



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

MMC Metrology Lab, INC
4989 Cleveland Street
Virginia Beach, VA 23462

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 22 August 2024

Certificate Number: AC-3123



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
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).

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
AND
ANSI/NCSL Z540-1-1994 (R2002)**

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David Blauvelt
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CALIBRATION

Valid to: **August 22, 2024**

Certificate Number: **AC-3123**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Generate	(0 to 199.999) mV	0.000 74 mV	Fluke 8508A/Fluke 5560A
	200 mV to 1.999 99 V	6.6 μ V	
	(2 to 19.999 9) V	0.000 062 V	
	(20 to 199.999) V	0.000 88 V	
	(200 to 1 100) V	0.009 1 V	
DC Voltage – Measure	(0 to 200) mV	0.000 74 mV	Fluke 8508A
	200 mV to 2 V	6.6 μ V	
	(2 to 20) V	0.000 062 V	
	(20 to 200) V	0.000 88 V	
	(200 to 1 000) V	0.009 1 V	
DC Current – Generate	(0 to 199.999) μ A	0.002 5 μ A	Fluke 8508A/Fluke 5560A
	200 μ A to 1.999 99) mA	0.000 04 mA	
	(2 to 19.999 9) mA	0.000 042 mA	
	(20 to 199.99) mA	0.008 2 mA	
DC Current – Generate	200 mA to 1.99999 A	0.000 39 A	Fluke 8508A/Fluke 5560A
	2 A to 20 A	0.001 6 A	
	(20 to 30.2) A	0.063A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure	0 μ A to 199.99 μ A	0.002 5 μ A	Fluke 8508A
	200 μ A to 1.999 mA	0.000 04 mA	
	2.0 mA to 19.999 mA	0.000 042 mA	
	20 mA to 199.999 mA	0.008 2 mA	
	200 mA to 2 A	0.000 39 A	
	2 A to 20 A	0.001 6 A	
AC Voltage – Generate	Up to 200 mV		Fluke 8508A/Fluke 5560A
	50 Hz to 1 kHz	0.008 2 mV	
	(1 to 50) kHz	0.017 mV	
	200 mV to 2 V		
	50 Hz to 1 kHz	0.004 2 V	
	(1 to 50) kHz	0.000 32 V	
	(2 to 20) V		
	50 Hz to 1 kHz	0.002 V	
	(1 to 50) kHz	0.004 8 V	
	20 V to 110 V		
50 Hz to 1 kHz	0.02 V		
(20 to 110) V		Fluke 8508A/Fluke 5560A	
(1 to 50) kHz	0.048 V		
(110 to 200) V		Fluke 8508A/Fluke 5560A	
50 Hz to 1 kHz	0.2 V		
(110 to 200) V		Fluke 8508A/Fluke 5560A	
(1 to 50) kHz	0.2 V		
(200 to 1 100) V		Fluke 8508A/Fluke 5560A	
50 Hz to 1 kHz	0.2 V		
(200 to 1 100) V		Fluke 8508A/Fluke 5560A	
(1 to 50) kHz	0.2 V		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	Up to 199.99 mV		Fluke 8508A
	@ 20 Hz	0.028 mV	
	@ 55 Hz	0.008 2 mV	
	@ 300 Hz	0.004 2 mV	
	@ 1 kHz	0.004 2 mV	
	@ 3 kHz	0.008 2 V	
	@ 10 kHz	0.017 mV	
	@ 30 kHz	0.017 mV	
	@ 60 kHz	0.041 mV	
	@ 100 kHz	0.041 mV	
	200 mV to 1.999 9 V		
	@ 20 Hz	0.000 24 V	
	@ 55 Hz	0.000 025 V	
	@ 300 Hz	0.004 2 V	
	@ 1 kHz	0.004 2 V	
	@ 3 kHz	0.000 2 V	
	@ 10 kHz	0.000 2 V	
@ 30 kHz	0.000 32 V		
@ 60 kHz	0.001 4 V		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	200 mV to 1.999 9 V @ 100 kHz @ 500 kHz @ 1 MHz (2 to 19.99) V @ 20 Hz @ 55 Hz @ 300 Hz @ 1 kHz @ 3 kHz @ 10 kHz @ 30 kHz @ 60 kHz @ 100 kHz @ 500 kHz @ 1 MHz (20 to 199.99) V @ 20 Hz @ 55 Hz @ 300 Hz @ 1 kHz @ 3 kHz @ 10 kHz @ 30 kHz @ 60 kHz @ 100 kHz (200 to 1 050) V @ 55 Hz @ 300 Hz @ 1 kHz @ 3 kHz @ 10 kHz @ 30 kHz	0.01 V 0.01 V 0.06 V 0.002 4 V 0.002 V 0.001 6 V 0.001 6 V 0.001 7 V 0.002 V 0.004 8 V 0.014 V 0.014 V 0.6 V 0.6 V 0.024 V 0.02 V 0.016 V 0.016 V 0.02 V 0.02 V 0.048 V 0.14 V 0.14 V 0.2 V 0.2 V 0.2 V 0.2 V 0.2 V 0.2 V	Fluke 8508A
AC Current – Generate	Up to 200 μ A 50 Hz to 30 kHz 200 μ A to 2 mA 50 Hz to 30 kHz 2 mA to 20 mA 50 Hz to 30 kHz 20 mA to 200 mA 50 Hz to 30 kHz	0.09 μ A 0.09 mA 0.16 mA 0.09 mA	Fluke 8508A/Fluke 5560A

