



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

MICRON INSPECTION & CALIBRATION SERVICES, INC.
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CALIBRATION

Valid To: November 30, 2017

Certificate Number: 2917.01

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 ^{2,4} (\pm)	Comments
Gage Blocks	Up to 4 in (5 to 20) in	(2.8 + 1.9L) μ in (0.7 + 2.5L) μ in	Master gage blocks
Calipers	Up to 36 in	(4 + 2.7L) μ in + 0.6R	Gage blocks
Calipers ³	Up to 36 in	(4 + 13L) μ in + 0.6R	Gage blocks
Micrometers	Up to 24 in	(51 + 3.4L) μ in + 0.6R	Gage blocks
Micrometers ³	Up to 24 in	(50 + 12L) μ in + 0.6R	Gage blocks
Height Gage	Up to 24 in	(110 + 1.0L) μ in + 0.6R	Gage blocks
Height Gage ³	Up to 24 in	(110 + 9.2L) μ in + 0.6R	Gage blocks
Indicator ³	Up to 0.008 in Up to 1 in	25 μ in + 0.6R 36 μ in + 0.6R	Indicator calibrator

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Cylindrical Rings	Up to 6 in (6 to 12) in	(10 + 2.0L) μin (8.9 + 2.2L) μin	Mahr 828cim, Helios Supra UMM
Cylindrical Plugs	Up to 12 in Up to 12 in	(2.4 + 2.7L) μin (3.4 + 2.6L) μin	Mahr 828cim, Helios Supra UMM
Thread Plugs – Simple Pitch Diameter Major Diameter	Up to 6 in Up to 6 in	(99 + 2.6L) μin (23 + 0.3L) μin	Helios Supra UMM
Thread Rings – Simple Pitch Diameter Minor Diameter	Up to 2 in Up to 2 in	(56 + 15L) μin (180 + 65L) μin	Helios Supra UMM
Optical Comparator	Up to 12 in	(130 + 1.8L) μin	Glass scale standard
Optical Comparator ³	Up to 12 in	(120 + 5.8L) μin	Glass scale standard
LVDT	Up to 0.01 in Up to 1.0 in	11 μin 37 μin	Gage blocks
Z-Mike	Up to 1 in	(61 + 28L) μin	Plug gage
Pin Gage ³	Up to 0.75 in	(61 + 29L) μin	Z-Mike
Length Standard	Up to 40 in	(3.0 + 2.7L) μin	P&W 1000A
Surface Finish Analyzer ³	(2 to 116) μin	7 μin	Mitutoyo surface finish tester
Surface Finish Patch ³	(2 to 116) μin	10 μin	Mitutoyo surface finish tester

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
CMM ³ – Repeatability Linearity Volumetric Bi-Directional	40 in x 30 in x 16 in	54 μin 130 μin 77 μin 45 μin	Calibration sphere Laser Ball bar Gage blocks
Dial Indicator Calibrator	Up to 1 in	26 μin	Gage block and electronic amplifier
Universal Measuring Machines (UMMs, Laser Scale, Micrometers) ³	Up to 12 in	(7 + 5L) μin	Gage blocks, master plug gages
Optical Scales (Reticles, Optical Micrometer Scales, Optical Grids)	12 in x 12 in	(62 + 1.5L) μin	OGP vision systems, glass scales/grids

II. Dimensional Testing¹

Parameter/Equipment	Range	CMC ² (±)	Comments
Length, Angle, Geometry – Piece Parts, First Articles, Fixture Gages ⁶	16 in x 18 in x 16 in 20 in x 20 in x 10 in	260 μin 160 μin	CMM, vision systems (contact and non-contact measurements)

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
DC Voltage – Generate	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	11 µV/V + 3.4 µV 11 µV/V + 5.7 µV 10 µV/V + 62 µV 15 µV/V + 0.19 mV 15 µV/V + 1.9 mV	5520A
DC Current – Generate	(0 to 330) µA (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 3) A (3 to 20.5) A	120 µA/A + 16 nA 75 µA/A + 49 nA 74 µA/A + 0.35 µA 98 µA/A + 4.5 µA 290 µA/A + 54 µA 810 µA/A + 0.88 mA	5520A
DC Voltage – Measure	(0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	6.1 µV/V + 0.13 µV 3.5 µV/V + 0.82 µV 3.5 µV/V + 7.5 µV 5.3 µV/V + 69 µV 5.6 µV/V + 0.67 mV	8508A
DC Current – Measure	(0 to 200) µA (0.2 to 2) mA (2 to 20) mA (20 to 200) mA (0.2 to 2) A (2 to 20) A	12 µA/A + 0.55 nA 13 µA/A + 4.3 nA 13 µA/A + 45 nA 40 µA/A + 1.4 µA 170 µA/A + 19 µA 360 µA/A + 0.63 mA	8508A

