SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

FRANK COX METROLOGY
(Formerly CANADIAN CENTRAL GAUGE LABORATORY)
40 West Drive
Brampton, Ontario, Canada L6T 3T6
Hilliard Cox Phone: 905 457 9190

CALIBRATION

Valid To: January 31, 2019 Certificate Number: 1165.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 4]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Gage Blocks –			Gage block comparison
Steel, Ceramic, Carbide, Chrome Carbide			
Length	(0.5 to 100) mm	(0.050 + 0.015*L*) µin	
Parallelism		0.05 µin	
Length	(0.010 to 4) in	(1.3 + 0.5*L*) µin	
Parallelism		2 µin	
Steel only:			
Length	(125 to 205) mm	(0.075 + 0.025*L*) µin	
Parallelism		0.05 µin	
Length	(5 to 8) in	(3 + 1*L*) µin	
Parallelism		3 µin	
Length	(10 to 20) in	(7 + 1.5*L*) µin	
Parallelism		3 µin	
Angle Blocks	Up to 90°	40 µin/5 in	

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, 5] (±)	Comments
Plug Gages –			
Plain	(0.007 to 4) in	(4 + 1.5*L*) µin	ANSI B89.1.5
Tapered	Up to 6 in	60 µin	
Parallel	(>4 to 24) in	(10 + 3*L*) µin	
Pin Gages/Set	Up to 1 in	20 µin	ANSI B891.17
Thread Measure Wire	Up to 80 TPI	4 µin	ANSI B891.17
Plain Ring Gages	(0.04 to 6) in	(7 + 1.5*L*) µin	ANSI B89.1.6M
	(6 to 12) in	(15 + 1.5*L*) µin	
Micrometers –			
Outside[3]	Up to 1 in (2 to 36) in	(0.6*R* + 10*L*) µin (0.6*R* + 5*L*) µin	By comparison
ID Rod Type	Up to 24	(0.6*R* + 35*L*) µin	
Height Masters[3]	Up to 24 in	(0.6*R* + 10*L*) µin	
High Resolution	Up to 4 in	10 µin	
Depth Gages[3] – Dial, Digital, Micrometer Types	(1 to 24) in	(0.6*R* + 10*L*) µin	By comparison
Squares	18 in	25 µin /in	Square checker

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Thread Plug Gages –			
Simple Pitch Diameter	Up to 4 in (4 to 12) in	85 µin (85 + 5*L*) µin	By comparison
Linear Pitch Variation	Up to 16 in	35 µin per 4 in	ULM
Flank Angle	(5 to 80)°	20 arcmin	Optical comparator
Major Diameter	Up to 16 in	(25 µin/in)	
Thread Ring Gages – Adjustable Type			
Functional Pitch Diameter	(0.06 to 12) in	(320 + 15*L*) µin	By comparison, fit to master plug
Flank Angle	(5 to 80)°	20 arcmin	By cast method
Minor Diameter	up to12 in	70 µin	
Thread Ring Gages – Non-Adjustable Type			
Simple Pitch Diameter	(0.5 to 6) in	120 µin	By comparison
Lead Variation	(0.5 to 2) in	25 µin per 4 in	
Flank Angle	(5 to 80)°	20 arcmin	By cast method
Minor Diameter	Up to 12 in	70 µin	
Thread Caliper Gauges – Adjustable			
Knife Edge	Up to 12 in	(420 + 5*L*) µin	Fit to master
Roller Type	Up to 12 in	(250 + 10*L*) µin	

