



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

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 2357.14

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory at the location above as well as the two satellite locations listed below to perform the following calibrations and dimensional inspections<sup>1,7</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Angle Generation – Levels & Protractors	0° Up to 180° 90°	0.0051° 0.012 ° 0.0015°	10-inch sine bar, grade 00 gage blocks, granite square, precision level & surface plate
Calipers <sup>3</sup>	(0.005 to 0.05) in (0.05 to 4) in (4 to 12) in (12 to 48) in	59 μin (58 + 0.25L) μin (59 + 4.0L) μin (91 + 5.3L) μin	Wafer gage block set, grade 00 gage blocks, grade AS1 gage blocks
Depth Gages <sup>3</sup>	(0.005 to 0.05) in (0.05 to 4) in (4 to 12) in (12 to 48) in	59 μin (58 + 0.25L) μin (43 + 4.0L) μin (55 + 3.0L) μin	Wafer gage block set, grade 00 gage blocks, grade AS1 gage blocks
Height Gages <sup>3</sup>	(0.005 to 0.05) in (0.05 to 4) in (4 to 48) in	59 μin (58 + 0.25L) μin (39 + 5.0L) μin	Wafer gage block set, grade 00 gage blocks, grade AS1 gage blocks
Indicators <sup>3</sup>	Up to 0.2 in (0.005 to 0.05) in (0.05 to 4) in (4 to 10) in (10 to 48) in	51 μin 59 μin (58 + 0.25L) μin (43 + 4.0L) μin (31 + 5.2L) μin	Calibration tester, wafer gage block set, grade 00 gage blocks, grade AS1 gage blocks
Feeler/Thickness Gage	(0.005 to 0.05) in (0.05 to 5) in	35 μin (48 + 14L) μin	Wafer gage block set Pratt & Whitney PC w/grade 00 gage blocks

Parameter/Equipment	Range	CMC <sup>2,5</sup> ( $\pm$ )	Comments
Micrometers <sup>3</sup>	(0.05 to 12) in (12 to 48) in	(9.0 + 5.2L) $\mu$ in (30 + 5.0L) $\mu$ in	Grade 00 gage blocks Grade ASI gage blocks
Flatness	Up to 1 in	8.0 $\mu$ in	Optical flat
Plain Plugs & Pins	(0.05 to 1) in	28 $\mu$ in	Pratt & Whitney PC w/grade 00 gage blocks

## II. Dimensional Inspection/Testing<sup>1,6</sup>

Parameter/Equipment	Range	CMC <sup>2,5</sup> ( $\pm$ )	Comments
Length – 1D	(Up to 10) in	(39 + 0.50L) $\mu$ in	Pratt & Whitney PC w/grade 00 gage blocks

## III. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC <sup>2,4</sup> ( $\pm$ )	Comments
AC Current – Generate <sup>3</sup>			
(9 to 220) $\mu$ A	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.41 mA/A + 16 nA 0.17 mA/A + 10 nA 0.13 mA/A + 8.0 nA 0.28 mA/A + 12 nA 1.0 mA/A + 65 nA	Fluke 5720A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.42 mA/A + 40 nA 0.21 mA/A + 35 nA 0.16 mA/A + 35 nA 0.22 mA/A + 110 nA 1.0 mA/A + 650 nA	
(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	0.41 mA/A + 400 nA 0.17 mA/A + 350 nA 0.13 mA/A + 350 nA 0.20 mA/A + 550 nA 1.0 mA/A + 5.0 $\mu$ A	
(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	0.42 mA/A + 4.0 $\mu$ A 0.18 mA/A + 3.5 $\mu$ A 0.13 mA/A + 2.5 $\mu$ A 0.20 mA/A + 3.5 $\mu$ A 1.0 mA/A + 10 $\mu$ A	

