



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

MASTER METROLOGY, INC.
1041 Cromwell Bridge Road
Towson, MD 21286
Ray Wood Phone: 410 337 0687

CALIBRATION

Valid To: December 31, 2013

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	CMC ^{2,3} (\pm)	Comments
Calipers	Up to 48 in	(560 + 3.5L) μ in	Gage blocks
Gage Blocks	Up to 4 in (5 to 20) in	(2.1 + 1.8L) μ in (4.8 + 1.8L) μ in	Gage blocks, gage block comparator
Height Gages	Up to 48 in	(560 + 3.1L) μ in	Gage blocks, electronic indicator
Height Masters	Up to 24 in	(36 + 7L) μ in	Gage blocks, electronic indicator
Indicators – Dial, Test, Electronic	Up to 1 in	0.6R μ in	Universal measuring machine (UMM), gage blocks
Length Standards – Micrometer, Gaging Fixtures-Single Axis, Others	Up to 48 in	(10 + 9.8L) μ in	Gage blocks, electronic indicator, UMM

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Micrometers – Inside Outside Depth	Up to 36 in Up to 4 in (4 to 42) in Up to 12 in	(580 + 2.4L) μin (60 + 6L) μin (80 + 15L) μin 600 μin	Gage blocks, UMM, indicator
Bore Gages – Bore Micrometer, Bore Indicators, Air Gage Systems	Up to 6 in	(0.7R + 4L) μin	Plain cylindrical ring gages
Plain Cylindrical Plug Gages, Pin Gages	Up to 10 in	(5.9 + 7L) μin	Internal/external comparator, UMM, gage blocks
Plain Cylindrical Ring Gages	(0.125 to 10) in	(13 + 6.5D) μin	Internal/external comparator, gage blocks
Thread Plugs – Simple Pitch Diameter Major Diameter	Up to 10 in Up to 10 in	(66 + 4.5D) μin (38 + 5.4D) μin	UMM, thread wires, gage blocks
Thread Rings (Adjustable)	Up to 4 in	0.00023 in	Class X thread setting plugs
NPT Plugs – Simple Pitch Diameter Step	Up to 3 in	(65 + 2D) μin 120 μin	UMM, thread wires, sine block, indicator

Peter Abney

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate (cont)			
(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	0.17 % + 250 μV 0.04 % + 60 μV 0.09 % + 60 μV 0.16 % + 300 μV 0.28 % + 1.7 mV 0.58 % + 3.3 mV	Fluke 5500A
(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	0.17 % + 2.5 mV 0.05 % + 600 μV 0.09 % + 2.6 mV 0.22 % + 5 mV 0.28 % + 17 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.06 % + 6.6 mV 0.09 % + 15 mV 0.10 % + 33 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.06 % + 80 mV 0.23 % + 100 mV 0.23 % + 500 mV	
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	0.29 % + 0.15 μA 0.15 % + 0.15 μA 0.15 % + 0.25 μA 0.47 % + 0.15 μA 1.5 % + 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	0.23 % + 0.3 μA 0.12 % + 0.3 μA 0.23 % + 0.3 μA 0.70 % + 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	0.23 % + 3 μA 0.12 % + 3 μA 0.10 % + 3 μA 0.23 % + 3 μA 0.69 % + 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	0.23 % + 30 μA 0.12 % + 30 μA 0.10 % + 30 μA 0.23 % + 30 μA 0.69 % + 30 μA	

Peter Abney

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current – Generate (cont)			
330 mA to 2.2 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.23 % + 300 µA 0.12 % + 300 µA 0.88 % + 300 µA	Fluke 5500A
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.07 % + 2 mA 0.12 % + 2 mA 0.38 % + 2 mA	
Capacitance – Generate			
(0.33 to 0.5) nF (0.5 to 11) nF (11 to 110) nF (110 to 330) nF (0.330 to 1.1) µF (1.1 to 3.3) µF	50 Hz to 1 kHz	0.91 % + 0.01 nF 0.59 % + 0.01 nF 0.30 % + 0.1 nF 0.30 % + 0.3 nF 0.30 % + 1 nF 0.41 % + 3 nF	Fluke 5500A
(3.3 to 11) µF (11 to 33) µF		0.41 % + 10 nF 0.47 % + 30 nF	
(33 to 110) µF	50 Hz to 400 Hz	0.59 % + 100 nF	
(110 to 330) µF (0.330 to 1.1) mF	50 Hz to 200 Hz 50 Hz to 100 Hz	0.81 % + 300 nF 1.2 % + 300 nF	

Parameter/Equipment	Range	CMC ^{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	0.015 % + 8 mΩ 0.015 % + 15 mΩ 0.012 % + 15 mΩ 0.012 % + 0.06 Ω 0.012 % + 0.6 Ω 0.014 % + 6 Ω 0.015 % + 6 Ω 0.017 % + 55 Ω 0.07 % + 550 Ω 0.12 % + 550 Ω 0.58 % + 5.5 kΩ 0.58 % + 17 kΩ	Fluke 5500A

Peter Abney

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
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	0.58 °C 0.20 °C 0.26 °C	Fluke 5500A
Type J	-210 °C to -100 °C -100 °C to 760 °C 760 °C to 1200 °C	0.32 °C 0.22 °C 0.28 °C	
Type K	-200 °C to -100 °C -100 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.39 °C 0.23 °C 0.31 °C 0.47 °C	
Type R	0 °C to 250 °C 250 °C to 1767 °C	0.66 °C 0.47 °C	
Type S	0 °C to 1767 °C	0.54 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 400 °C	0.73 °C 0.29 °C 0.21 °C	

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Torque – Measure	(0 to 2000) ft·lb	0.4 %	Torque cells
Torque – Measuring Equipment	(0 to 2000) ft·lb	0.15 %	Torque arms, weights

Peter Abney

IV. Time and Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Frequency – Measuring Equipment	0.01 Hz to 12 kHz (12 to 1200) kHz (1.2 to 2) MHz	29 µHz/Hz + 1 mHz 29 µHz/Hz + 15 mHz 29 µHz/Hz + 15 mHz	Fluke 5500A

¹ This laboratory offers commercial 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 In the statement of CMC, 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 microinches, 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. CMC's are expressed as a portion or percentage of the output plus a fixed floor specification.

⁵ In the statement of CMC, percentages are to be read as percent of reading unless otherwise indicated.





The American Association for Laboratory Accreditation

World Class 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 8 January 2009*).

Presented this 26th day of January 2012.



A handwritten signature in black ink, appearing to read "Peter Abney".

President & CEO
For the Accreditation Council
Certificate Number 1346.01
Valid to December 31, 2013

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