SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3-2006

JEM PRECISION
9615 56 Avenue NW
Edmonton, Alberta T6E 0B2
Canada
Cathy Shultz Phone: 780 440 1933

CALIBRATION

Valid To: April 30, 2020 Certificate Number: 1500.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Angle Blocks	(0 to 30)°	5.1″	Gauge blocks, sine bar, precision height gauge
Calipers[3, 5]	Up to 80 in	(12 + 6.0*L*) µin	Gauge blocks, surface plate
Crimp Tools[3]	(0.011 to 0.25) in > 0.25 in	0.024 in 0.024 in	Pin gauges
Diameter –			
External	Up to 1 in Up to 24 in	35 µin (16 + 5.8*D*) µin	Digital micrometer Precision height gauge
Internal	Up to 24 in	(8.7 + 5.6*D*) µin	Precision height gauge
Gauge Blocks	Up to 4 in 5 in	(1.9 + 0.75*L*) µin 7.9 µin	Gauge block comparator, master gauge blocks

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8398 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Height Gauges[3, 6]	Up to 24 in (24 to 40) in	(2.8 + 3.6*L*) µin (23 + 5.0*L*) µin	Gauge blocks
Indicators[3, 5]	Up to 3 in	(6.5 + 3.9*L*) µin	Gauge blocks
Indicator Calibrators[3]	Up to 2 in	12 µin	Gauge blocks
Length Standards	(1 to 80) in	(32 + 3.6*L*) µin	Gauge blocks, precision height gauge, laser interferometer
Precision Levels	Up to 18 in	24 µin/in	Sine bar, gauge blocks, surface plate
Linear Dimension and Angle – X-Axis Y-Axis Angle	 8 in 4 in (0 to 360) °	 (18 + 21*L*) µin (40 + 23*L*) µin 0.058 °	Optical comparator
Micrometers[3,5] – Depth ID OD	 Up to 12 in Up to 24 in Up to 60 in	 (1.1 + 7.9*L*) µin (11 + 5.9*L*) µin (16 + 4.9*L*) µin	Gauge blocks, precision height gauge
Optical Comparators – X-Axis Y-Axis Angle	 8 in 4 in (0 to 360)°	 (13 + 17*L*) µin (40 + 19*L*) µin 0.042 °	 Gauge blocks Angle blocks
Protractors[5]	At 0° and 90° (> 0 to < 90)°	0.000 60° 0.001 4°	Sine bar, gauge blocks, master square, surface plate

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Sine Bars –			
Parallelism	5 in 10 in 20 in	47 µin 47 µin 47 µin	Surface plate, precision height gauge
Length	5 in 10 in 20 in	95 µin 100 µin 120 µin	Surface plate, precision height gauge, gauge blocks
Angle (20 in bar length)	Up to 45 °	5.1″	
Squares	Up to 24 in	26 µin/in	Master square, gauge blocks
Step Gauges	Up to 6 in	(5.2 + 3.7*L*) µin	Gauge blocks, precision height gauge
Surface Plates[3] –			
Flatness Repeatability	Up to 12 ft x 12 ft Up to 12 ft x 12 ft	22 µin 25 µin	Laser interferometer Repeat-o-meter
Tape Measures[3]	Up to 25 ft	(0.002 + 0.000 2*L*) in	Gauge blocks, master rulers
Rulers[5]	Up to 72 in	(0.64 + 4.8*L*) µin	Gauge blocks, laser
Thickness Gauges[3, 5]	(0.1 to 0.6) in (> 0.6 to 1) in	16 µin 20 µin	Gauge blocks
Thread plugs –			
Major Diameter Pitch Diameter	(0.07 to 4) in (0.07 to 4) in	110 µin 140 µin	Thread wires, digital micrometers

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Straight Edges –			
Parallelism	Up to 72 in	47 µin	Surface plate, precision height gauge
Straightness		47 µin	

II. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 7] (±)	Comments
Durometers (Types A, B, C, D, DO, O, OO) –			
Indenter Extension and Shape			
Diameter	Up to 0.105 in	0.000 25 in	Optical comparator, gauge blocks, force gauge
Radius	Up to 0.125 in	0.000 25 in	
Angle	(25 to 40) °	0.046 °	
Extension	Up to 0.105 in	0.000 25 in	
Indenter Display	Up to 100 durometer units	0.009 durometer units	
Spring Calibration, Force	Up to 100 durometer units	0.29 durometer units	
Force – Measure and Measuring Equipment[3, 5]	(0 to 500) lbf	0.058 %	Dead weight
Scales and Balances[3, 5]	< 0.5 g (0.5 to 1) g (1 to 10) g (10 to 100) g (100 to 210) g	0.028 mg 0.026 mg (0.0029 + 0.000 26*X*) % (0.0003 + 0.000 002 2*X*) % (0.000 11 + 0.000 000 29*X*) %	Troemner weights
	Up to 300 kg	0.012 %	Class F weights

Parameter/Equipment	Range	CMC[2, 4, 7] (±)	Comments
Pressure/Vacuum – Measure and Measuring Equipment[3]	(-12.5 to 0) psig (0 to 20) psig (20 to 15 000) psig	0.044 psi 0.029 psi 0.12 %	Digital pressure gauges and pumps
Torque Wrenches and Drivers	(10 to 100) in oz 100 in oz to 500 in lb 500 in lb to 1 000 ft lb	0.35 % 0.40 % 0.35 %	Torque system and transducers

III. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Temperature – Measure and Measuring Equipment	(0 to 98) °C	0.15 °C	Calibration bath, RTD and thermometer
Measure	(32 to 200) °C	(0.90 + 0.0030*X*) °C	IR thermometer calibrator
Temperature –Measuring Equipment	0 °C	0.0050 °C	ASTM E56 ice point

[1] This laboratory offers commercial calibration services and field calibration service, 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 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. *D* is the numerical value of the nominal diameter of the device (Diameter, External and Internal); or the long diagonal (Surface Plates - Flatness) measured in inches. *X* is the numerical value of the nominal weight measured in g (Scales and Balances); or temperature measured in °C (Thermodynamics).

[5] The contributions from the "best existing device" are not included in the CMC claim.

[6] The contributions from the "best existing device" are not included in the CMC claim for height gauges greater than 24 in.

[7] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

Accredited Laboratory

A2LA has accredited

JEM PRECISION LTD

Edmonton, Alberta, 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 the requirements of ANSI/NCSLI Z540.3-2006 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 13th day of July 2018.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1500.04
Valid to April 30, 2020
Revised February 20, 2020

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