Parameter/Range	Frequency	CMC <sup>2,4,5</sup> (±)	Comments
<b>AC Current – Generate<sup>3,4</sup> (cont)</b>			
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.26 mA/A + 35 µA 0.39 mA/A + 80 µA 6.2 mA/A + 160 µA	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.36 mA/A + 170 µA 0.75 mA/A + 380 µA 2.8 mA/A + 750 µA	Fluke 5720A w/ 5725A
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.94 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	Fluke 5520A
<b>Clamp-On Only Torodial:</b>			
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.39 % 0.84 %	Fluke 5520A – SC1100 w/ Fluke 5500 coil
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.38 % 0.84 %	
<b>Non-Toroidal:</b>			
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.77 % 1.2 %	
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	1.2 % 1.6 %	
<b>AC Current – Measure<sup>3</sup></b>			
(10 to 100) µA	(10 to 20) Hz (20 to 45) Hz (45 to 5) kHz	3.1 nA/µA + 23 nA 1.2 nA/µA + 23 nA 0.49 nA/µA + 23 nA	HP 3458A
(0.1 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	3.1 µA/mA + 0.16 µA 1.2 µA/mA + 0.16 µA 0.52 µA/mA + 0.16 µA 0.28 µA/mA + 0.16 µA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	3.1 µA/mA + 1.6 µA 1.2 µA/mA + 1.6 µA 0.49 µA/mA + 1.6 µA 0.28 µA/mA + 1.6 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	3.1 µA/mA + 16 µA 1.2 µA/mA + 16 µA 0.49 µA/mA + 16 µA 0.28 µA/mA + 16 µA	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	3.1 mA/A + 0.16 mA 1.3 mA/A + 0.16 mA 0.69 mA/A + 0.16 mA 0.83 mA/A + 0.16 mA	
(1 to 20) A	55 Hz to 1 kHz (1 to 5) kHz	0.42 mA/A 0.92 mA/A	Y5020 w/ 3458A

