



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

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CALIBRATION

Valid To: September 30, 2018

Certificate Number: 4692.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Acoustic

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Sound Level Meters @ 1 kHz	94 dB 114 dB	0.52 dB	Sound calibrator

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Gage Blocks	Up to 20 in (Up to 500 mm)	(4.8 + 4.1L) µin	Master gage blocks & comparator
Step Gages	(0.5 to 22) in	(190 + 0.22L) µin	Gage blocks & height master
Micrometer Standards	(1 to 39) in (25 to 991) mm	(62 + 2.1L) µin	Step gage, linear height gage, & gage blocks

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Plain Ring Gages	(0.1 to 8) in (2 to 200 mm)	(5.4 + 18L) μin	Length measuring machine & master ring gages
Pin Gages	(0.01 to 2) in (0.2 to 50 mm)	91 μin	Laser micrometer
Feeler Gages	(0.001 to 1) in (0.05 to 25 mm)	80 μin	Digital micrometer
Stage Micrometers	(0.001 to 2) in (0.005 to 50 mm)	220 μin	Vision system
Straight Edges	(6 to 72) in	(150 + 3L) μin	Height master
Squares	(1 to 20) in (25 to 500 mm)	5L μin	Ceramic square, mu-checker & height gage
Surface Plates <sup>3</sup>	(3 to 72) in x 144 in	0.12 F <sup>2</sup> μin	Laser measuring system
V Blocks – Squareness of Sides Parallelism of Sides Angles of V Straightness of V	2 x 2 x 2 in to 10 x 10 x 10 in	58 μin 120 μin 0.07° 120 μin	Height master, square, video machine & gage blocks
Radius Gages	(0.01 to 1) in (0.2 to 25 mm)	690 μin	Optical projector
Thread Plugs Pitch Diameter	(0.05 to 2) in (1.3 to 50) mm	170 μin 4.3 μm	Length measuring machine, thread wire set, & optical projector
Thread Rings	(0.05 to 1.5) in (1.6 to 40 mm)	390 μin	Setting thread plug

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Calipers	(0.01 to 24) in (24 to 80) in	0.0007 in 0.001 in	Length standards
Depth Gages	(0.05 to 12) in	0.000 86 in	Depth master & surface plate
Micrometers			
Outside	(0.01 to 40) in	(53 + 15L) μin	Gage blocks & micmaster
Inside	(1 to 60) in	(130 + 13L) μin	Check master
Heads	(0.01 to 2) in	46 μin	Gage blocks
Height Gages	(0.05 to 40) in	(84 + 7.9L) μin	Step Gage and Surface plate
Indicators	(0.0005 to 4) in (4 to 6) in	86 μin 0.001 in	Gage blocks
Testers	(0.05 to 1) in	39 μin	
Thickness Gages	(0.0005 to 1) in	580 μin	Gage blocks
Rulers	(1 to 40) in (40 to 80) in	0.0029 in 0.0036 in	Length measuring machine
Pi Tapes	(6.3 to 10.3) in	900 μin	Cylinder
Tape Measures	(1 to 108) in (9 to 100) ft	(560 + 29L) μin	Length measuring machine
Ultrasonic Thickness Gages	(0.01 to 100) mm	0.01 mm	Steel gage blocks

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Coating Thickness Gages	(1 to 100) μm (100 to 250) μm (250 to 500) μm	1.6 μm 6 μm 10 μm	Thickness standards
Length Measuring Machines <sup>3</sup>	(0.1 to 4) in	(5.7 + 3.8L) μin	Gage blocks
Linear Setting Machine	(0.1 to 500) mm	0.002 mm	Linear measuring system
Industrial Length Measurement Standards	(0.1 to 600) in (600 to 1200) in (1200 to 2000) in	0.2 in 0.25 in 0.5 in	Laser distance meter
Length Tables	(0.1 to 1300) mm (1300 to 2200) mm (2200 to 4000) mm	15 μm 23 μm 32 μm	Laser measuring system
Optical Comparators <sup>3</sup>			
Linear Accuracy	(1 to 250) mm	6 μm	Glass scale master, precision square & gage blocks
Angle	90°	0.05°	
Magnification	(10, 20, 31.25, 50) X	290 μm	
Microscopes <sup>3</sup> – Linear Accuracy	(0.05 to 2) in	110 μin	Glass scale master
Video Machines <sup>3</sup> – Linear Accuracy	(0.05 to 300) mm	(2.9 + 0.0043L) μm	Glass scale master
Inclinometer / Protractors	0.1° to 360°	0.08 °	Angle Blocks
Levels	(4 to 12) in	330 μin	Master precision level, surface plate, and gage blocks

