



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
ANSI/NCSL Z540-1-1994 & ANSL/NCSL Z540.3-2006

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CALIBRATION

Valid To: November 30, 2023

Certificate Number: 2917.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 10}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Gage Blocks	Up to 4 in (5 to 20) in	(3 + 1.9L) μin (1.3 + 2.6L) μin	Master gage blocks
Calipers ³	Up to 36 in	(580 + 2.5L) μin	Gage blocks, ring gauge
Micrometers ³	Up to 24 in	(86 + 3.3L) μin	Gage blocks
Height Gage ³	Up to 24 in	(30 + 1.9L) μin	Gage blocks, surface plate
Length Indicators ³ (Digital, Dial, Test, LVDTs)	Up to 0.010 in Up to 1 in	11 μin 37 μin	Universal measuring machine (UMM), gage blocks, indicator calibrator
Cylindrical Gages – Plain Rings	Up to 6 in (6 to 12) in	(9 + 1L) μin (22 + 1.7L) μin	Universal measuring machine (UMM), cylindrical Rings

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Cylindrical Gages – Plain Plugs and Pins ^{3, 8}	Up to 12 in	(2.6 + 0.9L) μin	Universal measuring machine (UMM)
Thread Plugs – Simple Pitch Diameter	Up to 6 in	(63 + 0.8L) μin	Universal measuring machine (UMM) and thread wires
Major Diameter	Up to 6 in	(11 + 1.8L) μin	Universal measuring machine
Thread Rings – Solid Rings Simple Pitch Diameter Minor Diameter	Up to 2 in Up to 2 in	(79 + 28L) μin (80 + 3.4L) μin	Universal measuring machine (UMM) and thread balls.
Adjustable Simple Pitch Diameter Minor Diameter	Up to 2 in Up to 2 in	Class X Tolerance (80 + 3.4L) μin	Thread setting plug vision system
Optical Comparator ³	Up to 12 in	(127 + 7.1L) μin	Glass scale standard
Z-Mike Laser Micrometer	Up to 1 in	(18 + 4.8L) μin	Plug gages
Length Standard	Up to 40 in	(21 + 1.9L) μin	P&W 1000A ULM, gauge blocks length measuring system
Surface Finish Analyzer ³	Ra: (16.1 to 119.5) μin	4 μin	Surface finish standards
Surface Finish Patch ³	Ra: (16.1 to 119.5) μin	6 μin	Mitutoyo surface finish tester
Dial Indicator Calibrator	Up to 1 in	39 μin	Gage block and electronic amplifier

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Thread Wires	Up to 0.5 in	8 μin	Universal measuring machine (UMM), gage blocks
Universal Measuring Machines (UMMs), Laser Micrometers, Linear Scales ³	Up to 40 in	(6 + 8L) μin	Gage blocks, master plug gages, force gage
Optical Scales (Reticles, Optical Micrometer Scales, Optical Grids)	Up to 12 in	(67 + 8.6L) μin	OGP vision systems, glass scales/grids

II. Dimensional Testing/Calibration⁶

Parameter/Equipment	Range	CMC ² (±)	Comments
Length, Angle, Geometry – Piece Parts, First Articles, Fixture Gages	3D Measurement: Up to 27.6 in	240 μin	CMM used for 3D measurements
Length, Angle, Geometry – Piece Parts, First Articles, Fixture Gages	Up to 16 in	140 μin	Vision systems used for measurements

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
DC Voltage – Generate ³	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	11 μV/V + 3.4 μV 11 μV/V + 5.7 μV 10 μV/V + 62 μV 15 μV/V + 0.19 mV 15 μV/V + 1.9 mV	Fluke 5520A opt 1

