



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

FASTENAL COMPANY LABORATORY
1801 Theurer Boulevard
Winona, MN 55987
Bob Heyer Phone: 507 453 8421

CALIBRATION

Valid To: September 30, 2022

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 > 12 to 84 in	(540 + 17L) μin (310 + 14L) μin	Gage blocks
Micrometers –			
Outside	Up to 32 in (>32 to 52) in	(16 + 5L) μin + 0.6R (100+18L) uin	Gage blocks
Depth	Up to 12 in	(85+2.5L) uin + 0.6R	Depth Mic Master
Inside	Up to 23 in	9 uin + 0.6R	ULM with gage blocks
Micrometer Standards	Up to 23 in	(43 + 7L) μin	ULM
Indicators –			
Dial	Up to 2 in	51 μin	ULM
Dial and all digital	(2 to 6) in	31 μin + 0.6R	Gage Blocks
Bore Gages –			
Two point	Up to 10 in	(52+11L) uin	ULM
Three point	Up to 6 in	(62+34L) uin	Master rings

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Height Gages – OD Mics	Up to 24 in Up to 32 in (32 to 62) in	(320 + 15L) μin (4L + 16) μin + .6R (18L + 94) μin	Gage blocks
Steel Rules Radius Gages	Up to 12 in (12 to 48) in (48 to 60) in (60 to 72) in Up to 1 in	(410 + 7L) μin (990 + 47L) μin .0033 in .0036 in (472 + 175L) μin	Vision system
Cylindrical Plugs	Up to 1.5 in Up to 10 in	(41 + 6D) μin .00031 in	ULM Height Gage
Thread Plugs – Pitch Diameter Major Diameter	 Up to 5 in (.5 to 13) in Up to 13 in	 (110 + 10D) μin (140 + 7D) μin (84 + 2D) μin	 ULM using 3-wire method
Tapered Thread Plugs – Notch Height Functional Pitch Diameter at Notch	 (1/16 to 2) in (0.28 to 2.30) in	 270 μin 410 μin	 Height Gage 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	(1/16 to 2) in	43 μin	ULM
Functional Pitch Diameter at Base	(0.28 to 2.30) in	420 μin	Master plugs
Hex Plug / Hex Recess Gages – Width Across Flats Width Across Corners	Up to 1 in Up to 1 in	42 μin 44 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	0.0045% + 2.9μV 0.0038% + 9.0μV 0.0038% + 65μV 0.0040% + 1.8mV 0.0039% + 7.4mV	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	0.0010% + 26μV 0.0040% + 12μV 0.0030% + 120μV 0.0041% + 1.6mV 0.0040% + 29mV	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	0.0098% + 0.085μA 0.0035% + 3.0μA 0.0077% + 2.9μA 0.030% + 34μA 0.047% + 560μA	Fluke 5500A
DC High Current – Generate Clamp Meters	(10 to 550) A	0.60%	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% + 890μA 0.33% + 2.5mA 0.13% + 880μA	Keysight 34401A

Parameter/Equipment	Range	CMC ^{2,3} (\pm)	Comments
Resistance – Generate	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω	0.009% + 6.3 m Ω 0.0090% + 12 m Ω 0.007% + 12 m Ω 0.010% + 11 m Ω 0.006% + 71 m Ω 0.007% + 67 m Ω 0.006% + 710 m Ω 0.007% + 520 m Ω 0.0080% + 4.8 Ω 0.0060% + 7.7 Ω 0.010% + 66 Ω 0.009% + 230 Ω 0.047% + 600 Ω 0.60% + 15 k Ω 0.38% + 18 k Ω 0.38% + 25 k Ω	Fluke 5500A
Resistance - Measure	Up to 100 Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M (1 to 10) M Ω (10 to 100) M Ω	0.009% + 5.7 m Ω 0.009% + 23 m Ω 0.009% + 230 m Ω 0.009% + 2.3 Ω 0.009% + 25 Ω 0.034% + 0.96 k Ω 0.8% + 20 k Ω	Keysight 34401A

Capacitance - Generate	(0.33 to 0.5) nF	0.39% + 7.8 pF	Fluke 5500A
	(0.5 to 1.1) nF	0.39% + 7.8 pF	
	(1.1 to 3.3) nF	0.39% + 8.9 pF	
	(3.3 to 11) nF	0.23% + 580 pF	
	(11 to 33) nF	0.14% + 130 pF	
	(33 to 110) nF	0.19% + 78 pF	
	(110 to 330) nF	0.15% + 0.56 nF	
	(0.33 to 1.1) μF	0.19% + 0.82 nF	
	(1.1 to 3.3) μF	0.27% + 2.5 nF	
	(3.3 to 11) μF	0.27% + 5.9 nF	
	(11 to 33) μF	0.16% + 170 nF	
	(33 to 110) μF	0.34% + 160 nF	
	(110 to 330) μF	0.53% + 280 nF	
	(0.33 to 1.1) mF	0.75% + 560 nF	

