



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

ELECTRO-LAB SERVICES, INC.

Evansville, IN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 8 January 2009*).

Presented this 23rd day of April 2009.



A handwritten signature in black ink, reading "Peter Abney".

President & CEO
For the Accreditation Council
Certificate Number 1607.01
Valid to April 30, 2011
Revised on February 3, 2010

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



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: April 30, 2011

Certificate Number: 1607.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical - DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
DC Voltage ³ – Generate	Up to 329.9999 mV 330 mV to 3.299999 V (3.3 to 32.9999) V (33 to 329.9999) V (330 to 1000) V	81 µV/V + 3 µV 60 µV/V + 5 µV 61 µV/V + 50 µV 88 µV/V + 500 µV 0.011 % + 1.5 mV	Fluke 5500A
DC Voltage ³ – Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	6.1 µV/V 4.2 µV/V 4.2 µV/V 6.6 µV/V 14 µV/V	Fluke 8508A
DC Current ³ – Generate	(0.3 to 3.29) mA (3.3 to 32.9) mA (33 to 329.9) mA 330 mA to 2 A (2 to 10) A	0.016 % + 0.05 µA 0.013 % + 0.25 µA 0.052 % + 3.3 µA 0.066 % + 44 µA 0.088 % + 330 µA	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (\pm)	Comments
DC Current ³ – Measure	Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	15 μ A/A 16 μ A/A 18 μ A/A 60 μ A/A 0.022 % 0.046 %	Fluke 8508A
Capacitance ³ – Generate	(0.33 to 11) nF 11 nF to 1.1 μ F (1.1 to 11) μ F (11 to 33) μ F (33 to 330) μ F 330 μ F to 1 mF	1 % 0.3 % 0.4 % 0.46 % 1 % 2 %	Fluke 5500
Resistance ³ – Generate	Up to 10.99 Ω (11 to 32.99) Ω (33 to 109.9) Ω (110 to 329.9) Ω 330 Ω to 1.09 k Ω (1.1 to 3.29) k Ω (3.3 to 10.9) k Ω (11 to 32.9) k Ω (33 to 109.9) k Ω (110 to 329.9) k Ω 330 k Ω to 1.09 M Ω (1.1 to 3.29) M Ω (3.3 to 10.9) M Ω (11 to 32.9) M Ω (33 to 109.9) M Ω (110 to 330) M Ω	0.08 % + 8 m Ω 0.053 % + 15 m Ω 0.02 % + 15 m Ω 0.014 % + 15 m Ω 0.017 % + 0.06 Ω 0.013 % + 0.06 Ω 0.017 % + 0.6 Ω 0.013 % + 0.6 Ω 0.02 % + 6 Ω 0.016 % + 6 Ω 0.024 % + 55 Ω 0.02 % + 55 Ω 0.076 % + 550 Ω 0.12 % + 550 Ω 0.58 % + 5.5 k Ω 0.58 % + 17 k Ω	Fluke 5500
Resistance ³ – Measure	(0 to 2) Ω (2 to 20) Ω 20 Ω to 200 k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω	24 $\mu\Omega/\Omega$ 13 $\mu\Omega/\Omega$ 9.3 $\mu\Omega/\Omega$ 11 $\mu\Omega/\Omega$ 27 $\mu\Omega/\Omega$ 0.018 % 0.18 %	Fluke 8508A
High Voltage	(0 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω (2 to 20) G Ω	20 $\mu\Omega/\Omega$ 75 $\mu\Omega/\Omega$ 0.025 % 0.21 %	

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (\pm)	Comments
AC Voltage ³ – Generate			
(1 to 33) mV	45 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.2 % + 20 μ V 0.3 % + 20 μ V 0.4 % + 33 μ V	Fluke 5500A
(33 to 330) mV	45 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.1 % + 20 μ V 0.2 % + 20 μ V 0.3 % + 170 μ V	
330 mV to 3.3 V	45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.05 % + 60 μ V 0.12 % + 60 μ V 0.18 % + 300 μ V 0.3 % + 1700 μ V	
(3.3 to 33) V	45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.06 % + 600 μ V 0.1 % + 2600 μ V 0.22 % + 5000 μ V 0.3 % + 17 000 μ V	
(33 to 330) V	45 Hz to 20 kHz	0.15 % + 33 μ V	
(330 to 1020) V	45 Hz to 1 kHz (1 to 10) kHz	0.08 % + 80 μ V 0.25 % + 500 μ V	
AC Voltage ³ – Measure			
(0 to 200) mV	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.017 % 0.04 % 0.09 %	Fluke 8508A
200 mV to 200 V	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.013 % 0.026 % 0.07 % 0.45 % 2.2 %	
(200 to 1000) V	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.06 % 0.064 % 0.09 %	