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
DC Current – Generate ³	(0 to 330) μ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 3) A (3 to 20.5) A	120 μ A/A + 16 nA 75 μ A/A + 49 nA 74 μ A/A + 0.35 μ A 98 μ A/A + 4.5 μ A 290 μ A/A + 54 μ A 810 μ A/A + 0.88 mA	Fluke 5520A opt1
DC Voltage – Measure ³	(0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	6.1 μ V/V + 0.13 μ V 3.5 μ V/V + 0.82 μ V 3.5 μ V/V + 7.5 μ V 5.3 μ V/V + 69 μ V 5.6 μ V/V + 0.67 mV	Fluke 8508A
DC Current – Measure ³	(0 to 200) μ A (0.2 to 2) mA (2 to 20) mA (20 to 200) mA (0.2 to 2) A (2 to 20) A	12 μ A/A + 0.55 nA 13 μ A/A + 4.3 nA 13 μ A/A + 45 nA 40 μ A/A + 1.4 μ A 170 μ A/A + 19 μ A 360 μ A/A + 0.63 mA	Fluke 8508A
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (0.33 to 1.1) G Ω	45 $\mu\Omega/\Omega$ + 1.2 m Ω 24 $\mu\Omega/\Omega$ + 1.2 m Ω 23 $\mu\Omega/\Omega$ + 1.1 m Ω 25 $\mu\Omega/\Omega$ + 2.4 m Ω 24 $\mu\Omega/\Omega$ + 3.4 m Ω 33 $\mu\Omega/\Omega$ + 14 m Ω 27 $\mu\Omega/\Omega$ + 12 m Ω 25 $\mu\Omega/\Omega$ + 0.14 Ω 24 $\mu\Omega/\Omega$ + 0.17 Ω 31 $\mu\Omega/\Omega$ + 0.68 Ω 28 $\mu\Omega/\Omega$ + 1.8 Ω 63 $\mu\Omega/\Omega$ + 20 Ω 100 $\mu\Omega/\Omega$ + 38 Ω 210 $\mu\Omega/\Omega$ + 2.2 k Ω 500 $\mu\Omega/\Omega$ + 3.0 k Ω 0.24 % + 95 k Ω 1.2 % + 0.53 M Ω	Fluke 5520A opt 1

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
Resistance – Measure ³	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) k Ω (2 to 20) k Ω (20 to 200) k Ω (0.2 to 2) M Ω (2 to 20) M Ω (20 to 200) M Ω (0.2 to 2) G Ω	16 $\mu\Omega/\Omega$ + 5.2 $\mu\Omega$ 9 $\mu\Omega/\Omega$ + 21 $\mu\Omega$ 7.6 $\mu\Omega/\Omega$ + 70 $\mu\Omega$ 7.9 $\mu\Omega/\Omega$ + 0.65 m Ω 7.2 $\mu\Omega/\Omega$ + 14 m Ω 8.2 $\mu\Omega/\Omega$ + 57 m Ω 13 $\mu\Omega/\Omega$ + 1.6 Ω 22 $\mu\Omega/\Omega$ + 0.10 k Ω 150 $\mu\Omega/\Omega$ + 9.8 k Ω 0.14 % + 0.95 M Ω	Fluke 8508A

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
AC Voltage – Measure ³			
(0 to 199) mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	130 $\mu\text{V}/\text{V}$ + 16 μV 130 $\mu\text{V}/\text{V}$ + 5 μV 110 $\mu\text{V}/\text{V}$ + 5 μV 110 $\mu\text{V}/\text{V}$ + 2.4 μV 130 $\mu\text{V}/\text{V}$ + 5 μV 420 $\mu\text{V}/\text{V}$ + 10 μV 670 $\mu\text{V}/\text{V}$ + 24 μV	Fluke 8508A
199 mV to 1.99 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 $\mu\text{V}/\text{V}$ + 0.14 mV 100 $\mu\text{V}/\text{V}$ + 24 μV 84 $\mu\text{V}/\text{V}$ + 24 μV 75 $\mu\text{V}/\text{V}$ + 24 μV 120 $\mu\text{V}/\text{V}$ + 24 μV 390 $\mu\text{V}/\text{V}$ + 50 μV 540 $\mu\text{V}/\text{V}$ + 0.24 mV 0.24 % + 24 mV	
(2 to 19.9) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 $\mu\text{V}/\text{V}$ + 1.4 mV 110 $\mu\text{V}/\text{V}$ + 0.24 mV 84 $\mu\text{V}/\text{V}$ + 0.24 mV 76 $\mu\text{V}/\text{V}$ + 0.24 mV 130 $\mu\text{V}/\text{V}$ + 0.24 mV 210 $\mu\text{V}/\text{V}$ + 0.50 mV 460 $\mu\text{V}/\text{V}$ + 2.4 mV 0.82 % + 0.24 V	

