 to 69) HR30TW (69 to 83) HR30TW	0.29 HR15TW 0.58 HR15TW 0.53 HR15TW 0.48 HR30TW 0.41 HR30TW 0.45 HR30TW	Rockwell hardness test blocks
Pressure ³ – Measuring Equipment	Pneumatic, Absolute (0.13 to 14.7) psia (14.7 to 15.7) psia (15.7 to 21.1) psia (21.1 to 22.7) psia (22.7 to 30.7) psia Pneumatic (4 to 860) inH ₂ O (0 to 1) psi (1 to 6.4) psi (3 to 500) psi (501 to 1500) psi (1501 to 5000) psi (0 to 2) inH ₂ O Vacuum (0 to -15) psi (0 to -1) psi Water (10 to 10 000) psi	0.0025 psia 0.0018 psia 0.0019 psia 0.0020 psia 0.0026 psia 0.02 % 0.000 12 psi 0.0008 psi 0.01 % + 0.000 06 psi 0.012 % + 0.003 psi 0.012 % + 0.001 psi 0.000 48 inH ₂ O 0.002 psi 0.0001 psi 0.01 % + 0.0006 psi	Mensor CPC6000 transducers PKII 654WC-SS Mensor CPC6050 transducers T3500 deadweight Mensor CPC8000 transducer Dwyer 1430 microtector Mensor CPC6000 transducer Fluke P3224
Torque ³ – Measuring Equipment	(4 to 50) lbf·in (30 to 400) lbf·in (80 to 1000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft	0.25 % + 0.023 lbf·in 0.25 % + 0.24 lbf·in 0.27 % + 0.27 lbf·in 0.27 % + 0.067 lbf·ft 0.6 %	Snap-On TTC400 system Snap-On TTC12

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Torque Analyzers, Transducers	(2.5 to 50) lbf·in (10 to 150) lbf·in (30 to 400) lbf·in (80 to 1000) lbf·in (20 to 250) lbf·ft (20 to 2200) lbf·ft	0.02 % + 0.012 lbf·in 0.04 % + 0.011 lbf·in 0.04 % + 0.013 lbf·in 0.04 % + 0.14 lbf·in 0.04 % + 0.018 lbf·ft 0.05 % + 0.005 lbf·ft	5 in wheel 5 in wheel 20 in wheel 20 in wheel 20 in wheel 40 in arm, class F weights ASTM Class 6 weights

VII. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
Temperature ³ – Measure Water Baths, Thermal Wells, Refrigerators, Chambers, Ovens, Freezers	(-200 to 0) °C (0 to 660) °C	0.0041 % + 0.016 °C 0.0012 % + 0.016 °C	Additel (PRT system) AM1751
Temperature ³ – Measuring Equipment Digital & Analogue Thermometers	(-5 to 125) °C (50 to 660) °C	0.015 % + 0.039 °C 0.016 % + 0.045 °C	Additel (PRT system) AM1751, thermal wells
Relative Humidity – Measuring Equipment	Up to 80 % RH (80 to 100) % RH	0.3 % + 0.52 % RH 0.4 % + 0.46 % RH	GeoCal 2000SP, Rotronic HC2A-SH
Infrared Thermometers	(35 to 500) °C	0.42 % + 0.33 °C	Fluke 4181 $\epsilon = 0.9$ to 1.0 $\lambda = (8 \text{ to } 14) \mu\text{m}$

VIII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,7} ($\pm$)	Comments
Frequency ³ – Measure	DC to 3 GHz	1.7 parts in 10^7 Hz	Agilent 53132A opt.10 conditioned by a Datum 9390-6000 GPS
Frequency ³ – Measuring Equipment	DC to 600 MHz	1.7 parts in 10^7 Hz	Fluke 5520A/SC600 conditioned by a Datum 9390-6000 GPS
Stopwatches / Timers ³	(0 to 19.99) s/day	0.037 s/day	Timometer

¹ This laboratory offers commercial dimensional testing/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 Calibration and Measurement Capability Uncertainty (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 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 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. CMC's are expressed as either a specific value that covers the full range or as a percentage or fraction of the reading plus a fixed floor specification.

⁵ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches and % is the percent of reading unless otherwise stated.

⁶ In the statement of CMC, the contributions from "the best existing device" are not included.

⁷ 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.

⁸ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁹ 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.



Accredited Laboratory

A2LA has accredited

INSTRUMENT CALIBRATION SOLUTIONS, LLC

Aliquippa, PA

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 2nd day of October 2025.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2332.01
Valid to August 31, 2027

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