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Generate	200 mA to 1.2 A 50 Hz to 30 kHz	0.001 6 A	Fluke 8508A/Fluke 5560A
	1.2 A to 3.1A 3 Hz to 10 kHz	0.02 A	Fluke 8508A/Fluke 5560A
	3.1 to 10A 3 Hz to 10 kHz	0.02 A	Fluke 8508A/Fluke 5560A
	10 to 20 A 3 Hz to 5 kHz	0.02A	Fluke 8508A/Fluke 5560A
	20A to 30.2A 3 Hz to 5 kHz	0.31A	Fluke 5560
AC Current – Measure	(2 to 200) μ A 40 Hz to 1 kHz	0.09 μ A	Fluke 8508A
	2 μ A to 200 μ A (1 to 10) kHz	0.045 μ A	
	200 μ A to 2 mA 40 Hz to 1 kHz	0.09 mA	
	(1 to 10) kHz	0.09 mA	
	(2 to 20) mA 40 Hz to 1 kHz	0.016 mA	
	(1 to 10) kHz	0.017 mA	
	(20 to 200) mA 40 Hz to 1 kHz	0.09 mA	
	(1 to 10) kHz	0.09 mA	
	200 mA to 2 A 40 Hz to 1 kHz	0.001 6 A	
	(1 to 10) kHz	0.052 A	
Phase – Generate	(0 to 360) $^{\circ}$ 3 Hz to 65 Hz	0.2 $^{\circ}$	Fluke 5560
	65 Hz to 500 Hz	0.4 $^{\circ}$	
	500 Hz to 1 kHz	0.8 $^{\circ}$	
	1 kHz to 5 kHz	3.8 $^{\circ}$	
	5 kHz to 10 kHz	7.8 $^{\circ}$	
	10 kHz to 20 kHz	16 $^{\circ}$	
Phase – Measure	(0 to 360) $^{\circ}$ (50 to 500) Hz	0.22 $^{\circ}$	Dranetz 305D/PA3008