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
AC Voltage – Measure ³ (cont)			
(20 to 199) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	120 μ V/V + 14 mV 110 μ V/V + 2.4 mV 91 μ V/V + 2.4 mV 78 μ V/V + 2.4 mV 120 μ V/V + 2.4 mV 200 μ V/V + 5.0 mV 480 μ V/V + 24 mV	Fluke 8508A
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz (0.04 to 10) kHz (10 to 30) kHz (30 to 100) kHz	57 μ V/V + 0.16 V 91 μ V/V + 50 mV 93 μ V/V + 50 mV 150 μ V/V + 0.10 V 240 μ V/V + 0.50 V	
AC Current – Measure ³			
(0 to 200) μ A	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	260 μ A/A + 24 nA 240 μ A/A + 24 nA 430 μ A/A + 24 nA	Fluke 8508A
200 μ A to 2 mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	270 μ A/A + 0.24 μ A 240 μ A/A + 0.24 μ A 340 μ A/A + 0.24 μ A	
(2 to 20) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 μ A/A + 2.4 μ A 250 μ A/A + 2.4 μ A 240 μ A/A + 2.4 μ A	
(20 to 200) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 μ A/A + 24 μ A 230 μ A/A + 24 μ A 240 μ A/A + 24 μ A	
200 mA to 2 A	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	530 μ A/A + 0.24 mA 520 μ A/A + 0.24 mA 670 μ A/A + 0.24 mA	
(2 to 20) A	(0.01 to 2) kHz (2 to 10) kHz	690 μ A/A + 2.4 mA 0.21 % + 2.4 mA	

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
AC Current – Generate ³			
Up to 330 μ A	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.1 μ A 0.11 % + 0.1 μ A 0.093 % + 0.1 μ A 0.24 % + 0.15 μ A 0.61 % + 0.2 μ A 1.2 % + 0.4 μ A	Fluke 5520A opt 1
330 μ A to 3.3 mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.15 μ A 0.10 % + 0.15 μ A 0.081 % + 0.15 μ A 0.15 % + 0.2 μ A 0.39 % + 0.3 μ A 0.78 % + 0.6 μ A	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 2 μ A 0.071 % + 2 μ A 0.032 % + 2 μ A 0.062 % + 2 μ A 0.16 % + 3 μ A 0.31 % + 4 μ A	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 20 μ A 0.072 % + 20 μ A 0.033 % + 20 μ A 0.077 % + 50 μ A 0.15 % + 0.10 mA 0.31 % + 0.20 mA	
330 mA to 3 A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.10 mA 0.054 % + 0.10 mA 0.46 % + 10 mA 2.0 % + 50 mA	
(3 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.10 % + 50 mA 0.12 % + 50 mA 2.5 % + 50 mA	
AC Voltage – Generate ³			
Up to 33 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	590 μ V/V + 6 μ V 150 μ V/V + 6 μ V 200 μ V/V + 6 μ V 780 μ V/V + 6 μ V 0.27 % + 12 μ V 0.59 % + 50 μ V	Fluke 5520A opt 1

