



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

ELECTRICAL TEST INSTRUMENTS, LLC  
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CALIBRATION

Valid To: August 31, 2027

Certificate Number: 5636.02

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<sup>1, 8</sup>:

I. Acoustical Quantities

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Sound Level Meter <sup>3</sup>	94 dB 114 dB	0.38 dB 0.38 dB	B&K 4231

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Micrometers <sup>3</sup>	(0.5 to 4) in (4 to 10) in (10 to 12) in	(58 + 1L) μin (110 + 1L) μin (230 + 0L) μin	Gage blocks Gage blocks Mitutoyo 515-565
	(1.27 to 101.6) mm (101.6 to 254) mm (254 to 304.8) mm	(1.5 + 0.001L) μm (2.9 + 0.001L) μm (5.9 + 0L) μm	Gage blocks Gage blocks Mitutoyo 515-565
Calipers <sup>3</sup>	(0.05 to 10) in (1 to 24) in	(580 + 1L) μin (220 + 14L) μin	Gage blocks Mitutoyo 515-565, Starrett 234A
	(1.27 to 254) mm (1.27 to 609.6) mm	(15 + 0.001L) μm (29 + 0.002L) μm	

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Indicators <sup>3</sup>	(0.0001 to 1.5) in	(58 + 1L) μin	Gage blocks
	2.5 μm to 38.1 mm	(1.5 + 0.001L) μm	Gage blocks
Height Gages <sup>3</sup>	(0.05 to 24) in	(120 + 9L) μin	Mitutoyo 515-565, Starrett 234A
	(1.27 to 609.6) mm	(2.9 + 0.009L) μm	Mitutoyo 515-565, Starrett 234A

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Voltage – Measure <sup>3</sup>	72 μV to 330 mV 330 mV to 3.3 V (3.3 to 33) V (30 to 330) V (100 to 1020) V	4.3 μV + 0.006 % 18 μV + 0.005 % 200 μV + 0.005 % 2 mV + 0.0055 % 1.5 mV + 0.0055 %	Fluke 5500A
DC Voltage – Generate <sup>3</sup>	(2.4 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	1 μV + 0.0007 % 1 μV + 0.0006 % 2 μV + 0.0006 % 32 μV + 0.0008 % 10 mV + 0.0008 %	HP 3458A opt 002
DC Current – Measure <sup>3</sup>	(1.44 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	0.05 μA + 0.013 % 0.25 μA + 0.01 % 3.3 μA + 0.01 % 44 μA + 0.03 % 330 μA + 0.06 %	Fluke 5500A
Toroidal Clamp-On	(11 to 16.5) A (16.5 to 150) A (150 to 550) A	0.002 A + 0.25 % 0.015 A + 0.25 % 0.05 A + 0.25 %	Fluke 5500A w/ coil

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Current – Generate <sup>3</sup>	(0.13 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	0.04 nA + 0.0035 % 0.04 nA + 0.0025 % 0.1 nA + 0.0025 % 0.8 nA + 0.0025 % 5 nA + 0.0025 % 50 nA + 0.0025 % 0.5 µA + 0.004 % 10 µA + 0.012 %	HP 3458A opt 002
DC Resistance – Measure <sup>3</sup>	50 mΩ to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.5 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.008 Ω + 0.012 % 0.015 Ω + 0.012 % 0.015 Ω + 0.009 % 0.015 Ω + 0.009 % 0.061 Ω + 0.009 % 0.078 Ω + 0.009 % 0.66 Ω + 0.009 % 0.81 Ω + 0.009 % 6.7 Ω + 0.011 % 8.7 Ω + 0.012 % 65 Ω + 0.015 % 110 Ω + 0.015 % 740 Ω + 0.06 % 6600 Ω + 0.1 % 26 kΩ + 0.5 % 88 kΩ + 0.5 %	Fluke 5500A
DC Resistance – Generate <sup>3</sup>	(0.005 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	0.000 05 Ω + 0.0018 % 0.000 05 Ω + 0.0015 % 0.000 05 Ω + 0.0013 % 0.005 Ω + 0.0013 % 0.05 Ω + 0.0013 % 2 Ω + 0.0018 % 100 Ω + 0.0053 % 1 kΩ + 0.051 % 10 kΩ + 0.51 %	HP 3458A opt 002

