



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid To: December 31, 2018

Certificate Number: 4872.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Plain Ring Gage – Internal Diameter	(1 to 125) mm	0.92 µm	Method: Direct comparison. Master reference(s): ULM and ring gages
Pin, Plug and Wire Gage – External Diameter	(1 to 20) mm	1.0 µm	Method: Direct comparison. Master reference(s): ULM
Pitch Diameter (External) – Straight Thread, Taper Threads	(1 to 100) mm	1.4 µm	Method: Direct comparison. Master reference(s): ULM
Pitch Diameter (Internal) – Straight Thread, Taper Threads	(2.6 to 100) mm	2.0 µm	Method: Direct comparison. Master reference(s): ULM and ring gages

Parameter/Equipment	Range	CMC ² (±)	Comments
Fork	(1 to 100) mm	0.90 μm	Method: Direct comparison. Master reference(s): ULM and ring gages
Thickness Gage	Up to 2 mm	0.50 μm	Method: Direct comparison. Master reference(s): ULM
Adjustment Pattern Bar	(25 to 600) mm	$(0.33 + 0.002L)$ μm, <i>L</i> in mm	Method: Direct comparison. Master reference(s): ULM and gage blocks
3 Contact Interior Micrometer ³	(2 to 100) mm (Resolution of 0.001 mm)	$(1.2 + 0.01L)$ μm, <i>L</i> in mm	Method: Direct comparison. Master reference(s): Ring gages
Outside Micrometer ³	Up to 600 mm (Resolution of 0.001 mm)	$(1.4 + 0.005L)$ μm, <i>L</i> in mm	Method: Direct comparison. Master reference(s): Gage blocks
Interior Meter with Indicator ³	(12 to 101.6) mm (Resolution of 0.001 mm)	$(2 + 0.012L)$ μm, <i>L</i> in mm	Method: Direct comparison. Master reference(s): Ring gages



Parameter/Equipment	Range	CMC ² (±)	Comments
Depth Micrometer ³	(0 to 304.8) mm (Resolution of 0.001 mm)	(2.7 + 0.05L) μm, L in mm	Method: Direct comparison. Master reference(s): Gage blocks and surface plate
2 Contact Interior Micrometer	(12 to 500) mm (Resolution of 0.001 mm)	(1.0 + 0.01L) μm, L in mm	Method: Direct comparison. Master reference(s): ULM and gage blocks
Lever Indicator	(0 to 1.6) mm (Resolution of 0.001 mm)	(1.0 + 0.03L) μm, L in mm	Method: Direct comparison. Master reference(s): i-checker
Straight Stem Indicator	(0 to 101.6) mm (Resolution of 0.001 mm)	(3.1 + 0.001L) μm, L in mm	Method: Direct comparison. Master reference(s): i-checker
Caliper ³	(0 to 1016) mm (Resolution of 0.01 mm)	(14 + 0.006L) μm, L in mm	Method: Direct comparison. Master reference(s): Gage blocks, master check, and rings
Height Meter ³	(0 to 600) mm (Resolution of 0.001 mm and 0.01 mm)	(1.7 + 0.005L) μm, L in mm (9.3 + 0.005L) μm, L in mm	Method: Direct comparison. Master reference(s): Check master and gage blocks



