



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

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CALIBRATION

Valid To: April 30, 2025

Certificate Number: 2737.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 6}:

I. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Hand Tools ³ – Calipers Micrometers (Linearity) Height Gages Indicators Depth Micrometers (Linearity)	Up to 72 in Up to 72 in Up to 48 in Up to 2 in Up to 12 in	11 µin + 4.6 µin/in 9.7 µin + 4.6 µin/in 11 µin + 5 µin/in 7 µin + 3.3 µin/in 9.7 µin + 7.2 µin/in	Gage blocks
Tape Measure & Steel Ruler ³	(1 to 36) in (3 to 100) ft	0.000 29 in + 1 µin/in 0.000 33 in + 19 in/in	Gage blocks, no tension applied

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
DC Voltage ³ – Generate	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	0.49 μ V + 5.7 nV/mV 0.8 μ V + 3.5 μ V/V 2.9 μ V + 2.5 μ V/V 4.3 μ V + 2.5 μ V/V 43 μ V + 3.5 μ V/V 0.42 mV + 4.5 μ V/V	Fluke 5720A
DC Voltage ³ – Measure	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 10) kV (10 to 70) kV	0.33 μ V + 17 μ V/V 0.52 μ V + 8 μ V/V 8.8 μ V + 8.1 μ V/V 35 μ V + 10 μ V/V 1.2 mV + 11 μ V/V 3.2 V + 0.16 V/kV 8.7 V + 0.45 V/kV	3458A Vitretek 4700 w/probe
DC Current ³ – Generate	(0 to 220) μ A (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A (11 to 20.5) A (1 to 20) A (1 to 100) A	6 nA + 35 pA/ μ A 7.1 nA + 30 nA/mA 41 nA + 30 nA/mA 0.73 μ A + 1 μ A/mA 12 μ A + 0.11 mA/A 0.49 mA + 0.34 mA/A 9.4 mA + 0.8 mA/A 0.0045 % 0.0051 %	Fluke 5720A Fluke 5520A Power supply, L&N Shunt & 3458A
Clamp-On Only	(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	50 mA + 6.5 mA/A 0.18 A + 3.4 mA/A 0.83 A + 3.3 mA/A	Fluke 5522A w/ 5500A/coil

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
DC Current ³ – Measure	(0 to 100) nA 100 nA to 1 µA (1 to 10) µA (10 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	41 pA + 89 µA/A 41 pA + 28 µA/A 0.41 nA + 24 µA/A 0.83 nA + 22 µA/A 5.8 nA + 24 µA/A 53 nA + 21 µA/A 0.53 µA + 37 µA/A 10 µA + 0.11 mA/A	Agilent 3458A
	(0 to 2) A (2 to 20) A	14 µA + 0.18 mA/A 0.33 mA + 0.55 mA/A	Fluke 8508A
	(1 to 20) A (1 to 100) A	0.0045 % 0.0051 %	Agilent 3458A w/ shunts
DC Resistance ³ – Generate	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	50 µΩ 95 µΩ 0.18 mΩ 0.26 mΩ 0.48 mΩ 1.1 mΩ 2 mΩ 9 mΩ 17 mΩ 90 mΩ 0.17 Ω 1.1 Ω 2.1 Ω 18 Ω 36 Ω 0.37 kΩ 0.89 kΩ 50 kΩ	Fluke 5720A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Indicators ³ – (cont)			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.4 °C 0.13 °C 0.11 °C 0.13 °C 0.17 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.22 °C 0.13 °C 0.11 °C 0.14 °C 0.18 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.14 °C 0.13 °C 0.21 °C 0.32 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.32 °C 0.18 °C 0.15 °C 0.15 °C 0.22 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.46 °C 0.28 °C 0.27 °C 0.33 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.38 °C 0.29 °C 0.3 °C 0.37 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.51 °C 0.21 °C 0.15 °C 0.13 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.45 °C 0.22 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicators 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	0.042 °C 0.041 °C 0.057 °C 0.073 °C 0.081 °C 0.097 °C 0.19 °C	Fluke 5520A
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.041 °C 0.057 °C 0.073 °C 0.081 °C 0.097 °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	0.2 °C 0.033 °C 0.042 °C 0.049 °C 0.057 °C 0.065 °C 0.073 °C 0.09 °C 0.19 °C	
Pt 385, 200 Ω	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.034 °C 0.033 °C 0.042 °C 0.097 °C 0.11 °C 0.11 °C 0.13 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.034 °C 0.042 °C 0.041 °C 0.05 °C 0.065 °C 0.073 °C 0.089 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.026 °C 0.033 °C 0.042 °C 0.049 °C 0.057 °C 0.19 °C	