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			
(0.2 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 (0.5 to 1) MHz	1.2 mV/V + 5.0 μV 0.91 mV/V + 5.0 μV 0.90 mV/V + 5.0 μV 1.5 mV/V + 5.0 μV 2.1 mV/V + 6.0 μV 3.6 mV/V + 12 μV 5.2 mV/V + 25 μV 6.6 mV/V + 25 μV	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 (0.5 to 1) MHz	0.32 mV/V + 5.0 μV 0.18 mV/V + 5.0 μV 0.18 mV/V + 5.0 μV 0.33 mV/V + 5.0 μV 0.59 mV/V + 6.0 μV 1.3 mV/V + 12 μV 1.7 mV/V + 25 μV 3.2 mV/V + 25 μV	
(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 (0.5 to 1) MHz	0.39 mV/V + 15 μV 99 μV/V + 8.0 μV 87 μV/V + 8.0 μV 0.21 mV/V + 8.0 μV 0.49 mV/V + 20 μV 0.89 mV/V + 25 μV 1.4 mV/V + 30 μV 2.7 mV/V + 60 μV	
(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 (0.5 to 1) MHz	0.54 mV/V + 50 μV 88 μV/V + 20 μV 46 μV/V + 10 μV 80 μV/V + 12 μV 0.14 mV/V + 40 μV 0.42 mV/V + 100 μV 0.96 mV/V + 250 μV 1.7 mV/V + 400 μV	
(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 (0.5 to 1) MHz	0.40 mV/V + 500 μV 95 μV/V + 200 μV 48 μV/V + 70 μV 82 μV/V + 120 μV 0.12 mV/V + 250 μV 0.30 mV/V + 800 μV 1.0 mV/V + 2.5 mV 1.7 mV/V + 4.0 mV	
(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 (0.5 to 1) MHz	0.46 mV/V + 5.0 mV 99 μV/V + 2.0 mV 71 μV/V + 0.70 mV 0.15 mV/V + 1.2 mV 0.23 mV/V + 3 mV 0.87 mV/V + 20 mV 4.2 mV/V + 50 mV 8.6 mV/V + 100 mV	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (cont)			
(220 to 250) V	(15 to 50) Hz	0.28 mV/V + 20 mV	Fluke 5720A
(220 to 1100) V	50 Hz to 1 kHz	79 µV/V + 4.0 mV	
	(1 to 20) kHz (20 to 30) kHz	0.13 mV/V + 6.0 mV 0.49 mV/V + 11 mV	Fluke 5720A w/5725A
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.47 mV/V + 11 mV 1.8 mV/V + 45 mV	
AC Voltage – Measure <sup>3</sup>			
Up 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 kHz to 1 MHz	0.43 µV/mV + 3.0 µV 0.22 µV/mV + 1.1 µV 0.32 µV/mV + 1.1 µV 1.0 µV/mV + 1.1 µV 5.0 µV/mV + 1.1 µV 40 µV/mV + 5.0 µV	HP 3458A, synchronous sub- sampled mode
(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	0.30 µV/mV + 4.0 µV 0.10 µV/mV + 2.0 µV 0.15 µV/mV + 2.0 µV 0.32 µV/mV + 2.0 µV 0.81 µV/mV + 2.0 µV 3.0 µV/mV + 10 µV 10 µV/mV + 10 µV	
(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	0.28 mV/V + 40 µV 87 µV/V + 20 µV 0.15 mV/V + 20 µV 0.32 mV/V + 20 µV 0.81 mV/V + 20 µV 3.0 mV/V + 0.10 mV 10 mV/V + 0.10 mV	
(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	0.28 mV/V + 0.40 mV 86 µV/V + 0.20 mV 0.15 mV/V + 0.20 mV 0.32 mV/V + 0.20 mV 0.81 mV/V + 0.20 mV 3.0 mV/V + 1.0 mV 10 mV/V + 1.0 mV	
(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	0.34 mV/V + 4.0 mV 0.21 mV/V + 2.0 mV 0.21 mV/V + 2.0 mV 0.37 mV/V + 2.0 mV 1.2 mV/V + 2.0 mV 4.0 mV/V + 10 mV 15 mV/V + 10 mV	

Parameter/Range	Frequency	CMC <sup>2, 4, 5</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup> (cont)			
(100 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.49 mV/V + 40 mV 0.40 mV/V + 20 mV 0.60 mV/V + 20 mV 1.2 mV/V + 20 mV 3.0 mV/V + 20 mV	HP 3458A, synchronous sub- sampled mode
(0.7 to 42) kV	60 Hz	6.2 mV/V	Ross VD60 w/ 34401A
Oscilloscopes –			
Amplitude DC: 50 Ω 1 MΩ	(0 to ±6.6) V <sub>pp</sub> (0 to ±130) V <sub>pp</sub>	1.9 mV/V + 31 μV 0.39 mV/V + 31 μV	Fluke 5520A/SC1100
Square Wave: 50 Ω 1 MΩ	(0 to ±6.6) V <sub>pp</sub> (0 to ±130) V <sub>pp</sub>	1.6 mV/V + 31 μV 0.78 mV/V + 31 μV	Fluke 5520A/SC1100
Leveled Sine Wave	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz (1100 to 3200) MHz	2.8 % 3.0 % 4.0 % 4.7 % 4.1 %	Fluke 5520A/SC1100  Fluke 9500B with 9530 active heads
Time Marker	5 s to 50 ms	(19 + 39 <i>t</i> ) μs/s	Fluke 5520A/SC1100 <i>t</i> = time in seconds
	1 ns to 20 ms (cardinal points)	2.1 μs/s	
	1 ns to 20 ms (noncardinal points)	39 μs/s	
Rise Time – Generate	1 kHz to 2 MHz (200 to 300) ps	19 ps	
	(2 to 10) MHz (250 to 350) ps	19 ps	Fluke 5520A/SC1100
Distortion <sup>3</sup> – Measure			
(0 to 99.9) dB (0 to 99.9) dB	20 Hz to 20 kHz (20 to 100) kHz	1.2 dB 2.3 dB	HP 8903B
Inductance – Generate <sup>3</sup>			
100 mH	(0.1 to 1) kHz	2.9 mH/H	GenRad 1482L