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Vernier, Dial, and Digital Calipers[3]	Up to 60 in	(0.6*R* + 4.5*L*) µin	By comparison
Flush Pins – Gages	Up to 6 in	200 µin	Electronic amp, probe, gage blocks
Step Masters	Up to 24 in	20 µin	Electronic amp, probe, gage blocks
One Dimensional Measurement –			
Diameter	Up to 10 in	70 µin	Bench micrometer
Length	Up to 10 in	70 µin	Bench micrometer
Angle	Up to 180°	0° 3 arcmin	Optical comparator
Dial, Digital, and Test Indicators –	Up to 2 in	30 µin	ANSI B89.1.10M
High-Resolution/Digital High-Resolution/Analog	(0.001 to 0.05) in Up to 0.1 in	1.2 µin 4.5 µin	
Bore Gages	(0.5 to 24) in	(0.6*R* + 3*L*) µin	By comparison
Length Standards – Setting Rods	(1 to 36) in	(6 + 4.5*L*) µin	By comparison
Surface Plates[3] –			GGG-P-463c
Repeat Reading	0.020 in	4.5 µin	
Flatness	Up to 20 ft diagonal	(50 + 4*D*) µin	*D* is the length of the diagonal in feet

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Optical Comparators[3] –			
Magnification	Up to 100x	800 µin	Opti-master, mag rule, angle blocks, balls
Linearity	18 in travel	200 µin	
Angle	Up to 360°	Angle: 2.7 arcmin	
High Resolution Comparators	2 in	1.5 µin	Master blocks
Digital, Dial, and Vernier Height Gages[3]	(6 to 48) in	(0.6*R* + 5.2*L*) µin	By comparison
Sine Bars and Plates	Up to 10 in	30 µin/5 in	By comparison
Precision Levels	Up to 20 in	(0.6*R* + 5.5) µin	Level test rig
Autocollimator	5 ″	0.31 arcsec	Gage blocks and sine equipment
Plain Snap Gages[3]	Up to 12 in	(120 + 3*L*) µin	By comparison
Steel Rules	Up to 24 in	0.003 in	Optical comparator

II. Dimensional Testing/Calibration[1]

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
One Dimensional Measurement[6] –			
Diameter	Up to 10 in	70 µin	Bench micrometer
Length	Up to 10 in	70 µin	Bench micrometer
Angle	Up to 180°	0° 3 arcmin	Optical comparator

III. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HREW: Low Medium High HR15N: Low Medium High HR15TW: Low Medium High HR30N: Low Medium High HR30TW: Low Medium High HR45N: Low Medium High	 0.67 HRA 0.63 HRA 0.63 HRA 0.60 HRBW 0.76 HRBW 0.49 HRBW 0.65 HRC 0.96 HRC 0.43 HRC 0.67 HREW 0.75 HREW 0.56 HREW 0.48 HR15N 0.94 HR15N 0.95 HR15N 0.61 HR15TW 0.47 HR15TW 0.57 HR15TW 0.49 HR30N 0.86 HR30N 0.40 HR30N 0.74 HR30TW 0.69 HR30TW 0.50 HR30TW 0.66 HR45N 0.81 HR45N 0.90 HR45N	Indirect verification method per ASTM E18

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] – (cont)	HR45TW: Low Medium High	 1.1 HR45TW 0.73 HR45TW 0.59 HR45TW	Indirect verification method per ASTM E18
Torque Tools[3]	450 ft·lbf	5.0 % IV	Torque tester
Torque Testers	5500 in·lbf	0.33 % IV	Standard weights
Force Gauges	Up to 250 lbf	1.5 % IV	By comparison with standard weights
Direct Verification of Durometers (Shore Types A, B, C, D, DO, M, O, and OO) –			ASTM D2240
Indenter Shape and Extension:	Up to 100 Duro		
Diameter		200 µin	
Radius		200 µin	
Radius		200 µin	
Extension		200 µin	
Indenter Display	Up to 100 Duro	200 µin	
Spring Calibration – Force		1.5 % IV	Durocalibrator

[1] This laboratory offers commercial dimensional testing/calibration service and field calibration 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] This laboratory offers metric equivalent capability for all items listed.

[5] In the statement of CMC, *L* is the numerical value of the nominal length of the device measured in inches; *R* is the numerical value of the resolution of the device in microinches; *D* is the numerical value of the nominal diameter of the device measured in inches except where noted; IV is the percent of indicated value.

[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.

Accredited Laboratory

A2LA has accredited

FRANK COX METROLOGY

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 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 28th day of March 2017.

President and CEO
For the Accreditation Council
Certificate Number 1165.01
Valid to January 31, 2019

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