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

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	0.20% + 40µV 0.038% + 18µV 0.078% + 19µV 0.13% + 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% + 95µV 0.061% + 95µV 0.11% + 250µV 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% + 2.1mV 0.030% + 0.79mV 0.062% + 2.3mV 0.15% + 4.5mV 0.19% + 14mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.039% + 9mV 0.063% + 16mV 0.08% + 28mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.039% + 73mV 0.16% + 87mV 0.16% + 400mV	

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	1.0% + 200 µV 0.35% + 45 µV 0.06% + 54 µV 0.12% + 61 µV 0.60% + 85 µV 4.0% + 52 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% + 320 µV 0.35% + 330 µV 0.06% + 410 µV 0.12% + 490 µV 0.59% + 1 mV 4.0% + 5.4 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 % + 3.4 mV 0.12% + 60 mV 0.06% + 5 mV 0.12% + 5.2 mV 0.60% + 8.6 mV	
(10 to 100) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz	1.0% + 32 mV 0.35% + 33 mV 0.06% + 41 mV 0.12% + 48 mV	
(100 to 750) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz	1.0% + 230 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% + 500 µA 0.30% + 610 µA 0.09% + 710 µA	Keysight 34401A
(1 to 3) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.1% + 1.9 mA 0.35% + 2.1 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	0.20% + 0.13 µA 0.099% + 0.12 µA 0.099% + 0.20 µA 0.31% + 0.12 µA 0.97% + 0.12 µA	Fluke 5500A
(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% + 0.99 µA 0.080% + 0.90 µA 0.16% + 0.75 µA 0.47% + 0.51 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% + 8.0 µA 0.076% + 4.6 µA 0.073% + 4.4 µA 0.16% + 3.3 µA 0.48% + 2.5 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% + 36 µA 0.069% + 33 µA 0.16% + 25 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% + 280 µA 0.077% + 310 µA 0.58% + 270µA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.047% + 1.7 mA 0.078% + 1.7 mA 0.26% + 1.7 mA	
AC High Current – Generate			
Clamp Meters, (10 to 550) A	(50 to 60) Hz	0.81%	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	0.088 % + 0.0088 inH ₂ O	Ashcroft ATE-2
	Up to 100 inH ₂ O	0.096% + 0.053 inH ₂ O	
	(-15 to 145) psi	0.016% + 0.007 psi	Mensor CPC4000
	(145 to 1500) psi	0.019% + 0.026 psi	
	(1500 to 2000) psi	0.030% + 0.016 psi	Mensor CPG2400
	(2000 to 3000) psi	0.030% + 0.011 psi	
	(3000 to 4000) psi	0.030% + 0.014 psi	
	(4000 to 5000) psi	0.030% + 0.018 psi	
	(5000 to 6000) psi	0.030% + 0.021 psi	
Tachometers – Optical/Non-contact	Up to 7200 rpm (7200 to 72 000) rpm (72 000 to 720 000) rpm	0.0006% + 0.39 rpm 0.0004% + 3.5 rpm 0.0004% + 35 rpm	Fluke 5500A with LED
Torque Tools	(25 to 250) in·lbf (20 to 40) ft·lbf (>40 to 100) ft·lbf (>100 to 500) ft·lbf (>500 to 1500) ft·lbf (5 to 400) in·oz	(0.18 + 0.0048T) in·lbf (-0.23 + 0.16T) ft·lbf 0.50 ft·lbf (-0.13 + 0.0063T) ft·lbf (1.7 + 0.027T) ft·lbf (.154 + .0014T) in·oz	Torque transducers T is applied Torque
Torque Transducers/Testers	(5 to 50) in·ozf {CW} (5 to 50) in·ozf {CCW} (15 to 200) in·ozf {CW} (15 to 200) in·ozf {CCW} (5 to 50) in·lbf {CW} (5 to 50) in·lbf {CCW} (40 to 400) in·lbf {CW} (40 to 400) in·lbf {CCW} (80 to 1 000) in·lbf {CW} (80 to 1 000) in·lbf {CCW} (25 to 250) ft·lbf {CW} (25 to 250) ft·lbf {CCW} (60 to 600) ft·lbf {CW} (60 to 600) ft·lbf {CCW} (100 to 2 000) ft·lbf {CW} (100 to 2 000) ft·lbf {CCW}	0.15% 0.16% 0.098% 0.12% 0.12% 0.16% 0.13% 0.13% 0.10% 0.11% 0.080% 0.081% 0.11% 0.094% 0.13% 0.13%	Weights and Radius Arms

IV. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 3} (\pm)	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	0.0006% + 6.5 mHz 0.0004% + 59 mHz 0.0004% + 590 mHz 0.0004% + 5.9 Hz 0.0004% + 59 Hz 0.0001% + 590 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 17025:2017 *General requirements for the competence of testing and calibration laboratories*. 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 25th day of September 2020.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1046.02
Valid to September 30, 2022

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