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
Capacitance – Generate <sup>3</sup> (0.19 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) 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 3 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 DC to 50 Hz DC to 20 Hz DC to 6 Hz DC to 2 Hz DC to 0.6 Hz DC to 0.2 Hz	4.1 pF/nF + 7.8 pF 4.0 pF/nF + 7.8 pF 2.3 pF/nF + 7.8 pF 2.3 pF/nF + 78 pF 2.3 pF/nF + 230 pF 2.3 nF/μF + 0.78 nF 2.3 nF/μF + 2.3 nF 2.3 nF/μF + 7.8 nF 3.4 nF/μF + 23 nF 3.7 nF/μF + 78 nF 3.5 nF/μF + 230 nF 3.5 μF/mF + 0.78 μF 3.5 μF/mF + 2.3 μF 3.5 μF/mF + 7.8 μF 5.8 μF/mF + 23 μF 8.5 μF/mF + 78 μF	Fluke 5520A

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Current – Generate <sup>3,4</sup>	Up to 220 μA (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	41 μA/A + 5.4 nA 33 μA/A + 6.2 nA 33 μA/A + 39 nA 41 μA/A + 0.62 μA 71 μA/A + 12 μA 0.28 mA/A + 0.37 mA	Fluke 5720A opt 3 w/ 5725A
Clamp-On Only	(11 to 20.5) A (16.5 to 149.999) A (150 to 1025) A	0.78 mA/A + 0.58 mA 3.9 mA/A + 0.11 mA 7.1 mA/A + 0.39 mA	Fluke 5520A Fluke 5520A w/ 5500A coil
DC Current – Measure <sup>3,5</sup>	0 to 100 nA 0.1 to 1 μA 1 to 10 μA 10 to 100 μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 20) A (20 to 100) A	67 μA/A + 40 pA 34 μA/A + 40 pA 20 μA/A + 0.10 nA 22 μA/A + 0.80 nA 23 μA/A + 5.0 nA 22 μA/A + 50 nA 42 μA/A + 500 nA 110 μA/A + 10 μA 56 μA/A 0.46 mA/A	HP 3458A Y5020 w/3458A L&N shunt w/3458A
DC Resistance – Measure <sup>3</sup>	Up to 10 Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ	15 μΩ/Ω + 50 μΩ 12 μΩ/Ω + 0.50 mΩ 10 μΩ/Ω + 0.50 mΩ 10 μΩ/Ω + 5.0 mΩ 11 μΩ/Ω + 50 mΩ	HP 3458A