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Bore Gages	(0.2 to 3.5) in (3.5 to 7) in	190 µin 210 µin	Ring gages
Roughness Testers	16.1 Ra 119.5 Ra	3.1 µin 4.2 µin	Roughness standard
Coordinate Measuring Machine <sup>3</sup> – Linear Accuracy	(0 to 25) in (0 to 0.64) m	270 µin 6.8 µm	Laser measuring system; standard reference bar and step gages
CNC Machine Tools <sup>3</sup> :  Axis – Linear Accuracy	1 mm to 2.2 m	26 µm	Laser measuring system; standard reference bar and step gages

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Capacitance – Generate	(0.1 to 10) nF (10 to 110) nF (0.1 to 1) µF (1 to 5) µF (5 to 11) µF (11 to 33) µF (33 to 110) µF	18 pF 72 pF 0.7 nF 7.2 nF 44 nF 0.3 µF 0.9 µF	Multifunction calibrator
DC Current – Generate	(0 to 3) mA (3 to 30) mA (30 to 300) mA (0.3 to 3) A (3 to 10) A	0.4 µA 3.8 µA 38 µA 1.3 mA 6.4 mA	Multifunction calibrator
Clamps	(0 to 50) A (50 to 500) A (500 to 1000) A	0.14 A 0.9 A 2.5 A	Multifunction calibrator & 50 turn coil

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
DC Voltage – Generate	(0 to 300) mV (0.3 to 3) V (3 to 30) V (30 to 300) V (300 to 1000) V	10 μV 71 μV 0.73 mV 8.7 mV 62 mV	Multifunction calibrator
Resistance – Generate	(0 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 110) MΩ	0.06 mΩ 1.7 mΩ 7.5 mΩ 68 mΩ 680 mΩ 6.8 Ω 71 Ω 1.7 kΩ 85 kΩ 7.5 MΩ	Multifunction calibrator
Electrical Calibration of Temperature Sensors <sup>3</sup>	(32 to 1382) °C	0.6 °C	Process calibrator
Electrical Calibration of Thermocouples – Measure			
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.59 °C 0.49 °C 0.48 °C 0.79 °C 0.86 °C	Multifunction calibrator
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.47 °C 0.39 °C 0.38 °C 0.4 °C 0.72 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.7 °C 0.83 °C 0.84 °C 0.9 °C	
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.56 °C 0.53 °C 0.8 °C 0.92 °C 1.2 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouples – Measure (cont)			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.66 °C 0.36 °C 0.35 °C 0.36 °C 0.7 °C	Multifunction calibrator
Type U	(-200 to 0) °C (0 to 600) °C	0.76 °C 0.5 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.63 °C 0.5 °C 0.48 °C 0.48 °C 0.78 °C	
Electrical Calibration of pH– pH Meters	(0 to 14) pH units	0.017 pH units	pH meter calibrator
Electrical Calibration of pH Meter Calibrators	(-400 to 400) mV (0 to 14 pH)	0.01 mV (0.01 pH)	Multifunction calibrator

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Current – Generate			
(0 to 3) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	7.4 µA 6.9 µA 6.9 µA 9.2 µA 8.4 µA 36 µA	Multifunction calibrator
(3 to 30) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	34 µA 17 µA 17 µA 31 µA 73 µA 0.14 mA	

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
AC Current – Generate (cont)			
(30 to 300) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.3 mA 0.1 mA 0.1 mA 0.4 mA 0.8 mA 1.6 mA	Multifunction calibrator
(0.3 to 3) A	45 Hz to 1 kHz (1 to 5) kHz	21 mA 21 mA	
(3 to 10) A	60 Hz to 1 kHz (1 to 5) kHz	14 mA 0.35 A	
Clamp (0 to 50) A	(45 to 60) Hz (60 to 400) Hz	0.17 A 0.26 A	Multifunction calibrator & 50 turn coil
(50 to 500) A	(45 to 60) Hz (60 to 400) Hz	0.91 A 1.8 A	
(500 to 1000) A	(45 to 60) Hz (60 to 400) Hz	2.6 A 4.8 A	
AC Voltage – Generate			
(30 to 300) mV	(10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	12 μV 12 μV 12 μV 14 μV 42 μV 0.14 mV 0.34 mV	Multifunction calibrator
(0.3 to 3) V	(10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.59 mV 0.59 mV 0.59 mV 0.73 mV 1.1 mV 2.6 mV 9.1 mV	



