



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

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CALIBRATION

Valid To: September 30, 2020

Certificate Number: 1046.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,5}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Calipers –	Up to 12 in Up to 60 in	(540 + 17L) μin (310 + 14L) μin	Gage blocks
Micrometers –			
Outside	Up to 12 in (>12 to 18) in (>18 to 36) in (>36 to 52) in	(66 + 5L) μin (590 + 4L) μin (583 + 2.6L) uin (577+9L) uin	Gage blocks
Depth	Up to 12 in	(85+2.5L) uin + 0.6R	Depth Mic Master
Inside	Up to 23 in	(0.6R + 9) uin	ULM with gage blocks
Micrometer Standards	Up to 23 in	(43 + 7L) μin	ULM
Indicators –	Up to 6 in	(29 + 0.6R) μin	ULM
Bore Gages –			
Two point	Up to 10 in	(52+11.3L) uin	ULM
Three point	Up to 6 in	(32+35L) uin + 0.6R	Master rings

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Height Gages –	Up to 24 in	(316 + 14.6L) μin	Gage blocks
Steel Rules	Up to 12 in	420 μin	Vision system
Cylindrical Plugs	Up to 1.5 in	(39 + 10D) μin	ULM
Thread Plugs – Pitch Diameter Major Diameter	Up to 5 in Up to 5 in	(121 + 20D) μin (85 - 7D) μin	ULM using 3-wire method
Tapered Thread Plugs – Notch Height Functional Pitch Diameter at Base	(1/16 to 2) in (0.28 to 2.30) in	280 μin 210 μin	Master rings
Adjustable Threaded Rings ⁴ – Functional Pitch Diameter Minor Diameter	Up to 1 in (1 to 4) in Up to 1 in	300 μin 400 μin 600 μin	Set using master plug gages ASME/ANSI B1.2-18983 and ASME/ANSI B1.3-2007 Plain cylindrical plugs
Tapered Ring Gages – Thickness Functional Pitch Diameter at Base	(1/16 to 2) in (0.28 to 2.30) in	43 μin 210 μin	Master plugs
Hex Plug / Hex Recess Gages – Width Across Flats Width Across Corners	Up to 1 in Up to 1 in	44 μin 47 μin	ULM

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
DC Voltage – Generate	Up to 330 mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	0.0047% + 23µV 0.0039% + 16µV 0.0039% + 230µV 0.0043% + 2.8mV 0.0043% + 14mV	Fluke 5500A
DC Voltage – Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.0051% + 4.3µV 0.0041% + 13µV 0.0035% + 130µV 0.0046% + 1.8mV 0.0046% + 20mV	Keysight 34401A
DC Current - Generate	Up to 3.3 mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	0.010% + 0.07µA 0.0078% + 0.21µA 0.0078% + 2.6µA 0.023% + 35µA 0.047% + 270µA	Fluke 5500A
DC High Current – Generate Clamp Meters	(10 to 550) A	0.76%	Fluke 5500A with 50-turn coil
DC Current - Measure	Up to 10 mA (10 to 100) mA 100 mA to 1 A (1 to 3) A	0.05% + 2.3µA 0.06% + 12µA 0.11% + 220µA 0.13% + 880µA	Keysight 34401A

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Resistance – Generate	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 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 (0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.012% + 6.2 mΩ 0.0094% + 12 m 0.007% + 12 mΩ 0.007% + 12 mΩ 0.007% + 75 mΩ 0.007% + 83 m 0.007% + 750 mΩ 0.007% + 600 m 0.0086% + 4.8 Ω 0.0094% + 8.4 Ω 0.012% + 75 Ω 0.012% + 270 0.047% + 780 Ω 0.078% + 18 kΩ 0.39% + 56 kΩ 0.39% + 59 kΩ	Fluke 5500A
Resistance - Measure	Up to 100 Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 M (1 to 10) MΩ (10 to 100) MΩ	0.01% + 5.4 mΩ 0.01% + 26 mΩ 0.01% + 260 mΩ 0.01% + 2.6 Ω 0.01% + 29 Ω 0.04% + 1.2 kΩ 0.8% + 43 kΩ	Keysight 34401A
Capacitance - Generate	(0.33 to 0.5) nF (0.5 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 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 (0.33 to 1.1) mF	0.39% + 7.8 pF 0.39% + 7.8 pF 0.39% + 7.8 pF 0.39% + 7.8 pF 0.19% + 78 pF 0.19% + 78 pF 0.19% + 0.23 nF 0.19% + 0.78 nF 0.27% + 2.3 nF 0.27% + 7.8 nF 0.31% + 23 nF 0.40% + 78 nF 0.54% + 0.24 μF 0.78% + 0.31 μF	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Electrical Simulation of Thermocouples Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27°C 0.17°C 0.15°C 0.22°C 0.32°C	Fluke 5500A

Parameter/Equipment	Frequency	CMC ^{2,3} (±)	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	0.27% + 16µV 0.12% + 16µ 0.16% + 16µV 0.19% + 17µV 0.27% + 27µV 0.78% + 54µV	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	0.19% + 40µV 0.039% + 19µV 0.078% + 19µV 0.12% + 35µV 0.19% + 130µV 0.54% + 270µV	
330 mV 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	0.12% + 210µV 0.023% + 100µV 0.062% + 100µV 0.11% + 280µV 0.19% + 1300µV 0.39% + 2800µV	
(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	0.12% + 2.2mV 0.031% + 1.1mV 0.062% + 2.2mV 0.15% + 4.2mV 0.19% + 13mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.039% + 13mV 0.062% + 17mV 0.07% + 28mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.039% + 72mV 0.16% + 86mV 0.16% + 390mV	