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Resistance – Measure <sup>3</sup> (cont)	(0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ	16 μΩ/Ω + 2.0 Ω 51 μΩ/Ω + 100 Ω 0.51 mΩ/Ω + 1.0 kΩ 5.6 mΩ/Ω + 10 kΩ	HP 3458A
DC Resistance –Generate <sup>3</sup>	(0 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (330 to 1099.999) Ω (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 (330 to 1099.999) kΩ (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 329.9999) MΩ (330 to 1099.999) MΩ	33 μΩ/Ω + 0.78 mΩ 24 μΩ/Ω + 1.2 mΩ 22 μΩ/Ω + 1.1 mΩ 23 μΩ/Ω + 1.6 mΩ 22 μΩ/Ω + 1.6 mΩ 23 μΩ/Ω + 16 mΩ 23 μΩ/Ω + 16 mΩ 23 μΩ/Ω + 0.16 Ω 23 μΩ/Ω + 0.16 Ω 26 μΩ/Ω + 1.6 Ω 26 μΩ/Ω + 1.6 Ω 48 μΩ/Ω + 23 Ω 0.10 mΩ/Ω + 39 Ω 0.21 mΩ/Ω + 1.9 kΩ 0.40 mΩ/Ω + 2.3 kΩ 2.3 mΩ/Ω + 78 kΩ 12 mΩ/Ω + 390 kΩ	Fluke 5520A
DC Resistance –Generate <sup>3</sup> Fixed Points	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	0.11 mΩ 0.16 mΩ 0.21 mΩ 0.41 mΩ 0.96 mΩ 1.8 mΩ 8.6 mΩ 16 mΩ 80 mΩ 0.15 Ω 1.2 Ω 2.2 Ω 20 Ω 38 Ω 0.37 kΩ 0.84 kΩ 12 kΩ	Fluke 5720A
DC Voltage – Measure <sup>3</sup>	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1100) V  (1 to 60) kV	5.9 μV/V + 0.23 μV 3.5 μV/V + 0.23 μV 3.4 μV/V + 0.39 μV 4.9 μV/V + 23 μV 5.0 μV/V + 78 μV  1.7 mV/V	HP 3458A OPT 002  VD60 Ross divider w/ HP 34401A



Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	9.0 μV/V + 0.62 μV 7.3 μV/V + 0.93 μV 7.3 μV/V + 3.1 μV 7.3 μV/V + 6.2 μV 7.9 μV/V + 78 μV 9.3 μV/V + 470 μV	Fluke 5720A
Electrical Calibration of Thermocouple Indicators			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.34 °C 0.27 °C 0.24 °C 0.26 °C	Fluke 5520A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.24 °C 0.21 °C 0.25 °C 0.39 °C 0.65 °C	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.13 °C 0.11 °C 0.13 °C 0.17 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.13 °C 0.12 °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	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.31 °C 0.17 °C 0.15 °C 0.14 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.26 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.38 °C 0.28 °C 0.29 °C 0.36 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators (cont)			
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.19 °C 0.13 °C 0.11 °C	Fluke 5520A
Type U	(-200 to 0) °C (0 to 600) °C	0.44 °C 0.21 °C	
Electrical Calibration of RTDs <sup>3,4</sup> –			
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	0.085 °C 0.12 °C 0.12 °C 0.11 °C 0.097 °C 0.11 °C 0.20 °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	0.064 °C 0.076 °C 0.075 °C 0.089 °C 0.095 °C 0.17 °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	0.21 °C 0.060 °C 0.068 °C 0.070 °C 0.077 °C 0.084 °C 0.090 °C 0.13 °C 0.19 °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	0.041 °C 0.043 °C 0.044 °C 0.051 °C 0.098 °C 0.11 °C 0.11 °C 0.13 °C	

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Electrical Calibration of RTDs <sup>3,4</sup> – (cont)			
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	0.036 °C 0.043 °C 0.044 °C 0.051 °C 0.066 °C 0.066 °C 0.073 °C 0.088 °C	Fluke 5520A
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	0.029 °C 0.029 °C 0.036 °C 0.042 °C 0.050 °C 0.18 °C 0.057 °C 0.18 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.081 °C 0.11 °C 0.11 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.69 °C	
Rise/Fall Time – Measure	> 400 ps	79 ps	Tektronix TDS784D

#### IV. Electrical – RF & Microwave

Parameter/Equipment	Range	CMC <sup>2,4,5</sup> (±)	Comments
RF Power – Measure			
(-30 to + 20) dBm	100 kHz to 500 kHz 500 kHz to 1 MHz (1 to 100) MHz (0.1 to 2) GHz 2 to 4.2 GHz	2.1 % 1.6 % 1.5 % 1.6 % 1.8 %	HP N1914A w/ HP 8482A-H84
RF Power @ 50 MHz	1.00 mW	0.30 %	HP 432C w/ HP 478A-H76 & HP 3458A



Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Torque Wrenches <sup>3</sup>	(5 to 50) lbs·in (25 to 250) lbs·in (100 to 1000) lbs·in (20 to 250) lbs·ft (60 to 600) lbs·ft	0.30 % 0.31 % 0.46 % 0.34 % 0.44 %	CDI 2000-400-02    CDI 2000-12-02

## VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,5,8</sup> (±)	Comments
Relative Humidity – Measure <sup>3</sup>	(20 to 90) % RH	1.3 % RH	Vaisala HMI-41 RH meter w/ HMP 46 probe
Temperature – Measure <sup>3</sup>	(-100 to 420) °C (> 420 to 500) °C	0.021 °C 0.062 °C	PRT w/ digital thermometer
Temperature – Measuring Equipment	(-38 to 0.0) °C (0.0 to 100) °C (100 to 400) °C	0.29 °C 0.060 °C 0.061 °C	PRT w/ digital thermometer, bath

## VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,5,8</sup> (±)	Comments
Frequency – Generate <sup>3</sup>	(0.001 to 1000) Hz 1000 Hz to 80 MHz 80 MHz to 26.5 GHz	0.12 mHz/Hz 1.2 nHz/Hz 1.2 nHz/Hz	Fluke 910 w/ HP 33250A  HP 8340B
Frequency – Measure <sup>3</sup>	0.001 Hz to 1 kHz 1 kHz to 255 MHz  50 MHz to 26.5 GHz	0.12 mHz/Hz 1.2 nHz/Hz  1.2 nHz/Hz	Fluke 910 w/ HP 53132A  HP 53152A
Stop Watches <sup>3</sup>	(1 to 86 400) s	39 ms	Helmut-Klein 4500 timometer
Non-Contact Tachometers <sup>3</sup>	(1 to 100 000) RPM (100 000 to 200 000) RPM	0.0023 RPM + 0.6R 0.21 RPM + 0.6R	Fluke 910 w/ HP 33250A

SATELLITE FACILITY

TEKTRONIX INC.  
 10811 West Collins Ave  
 Lakewood, CO 80215  
 Steven Ewing Phone: 800 438 8165

CALIBRATION

I. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Pressure – Measuring Equipment <sup>3</sup>  Pneumatic	Up to 10.15 psia/g (10.15 to 1000) psia/g	0.0093 psi 0.02 % + 0.0073 psi	Fluke PPC4EX 7M % is of span of device under test

II. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Gas Flow – Measuring Equipment	(1 to 10) sccm (10 to 1000) sccm (1000 to 30 000) sccm	0.44 % 0.29 % 0.30 %	DHI Molbox

III. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Relative Humidity – Measuring Equipment	(14.7 to 49.9) % RH (50 to 95) % RH	0.54 % RH 0.60 % RH	Thunder Scientific 2500
Temperature – Measure	(-38 to 0) °C (0 to 130) °C	0.020 °C 0.045 °C	PRT w/ digital thermometer
Temperature – Measuring Equipment	(-38 to 0) °C (0 to 130) °C	0.049 °C 0.064 °C	PRT w/ digital thermometer, bath

SATELLITE FACILITY

TEKTRONIX INC.  
 799 E. Utah Valley Drive  
 American Fork, UT 84003  
 Steven Ewing Phone: 800 438 8165

