



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

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CALIBRATION

Valid To: August 31, 2020

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^{1, 8}:

I. Acoustic

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

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Gage Blocks	Up to 20 in	$(4.8 + 4.1L) \mu\text{in}$	Master gage blocks & comparator
Length Standards – Step Gages	(0.5 to 22) in	$(190 + 0.22L) \mu\text{in}$	Gage blocks & height master
Micrometer Setting Standards	(1 to 39) in	$(62 + 2.1L) \mu\text{in}$	Step gage, height gage & gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Length Standards – (cont)			
Endrods, Distance Indicators	(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
Plain Ring Gages	(0.1 to 8) in	(5.4 + 18L) μin	Length measuring machine & master ring gages
Pin Gages	(0.01 to 2) in	91 μin	Laser micrometer
Thickness & Feeler Gages –			
Thickness	(0.0005 to 1) in	580 μin	Gage blocks
Feeler Gages	(0.001 to 1) in	80 μin	Digital micrometer
Ultrasonic Thickness	(0.01 to 100) mm	0.01 mm	Steel gage blocks
Coating Thickness	(1 to 100) μm (100 to 250) μm (250 to 500) μm	1.6 μm 6 μm 10 μm	Thickness standards
Radius Gages	(0.01 to 1) in	690 μin	Optical projector
Stage Micrometers	(0.001 to 2) in	220 μin	Vision system
Gaging Fixtures –			
Straight Edges, Parallel Bars	(1 to 72) in	(150 + 3L) μin	Height master
Squares	(1 to 20) in	5L μin	Ceramic square, mu-checker & height gage

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Gaging Fixtures – (cont) V Blocks – Squareness of Sides Parallelism of Sides Angles Straightness	Up to 10 in	58 µin 120 µin 0.07° 120 µin	Height master, square, video machine & gage blocks
Surface Plates ³	(3 to 72) in x 144 in	0.12 F^2 µin	Laser measuring system
Thread Plugs – Pitch Diameter	(0.05 to 2) in	170 µin	Length measuring machine, thread wire set & optical projector
Calipers	(0.01 to 24) in (24 to 80) in	0.0007 in 0.001 in	Length standards
Micrometers – Outside Inside Heads Depth	(0.01 to 40) in (1 to 60) in (0.01 to 2) in (0.05 to 12) in	(53 + 15L) µin (130 + 13L) µin 46 µin 0.000 86 in	Gage blocks & micmaster Check master Gage blocks Depth master & surface plate
Height Gages	(0.05 to 40) in	(84 + 7.9L) µin	Step gage & surface plate
Length Indicators – Dial & Test	Up to 1 in (1 to 4) in (4 to 6) in	39 µin 86 µin 0.001 in	Gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Rules & Tapes – Rulers Pi Tapes Tape Measures	(1 to 40) in (40 to 80) in (6.3 to 10.3) in (1 to 108) in (9 to 100) ft	0.0029 in 0.0036 in 900 μin (560 + 29L) μin	Length measuring machine Cylinder Length measuring machine
Length Measuring Systems ³ – (UMMs, ULMs, Length Setting Machine, Distance Indicators)	(0.1 to 4) in (100 to 500) mm (500 to 1300) mm (1300 to 2200) mm (2200 to 4000) mm	(5.7 + 3.8L) μin 2 μm 15 μm 23 μm 32 μm	Gage blocks, laser measuring system
Optical Comparators ³ – Linear Accuracy Angle Magnification	(1 to 250) mm 90° (10, 20, 31.25, 50) X	6 μm 0.05° 290 μm	Glass scale master, precision square & gage blocks
Microscopes ³ – Linear Accuracy	(0.05 to 2) in	110 μin	Glass scale master
Video Machines ³ – Linear Accuracy	(0.05 to 300) mm	(2.9 + 0.0043L) μm	Glass scale master
Angle Indicators – Inclinometer & Protractors Levels	(0.1 to 360)° (4 to 12) in	0.08 ° 330 μin	Angle blocks Master precision level, surface plate & gage blocks
Bore Gages	(0.2 to 3.5) in (3.5 to 7) in	190 μin 210 μin	Ring gages