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
AC Voltage – Generate (cont) ³			
(33 to 330) 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	230 μ V/V + 8 μ V 120 μ V/V + 8 μ V 130 μ V/V + 8 μ V 290 μ V/V + 8 μ V 610 μ V/V + 32 μ V 0.16 % + 70 μ V	Fluke 5520A opt 1
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	230 μ V/V + 50 μ V 120 μ V/V + 60 μ V 160 μ V/V + 60 μ V 290 μ V/V + 50 μ V 770 μ V/V + 0.13 mV 0.19 % + 0.60 mV	
(3.3 to 33) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	230 μ V/V + 0.65 mV 130 μ V/V + 0.60 mV 190 μ V/V + 0.60 mV 270 μ V/V + 0.60 mV 690 μ V/V + 1.6 mV	
(33 to 330) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	240 μ V/V + 2 mV 180 μ V/V + 6 mV 240 μ V/V + 6 mV 330 μ V/V + 6 mV 0.23 % + 50 mV	
(330 to 1020) V	(0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	310 μ V/V + 10 mV 200 μ V/V + 10 mV 240 μ V/V + 10 mV	

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
Capacitance – Generate ³			
0.35 nF	10 Hz to 10 kHz	0.58 % + 10 pF	Fluke 5520A opt 1
1.1 nF	10 Hz to 10 kHz	0.45 % + 10 pF	
3.3 nF	10 Hz to 3 kHz	0.41 % + 10 pF	
11 nF	10 Hz to 1 kHz	0.21 % + 10 pF	
33 nF	10 Hz to 1 kHz	0.13 % + 0.10 nF	
109 nF	10 Hz to 1 kHz	0.19 % + 0.10 nF	
300 nF	10 Hz to 1 kHz	0.20 % + 0.30 nF	
1.09 µF	(10 to 600) Hz	0.19 % + 1 nF	
3 µF	(10 to 300) Hz	0.18 % + 3 nF	
10.9 µF	(10 to 150) Hz	0.19 % + 10 nF	
30 µF	(10 to 120) Hz	0.30 % + 30 nF	
109 µF	(10 to 80) Hz	0.35 % + 0.10 µF	
300 µF	(0 to 50) Hz	0.39 % + 0.30 µF	
1.09 mF	(0 to 20) Hz	0.35 % + 1 µF	
3 mF	(0 to 6) Hz	0.34 % + 3 µF	
10.9 mF	(0 to 2) Hz	0.35 % + 10 µF	
30 mF	(0 to 0.6) Hz	0.57 % + 30 µF	
109 mF	(0 to 0.2) Hz	0.84 % + 0.10 mF	

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Electrical Simulation of Thermocouples – Generate			
Type C	(0 to 150) °C	0.35 °C	Fluke 5520A
	(150 to 650) °C	0.33 °C	
	(650 to 1000) °C	0.36 °C	
	(1000 to 1800) °C	0.47 °C	
	(1800 to 2316) °C	0.7 °C	
Type E	(-250 to -100) °C	0.47 °C	
	(-100 to -25) °C	0.29 °C	
	(-25 to 350) °C	0.28 °C	
	(350 to 650) °C	0.29 °C	
	(650 to 1000) °C	0.31 °C	

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Electrical Simulation of Thermocouples – Generate (cont)			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.34 °C 0.29 °C 0.28 °C 0.29 °C 0.32 °C	Fluke 5520A
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 0.30 °C 0.29 °C 0.33 °C 0.41 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.51 °C 0.38 °C 0.37 °C 0.41 °C	
Type S	(0 to 250) °C (250 to 400) °C (400 to 1400) °C (1400 to 1767) °C	0.45 °C 0.38 °C 0.39 °C 0.44 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.55 °C 0.32 °C 0.29 °C 0.28 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.51 °C 0.34 °C	