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Resistance – Generate	(0 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 (0.33 to 1.1) GΩ	45 μΩ/Ω + 1.2 mΩ 24 μΩ/Ω + 1.2 mΩ 23 μΩ/Ω + 1.1 mΩ 25 μΩ/Ω + 2.4 mΩ 24 μΩ/Ω + 3.4 mΩ 33 μΩ/Ω + 14 mΩ 27 μΩ/Ω + 12 mΩ 25 μΩ/Ω + 0.14 Ω 24 μΩ/Ω + 0.17 Ω 31 μΩ/Ω + 0.68 Ω 28 μΩ/Ω + 1.8 Ω 63 μΩ/Ω + 20 Ω 100 μΩ/Ω + 38 Ω 210 μΩ/Ω + 2.2 kΩ 500 μΩ/Ω + 3.0 kΩ 0.24 % + 95 kΩ 1.2 % + 0.53 MΩ	5520A
Resistance – Measure	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ	16 μΩ/Ω + 5.2 μΩ 9 μΩ/Ω + 21 μΩ 7.6 μΩ/Ω + 70 μΩ 7.9 μΩ/Ω + 0.65 mΩ 7.2 μΩ/Ω + 14 mΩ 8.2 μΩ/Ω + 57 mΩ 13 μΩ/Ω + 1.6 Ω 22 μΩ/Ω + 0.10 kΩ 150 μΩ/Ω + 9.8 kΩ 0.14 % + 0.95 MΩ	8508A

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage – Measure (0 to 199) mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	130 μV/V + 16 μV 130 μV/V + 5 μV 110 μV/V + 5 μV 110 μV/V + 2.4 μV 130 μV/V + 5 μV 420 μV/V + 10 μV 670 μV/V + 24 μV	8508A

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage – Measure (cont)			
199 mV to 1.99 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 µV/V + 0.14 mV 100 µV/V + 24 µV 84 µV/V + 24 µV 75 µV/V + 24 µV 120 µV/V + 24 µV 390 µV/V + 50 µV 540 µV/V + 0.24 mV 0.24 % + 24 mV	8508A
(2 to 19.9) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (0.1 to 1) MHz	120 µV/V + 1.4 mV 110 µV/V + 0.24 mV 84 µV/V + 0.24 mV 76 µV/V + 0.24 mV 130 µV/V + 0.24 mV 210 µV/V + 0.50 mV 460 µV/V + 2.4 mV 0.82 % + 0.24 V	
(20 to 199) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	120 µV/V + 14 mV 110 µV/V + 2.4 mV 91 µV/V + 2.4 mV 78 µV/V + 2.4 mV 120 µV/V + 2.4 mV 200 µV/V + 5.0 mV 480 µV/V + 24 mV	
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz (0.04 to 10) kHz (10 to 30) kHz (30 to 100) kHz	57 µV/V + 0.16 V 91 µV/V + 50 mV 93 µV/V + 50 mV 150 µV/V + 0.10 V 240 µV/V + 0.50 V	
AC Current – Measure			
(0 to 200) µA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	260 µA/A + 24 nA 240 µA/A + 24 nA 430 µA/A + 24 nA	8508A
200 µA to 2 mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	270 µA/A + 0.24 µA 240 µA/A + 0.24 µA 340 µA/A + 0.24 µA	
(2 to 20) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 µA/A + 2.4 µA 250 µA/A + 2.4 µA 240 µA/A + 2.4 µA	

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Current – Measure (cont)			
(20 to 200) mA	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	280 µA/A + 24 µA 230 µA/A + 24 µA 240 µA/A + 24 µA	8508A
200 mA to 2 A	(1 to 10) Hz (0.01 to 10) kHz (10 to 30) kHz	530 µA/A + 0.24 mA 520 µA/A + 0.24 mA 670 µA/A + 0.24 mA	
(2 to 20) A	(0.01 to 2) kHz (2 to 10) kHz	690 µA/A + 2.4 mA 0.21 % + 2.4 mA	
AC Current – Generate			5520A
Up to 330 µA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.1 µA 0.11 % + 0.1 µA 0.093 % + 0.1 µA 0.24 % + 0.15 µA 0.61 % + 0.2 µA 1.2 % + 0.4 µA	
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.17 % + 0.15 µA 0.10 % + 0.15 µA 0.081 % + 0.15 µA 0.15 % + 0.2 µA 0.39 % + 0.3 µA 0.78 % + 0.6 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 2 µA 0.071 % + 2 µA 0.032 % + 2 µA 0.062 % + 2 µA 0.16 % + 3 µA 0.31 % + 4 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 20 µA 0.072 % + 20 µA 0.033 % + 20 µA 0.077 % + 50 µA 0.15 % + 0.10 mA 0.31 % + 0.20 mA	

