



THE AMERICAN ASSOCIATION FOR
LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

MASTER METROLOGY, INC.

Towson, MD

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 18 June 2005*).

Presented this 30th day of January 2008.

A handwritten signature in cursive script, reading "Peter Abney", positioned above a horizontal line.

President
For the Accreditation Council
Certificate Number 1346.01
Valid to January 31, 2010
Revised: December 18, 2009



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: January 31, 2010

Certificate Number: 1346.01

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

I. Dimensional

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Calipers – Outside Inside	(0 to 48) in (0 to 1) in	(560 + 3.5L) µin 580 µin	Comparison with gage blocks
Gage Blocks	(0 to 4) in (5 to 20) in	(2.1 + 1.8L) µin (1 + 2.8L) µin	Mechanical comparison
Height Gages – Height Master	(0 to 48) in (0 to 48) in	(0.6R + 1.8L) µin (0.6R + 7.3L) µin	Comparison with gage block
Indicators	(0 to 1) in	0.6R µin	Supermicrometer
Micrometer Length Standards –	(0 to 48) in	(10 + 9.8L) µin	Gage block, electronic indicator with amplifier

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (\pm)	Comments
Micrometers – Inside Outside Depth	(0 to 36) in (0 to 4) in (4 to 42) in (0 to 12) in	(580 + 2.4L) μ in (60 + 6L) μ in (80 + 15L) μ in 600 μ in	Comparison with gage blocks
Pin Gages	(0.010 to 1.000) in	26 μ in	Laser micrometer
Plain Cylindrical Plug Gages	(0 to 10) in	(5.9 + 7L) μ in	Internal/external Comparator
Plain Cylindrical Ring Gages	(0.125 to 10) in	(13 + 6.5D) μ in	Internal/external Comparator
Thread Plugs – Simple Pitch Diameter	(0 to 10) in	(75 + 12D) μ in	Three wire method
Thread Rings	(0 to 4) in	Tactile fit	In accordance with thread setting plug methods ANSI/ASME B1.2 and ANSI/ASME B1.16M.

II. Mechanical

Parameter/Equipment	Range	Best Uncertainty ² (\pm)	Comments
Torque – Measure	(0 to 2000) ft-lb	0.4 % of reading	Torque cells
Torque Measuring Equipment	(0 to 2000) ft-lb	0.15 % of reading	Torque arms and weights

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty ^{2,4} (±)	Comments
DC Voltage – Generate	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (100 to 1020) V	60 μV/V + 3 μV 50 μV/V + 5 μV 50 μV/V + 50 μV 55 μV/V + 500 μV 55 μV/V + 1.5 mV	Fluke 5500A
DC Current – Generate	(0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 2.2) A (0 to 11) A	0.013 % + 0.05 μA 0.01 % + 0.25 μA 0.01 % + 3.3 μA 0.03 % + 44 μA 0.06 % + 330 μA	Fluke 5500A

Parameter/Range	Frequency	Best Uncertainty ^{2,4} (±)	Comments
AC Voltage – Generate			
(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	0.35 % + 20 μV 0.15 % + 20 μV 0.20 % + 20 μV 0.25 % + 20 μV 0.35 % + 33 μV 1.0 % + 60 μV	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	0.25 % + 50 μV 0.05 % + 20 μV 0.1 % + 20 μV 0.16 % + 40 μV 0.24 % + 170 μV 0.7 % + 330 μV	
(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	0.15 % + 250 μV 0.03 % + 60 μV 0.08 % + 60 μV 0.14 % + 300 μV 0.24 % + 1.7 mV 0.5 % + 3.3 mV	
(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	0.15 % + 2.5 mV 0.04 % + 600 μV 0.08 % + 2.6 mV 0.19 % + 5 mV 0.24 % + 17 mV	

Parameter/Range	Frequency	Best Uncertainty ^{2,4} (±)	Comments
AC Voltage – Generate (cont)			
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.05 % + 6.6 mV 0.08 % + 15 µV 0.09 % + 33 µV	Fluke 5500A
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.05 % + 80 mV 0.2 % + 100 µV 0.2 % + 500 µV	
AC Current – Generate			
(30 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.25 % + 0.15 µA 0.13 % + 0.15 µA 0.13 % + 0.25 µA 0.4 % + 0.15 µA 1.3 % + 0.15 µA	Fluke 5500A
330 µA to 3.3 mA	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.2 % + 0.3 µA 0.1 % + 0.3 µA 0.2 % + 0.3 µA 0.6 % + 0.3 µA	
(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	0.2 % + 3 µA 0.1 % + 3 µA 0.09 % + 3 µA 0.2 % + 3 µA 0.6 % + 3 µA	
(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	0.2 % + 30 µA 0.1 % + 30 µA 0.09 % + 30 µA 0.2 % + 30 µA 0.6 % + 30 µA	
330 mA to 2.2 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.2 % + 300 µA 0.1 % + 300 µA 0.75 % + 300 µA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.06 % + 2 mA 0.1 % + 2 mA 0.33 % + 2 mA	

Parameter/Equipment	Range	Best Uncertainty ^{2,4} (±)	Comments
Resistance – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 3.3 MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.012 % + 8 mΩ 0.012 % + 15 mΩ 90 μΩ/Ω + 15 mΩ 90 μΩ/Ω + 0.06 Ω 90 μΩ/Ω + 0.6 Ω 0.011 % + 6 Ω 0.012 % + 6 Ω 0.015 % + 55 Ω 0.06 % + 550 Ω 0.1 % + 550 Ω 0.5 % + 5.5 kΩ 0.5 % + 17 kΩ	Fluke 5500A
Capacitance – Generate	(0.33 to 11) nF (11 to 110) nF (110 to 330) nF 330 nF 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	0.5 % + 0.01 nF 0.25 % + 0.1 nF 0.25 % + 0.3 nF 0.25 % + 1 nF 0.35 % + 3 nF 0.35 % + 10 nF 0.4 % + 30 nF 0.5 % + 100 nF 0.7 % + 300 nF 1 % + 300 nF	Fluke 5500A
Electrical Calibration of Thermocouple Indicators and Indicating Systems – Measure			
Type E	-250 °C to -100 °C -100 °C to 650 °C 650 °C to 1000 °C	0.5 °C 0.17 °C 0.22 °C	Fluke 5500A
Type J	-210 °C to -100 °C -100 °C to 760 °C 760 °C to 1200 °C	0.28 °C 0.18 °C 0.24 °C	
Type K	-200 °C to -100 °C -100 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.34 °C 0.19 °C 0.27 °C 0.4 °C	
Type R	0 °C to 250 °C 250 °C to 1767 °C	0.57 °C 0.4 °C	
Type S	0 °C to 1767 °C	0.47 °C	

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Electrical Calibration of Thermocouple Indicators and Indicating Systems – Measure (cont)			
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 400 °C	0.63 °C 0.25 °C 0.17 °C	Fluke 5500A

¹ This laboratory offers commercial calibration service.

² “Best Uncertainty” 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 best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.

³ In the statement of best uncertainty, L is the numerical value of the nominal length of the device measured in inches, R is the numerical value of the resolution of the device in micrometers, and D is the numerical value of the nominal diameter of the device measured in inches.

⁴ 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. Best measurement uncertainties are expressed as a portion or percentage of the output plus a fixed floor specification.