IV. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 4, 5, 9} (±)	Comments
Amplitude Modulation – Measure ³ Rate: (1 to 100) kHz Depth: (10 to 90) %	9 kHz to 26.5 GHz	4.2 % + 0.6R	Agilent E4407B opt BAA
Frequency Modulation – Measure ³ Rate: (1 to 100) kHz Deviation: (1 to 100) kHz	9 kHz to 26.5 GHz 9 kHz to 26.5 GHz	3.1 % + 0.6R 3.1 % + 0.6R	Agilent E4407B opt BAA
Absolute RF Power ³ – Measure, 50 Ω (20 to 0) dBm (0 to -20) dBm (-20 to -35) dBm	(100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz (100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz (100 to 500) kHz 500 kHz to 3 MHz (3 to 10) MHz 10 MHz to 1.2 GHz (1.2 to 18) GHz (18 to 26.5) GHz	0.48 dBm 0.47 dBm 0.46 dBm 0.55 dBm 0.42 dBm 0.54 dBm 0.48 dBm 0.46 dBm 0.46 dBm 0.60 dBm 0.37 dBm 0.51 dBm 0.48 dBm 0.47 dBm 0.46 dBm 0.60 dBm 0.37 dBm 0.51 dBm	HP 53148A power meter w/HP 8485A and 8482A sensors

Parameter/Range	Frequency	CMC ^{2, 9} (±)	Comments
Absolute RF Power – Generate, 50 Ω ³			
(10 to -30) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.40 dBm 0.43 dBm 0.43 dBm 0.63 dBm	HP 83630 sweeper, E4407B spectrum analyzer, 11667B splitter, 8485A power sensor
(-30 to -50) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.63 dBm 0.54 dBm 0.61 dBm 0.76 dBm	
(-50 to -80) dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.63 dBm 0.53 dBm 0.62 dBm 0.80 dBm	
< -80 dBm	< 2 GHz (2.05 to 10) GHz (10.05 to 20) GHz (20.05 to 26.5) GHz	0.38 dBm 0.38 dBm 0.62 dBm 0.71 dBm	
Attenuation – Generate			
Coaxial, 1 dB Step ³	DC to 50 MHz		Agilent 8494B 1 dB/step attenuator
0 dB		0.57 dB	
1 dB		0.49 dB	
2 dB		0.49 dB	
3 dB		0.6 dB	
4 dB		0.6 dB	
5 dB		0.72 dB	
6 dB		0.71 dB	
7 dB		0.84 dB	
8 dB		0.84 dB	
9 dB		0.83 dB	
10 dB		0.84 dB	
11 dB	0.96 dB		

Parameter/Range	Frequency	CMC ^{2, 9} (±)	Comments
Attenuation – Generate (cont)			
Coaxial, 1 dB Step ³			
0 dB	(50 to 500) MHz	0.56 dB	Agilent 8494B 1 dB/step attenuator
1 dB		0.49 dB	
2 dB		0.49 dB	
3 dB		0.60 dB	
4 dB		0.60 dB	
5 dB		0.71 dB	
6 dB		0.71 dB	
7 dB		0.83 dB	
8 dB		0.84 dB	
9 dB		0.83 dB	
10 dB		0.84 dB	
11 dB	0.96 dB		
0 dB	500 MHz to 1 GHz	0.64 dB	
1 dB		0.50 dB	
2 dB		0.49 dB	
3 dB		0.60 dB	
4 dB		0.60 dB	
5 dB		0.71 dB	
6 dB		0.72 dB	
7 dB		0.84 dB	
8 dB		0.84 dB	
9 dB		0.84 dB	
10 dB		0.93 dB	
11 dB	0.96 dB		
0 dB	(1 to 12.4) GHz	1 dB	
1 dB		1 dB	
2 dB		0.99 dB	
3 dB		0.99 dB	
4 dB		0.99 dB	
5 dB		0.99 dB	
6 dB		1.1 dB	
7 dB		1.1 dB	
8 dB		1.1 dB	
9 dB		1.1 dB	
10 dB		1.2 dB	
11 dB	1.2 dB		