Parameter	Range	CMC ² (±)		Comments
		<i>lc</i>	<i>v</i>	
Long Pattern Blocks ⁵ –	(100 to 150) mm (150 to 200) mm (200 to 250) mm (250 to 300) mm (300 to 400) mm (400 to 508) mm	<i>lc</i> 0.33 μm 0.40 μm 0.47 μm 0.51 μm 0.63 μm 0.75 μm	<i>v</i> 0.11 μm 0.11 μm 0.13 μm 0.15 μm 0.20 μm 0.24 μm	Method: Direct comparison. Master reference(s): ULM and gage blocks <i>lc</i> = uncertainty of central length <i>v</i> = uncertainty of variation length
Short Pattern Blocks ⁶ –				
Steel	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	Steel <i>lc</i> 0.042 μm 0.049 μm 0.068 μm 0.091 μm 0.12 μm	Steel <i>v</i> 0.014 μm 0.015 μm 0.020 μm 0.026 μm 0.033 μm	Method: Direct comparison. Master Reference(s): Gage block comparator and gage blocks. <i>lc</i> = uncertainty of central deviation <i>v</i> = uncertainty of variation length
Ceramic	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	Ceramic <i>lc</i> 0.045 μm 0.051 μm 0.069 μm 0.092 μm 0.12 μm	Ceramic <i>v</i> 0.018 μm 0.020 μm 0.024 μm 0.029 μm 0.035 μm	
Carbide	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	Carbide <i>lc</i> 0.043 μm 0.048 μm 0.062 μm 0.10 μm 0.13 μm	Carbide <i>v</i> 0.017 μm 0.018 μm 0.023 μm 0.028 μm 0.035 μm	



Parameter	Range	CMC ^{2,4} (\pm)	Comments
Optical Comparators ³ – Length Amplification Angle	X = 250 mm Y = 250 mm (Resolution of 0.001 mm) 5X, 10X, 20X (0 to 360) °	(2.3 + 0.01L) μ m, L in mm 0.018 % 2.3"	Method: Direct comparison. Master reference(s): Glass scale
Surface Plate Flatness ^{3,8}	3658 mm x 1828 mm	(2.0 + 0.003L) μ m, L in mm	Method: Indirect comparison (trigonometric). Master reference(s): Wyler system

II. Mechanical

Parameter/Equipment ⁷	Range	CMC ² (\pm)	Comments
Vacuum Gauges ³ ≥ 0.5 % F.S.	(-70.38 to -6.46) kPa	0.15 kPa	Method: Direct comparison Master reference: Pressure gage
Pressure Gauges ³ ≥ 0.2 % F.S. ≥ 0.05 % F.S. ≥ 0.1 % F.S.	(> 9.18 to 684.77) kPa (> 684.77 to 13 699.85) kPa (> 13 699.85 to 69 760.81) kPa	0.33 kPa 1.4 kPa 16 kPa	Method: Direct comparison Master reference: Pressure gage
Torque ³	(0.6 to 3) N·m (> 3 to 6) N·m (> 6 to 10) N·m (> 10 to 30) N·m (> 30 to 100) N·m (> 100 to 300) N·m (> 300 to 700) N·m	0.014 N·m 0.039 N·m 0.035 N·m 0.18 N·m 0.95 N·m 0.75 N·m 0.71 N·m	Method: Direct comparison Master reference: Torque transducer

III. Thermodynamics³

Parameter/Equipment	Range	CMC ² (±)	Comments
Thermometer – Liquid in Glass	(30 to 180) °C (> 180 to 350) °C	0.42 °C 0.52 °C	Method: Direct comparison Master reference: Thermometer RTD PT100
Temperature – Measuring Equipment	(30 to 180) °C (> 180 to 350) °C	0.092 °C 0.12 °C	Method: Direct comparison Master reference: Thermometer RTD PT100

¹ This laboratory offers commercial calibration and field calibration services, where noted.

² Calibration and Measurement 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, percentages are percentage of reading unless otherwise indicated.

⁵ Calibration of gage block grade 1 and 2 according NMX-CH-3650 and AS1 and AS2 according the standard ASMEB89.1.9-2002.

⁶ Calibration of gage block grade 0, 1 and 2 according NMX-CH-3650 and AS1 and AS2 according the standard ASMEB89.1.9-2002.

⁷ In the statement of parameter, F.S. means Full Scope.

⁸ Calibration of Surface Plate Flatness grade 0, 1, 2 and 3 according the standard NMX-CH-8512-2-IMNC-2005.





Accredited Laboratory

A2LA has accredited

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Querétaro, MEXICO

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 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 29th day of January 2018.

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

President and CEO
For the Accreditation Council
Certificate Number 4872.01
Valid to December 31, 2018

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