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			
(1 to 33) 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	23 μV + 0.35 % 23 μV + 0.15 % 23 μV + 0.2 % 23 μV + 0.25 % 40 μV + 0.35 % 170 μV + 1 %	Fluke 5500A
(33 to 330) 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	73 μV + 0.25 % 43 μV + 0.05 % 44 μV + 0.1 % 71 μV + 0.16 % 230 μV + 0.24 % 1.3 mV + 0.7 %	
(0.33 to 3.3) 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	480 μV + 0.15 % 290 μV + 0.03 % 290 μV + 0.08 % 610 μV + 0.14 % 2.3 mV + 0.24 % 13 mV + 0.5 %	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	7 mV + 0.15 % 3.6 mV + 0.04 % 5.6 mV + 0.08 % 9.2 mV + 0.19 % 22 mV + 0.24 %	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	40 mV + 0.05 % 30 mV + 0.08 % 30 mV + 0.09 %	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	130 mV + 0.05 % 100 mV + 0.2 % 500 mV + 0.2 %	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			HP 3458A opt 002
18 µV to 10 mV	(1 to 40) Hz	3 µV + 0.03 %	
9.3 µV to 10 mV	40 Hz to 1 kHz	1.1 µV + 0.02 %	
12.3 µV to 10 mV	(1 to 20) kHz	1.1 µV + 0.03 %	
µV to 10 mV	(20 to 50) kHz	1.1 µV + 0.1 %	
153.3 µV to 10 mV	(50 to 100) kHz	1.1 µV + 0.5 %	
(1.2 to 10) mV	(100 to 300) kHz	2 µV + 4 %	
(10 to 100) mV	(1 to 40) Hz	4 µV + 0.007 %	
	40 Hz to 1 kHz	2 µV + 0.007 %	
	(1 to 20) kHz	2 µV + 0.014 %	
	(20 to 50) kHz	2 µV + 0.03 %	
	(50 to 100) kHz	2 µV + 0.08 %	
	(100 to 300) kHz	10 µV + 0.3 %	
	300 kHz to 1 MHz	10 µV + 1 %	
	(1 to 2) MHz	10 µV + 1.5 %	
100 mV to 1 V	(1 to 40) Hz	40 µV + 0.007 %	
	40 Hz to 1 kHz	20 µV + 0.007 %	
	(1 to 20) kHz	20 µV + 0.014 %	
	(20 to 50) kHz	20 µV + 0.03 %	
	(50 to 100) kHz	20 µV + 0.08 %	
	(100 to 300) kHz	100 µV + 0.3 %	
	300 kHz to 1 MHz	100 µV + 1 %	
	(1 to 2) MHz	100 µV + 1.5 %	
(1 to 10) V	(1 to 40) Hz	400 µV + 0.007 %	
	40 Hz to 1 kHz	200 µV + 0.007 %	
	(1 to 20) kHz	200 µV + 0.014 %	
	(20 to 50) kHz	200 µV + 0.03 %	
	(50 to 100) kHz	200 µV + 0.08 %	
	(100 to 300) kHz	1 mV + 0.3 %	
	300 kHz to 1 MHz	1 mV + 1 %	
	(1 to 2) MHz	1 mV + 1.5 %	
(10 to 100) V	(1 to 40) Hz	4 mV + 0.02 %	
	40 Hz to 1 kHz	2 mV + 0.02 %	
	(1 to 20) kHz	2 mV + 0.02 %	
	(20 to 50) kHz	2 mV + 0.035 %	
	(50 to 100) kHz	2 mV + 0.12 %	
	(100 to 300) kHz	10 mV + 0.4 %	
	300 kHz to 1 MHz	10 mV + 1.5 %	
(100 to 1000) V	(1 to 40) Hz	40 mV + 0.04 %	
	40 Hz to 1 kHz	20 mV + 0.04 %	
	(1 to 20) kHz	20 mV + 0.06 %	
	(20 to 50) kHz	20 mV + 0.12 %	
	(50 to 100) kHz	20 mV + 0.3 %	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Current – Measure <sup>3</sup>			
(0.029 to 0.3299) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.23 μA + 0.25 % 0.49 μA + 0.13 % 0.58 μA + 0.13 % 0.64 μA + 0.4 % 1.4 μA + 1.3 %	Fluke 5500A
(0.33 to 3.3) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.76 μA + 0.2 % 0.8 μA + 0.1 % 0.72 μA + 0.1 % 0.79 μA + 0.2 % 0.79 μA + 0.6 %	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	3 μA + 0.2 % 3 μA + 0.1 % 3 μA + 0.09 % 3 μA + 0.2 % 3 μA + 0.6 %	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	30 μA + 0.2 % 30 μA + 0.1 % 30 μA + 0.09 % 30 μA + 0.2 % 30 μA + 0.6 %	
(0.33 to 2.2) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	300 μA + 0.2 % 300 μA + 0.1 % 300 μA + 0.75 %	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	2000 μA + 0.06 % 2000 μA + 0.1 % 2000 μA + 0.33 %	
Toroidal Clamp-On:			
(10 to 16.5) A	(45 to 65) Hz (65 to 440) Hz	0.003 A + 0.28 % 0.003 A + 0.79 %	
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.025 A + 0.28 % 0.027 A + 0.79 %	
(150 to 550) A	(45 to 65) Hz (65 to 440) Hz	0.09 A + 0.28 % 0.1 A + 0.79 %	



Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Capacitance – Measure <sup>3</sup>	(0.33 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF 330 μF to 1.1 mF	0.01 nF + 0.5 % 0.01 nF + 0.25 % 0.3 nF + 0.25 % 1 nF + 0.25 % 3 nF + 0.35 % 10 nF + 0.35 % 30 nF + 0.4 % 100 nF + 0.5 % 300 nF + 0.7 % 300 nF + 1 %	Fluke 5500A
Electrical Calibration of Thermocouple Indicators <sup>3</sup>			
Type B	(250 to 350) °C (350 to 445) °C (445 to 580) °C (580 to 750) °C (750 to 1000) °C (1000 to 1820) °C	0.95 °C 0.74 °C 0.58 °C 0.45 °C 0.37 °C 0.17 °C	Ectron 1140A
Type E	(-270 to -245) °C (-245 to -195) °C (-195 to -155) °C (-155 to -90) °C (-90 to 15) °C (15 to 890) °C (890 to 1000) °C	1.2 °C 0.18 °C 0.1 °C 0.08 °C 0.07 °C 0.06 °C 0.07 °C	
Type J	(-210 to -180) °C (-180 to -120) °C (-120 to -50) °C (990 to 1200) °C	0.12 °C 0.1 °C 0.08 °C 0.07 °C	
Type K	(-270 to -255) °C (-225 to -195) °C (-195 to 115) °C (-115 to -55) °C (-55 to 1000) °C (1000 to 1372) °C	2.2 °C 0.7 °C 0.12 °C 0.09 °C 0.07 °C 0.08 °C	
Type N	(-270 to -260) °C (-260 to -200) °C (-200 to -140) °C (-140 to -70) °C (-70 to 25) °C (25 to 160) °C (160 to 1300) °C	5 °C 1 °C 0.23 °C 0.15 °C 0.12 °C 0.1 °C 0.09 °C	

Parameter/Equipment	Range	CMC <sup>2,6</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup> (cont)			
Type R	(-50 to -30) °C (-30 to 45) °C (45 to 160) °C (160 to 380) °C (380 to 775) °C (775 to 1768.1) °C	0.65 °C 0.55 °C 0.4 °C 0.3 °C 0.26 °C 0.22 °C	Ectron 1140A
Type S	(-50 to -30) °C (-30 to 45) °C (45 to 105) °C (105 to 310) °C (310 to 615) °C (615 to 1768.1) °C	0.62 °C 0.56 °C 0.4 °C 0.33 °C 0.29 °C 0.26 °C	
Type T	(-270 to -255) °C (-255 to -240) °C (-240 to -210) °C (-210 to -150) °C (-150 to -40) °C (-40 to 100) °C (100 to 400) °C	1.8 °C 0.49 °C 0.3 °C 0.18 °C 0.12 °C 0.08 °C 0.07 °C	
Electrical Calibration of RTDs <sup>3</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	0.05 °C 0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.23 °C	Fluke 5500A
Oscilloscopes <sup>3</sup> –  AC Voltage – Leveled Sine Wave – (50 Ω)			
0.1 Hz to 300 MHz (300 to 550) MHz 550 MHz to 1.1 GHz (1.1 to 3.2) GHz	5 mVp-p to 5 Vp-p 5 mVp-p to 5 Vp-p 5 mVp-p to 3 Vp-p 5 mVp-p to 2 Vp-p	2.0 % 5.5 % 7.5 % 9.0 %	Fluke 9500B / 9530