CALIBRATION

I. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Current – Generate <sup>3</sup>			
(29 to 329.99) µA	(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	1.6 nA/µA + 78 nA 1.2 nA/µA + 78 nA 0.98 nA/µA + 78 nA 2.3 nA/µA + 0.12 µA 6.2 nA/µA + 0.16 µA 12 nA/µA + 0.31 µA	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	1.6 µA/mA + 0.12 µA 1.0 µA/mA + 0.12 µA 0.79 µA/mA + 0.12 µA 1.6 µA/mA + 0.16 µA 4.0 µA/mA + 0.23 µA 7.8 µA/mA + 0.47 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	1.4 µA/mA + 1.6 µA 0.71 µA/mA + 1.6 µA 0.35 µA/mA + 1.6 µA 0.64 µA/mA + 1.6 µA 1.6 µA/mA + 2.3 µA 3.5 µA/mA + 3.1 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	1.5 µA/mA + 16 µA 0.71 µA/mA + 16 µA 0.34 µA/mA + 16 µA 0.79 µA/mA + 39 µA 1.6 µA/mA + 78 µA 3.2 µA/mA + 0.16 mA	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Current – Generate <sup>3</sup> (cont)			Fluke 5522A
(0.33 to 1.099 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 0.078 mA 0.41 mA/A + 0.078 mA 4.7 mA/A + 0.78 mA 19 mA/A + 3.9 mA	
(1.1 to 2.999 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 78 µA 0.56 mA/A + 78 µA 4.7 mA/A + 0.78 mA 19 mA/A + 3.9 mA	
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.52 mA/A + 1.6 mA 0.81 mA/A + 1.6 mA 23 mA/A + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.96 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	
AC Voltage – Generate <sup>3</sup>			Fluke 5522A
(1.0 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	0.63 mV/V + 4.7 µV 0.15 mV/V + 4.7 µV 0.19 mV/V + 4.7 µV 0.80 mV/V + 4.7 µV 2.7 mV/V + 9.3 µV 6.2 mV/V + 39 µV	
(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	0.23 mV/V + 6.2 µV 0.12 mV/V + 6.2 µV 0.13 mV/V + 6.2 µV 0.28 mV/V + 6.2 µV 0.63 mV/V + 25 µV 1.6 mV/V + 54 µV	



Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (cont)			Fluke 5522A
(0.33 to 3.299 99) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.23 mV/V + 39 µV 0.12 mV/V + 47 µV 0.15 mV/V + 47 µV 0.24 mV/V + 39 µV 0.55 mV/V + 97 µV 1.9 mV/V + 0.47 mV	
(3.3 to 32.9999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.23 mV/V + 0.50 mV 0.12 mV/V + 0.47 mV 0.19 mV/V + 0.47 mV 0.27 mV/V + 0.47 mV 0.7 mV/V + 1.2 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	0.15 mV/V + 1.6 mV 0.16 mV/V + 4.7 mV 0.44 mV/V + 4.7 mV 0.25 mV/V + 4.7 mV 1.6 mV/V + 39 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.23 mV/V + 7.8 mV 0.20 mV/V + 7.8 mV 0.23 mV/V + 7.8 mV	
Capacitance – Generate <sup>3</sup>			Fluke 5522A
(220 to 399.9) pF	10 Hz to 10 kHz	5.6 fF/pF + 7.8 pF	
(0.4 to 1.0999) nF	10 Hz to 10 kHz	4.3 pF/nF + 7.8 pF	
(1.1 to 3.2999) nF	10 Hz to 3 kHz	4.1 pF/nF + 7.8 pF	
(3.3 to 10.9999) nF	10 Hz to 1 kHz	2.0 pF/nF + 7.8 pF	
(11 to 32.9999) nF	10 Hz to 1 kHz	2.0 pF/nF + 78 pF	
(33 to 109.999) nF	10 Hz to 1 kHz	2.0 pF/nF + 78 pF	
(110 to 329.999) nF	10 Hz to 1 kHz	2.1 pF/nF + 0.23 nF	
(0.33 to 1.099 99) µF	(10 to 600) Hz	2.0 nF/µF + 0.78 nF	
(1.1 to 3.299 99) µF	(10 to 300) Hz	2.0 nF/µF + 2.3 nF	
(3.3 to 10.9999) µF	(10 to 150) Hz	2.1 nF/µF + 7.8 nF	
(11 to 32.9999) µF	(10 to 120) Hz	3.2 nF/µF + 23 nF	
(33 to 109.999) µF	(10 to 80) Hz	3.7 nF/µF + 78 nF	
(110 to 329.999) µF	DC to 50 Hz	3.7 nF/µF + 0.23 µF	
(0.33 to 1.099 99) mF	DC to 20 Hz	3.7 µF/mF + 0.78 µF	
(1.1 to 3.299 99) mF	DC to 6 Hz	3.5 µF/mF + 2.3 µF	
(3.3 to 10.9999) mF	DC to 2 Hz	3.5 µF/mF + 7.8 µF	
(11 to 32.9999) mF	DC to 0.6 Hz	5.8 µF/mF + 23 µF	
(33 to 110) mF	DC to 0.2 Hz	8.5 µF/mF + 78 µF	