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Current – Generate (cont)			
330 mA to 3 A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.10 mA 0.054 % + 0.10 mA 0.46 % + 10 mA 2.0 % + 50 mA	5520A
(3 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.10 % + 50 mA 0.12 % + 50 mA 2.5 % + 50 mA	
AC Voltage – Generate			
Up to 33 mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	590 μV/V + 6 μV 150 μV/V + 6 μV 200 μV/V + 6 μV 780 μV/V + 6 μV 0.27 % + 12 μV 0.59 % + 50 μV	5520A
(33 to 330) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	230 μV/V + 8 μV 120 μV/V + 8 μV 130 μV/V + 8 μV 290 μV/V + 8 μV 610 μV/V + 32 μV 0.16 % + 70 μV	
330 mV to 3.3 V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	230 μV/V + 50 μV 120 μV/V + 60 μV 160 μV/V + 60 μV 290 μV/V + 50 μV 770 μV/V + 0.13 mV 0.19 % + 0.60 mV	
(3.3 to 33) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	230 μV/V + 0.65 mV 130 μV/V + 0.60 mV 190 μV/V + 0.60 mV 270 μV/V + 0.60 mV 690 μV/V + 1.6 mV	
(33 to 330) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	240 μV/V + 2 mV 180 μV/V + 6 mV 240 μV/V + 6 mV 330 μV/V + 6 mV 0.23 % + 50 mV	

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage – Generate (cont) (330 to 1020) V	(0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	310 µV/V + 10 mV 200 µV/V + 10 mV 240 µV/V + 10 mV	5520A
Capacitance – 0.35 nF 1.1 nF 3.3 nF 11 nF 33 nF 109 nF 300 nF 1.09 µF 3 µF 10.9 µF 30 µF 109 µF 300 µF 1.09 mF 3 mF 10.9 mF 30 mF 109 mF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	0.58 % + 10 pF 0.45 % + 10 pF 0.41 % + 10 pF 0.21 % + 10 pF 0.13 % + 0.10 nF 0.19 % + 0.10 nF 0.20 % + 0.30 nF 0.19 % + 1 nF 0.18 % + 3 nF 0.19 % + 10 nF 0.30 % + 30 nF 0.35 % + 0.10 µF 0.39 % + 0.30 µF 0.35 % + 1 µF 0.34 % + 3 µF 0.35 % + 10 µF 0.57 % + 30 µF 0.84 % + 0.10 mF	5520A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Stimulation of Thermocouple – Generate Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.35 °C 0.33 °C 0.36 °C 0.47 °C 0.7 °C	5520A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.47 °C 0.29 °C 0.28 °C 0.29 °C 0.31 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Stimulation of Thermocouple – Generate (cont)			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.34 °C 0.29 °C 0.28 °C 0.29 °C 0.32 °C	5520A
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.37 °C 0.30 °C 0.29 °C 0.33 °C 0.41 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.51 °C 0.38 °C 0.37 °C 0.41 °C	
Type S	(0 to 250) °C (250 to 400) °C (400 to 1400) °C (1400 to 1767) °C	0.45 °C 0.38 °C 0.39 °C 0.44 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.55 °C 0.32 °C 0.29 °C 0.28 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.51 °C 0.34 °C	
GPS Disciplined Oscillator Frequency Reference	10 MHz	1.1 x 10 ⁻¹⁰ Hz/Hz	Fluke 910R
Frequency – Measure	(1 to 1000) Hz (1 to 10) kHz (10 to 100) kHz (0.1 to 350) MHz	1.2 x 10 ⁻⁶ Hz/Hz 1.2 x 10 ⁻⁷ Hz/Hz 2.7 x 10 ⁻⁸ Hz/Hz 2.8 x 10 ⁻⁸ Hz/Hz	

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2,5} (\pm)	Comments
Scales and Balances ³	(0 to 300) lb (0 to 200) g	0.24 lb 0.09 g	Class F weights Class 1 weights
Pressure ³ – Low Pressure/Vacuum	(-12.8 to 300) psi (10 to 10 000) psi	0.17 psi 1.7 lbs	DHI pressure calibrator; pressure calibrator
Torque ³	(1 to 10) in·lbf (10 to 100) in·lbf (5 to 50) ft·lbf (50 to 500) ft·lbf (100 to 1000) ft·lbf	1 % 0.9 % 1.5 % 0.6 % 0.5 %	Mountz torque calibrator
Acceleration	20 hz to 10 kHz	3.4 % + 1 digit	Dytran 3120B reference accelerometer

¹ This laboratory offers commercial dimensional testing, calibration and field services where noted.

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 of 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 Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches and R is the resolution of the unit under test.

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

⁶ This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program*

for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

⁷ The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.



Accredited Laboratory

A2LA has accredited

MICRON INSPECTION & CALIBRATION SERVICES, INC.

York, PA

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 11th day of November 2015.

A handwritten signature in blue ink, appearing to read "L. A. ...".

President & CEO
For the Accreditation Council
Certificate Number 2917.01
Valid to November 30, 2017
Revised June 28, 2017

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