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Electrical Calibration of RTD Indicators ³ – (cont)			
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.066 °C 0.066 °C 0.11 °C	Fluke 5520A
Cu 427, 10 Ω	(-100 to 260) °C	0.24 °C	
Oscilloscopes ³ –			
Volts – DC Signal: Into 50 Ω Into 1 MΩ	± 0 mV to 6.6 V ± 0 mV to 130 V	33 μV + 2 mV/V 33 μV + 0.39 mV/V	Fluke 5520A
Volts – Squarewave: Into 50 Ω Into 1 MΩ	1 mVpp to 6.6 Vpp; 1 mVpp to 130 Vpp; 10 Hz to 1 kHz (1 to 100) kHz	91 μV + 4.3 mV/V 0.2 mV + 0.8 mV/V 0.24 mV + 2 mV/V	
Edge into 50 Ω	≤ 300 ps (Up to 2 MHz) ≤ 350 ps (Above 2 MHz)	82 ps 82 ps	
Leveled Sine Wave	50 kHz Reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	0.33 mV + 17 mV/V 0.4 mV + 31 mV/V 0.43 mV + 36 mV/V 0.53 mV + 57 mV/V 0.58 mV + 67 mV/V	
Time Marker	5 s to 50 ms 50 ms to 1 ns	0.000 63 % + $T \times 0.1$ % 0.000 52 %	$T = \text{time in seconds}$