Parameter/Range	Frequency	CMC ^{2, 9} (±)	Comments
Attenuation – Generate (cont)			
Coaxial, 1 dB Step ³	(12.4 to 18) GHz		Agilent 8494B 1 dB/step attenuator
0 dB		1.2 dB	
1 dB		1.2 dB	
2 dB		1.2 dB	
3 dB		1.2 dB	
4 dB		1.1 dB	
5 dB		1.3 dB	
6 dB		1.3 dB	
7 dB		1.3 dB	
8 dB		1.3 dB	
9 dB		1.4 dB	
10 dB		1.4 dB	
11 dB		1.6 dB	
Coaxial, 10 dB Step ³	DC to 10 MHz		Agilent 8496B 10 dB/ step attenuator
0 dB		0.79 dB	
10 dB		0.71 dB	
20 dB		0.96 dB	
30 dB		1.2 dB	
40 dB		1.6 dB	
50 dB		2 dB	
60 dB		2.4 dB	
70 dB		2.8 dB	
80 dB		3.2 dB	
90 dB		3.5 dB	
100 dB		3.9 dB	
110 dB		4.3 dB	
0 dB	10 MHz to 1 GHz	0.76 dB	
10 dB		0.71 dB	
20 dB		0.96 dB	
30 dB		1.2 dB	
40 dB		1.6 dB	
50 dB		2 dB	
60 dB		2.4 dB	
70 dB		2.8 dB	
80 dB		3.2 dB	
90 dB		3.5 dB	
100 dB		3.9 dB	
110 dB		4.3 dB	

Parameter/Range	Frequency	CMC ^{2, 9} (±)	Comments
Attenuation – Generate (cont)			
Coaxial, 10 dB Step ³			
0 dB	(1 to 8) GHz	0.80 dB	Agilent 8496B 10 dB/ step attenuator
10 dB		0.76 dB	
20 dB		0.99 dB	
30 dB		1.2 dB	
40 dB		1.6 dB	
50 dB		2.0 dB	
60 dB		2.4 dB	
70 dB		2.8 dB	
80 dB		3.2 dB	
90 dB		3.6 dB	
100 dB		3.9 dB	
110 dB	4.3 dB		
0 dB	(8 to 12.4) GHz	0.91 dB	
10 dB		0.87 dB	
20 dB		1.1 dB	
30 dB		1.6 dB	
40 dB		2.1 dB	
50 dB		2.6 dB	
60 dB		3.2 dB	
70 dB		3.7 dB	
80 dB		4.2 dB	
90 dB		4.7 dB	
100 dB		5.2 dB	
110 dB	5.8 dB		
0 dB	(12.4 to 18) GHz	1.1 dB	
10 dB		1.1 dB	
20 dB		1.3 dB	
30 dB		1.7 dB	
40 dB		2.2 dB	
50 dB		2.7 dB	
60 dB		3.2 dB	
70 dB		3.7 dB	
80 dB		4.2 dB	
90 dB		4.8 dB	
100 dB		5.3 dB	
110 dB	5.8 dB		

V. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4, 5, 9} (±)	Comments
Scales and Balances ³	(0 to 300) lb	0.04 lb	Using NIST Class F weights
	(1 to 10) g	0.21 mg	Using ASTM Class 1 weights
	(10 to 50) g	0.21 mg	
	(50 to 200) g	0.052 mg + 0.011 mg/g	
	(200 to 1000) g	0.012 mg + 0.06 mg/g	
Gas Pressure (Absolute) – Measuring Devices	(1.5 to 7) psia	0.003 psia	Fluke PM600-A200K pressure transducer
	(>7 to 15) psia	0.003 psia	
	(>15 to 30) psia	0.004 psia	
	(5 to 100) psia	0.01 psia	Fluke PM600-A1.4M pressure transducer
	(>100 to 200) psia	0.03 psia	
	(14.5 to 50) psia	0.01 psia	Fluke PM600-A7M pressure transducer
(50 to 250) psia	0.03 psia		
(250 to 500) psia	0.05 psia		
	(500 to 1000) psia	0.11 psia	
Hydraulic Gauge Pressure ³ – Measuring Devices and Gauges	(10 to 2000) psi	0.39 psi + 0.6R	Fluke P3124-PSI deadweight tester
	(2000 to 4000) psi	0.77 psi + 0.6R	
	(4000 to 6000) psi	1.2 psi + 0.6R	
	(6000 to 8000) psi	1.6 psi + 0.6R	
	(8000 to 10 000) psi	2.0 psi + 0.6R	
Gas Gauge Pressure – Measuring Devices and Gauges	(-13 to 10) psi	0.12 psi + 0.6R	Additel ADT761-M pressure calibrator
	(10 to 36) psi	0.15 psi + 0.6R	
	(36 to 360) psi	0.16 psi + 0.6R	
Torque Transducers	(5 to 200) ozf·in	0.09 % IV + 0.58R	Using CI torque arms and NIST Class F weights
	(5 to 400) lbf·in	0.10 % IV + 0.58R	
	(40 to 1000) lbf·in	0.13 % IV + 0.58R	
	(25 to 600) lbf·ft	0.14 % IV + 0.58R	
	(60 to 2000) lbf·ft	0.09 % IV + 0.58R	