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
AC Voltage – Generate (cont)			
(3 to 30) V	(10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	6 mV 6 mV 6 mV 9 mV 13 mV 33 mV	Multifunction calibrator
(30 to 300) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	69 mV 77 mV 94 mV 0.12 V 0.76 V	
(300 to 750) V	45 Hz to 1 kHz (1 to 10) kHz	0.3 V 0.36 V	
(750 to 1000) V	45 Hz to 1 kHz (1 to 10) kHz	0.31 V 0.36 V	

#### IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Force Gages <sup>3</sup> – Compression and Tension	(1 to 8) ozf (0.1 to 2) lbf (2 to 10) lbf (10 to 25) lbf (25 to 500) lbf	0.002 ozf 0.001 lbf 0.01 lbf 0.01 lbf 0.06 lbf	NIST handbook 105-1 Class F weights
Load Cells <sup>3</sup>	(30 to 300) lbf (200 to 2000) lbf (2500 to 25 000) lbf (5000 to 50 000) lbf  (50 000 to 600 000) lbf	0.07 % of reading 0.07 % of reading 0.07 % of reading 0.07 % of reading  0.08 % of reading	Load cell system    High capacity load cell system
Mass Flow <sup>3</sup>	(0.1 to 30) l/s	1 % of reading	Ultrasonic flowmeter

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Durometer Calibration – A,B,E,O,C,D, & DO	(0 to 90) Duro	0.9 Duro	ASTM D-2240 with: Durometer calibrator/force gauge
Test Blocks	(20 to 90) Duro	1.9 Duro	Durometers
Indenter Shape:			Vision system
Length	(2 to 3) mm	0.01 mm	
Angle	(2 to 40) °	0.066 °	
Diameter	(0.7 to 12) mm	0.01 mm	
Radius	(0.09 to 11) mm	0.01 mm	
Calibrators	(0 to 4.54) kg·f	9 g·f	Force gage
Indirect Verification of Rockwell Hardness Testers <sup>3</sup>	HRBW High Middle Low  HRC High Middle Low  HRFW High Middle Low	0.72 HRBW 0.52 HRBW 0.65 HRBW  0.52 HRC 0.45 HRC 0.41 HRC  0.55 HRFW 0.58 HRFW 0.57 HRFW	ASTM E-18 with test blocks
Indirect Verification of Leeb Hardness Testers	(700 to 800) HLD	17 HLD	ASTM A956
Weights	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 20 mg 500 mg	0.04 mg 0.04 mg 0.04 mg 0.04 mg 0.05 mg 0.05 mg 0.04 mg 0.05 mg 0.04 mg	ASTM E617 Class I weights and precision balance

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Weights (cont)	1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 2 oz 4 oz 8 oz 1 lb 2 lb 5 lb 10 lb 20 lb 25 lb 50 lb	0.03 mg 0.02 mg 0.04 mg 0.03 mg 0.08 mg 0.27 mg 0.32 mg 0.87 mg 3.2 mg 5.7 mg 0.14 g 0.2 g 0.22 g 0.26 g 0.000 01 oz 0.000 02 oz 0.000 05 oz 0.000 12 oz 0.000 16 oz 0.000 37 lb 0.000 37 lb 0.000 43 lb 0.000 46 lb 0.000 48 lb	ASTM E617 Class I weights and precision balance
Vacuum <sup>3</sup> – Generate	(-14 to -1) psi	0.07 psi	Dead weight tester
Pressure <sup>3</sup> – Measure	Up to 500 psi	0.38 psi	Pressure meter
Pressure <sup>3</sup> – Generate	(0.1 to 100) psi (100 to 500) psi (500 to 5000) psi (5000 to 10 000) psi	0.02 psi 0.1 psi 1 psi 2.2 psi	Dead weight tester
Balances <sup>3</sup> –  0.01 mg Resolution  0.1 mg Resolution	  (0 to 1) g (0 to 10) g (0 to 20) g  (0 to 50) g (0 to 100) g (0 to 200) g	  0.035 mg 0.042 mg 0.052 mg  0.18 mg 0.24 mg 0.6 mg	ASTM E617 with:  Class 0 and 1 weights