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage ³ – Generate			
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 (300 to 500) kHz 500 kHz to 1 MHz	4 µV + 0.33 µV/mV 4 µV + 85 nV/mV 4 µV + 75 nV/mV 4 µV + 0.18 µV/mV 5 µV + 0.46 µV/mV 10 µV + 0.9 µV/mV 20 µV + 1.2 µV/mV 20 µV + 2.5 µV/mV	Fluke 5720A
(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 (300 to 500) kHz 500 kHz to 1 MHz	4.5 µV + 0.22 µV/mV 4.2 µV + 85 nV/mV 4.2 µV + 75 nV/mV 4.4 µV + 0.18 µV/mV 6.1 µV + 0.46 µV/mV 12 µV + 0.9 µV/mV 23 µV + 1.2 µV/mV 26 µV + 2.5 µV/mV	
(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 (300 to 500) kHz 500 kHz to 1 MHz	17 µV + 0.22 µV/mV 9 µV + 85 nV/mV 8.7 µV + 75 nV/mV 11 µV + 0.18 µV/mV 16 µV + 0.46 µV/mV 31 µV + 0.9 µV/mV 48 µV + 1.2 µV/mV 78 µV + 2.5 µV/mV	
(0.22 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 (300 to 500) kHz 500 kHz to 1 MHz	90 µV + 0.22 mV/V 34 µV + 79 µV/V 18 µV + 39 µV/V 26 µV + 70 µV/V 54 µV + 0.11 mV/V 0.16 mV + 0.34 mV/V 0.56 mV + 0.83 mV/V 0.64 mV + 1.5 mV/V	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage ³ – Generate (cont)			
(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 (300 to 500) kHz 500 kHz to 1 MHz	0.89 mV + 0.22 mV/V 0.34 mV + 80 µV/V 0.15 mV + 40 µV/V 0.26 mV + 70 µV/V 0.41 mV + 0.1 mV/V 1.2 mV + 0.26 mV/V 4 mV + 0.9 mV/V 6.1 mV + 1.3 mV/V	Fluke 5720A
(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 (300 to 500) kHz 500 kHz to 1 MHz	8.9 mV + 0.22 mV/V 3.4 mV + 80 µV/V 1.7 mV + 47 µV/V 3.5 mV + 72 µV/V 5.9 mV + 0.13 mV/V 34 mV + 0.8 mV/V 0.13 V + 4.2 mV/V 0.24 V + 7 mV/V	
(220 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	22 mV + 80 µV/V 34 mV + 0.13 mV/V 93 mV + 0.36 mV/V	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	93 mV + 0.36 mV/V 0.34 V + 1.3 mV/V	
AC Voltage – Measure			
(0 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	6.1 µV + 0.0003 mV/mV 4.1 µV + 0.0002 mV/mV 4.2 µV + 0.0003 mV/mV 4.9 µV + 0.001 mV/mV 9 µV + 0.005 mV/mV 45 µV + 0.04 mV/mV	Agilent 3458A
(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 (0.3 to 1) MHz (1 to 2) MHz	12 µV + 0.000 07 mV/mV 2.7 µV + 0.000 07 mV/mV 11 µV + 0.000 14 mV/mV 12 µV + 0.0003 mV/mV 17 µV + 0.0008 mV/mV 47 µV mV + 0.003 mV/mV 0.12 mV + 0.01 mV/mV 3.8 mV + 0.01 mV/mV	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Voltage – Measure (cont)			
(0.1 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 (0.3 to 1) MHz (1 to 2) MHz	0.12 mV + 0.000 07 V/V 0.1 mV + 0.000 07 V/V 0.11 mV + 0.000 14 V/V 0.12 mV + 0.0003 V/V 0.17 mV + 0.0008 V/V 0.47 mV + 0.003 V/V 1.2 mV + 0.010 V/V 38 mV + 0.015 V/V	Agilent 3458A
(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 (0.3 to 1) MHz (1 to 2) MHz	1.2 mV + 0.000 07 V/V 1 mV + 0.000 07 V/V 1 mV + 0.000 14 V/V 1.2 mV + 0.0003 V/V 1.7 mV + 0.0008 V/V 4.7 mV + 0.003 V/V 12 mV + 0.01 V/V 0.38 V + 0.015 V/V	
(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 (100 to 300) kHz (0.3 to 1) MHz	13 mV + 0.0002 V/V 11 mV + 0.0002 V/V 11 mV + 0.0002 V/V 13 mV + 0.000 35 V/V 21 mV + 0.0012 V/V 57 mV + 0.004 V/V 0.17 V + 0.015 V/V	
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	98 mV + 0.0004 V/V 84 mV + 0.0004 V/V 98 mV + 0.0006 V/V 0.14 V + 0.0012 V/V 0.27 V + 0.003 V/V	
	(1 to 10) kV (10 to 50) kV	9.6 V + 0.8 V/kV 14 V + 1.2 V/kV	Vitretek 4700 w/probe

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
Capacitance ³ – Generate (0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.0999) μF (1.1 to 3.299 99) μF (3.3 to 10.9999) μF (11 to 32.9999) μF (33 to 109.999) μF (110 to 329.999) μF (0.33 to 1.099 99) mF (1.1 to 3.2999) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (10 to 50) Hz (10 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	8.8 pF + 4 pF/nF 9.7 pF + 4 pF/nF 13 pF + 4 pF/nF 15 pF + 2 pF/nF 0.1 nF + 2 pF/nF 0.15 nF + 2 pF/nF 0.46 nF + 2 pF/nF 1.5 nF + 2 nF/μF 4.6 nF + 2 nF/μF 15 nF + 2 nF/μF 59 nF + 3.2 nF/μF 0.2 μF + 3.6 nF/μF 0.64 μF + 3.6 nF/μF 2 μF + 3.6 μF/mF 7 μF + 3.5 μF/mF 38 μF + 2.6 μF/mF 90 μF + 6 μF/mF 0.37 mF + 8.8 μF/mF	Fluke 5520A
AC Current ³ – Generate Up to 220 μA (0.22 to 2.2) mA (2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	63 nA + 0.13 nA/μA 12 nA + 0.14 nA/μA 9 nA + 0.11 nA/μA 15 nA + 0.25 nA/μA 75 nA + 0.9 nA/μA 93 nA + 0.23 μA/mA 67 nA + 0.14 μA/mA 60 nA + 0.11 μA/mA 0.15 μA + 0.18 μA/mA 0.85 μA + 0.9 μA/mA 0.92 μA + 0.23 μA/mA 0.69 μA + 0.14 μA/mA 0.6 μA + 0.11 μA/mA 0.95 μA + 0.18 μA/mA 7 μA + 0.9 μA/mA	Fluke 5720A