Parameter/Equipment	Range	CMC ² , (±)	Comments
Roughness Testers	16.1 Ra 119.5 Ra	3.1 µin 4.2 µin	Roughness standard
Machine Tools Scale ³ (DRO)	1 mm to 2.2 m	26 µm	Laser measuring system; standard reference bar & step gages

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 6} (±)	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
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
DC Voltage – Measure	(0 to 10) V	7.1 mV	Multifunction calibrator

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
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 ³	(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 ^{2,6} (±)	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	0.56 °C 0.53 °C 0.8 °C 0.92 °C 1.2 °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 Simulation of Thermocouples ³ –			
Type K	(-178 to 1200) °C	0.85 °C	Thermocouple calibrator – Field calibration
Type N	(-178 to 1200) °C	0.87 °C	
Type J	(-18 to 700) °C	0.77 °C	
Type T	(-200 to 350) °C	0.71 °C	
Type S	(0 to 1200) °C	1 °C	
Electrical Calibration of pH Meters & Calibrators –			
pH Meters	(0 to 14) pH units	0.017 pH units	pH meter calibrator
Calibrators	(-400 to 400) mV (0 to 14) pH	0.01 mV 0.01 pH	Multifunction calibrator

Parameter/Range	Frequency	CMC ^{2,6} (±)	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	
(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	
(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	
Clamps			
(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	

Parameter/Range	Frequency	CMC ^{2, 6} (±)	Comments
AC Voltage – Generate			
(0 to 30) 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
(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	61 µV 61 µV 61 µV 66 µV 0.13 mV 0.32 mV 0.78 mV	
(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	
(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	
(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 ^{2,7} (±)	Comments
Force Gages ³ – Compression & Tension	(1 to 8) ozf (0.5 to 2) lbf (2 to 10) lbf (10 to 25) lbf (25 to 500) lbf	0.002 ozf 0.001 lbf 0.008 lbf 0.009 lbf 0.06 lbf	NIST handbook 105-1 Class F weights
Load Cells ³	(30 to 300) lbf (200 to 2000) lbf (2500 to 25 000) lbf (5000 to 50 000) lbf (50 000 to 320 000) lbf	0.07 % of rdg 0.07 % of rdg 0.07 % of rdg 0.07 % of rdg 0.25 % of rdg	Load cell system High capacity load cell system
Mass Flow ³	(0.1 to 30) l/s	1 % of rdg	Ultrasonic flowmeter
Durometers – A, B, E, O, C, D, & DO Test Blocks Indenter Shape: Length Angle Diameter Radius Calibrators	(0 to 90) Duro (20 to 90) Duro (2 to 3) mm (2 to 40)° (0.7 to 12) mm (0.09 to 11) mm (0 to 4.54) kg·f	0.9 Duro 1.9 Duro 0.01 mm 0.066° 0.01 mm 0.01 mm 9 g·f	ASTM D2240 with: Durometer calibrator/force gauge Durometers Vision system Force gage
Rockwell Hardness Testers ³ – Indirect Verification	HRBW: High Middle Low HRC: High Middle Low	0.72 HRBW 0.52 HRBW 0.65 HRBW 0.52 HRC 0.45 HRC 0.41 HRC	ASTM E18 with test blocks

Parameter/Equipment	Range	CMC ² (±)	Comments
Rockwell Hardness Testers ³ – Indirect Verification (cont)	HRFW: High Middle Low	0.55 HRFW 0.58 HRFW 0.57 HRFW	ASTM E-18 with test blocks
Leeb Hardness Testers – Indirect Verification	(500 to 800) HLD	17 HLD	ASTM A956
Mass, Fixed Points	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 20 mg 500 mg 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	0.04 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 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 & precision balance