Parameter/Equipment	Range	CMC <sup>2, 6</sup> ( $\pm$ )	Comments
Oscilloscopes <sup>3</sup> (cont) –  AC Voltage – Amplitude V <sub>p-p</sub> – (1 M $\Omega$ )  1 kHz  DC Voltage –  1 M $\Omega$ 50 $\Omega$	    1 mV to 200 V <sub>p-p</sub>    1 mV to +/-200 V 1 mV to +/-5 V	    1.0 % + 10 $\mu$ V    0.025 % + 25 $\mu$ V 0.025 % + 25 $\mu$ V	    Fluke 9500B / 9530

#### IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 7</sup> ( $\pm$ )	Comments
Scales & Balances <sup>3</sup> –  Analytical Balances  Electronic Balances	  (50 to 500) g  (50 to 2000) g	  (4.4 x 10 <sup>4</sup> + 3 x 10 <sup>-6</sup> Wt) g  (1.2 x 10 <sup>-2</sup> + 1 x 10 <sup>-6</sup> Wt) g	  Class 1 weights
Pressure Gages <sup>3</sup>	(0 to 6.89) kPa (0 to 68.947) kPa  (0 to 1) psi (0 to 10) psi  (0 to 2068) kPa (0 to 6894) kPa (0 to 34 473) kPa  (0 to 300) psi (0 to 1000) psi (0 to 5000) psi	0.024 kPa 0.093 kPa  0.0035 psi 0.014 psi  0.56 kPa 3.5 kPa 28 kPa  0.081 psi 0.5 psi 4 psi	Fluke 700P22 Druck DPI 610 w/ PDCR 2200-A145    Drunk DPI 611 Fluke 700P08 Fluke 700P30
Vacuum Gages <sup>3</sup>	(-755 to -2.5) mmHg  (-29.72 to -0.098) inHg	4.1 mmHg  0.16 inHg	Druck DPI 611

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Torque – Tools <sup>3</sup>	(0.28 to 2.8) N·m (2.825 to 28.25) N·m (33.9 to 339) N·m  (25 to 250) lbf·in (25 to 250) lbf·ft	0.028 N·m 0.28 N·m 3.5 N·m  2.5 lbf·in 2.6 lbf·ft	AWS QCI-25 Mountz BMX250I Mountz BMX250F  Mountz BMX250I Mountz BMX250F

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 8</sup> (±)	Comments
Temperature – Measure <sup>3</sup>	(-20 to 0) °C (0 to 420) °C (420 to 670) °C	0.026 °C 0.046 °C 0.067 °C	Additel ADT282 w/ Accumac AMI 751
Temperature – IR Measuring Equipment <sup>3</sup>	(50 to 500) °C	2 °C	Fluke 9132
Relative Humidity – Measure <sup>3</sup> (Fixed Points)	11.3 % RH 75 % RH 97 % RH	1.3 % RH 1.5 % RH 2 % RH	Vaisala 19729HM Vaisala 19731HM Vaisala 19732HM
Relative Humidity – Measuring Equipment <sup>3</sup>	(10 to 90) % RH	1.2 % RH	Vaisala HMI41 w/ HMP46

#### VI. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Stopwatches & Timers <sup>3</sup>	(5 to 180) min	0.098 s	HP 53181A
Tachometers – Mechanical <sup>3</sup>	(575 to 3500) rpm	0.4 rpm	Automation Direct CCT-AN-A120 counter

Parameter/Equipment	Range	CMC <sup>2, 6</sup> ( $\pm$ )	Comments
Tachometers – Photo <sup>3</sup>	(60 to 100 000) rpm	1.2 rpm	Fluke 5500A
Oscilloscope – Time Markers <sup>3</sup> (1,2,2.5,4,5 Sequence)	900.91 ns to 83 $\mu$ s 83 $\mu$ s to 55 s	0.000 025 % 0.0003 %	Fluke 9500B/ 9530

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

<sup>2</sup> 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.

<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, repeatability) 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>  $L$  is the numerical value of the nominal length of the device measured in inches or millimeters,

<sup>6</sup> In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

<sup>7</sup>  $Wt$  is the numerical value of the nominal mass of the device measured in grams.

<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.

<sup>9</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.



## Accredited Laboratory

A2LA has accredited

### **ELECTRICAL TEST INSTRUMENTS, LLC**

*Huntersville, NC*

for technical competence in the field of

### Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCCL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).



Presented this 24<sup>th</sup> day of March 2026.

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 5636.02  
Valid to August 31, 2027

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