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current ³ – Generate (cont)			
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	9.3 µA + 0.23 µA/mA 6.8 µA + 0.14 µA/mA 5 µA + 0.11 µA/mA 7.5 µA + 0.18 µA/mA 30 µA + 0.9 µA/mA	Fluke 5720A
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	89 µA + 0.24 mA/A 0.17 mA + 0.39 mA/A 1.5 mA + 6 mA/A	
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.1 mA + 0.4 mA/A 2.3 mA + 0.85 mA/A 8 mA + 3.3 mA/A	
(11 to 20.5) A	(45 to 100) Hz (0.100 to 1) kHz (1 to 5) kHz	15 mA + 0.96 mA/A 17 mA + 1.2 mA/A 0.27 A + 24 mA/A	
Toroidal:			
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(45 to 65) Hz	26 mA + 2.1 mA/A 50 mA + 1.9 mA/A 0.34 A + 1.9 mA/A	
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(65 to 440) Hz	60 mA + 6 mA/A 0.11 A + 5.3 mA/A 0.86 A + 5.3 mA/A	
Non-Toroidal:			
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(45 to 65) Hz	60 mA + 3.8 mA/A 0.23 A + 3.7 mA/A 1.2 A + 3.7 mA/A	Fluke 5520A
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(65 to 440) Hz	90 mA + 7.2 mA/A 0.28 A + 6.7 mA/A 1.6 A + 6.7 mA/A	Fluke 5520A w/5500A/coil

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current ³ – Measure			
(5 to 100) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz	57 nA + 4 mA/A 45 nA + 1.5 mA/A 40 nA + 0.64 mA/A	Agilent 3458A
(0.1 to 1) 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	0.43 µA + 0.0041 mA/mA 0.31 µA + 0.0016 mA/mA 0.26 µA + 0.000 67 mA/mA 0.25 µA + 0.000 37 mA/mA 0.26 µA + 0.000 67 mA/mA 0.63 µA + 0.0042 mA/mA 1.8 µA + 0.0056 mA/mA	
(1 to 10) 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	2.4 µA + 0.0041 mA/mA 2.3 µA + 0.0016 mA/mA 2.3 µA + 0.000 67 mA/mA 2.3 µA + 0.000 37 mA/mA 2.3 µA + 0.000 67 mA/mA 4.5 µA + 0.0041 mA/mA 16 µA + 0.0056 mA/mA	
(10 to 100) 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	42 µA + 0.004 mA/mA 30 µA + 0.0015 mA/mA 25 µA + 0.0006 mA/mA 24 µA + 0.0003 mA/mA 25 µA + 0.0006 mA/mA 62 µA + 0.004 mA/mA 0.18 mA + 0.0055 mA/mA	
(0.1 to 1) 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	0.42 mA + 0.0041 A/A 0.3 mA + 0.0017 A/A 0.26 mA + 0.0009 A/A 0.27 mA + 0.0011 A/A 0.37 mA + 0.0031 A/A 0.92 mA + 0.01 A/A	
(0 to 2) A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.4 mA + 0.5 mA/A 0.26 mA + 0.7 mA/A 0.42 mA + 2.4 mA/A	Fluke 8508A
(0 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	1.9 mA + 0.72 mA/A 2.1 mA + 2 mA/A	