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power / VARS	60 Hz and 400 Hz (1.5 to 165) W	0.3 W	Fluke 5560A
	60 Hz and 400 Hz 15 W to 785 W	1.5 W	
	60 Hz and 400 Hz 15 W to 825 W	1.5 W	
	60 Hz and 400 Hz 150 W to 5 625 W	12 W	
Resistance – Measure	(0 to 2) Ω	0.000 16 Ω	Fluke 8508A
	(2 to 20) Ω	0.000 17 Ω	
	(20 to 200) Ω	0.001 5 Ω	
	200 Ω to 2 kΩ	0.000 003 2 kΩ	
	(2 to 20) kΩ	0.000 15 kΩ	
Resistance – Measure	(20 to 200) kΩ	0.001 5 kΩ	Fluke 8508A
	200 kΩ to 2 MΩ	0.000 016 MΩ	
	(2 to 20) MΩ	0.000 16 MΩ	
	(20 to 200) MΩ	0.001 8 MΩ	
Resistance – Measure	200 MΩ to 2 GΩ	0.000 38 GΩ	Fluke 8508A
	2 GΩ to 20 GΩ	0.03 GΩ	
Resistance – Generate (Fixed Artifact)	100 GΩ	0.2 GΩ	IET SR-C-100G
Capacitance	(0 to 1.2) nF	0.007 6 nF	Fluke 5560
	(1 to 1.2) nF	0.37 nF	
	(10 to 120) nF	0.36 nF	
	(0.1 to 1.2) μF	0.005 1 μF	
	(1 to 12) μF	0.39 μF	
	(10 to 120) μF	0.39 μF	
	(0.1 to 1.2) mF	0.005 7 mF	
	(1 to 12) mF	0.062 mF	
Inductance	(10 to 120) mF	12 mF	Fluke 5560
	(13 to 120) μH	0.47 μH	
	(0.1 to 1.2) mH	0.005 8 mH	
	(1 to 12) mH	0.047 mH	
	(10 to 120) mH	0.47 mH	
	(0.1 to 1.2) H	0.004 2 H	
Inductance	(1 to 12) H	0.067 H	Fluke 5560
	(10 to 120) H	0.067 H	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Plain Rings	(0.125 to 1) in (1 to 4) in (4 to 10) in (10 to 16) in	0.000 15 in 0.000 88 in 0.001 7 in 0.002 6 in	Gage Blocks and Bore Mic
Plain Plugs	(0.011 to 1) in (1 to 4) in (4 to 10) in	0.000 15 in 0.000 88 in 0.001 7 in	Gage Blocks and Super Mic
Length Standards	0.05 in to 1 in (1 to 4) in (4 to 10) in (10 to 36) in	0.000 3 in 0.001 9 in 0.002 4 in 0.002 8 in	Gage Blocks and Super Mic
Inside Micrometer	Up to 1 in (1 to 4) in (4 to 10) in (10 to 36) in	0.000 25 in 0.000 9 in 0.001 7 in 0.002 6 in	Gage Blocks
Outside Micrometer	Up to 1 in (1 to 4) in (4 to 10) in (10 to 60) in	0.000 25 in 0.000 9 in 0.001 7 in 0.002 6 in	Gage Blocks
Depth Micrometer	Up to 1 in 1 in to 4 in 4 in to 10 in 10 in to 12 in	0.000 25 in 0.000 9 in 0.001 7 in 0.002 6 in	Gage Blocks
Height Gages	Up to 1 in 1 in to 4 in 4 in to 10 in 10 in to 24 in	0.001 8 in 0.002 in 0.002 5 in 0.003 2 in	Gage Blocks
Dial Indicators	Up to 1 in (1 to 4) in	0.000 15 in 0.000 88 in	Gage Blocks
Calipers	Up to 1 in 1 in to 4 in 4 in to 10 in 10 in to 72 in	0.000 25 in 0.000 9 in 0.001 7 in 0.002 9 in	Gage Blocks

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure – Measure	(0 to 200) inH ₂ O	0.23 inH ₂ O	Meriam 350
	(0 to 1 500) PSI	0.32 PSIG	Ruska 2400 DWT
	(1 500 to 10 000) PSI	2.2 PSIG	Ruska 2400 DWT
Absolute Pressure – Measure	(0 to 30) psia (38 to 150) psia	0.027 psia 0.038 psia	Ashcroft PT
Vacuum – Measure	(-29.5 to 0) psiv	0.008 5 psi	Ashcroft PT
Torque Devices	(10 to 600) ozf·in (25 to 250) lbf·in	10 ozf·in 4.9 lbf·in	Torque Controls ET600Z
	(7.5 to 300) lbf·ft	30 lbf·ft	Sturtevant Richmond 12013 Veritorq 2-300
	(100 to 500) lbf·ft (500 to 1 000) lbf·ft	4 lbf·ft 20 lbf·ft	AKO TSD-1200-1101
Scales and Balances	(10 to 1 100) mg (1 to 210) g	2 mg 0.02 g	Troemner certified weights using NAVSEA procedures
Scales and Balances	(0.5 to 40.5) lb (20 to 280) lb	0.062 lb 0.066 lb	MSD D-77 certified weights using NAVSEA procedures

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Generate	(-25 to -1.5) °C	0.56 °C	Hart 9103 Thermo Unit
	(-1.5 to 105) °C	0.17 °C	Temperature bath/ Azonix A1011
	(105 to 120) °C	0.56 °C	Hart 9103 Thermo Unit
	(50 to 420) °C (420 to 660) °C	0.7 °C 1 °C	Fluke 9144A
Temperature - Measure	(-40 to 660) °C	0.057 °C	Rosemount 162CE
Humidity	(10 to 90) %RH	1.9 %RH	Vaisala Indigo510/HMP3 w/ Chamber
Infrared	(50 to 100) °C	1.9 °C	Reed BX-500
	(100 to 200) °C	3.2 °C	
	(200 to 500) °C	5.8 °C	

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Contact Tachometers	(250 to 5 500) RPM (5 500 to 20 000) RPM	0.025% reading + 1.1 RPM 0.029% reading + 3 RPM	Quantum Dynamics N11ECS2B
Optical Tachometer	(180 to 7 100) RPM (7 100 to 71 400) RPM (71 400 to 100 000) RPM	0.72 RPM 7.2 RPM 21.6 RPM	Fluke 5560A

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-3123.



Jason Stine, Vice President