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Pressure – Generate & Measure	(0.1 to 100) psi (100 to 500) psi (500 to 5000) psi (5000 to 10 000) psi (10 000 to 16 000) psi	0.02 psi 0.1 psi 1 psi 2.2 psi 3.0 psi	Dead weight tester, Pressure meter
Negative Pressure	(-14 to -1) psi	0.07 psi	Dead weight tester
Pressure – Hydraulic & Pneumatic ³	(0 to 14.49) psig (0 to 100) psig (0 to 300) psig (0 to 1000) psig (0 to 10 000) psig	0.0025 psi 0.020 psi 0.086 psi 0.26 psi 7.0 psi	Pressure calibrator
Pressure Gage Transducers ³	(0.5 to 30) psia	0.2 psia	Pressure gage, pressure/vacuum pump
Vacuum Gage Transducers ³	(0 to 28.8) in·Hg	0.2 in·Hg	Vacuum gage/pump
Scales & Balances ³ –			ASTM E898 with:
0.01 mg Resolution	(0 to 1) g (0 to 10) g (0 to 20) g	35 µg 2.3 mg 3.8 mg	Class 0 & 1 weights
0.10 mg Resolution	(0 to 50) g (0 to 100) g (0 to 200) g	0.18 mg 0.24 mg 0.6 mg	
1 mg Resolution	(0 to 500) g (0 to 1200) g	2.3 mg 3.8 mg	Class 1 weights
0.0002 lb Resolution	(0 to 5) lb (0 to 10) lb (0 to 20) lb (0 to 50) lb (0 to 60) lb	0.0003 lb 0.0003 lb 0.0004 lb 0.0004 lb 0.0026 lb	Class F weights in accordance with NIST Handbook 105-1
0.1 lb Resolution	(0 to 1000) lb	0.3 lb	

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Torque – Wrenches, Indicators, Transducers	(1.25 to 250) lbf·in (20 to 260) lbf·ft	0.1 % of rdg 0.23 % of rdg	NIST Handbook 105-1 with Class F weights, torque arm
	(4 to 36) ozf·in (4 to 1000) lbf·in (20 to 250) lbf·ft (250 to 1000) lbf·ft	2 % of rdg 0.4 % of rdg 0.7 % of rdg 0.9 % of rdg	Torque calibration system

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Relative Humidity – Measure & Generate ³	(15 to 95) % RH	1.6 % RH	Humidity chamber and thermo-hygrometer
Humidity – Measure ³	(10 to 95) %	1.0 % RH	High precision thermo-hygrometer
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
Temperature – Measuring Equipment & Measure	(-45 to 150) °C (150 to 200) °C (150 to 650) °C	0.024 °C 0.04 °C 0.06 °C	Temp.calibrator, liquid temp calibrator, PRT probe
Temperature Sensor/Digital Thermometers ³	(-70 to 25) °C (-40 to 140) °C (140 to 420) °C	0.14 °C 0.18 °C 0.26 °C	Metal block, cal bath PRT sensor, Hart 1560, 3560 SPRT module

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Temperature System Checks ³ – System Accuracy Tests (Type K or Type N)	(100 to 1100) °C	2.6 °C	Thermocouple calibrator, thermocouple
Temperature System Checks ³ – System Accuracy Tests	(-80 to 220) °C	0.5 °C	Process calibrator, RTD
Temperature Uniformity Survey ³ (Type K or Type N)	(50 to 1205) °C	1.3 °C	Datalogger, thermocouples

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Frequency – Measuring Equipment	(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 & Stroboscopes –			
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 & LED
	(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 ² (±)	Comments
Speed	(0.1 to 12) in/min	0.6 % of rdg	Ruler & stopwatch
Stopwatch	1 s to 8 h	0.55 s	Master stopwatch & camera

VII. Dimensional Testing⁵

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Length – 1D	Up to 2 in Up to 6 in Up to 12 in Up to 24 in Up 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	Up to 60 in Up to 90 °	370 µin 0.015 °	Optical comparator or video machine Video machine
Length – 3D	Up to 18 in	266 µin	Coordinate measuring machine

MECHANICAL TESTING

Test

Compression Test

Tensile Test

Test Method

Internal Procedure TP02

Internal Procedure TP03

¹ This laboratory offers commercial calibration, dimensional testing and mechanical testing service.

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 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.

⁴ 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.

⁵ This test is not equivalent to that of a calibration.

⁶ 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. CMCs 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.

⁷ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

⁸ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

TRESCAL CANADA INC. (ONTARIO)

Brampton ON, 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 the requirements of 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 April 2017).



Presented this 22nd day of October 2018.

A blue ink signature of the Senior Director of Accreditation Services.

Senior Director, Accreditation Services
For the Accreditation Council
Certificate Number 4692.01
Valid to August 31, 2020
Revised January 3, 2020

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