Parameter/Equipment	Range	CMC ^{2, 4, 5} (\pm)	Comments
Torque Gages ³	(5 to 50) ozf·in (50 to 200) ozf·in (30 to 400) lbf·in (400 to 1000) lbf·in (30 to 50) lbf·ft (50 to 250) lbf·ft (250 to 600) lbf·ft (100 to 1000) lbf·ft	0.78 % IV + 0.6R 0.42 % IV + 0.6R 0.54 % IV + 0.6R 0.61 % IV + 0.6R 0.43 % IV + 0.6R 0.36 % IV + 0.6R 0.48 % IV + 0.6R 0.43 % IV + 0.6R	Torque transducers

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 9} (\pm)	Comments
Temperature ³ – Measuring Equipment (Digital and Mechanical)	(-45 to 500) °C	0.12 °C	Fluke 2560 readout and Fluke 5628 PRT probe, liquid bath, dry well
Temperature ³ – Measure (Chambers, Ovens, Freezers)	(0 to 20) °C	0.30 °C	Vaisala M170 temperature probe with readout
Relative Humidity – Measuring Devices ³	(25 to 75) % RH	1.0 % RH + 0.6R	Vaisala HMP75 humidity probe with readout and humidity chamber
Relative Humidity – Measure ³ (Humidity Chambers)	(25 to 75) % RH	1.6 % RH + 0.6R	Vaisala HMP75 humidity probe with readout

VII. Time and Frequency

Parameter/Range	Frequency	CMC ^{2,9} (\pm)	Comments
GPS Disciplined Oscillator Frequency Reference	10 MHz	1.1×10^{-12} Hz/Hz	Fluke 910R
Frequency – Measure ³	(1 to 1000) Hz (1 to 10) kHz (10 to 100) kHz (0.1 to 350) MHz	1.2×10^{-6} Hz/Hz 1.2×10^{-7} Hz/Hz 2.7×10^{-8} Hz/Hz 2.8×10^{-8} Hz/Hz	Agilent 53220A

¹ This laboratory offers commercial dimensional testing, calibration and field services where noted.

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 of 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 at customer's site can normally be expected to be larger than the CMC uncertainty 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 In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches. In the statement of CMC, div is the lowest division identified for the resolution of the unit under calibration. In the statement of CMC, R is the resolution of the unit under test.

⁵ In the statement of CMC, percentages are to be read as percent of reading, unless noted otherwise. In the statement of CMC, percent IV is to be read as percent of indicated value.

⁶ 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.

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. CMC's 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 Field calibrations limited to pin gages and a range of 0.75 inches.

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.

¹⁰ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

MICRON INSPECTION & CALIBRATION SERVICES

York, 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, the requirements of ANSI/NCSL Z540.3-2006, 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 6th day of December 2021.

A blue ink signature of a person, likely a representative of the Accreditation Council.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2917.01
Valid to November 30, 2023
Revised December 10, 2021

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