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (\pm)	Comments
AC Current ³ – Generate			
(0.029 to 0.329) mA	20 Hz to 5 kHz	0.46 % + 0.15 μ A	Fluke 5500
(0.33 to 3.29) mA	20 Hz to 5 kHz	0.23 % + 0.3 μ A	
(3.3 to 32.9) mA	20 HZ to 1 kHz (1 to 5) kHz	0.12 % + 3 μ A 0.23 % + 3 μ A	
(33 to 329.9) mA	20 HZ to 1 kHz (1 to 5) kHz	0.13 % + 30 μ A 0.24 % + 30 μ A	
330 mA to 2.2 A	45 Hz to 1 kHz (1 to 5) kHz	0.15 % + 300 μ A 0.88 % + 300 μ A	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.094 % + 2 mA 0.14 % + 2 mA 0.41 % + 2 mA	
AC Current ³ – Measure			Fluke 8508A
(0 to 200) μ A	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.07 % 0.083 % 0.53 %	
200 μ A to 20 mA	10 Hz to 10 kHz (10 to 100) kHz	0.045 % 0.55 %	
(20 to 200) mA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.07 % 0.083 % 0.6 %	
200 mA to 2 A	10 Hz to 30 kHz	0.087 %	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.1 % 0.4 %	

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (\pm)	Comments
Thermocouple Simulation ³ –			
Type E	-25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.16 °C 0.18 °C 0.24 °C	Fluke 5500A
Type J	-30 °C to 150 °C 150 °C to 760 °C	0.16 °C 0.2 °C	
Type K	-25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.18 °C 0.3 °C 0.46 °C	
Type S	0 °C to 250 °C 250 °C to 1400 °C 1400 °C to 1767 °C	0.54 °C 0.42 °C 0.54 °C	
Type T	-150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.28 °C 0.18 °C 0.16 °C	
RTD Simulation ³ –			
10 Ω Copper	-100 °C to 260 °C	0.34 °C	Fluke 5500A
100 Ω Platinum	-200 °C to 0 °C	0.06 °C	
	0 °C to 100 °C	0.08 °C	
	100 °C to 300 °C	0.1 °C	
	300 °C to 400 °C	0.12 °C	
	400 °C to 630 °C	0.14 °C	
1000 Ω Platinum	630 °C to 800 °C	0.26 °C	
	-200 °C to 100 °C	0.05 °C	
	100 °C to 300 °C	0.07 °C	
	300 °C to 600 °C	0.08 °C	
	600 °C to 630 °C	0.26 °C	
RTD ³ – Measure	(2 to 20) Ω 20 Ω to 200 k Ω	13 $\mu\Omega/\Omega$ 9.3 $\mu\Omega/\Omega$	Fluke 8508A

II. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Temperature ³	-10 °C to 150 °C 150 °C to 650 °C 650 °C to 1200 °C 1200 °C to 1450 °C	0.06 °C 0.12 °C 2.7 °C 3.3 °C	Hart 5626, Prema Hart 5650, Fluke 8508A
Humidity ³	(11 to 90) %	2.2 % RH	Vaisala HMP45A

III. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency – Measure ³	1 Hz to 225 MHz	0.2 µHz/Hz	Agilent 53131A

¹ This laboratory offers commercial calibration service and field calibration service.

² Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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 and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. 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 Where ranges overlap, the uncertainty for the overlapping specifications will be the lower of the two uncertainties.

⁵ The measurands stated are generated with the Fluke 5500 series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁶ The measurands stated are generated with the Fluke 8508A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.