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 5, 7} ($\pm$)	Comments
Amplitude Modulation – Measure			
Rate: 50 Hz to 10 kHz Depths: (5 to 99) %	150 kHz to 10 MHz	0.14 % depth + 0.024 % depth/% depth	8902A
Rate: 20 Hz to 10 kHz Depths: To 99 %	150 kHz to 10 MHz	0.11 % depth + 0.023 % depth/% depth	
Rate: 50 Hz to 50 kHz Depths: (5 to 99) %	(0.01 to 1.3) GHz	0.15 % depth + 0.01 % depth/% depth	
Rate: 20 Hz to 100 kHz Depths: To 99 %	(0.01 to 1.3) GHz	0.11 % depth + 0.023 % depth/% depth	
Rate: 50 Hz to 50 kHz Depths: (5 to 99) %	(1.3 to 26.5) GHz	0.33 % depth + 0.008 % depth/% depth	
Rate: 20 Hz to 100 kHz Depths: To 99 %	(1.3 to 26.5) GHz	0.31 % depth + 0.021 % depth/% depth	
Phase Modulation – Measure			
Rate: 200 Hz to 10 kHz (0 to 100) rad	150 kHz to 10MHz	36 mrad + 37 mrad/rad	8902A
Rate: 200 Hz to 20 kHz (0 to 100) rad	(0.01 to 1.3) GHz	36 mrad + 37 mrad/rad	
Rate: 200 Hz to 20 kHz (0 to 100) rad	(1.3 to 26.5) GHz	36 mrad + 37 mrad/rad	
Frequency Modulation – Measure			
Rate: 20 Hz to 10 kHz Dev.: ≤ 40 kHz Peak	250 kHz to 10 MHz	3.5 Hz + 16 Hz/kHz	8902A
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz Peak	(0.01 to 1.3) GHz	3.5 Hz + 7.8 Hz/kHz	
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz Peak	(0.01 to 1.3) GHz	6.8 Hz + 39 Hz/kHz	

Parameter/Range	Frequency	CMC ^{2, 5, 7} ($\pm$)	Comments
Frequency Modulation – Measure (cont)			
Rate: 50 Hz to 100 kHz Dev.: ≤ 400 kHz Peak	(1.3 to 26.5) GHz	6.8 Hz + 7.8 Hz/kHz	8902A
Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz Peak	(1.3 to 26.5) GHz	6.8 Hz + 39 Hz/kHz	
RF Microwave – Power Meter ³			
Power Reference at 1 mW	50 MHz	0.42 %	432A power meter, 478A-H75 thermistor mount, 3458A
Power Accuracy (3 μ W to 100 mW)	-----	0.29 %	Range calibrator
Calibration Factor	100 kHz to 2 GHz (2 to 12) GHz (12 to 18) GHz (18 to 22) GHz (22 to 26.5) GHz	1.2 % 1.3 % 1.2 % 2.7 % 3.1 %	Tegam 1806A, F1130B & F1135B power reference
RF Microwave – Absolute Power, Measure ³			
(-70 to +20) dBm	10 MHz to 18 GHz	3.7 %	E4418B power meter w/: E4412A
(-30 to 20) dBm	50 MHz to 3 GHz (3 to 13) GHz (13 to 18) GHz (18 to 26.5) GHz (26.5 to 33) GHz (33 to 38) GHz (38 to 50) GHz	1.5 % 1.8 % 1.9 % 2.2 % 2.4 % 2.9 % 3.6 %	N8487A

Parameter/Range	Frequency	CMC ^{2, 7} (±)	Comments
RF Absolute Power – Generate ³ (cont)			
Amplitude Into 75 Ω: (-46.75 to +11.25) dBm (-88.74 to -46.75) dBm	200 Hz to 25 MHz	0.22 dB 0.3 dB	Agilent 3335A
(-26.75 to 11.25) dBm (-46.75 to -26.75) dBm (88.74 to -46.75) dBm	(25 to 80) MHz	0.26 dB 0.35 dB 0.61 dB	
(-70 to +20) dBm	80 MHz to 18 GHz (18 to 33) GHz (33 to 38) GHz (38 to 50) GHz	0.35 dB 0.36 dB 0.51 dB 0.52 dB	83650B, 8902A, E4412A & power splitter
(-110 to -70) dBm	80 MHz to 2 GHz (2 to 20) GHz (20 to 40) GHz (40 to 50) GHz	2.1 dB 2.2 dB 2.6 dB 3.8 dB	
Excess Noise Ratio (ENR) – Calibrate Noise Sources			
Up to 20 dB ENR	10 MHz to 18 GHz (18 to 26.5) GHz	0.52 dB 0.59 dB	346C reference noise source, 8971C noise figure test set, 8970B noise figure meter