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Balances <sup>3</sup> (cont) –  1 mg Resolution  0.0002 lb Resolution	(0 to 500) g (0 to 1200) g  (0 to 5) lb (0 to 10) lb (0 to 20) lb (0 to 50) lb (0 to 60) lb	2.3 mg 3.8 mg  0.0003 lb 0.0003 lb 0.0004 lb 0.0004 lb 0.0026 lb	ASTM E617 with:  Class o and 1 weights  Class 1 weights
Scales <sup>3</sup> –  0.1 lb Resolution	(0 to 1000) lb	0.3 lb	Class F weights in accordance with NIST Handbook 105-1
Torque Testers	(1.25 to 250) lbf·in (20 to 260) lbf·ft	0.1 % of reading 0.23 % of reading	NIST Handbook 105-1 with Class F weights, torque arm
Torque Watches	(4 to 36) ozf·in	2 % of reading	Torque calibration system
Torque Wrenches	(4 to 1000) lbf·in (20 to 250) lbf·ft (250 to 1000) lbf·ft	0.4 % of reading 0.7 % of reading 0.9 % of reading	Torque calibration system

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Thermohygrometers	(30 to 55) % RH	1.4 % RH	Humidity standard at ambient RH
Infrared Thermometers ( $\epsilon = 0.95$ )	(50 to 100) °C (101 to 249) °C (250 to 500) °C	0.7 °C 1.9 °C 3.5 °C	Infrared calibrator

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Temperature – Thermohygrometer	(19 to 25) °C	0.3 °C	Temperature standard
Temperature – Sensors/Probes/ Thermocouples/ Digital Thermometers	(-45 to 150) °C (150 to 650) °C	0.024 °C 0.63 °C	PRT probe, temperature calibrator & reference probe
Thermometer – Liquid In Glass	(-20 to 140) °C	0.07 °C	Liquid temperature calibrator & reference probe
Liquid Bath	(-25 to 200) °C	0.04 °C	PRT probe
Dry Block Calibrator	(-40 to 650) °C	0.06 °C	PRT probe

## VI. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Frequency – Generate	(0.1 to 120) Hz (0.12 to 1) kHz (1 to 100) kHz (100 to 500) kHz	360 µHz 3 mHz 320 mHz 1.5 Hz	Multifunction calibrator
Tachometers –  Contact	(1 to 500) rpm (500 to 2000) rpm (2000 to 4000) rpm	0.2 rpm 0.5 rpm 1 rpm	Tachometer, calibrator
Non-Contact	(1 to 1000) rpm (1000 to 10 000) rpm (10 000 to 100 000) rpm	0.022 rpm 0.062 rpm 0.61 rpm	Multifunction calibrator and LED
Stroboscopes	(1 to 12 500) fpm (20 000 to 100 000) fpm	0.019 % rdg + 0.64 fpm 0.058 % rdg + 0.5 fpm	Digital Tachometer

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Force Test Stands	(0.1 to 12) in/min	0.6 % of reading	Ruler & stopwatch
Stopwatch	1 s to 8 h	0.55 s	Master stopwatch & camera

#### VII. Dimensional Testing<sup>5</sup>

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Length – 1D	(0 to 2) in (0 to 6) in (0 to 12) in (0 to 24) in (0 to 40) in	150 µin 370 µin 300 µin 0.0025 in 300 µin	Digital micrometer Optical comparator Video machine Digital caliper Check master
Length – 2D	(0 to 200) µin  (0 to 60) in  (0 to 90) °	4 µin  370 µin  0.015 °	Surface roughness tester  Optical comparator or video machine  Video machine
Length – 3D	X = (0 to 16) in Y = (0 to 20) in Z = (0 to 14) in	770 µin	Coordinate measuring machine

#### MECHANICAL TESTING

##### Test

Cable Break Test

Crush Test

##### Test Method

Internal Procedure TP02

Internal Procedure TP03

<sup>1</sup> This laboratory offers commercial calibration, dimensional testing and mechanical testing service.

<sup>2</sup> 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.

<sup>3</sup> 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 actual 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.

<sup>4</sup> In the statement of CMC  $L$  is the numerical value of the nominal length of the device measured in inches and  $F$  is the diagonal length of the surface plate in inches.

<sup>5</sup> This test is not equivalent to that of a calibration.



## *Accredited Laboratory*

A2LA has accredited

# **DIGITAL MEASUREMENT METROLOGY INC**

*Brampton ON L6S 5N7, CANADA*

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 ANSI/NCSL Z540-1-1994 and 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 8 January 2009*).



Presented this 22<sup>nd</sup> day of September 2017.

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

President and CEO  
For the Accreditation Council  
Certificate Number 4692.01  
Valid to September 30, 2018  
Revised August 21, 2018

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