Parameter/Equipment	Frequency	CMC ^{2,3} (±)	Comments
AC Voltage – Measure			
Up to 100 mV	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.1% + 46 µV 0.35% + 46 µV 0.06% + 55 µV 0.12% + 63 µV 0.60% + 89 µV 4.0% + 500 µV	Keysight 34401A
(0.1 to 1) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0% + 360 µV 0.35% + 360 µV 0.06% + 420 µV 0.12% + 500 µV 0.60% + 1 mV 4.0% + 5.6 mV	
(1 to 10) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	1.0 % + 4.4 mV 0.35% + 4.4 mV 0.06% + 4.7 mV 0.12% + 5.4 mV 0.60% + 8.8 mV	
(10 to 100) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz	1.0% + 34 mV 0.35% + 34 mV 0.06% + 42 mV 0.12% + 50 mV	
(100 to 750) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz	1.0% + 240 mV 0.35% + 240 mV 0.06% + 300 mV 0.12% + 360 mV	
AC Current – Measure			
Up to 1 A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.0% + 610 µA 0.30% + 610 µA 0.10% + 610 µA	Keysight 34401A
(1 to 3) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.1% + 2.2 mA 0.35% + 2.2 mA 0.15% + 2.2 mA	

Parameter/Equipment	Frequency	CMC ^{2,3} (±)	Comments
AC Current – Generate			
Up to 330 µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.19% + 0.14 µA 0.098% + 0.12 µA 0.098% + 0.19 µA 0.31% + 0.12 µA 0.97% + 0.12 µA	Fluke 5522A
(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	0.16% + 0.75 µA 0.079% + 0.26 µA 0.080% + 0.26 µA 0.16% + 0.26 µA 0.47% + 0.26 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	0.16% + 7.9 µA 0.078% + 3.1 µA 0.070% + 3.1 µA 0.16% + 3.1 µA 0.47% + 3.1 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	0.16% + 89 µA 0.078% + 37 µA 0.070% + 37 µA 0.16% + 37 µA 0.47% + 37 µA	
(0.33 to 2.2) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.16% + 320 µA 0.078% + 320 µA 0.58% + 320 µA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.077% + 1.7 mA 0.078% + 1.6 mA 0.26% + 1.6 mA	
AC High Current – Generate			
Clamp Meters, (10 to 550) A	(50 to 60) Hz	1%	Fluke 5500A with 50-turn coil

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Pressure and Vacuum – Measuring Instruments	Up to 50 inH ₂ O	0.11 % + 0.0088 inH ₂ O	Ashcroft ATE-2
	Up to 100 inH ₂ O	0.11% + 0.011 inH ₂ O	
	(-15 to 145) psi	0.021% + 0.007 psi	Mensor CPC4000
	(145 to 1500) psi	0.02% + 0.045 psi	
	(1500 to 2000) psi	0.031% + 0.33 psi	Mensor CPG2400
	(2000 to 3000) psi	0.031% + 0.37 psi	
	(3000 to 4000) psi	0.031% + 0.69 psi	
	(4000 to 5000) psi	0.021% + 0.7 psi	
	(5000 to 6000) psi	0.021% + 0.7 psi	
Tachometers – Optical/Non-contact	Up to 7200 rpm	0.002% + 0.35 rpm	Fluke 5500A with LED
	(7200 to 72 000) rpm	0.002% + 3.5 rpm	
	(72 000 to 720 000) rpm	0.002% + 35 rpm	
Torque Tools	20 in·lbf to <20 ft·lbf	1.7 % full scale	Torque transducers
	(20 to <1000) ft·lbf	0.7 % full scale	
	(1000 to 1500) ft·lbf	0.4 % full scale	

IV. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Thermometers, Infrared	(-50 to 150) °C	0.24 °C	Hart 9133
	(50 to 500) °C	0.42 °C	Hart 9132

V. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Frequency – Measuring Instruments	(0.01 to 120) Hz (120 to 1200) Hz (1.2 to 12) kHz (12 to 120) kHz (120 to 1200) kHz (1.2 to 2) MHz	0.002% + 5.8 mHz 0.002% + 58 mHz 0.002% + 580 mHz 0.002% + 5.8 Hz 0.002% + 58 Hz 0.002% + 580 Hz	Fluke 5500A

¹ Commercial calibration service is available for this laboratory.

² 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.

³ In the statement of CMC, R is the resolution of the unit under test, L is the numerical value of the nominal length of the device expressed in inches, D is the numerical value of the nominal Diameter of the device expressed in inches.

⁴ Adjustable thread rings are set to applicable specifications using calibrated master plug gages.

⁵ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

FASTENAL COMPANY LABORATORY

Winona, MN

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 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 19th day of November 2018.

A handwritten signature in black ink, written over a horizontal line.

President and CEO
For the Accreditation Council
Certificate Number 1046.02
Valid to September 30, 2020

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