



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

FRANK COX METROLOGY  
 (Formerly CANADIAN CENTRAL GAUGE LABORATORY)  
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CALIBRATION

Valid To: January 31, 2021

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<sup>1,4,7</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Gage Blocks –			Gage block comparison
Steel, Ceramic, Carbide, Chrome Carbide			
Length	(0.5 to 100) mm	(0.060 + 0.03L) μm	
Parallelism		0.05 μm	
Length	(0.010 to 4) in	(2.3 + 1L) μin	
Parallelism		2 μin	
Steel Only:			
Length	(125 to 205) mm	(0.075 + 0.025L) μm	
Parallelism		0.05 μm	
Length	(5 to 8) in	(3 + 1L) μin	
Parallelism		3 μin	
Length	(10 to 20) in	(10 + 2.7L) μin	
Parallelism		3 μin	
Angle Blocks	Up to 90°	40 μin/5 in	

Parameter/Equipment	Range	CMC <sup>2,5</sup> ( $\pm$ )	Comments
Plug Gages – Plain Tapered Parallel	(0.007 to 4) in Up to 6 in (>4 to 24) in	(11 + 7L) $\mu$ in 60 $\mu$ in (10 + 3L) $\mu$ in	ANSI B89.1.5
Pin Gages/Set	Up to 1 in	20 $\mu$ in	ANSI B891.17
Thread Measure Wire	Up to 80 TPI	4 $\mu$ in	ANSI B891.17
Plain Ring Gages	(0.04 to 6) in (6 to 12) in	(7 + 1.5L) $\mu$ in (15 + 1.5L) $\mu$ in	ANSI B89.1.6M
Micrometers – Outside <sup>3</sup> ID Rod Type Height Masters <sup>3</sup> High Resolution	Up to 36 in Up to 24 Up to 24 in Up to 4 in	(0.6R + 15L) $\mu$ in (0.6R + 30 + 15L) $\mu$ in (0.6R + 10L) $\mu$ in 10 $\mu$ in	By comparison
Depth Gages <sup>3</sup> – Dial, Digital, Micrometer Types	(1 to 24) in	(0.6R + 10L) $\mu$ in	By comparison
Squares	18 in	25 $\mu$ in/in	Square checker

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Thread Plug Gages – Simple Pitch Diameter	Up to 4 in (4 to 12) in	85 μin (85 + 7L) 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 + 15L) μin	By comparison, fit to master plug
Flank Angle	(5 to 80)°	20 arcmin	By cast method
Minor Diameter	Up to 12 in	70 μin	Bore micrometer /gage block & pins
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	Bore micrometer /gage block & pins
Thread Caliper Gauges – Adjustable			
Knife Edge	Up to 12 in	(420 + 5L) μin	Fit to master
Roller Type	Up to 12 in	(250 + 10L) μin	

Parameter/Equipment	Range	CMC <sup>2,5</sup> ( $\pm$ )	Comments
Vernier, Dial, and Digital Calipers <sup>3</sup>	Up to 60 in	$(0.6R + 15L) \mu\text{in}$	By comparison
Flush Pins – Gages	Up to 6 in	200 $\mu\text{in}$	Electronic amp, probe, gage blocks
Step Masters	Up to 1 in (1 to 24) in	20 $\mu\text{in}$ $(20 + 6.5L) \mu\text{in}$	Electronic amp, probe, gage blocks
Dial, Digital, and Test Indicators –	Up to 2 in	30 $\mu\text{in}$	ULM
High-Resolution/Digital High-Resolution/Analog	(0.001 to 0.05) in Up to 0.1 in	1.2 $\mu\text{in}$ 4.5 $\mu\text{in}$	Gage blocks
Bore Gages			
2-Point	(0.5 to 24) in	$(0.6R + 50) \mu\text{in}$	By comparison
3-Point	Up to 6 in	$(0.6R + 82 + 10L) \mu\text{in}$	
Length Standards – Setting Rods	(1 to 36) in	$(6 + 4.5L) \mu\text{in}$	By comparison
Surface Plates <sup>3</sup> –			GGG-P-463c
Repeat Reading	0.020 in	4.5 $\mu\text{in}$	Tesa TT20
Flatness	Up to 20 ft diagonal	$(50 + 4D) \mu\text{in}$	Autocollimator  <i>D</i> is the length of the diagonal in feet

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

## II. Dimensional Testing/Calibration<sup>1</sup>

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
One Dimensional Measurement <sup>6</sup> –			
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 <sup>2</sup> (±)	Comments
Indirect Verification of Rockwell Hardness Testers <sup>3</sup>	<p>HRA: Low Medium High</p> <p>HRBW: Low Medium High</p> <p>HRC: Low Medium High</p> <p>HREW: Low Medium High</p> <p>HR15N: Low Medium High</p> <p>HR15TW: Low Medium High</p>	<p>0.67 HRA 0.63 HRA 0.63 HRA</p> <p>0.60 HRBW 0.76 HRBW 0.49 HRBW</p> <p>0.65 HRC 0.96 HRC 0.43 HRC</p> <p>0.67 HREW 0.75 HREW 0.56 HREW</p> <p>0.48 HR15N 0.94 HR15N 0.95 HR15N</p> <p>0.61 HR15TW 0.47 HR15TW 0.57 HR15TW</p>	Indirect verification method per ASTM E18

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Indirect Verification of Rockwell Hardness Testers <sup>3</sup> – (cont)	HR30N: Low Medium High  HR30TW: Low Medium High  HR45N: Low Medium High  HR45TW: Low Medium High	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  1.1 HR45TW 0.73 HR45TW 0.59 HR45TW	Indirect verification method per ASTM E18
Torque Tools <sup>3</sup>	450 ft·lbf	1.6 % IV	Torque tester
Torque Testers	5500 in·lbf	0.33 % IV	Standard weights
Force Gauges	Up to 250 lbf	0.1 % IV	By comparison with standard weights



Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments
Direct Verification of Durometers (Shore Types A, B, C, D, DO, M, O, and OO) –			ASTM D2240
Indenter Shape and Extension:			
Diameter	Up to 1 in	200 $\mu$ in	Optical comparator
Radius	Up to 0.5 in	200 $\mu$ in	
Angle	Up to 45°	0.8 min arc	
Extension	Up to 0.1 in	200 $\mu$ in	
Indenter Display	Up to 100 Duro	200 $\mu$ in	Gage blocks
Spring Calibration – Force		1.5 % IV	Durocalibrator

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

<sup>5</sup> 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.



<sup>6</sup> 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.

<sup>7</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.





## *Accredited Laboratory*

A2LA has accredited

### **FRANK COX METROLOGY**

*Brampton, ON L6T 3T6, CANADA*

for technical competence in the field of

## Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *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 April 2017)*.



Presented this 21<sup>st</sup> day of January 2019

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

Senior Director, Accreditation Services  
For the Accreditation Council  
Certificate Number 1165.01  
Valid to January 31, 2021

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