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Torque Equipment	(15 to 200) ozf·in 4 lbf·in to 2000 lbf·ft	0.58 % 0.33 %	CDI Suretest system
Torque Transducers	5 ozf·in to 150 lbf·in 150 lbf·in to 250 lbf·ft	0.037 % 0.036 %	Torque arms, Class 6 & F weights

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
Balances ³			
0.0001 g Resolution	(10 to 500) mg > 500 mg to 5 g (> 5 g to 10) g > 10 g to 1 kg	0.87 x <i>R</i> 1.0 x <i>R</i> 1.2 x <i>R</i> 1.5 x <i>R</i>	Class 1 weights
0.001 g Resolution	10 mg to 50 g (> 50 to 200) g > 200 g to 1 kg	0.87 x <i>R</i> 1.0 x <i>R</i> 1.5 x <i>R</i>	
0.01 g Resolution	10 mg to 500 g > 500 g to 1 kg	0.87 x <i>R</i> 1.0 x <i>R</i>	
0.1 g, 1 g & 10 g Resolution	10 mg to 1 kg	0.82 x <i>R</i>	
Scales ³	Up to 1000 lbs	0.82 x <i>R</i>	Class F Weights
Force – Measure			
Compression	(1000 to 17 000) lbf (1000 to 60 000) lbf	4.6 lb + 0.0045 lb/lb 2 lb + 0.000 088 lb/lb	Load cells
Compression & Tension	(10 000 to 120 000) lbf	6.3 lb + 0.0022 lb/lb	
Accelerometers –			
(1 to 10) g	(5 to < 10) Hz (10 to < 100) Hz 100 Hz (> 100 to < 2000) Hz (2 to 10) kHz	2.2 % 1.8 % 1.3 % 1.4 % 2.8 %	VR9500 controller, 301A03 reference sensor
Pressure – Measure & Measuring Equipment			
Pneumatic	$\pm$ 10 inH ₂ O (0.3 to 15) psia (-15 to 30) psig (30 to 100) psig (100 to 500) psig (500 to 1500) psig (1500 to 3000) psig	0.012 inH ₂ O 0.0032 psia 0.01 psi 0.018 psi 0.051 psi 0.15 psi 0.3 psi	Fluke 6270A w/ PM200 modules

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 5, 7} ($\pm$)	Comments
Hygrometers –	(20 to 70) % RH (16 to 24) °C	1.8 % RH 0.15 °C	Fluke 2626-H thermo-hygrometer probe
Humidity/Temperature – Measuring Equipment ³			
Humidity	(10 to 90) % RH (90 to 95) % RH	1.3 % RH 2.1 % RH	Vaisala humidity meter/probe
Temperature	(-70 to 140) °C	0.77 °C	

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Frequency – Measure	Up to 3 GHz	58 pHz + 12 pHz/Hz	Counter phase locked to GPS (f is the frequency)
Frequency – Measuring Equipment	10 MHz 1 μ Hz to 20 MHz 20 MHz to 50 GHz	6.9 μ Hz 0.58 μ Hz + 29 pHz/Hz 0.58 Hz	Spectracom rubidium Signal generators phase locked to GPS (f is the frequency)

¹ This laboratory offers commercial calibration 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 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.
- ⁵ In the statement of CMC uncertainty, the value is defined as the percentage of reading unless otherwise indicated; *R* represents the resolution of the unit under test.
- ⁶ This scope meets A2LA's *P112 Flexible Scope Policy*.
- 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 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

TRESCAL, INC.

Manassas, VA

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 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 28th day of July 2023

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2737.01
Valid to April 30, 2025

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