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Current – Generate <sup>3</sup>	(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	120 µA/A + 16 nA 78 µA/A + 39 nA 78 µA/A + 0.19 µA 80 µA/A + 1.9 µA 0.16 mA/A + 31 µA 0.3 mA/A + 31 µA 0.39 mA/A + 0.39 mA 0.78 mA/A + 0.58 mA	Fluke 5522A
DC Voltage – Generate <sup>3</sup>	(0 to 329.9999) mV (0 to 3.299 999) V (0 to 32.999 99) V (30 to 329.9999) V (100 to 1000.000) V	16 µV/V + 0.78 µV 9.0 µV/V + 1.6 µV 9.8 µV/V + 16 µV 14 µV/V + 0.12 mV 14 µV/V + 1.2 mV	Fluke 5522A
DC Resistance – Generate <sup>3</sup>	(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 329.9999) MΩ (330 to 1100) MΩ	33 µΩ/Ω + 0.78 mΩ 24 µΩ/Ω + 1.2 mΩ 22 µΩ/Ω + 1.1 mΩ 23 µΩ/Ω + 1.6 mΩ 22 µΩ/Ω + 1.6 mΩ 23 µΩ/Ω + 16 mΩ 23 µΩ/Ω + 16 mΩ 23 µΩ/Ω + 0.16 Ω 23 µΩ/Ω + 0.16 Ω 26 µΩ/Ω + 1.6 Ω 26 µΩ/Ω + 1.6 Ω 48 µΩ/Ω + 23 Ω 0.10 mΩ/Ω + 39 Ω 0.21 mΩ/Ω + 1.9 kΩ 0.40 mΩ/Ω + 2.3 kΩ 2.4 mΩ/Ω + 78 kΩ 12 mΩ/Ω + 0.39 MΩ	Fluke 5522A
Electrical Calibration of Thermocouple Indicators <sup>3</sup>			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.34 °C 0.27 °C 0.24 °C 0.26 °C	Fluke 5522A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.24 °C 0.21 °C 0.25 °C 0.39 °C 0.65 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup> (cont)			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.13 °C 0.11 °C 0.13 °C 0.17 °C	Fluke 5522A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.13 °C 0.12 °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	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.31 °C 0.17 °C 0.15 °C 0.14 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.26 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.38 °C 0.28 °C 0.29 °C 0.36 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.19 °C 0.13 °C 0.11 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.44 °C 0.21 °C	

<sup>1</sup> This laboratory offers commercial and field calibration and inspection service.

- <sup>2</sup> “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. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The CMC of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer’s device, to the environment and to influences from the circumstances of the specific calibration.
- <sup>3</sup> 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.
- <sup>4</sup> 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.
- <sup>5</sup> 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, the value is defined as the percentage of reading, unless otherwise noted.  $R$  is the numerical value of the resolution of the device under test.
- <sup>6</sup> 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.
- <sup>7</sup> This scope meets A2LA’s *P112 Flexible Scope Policy*.
- <sup>8</sup> 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

**TEKTRONIX, INC**

*Littleton, CO*

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 8<sup>th</sup> day of November 2023.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services  
for the Accreditation Council  
Certificate Number 2357.14  
Valid to September 30, 2025

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