



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: May 31, 2021

Certificate Number: 3047.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,9}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Coordinate Measuring Machines (CMM) Verification ³ –			
E _L - Length Measurement Error	Up to 2000 mm Up to 12 000 mm	(0.50 + 0.85L) μm (0.25 + 0.60L) μm	ASME B89.4.10360-2, ISO 10360-2 step gage, gage blocks, laser interferometer, master sphere
Rotary Table (4 th axis) – Four-axis Errors (FR, FT, FA)	Distance between Sphere: Up to 500 mm and CMM Resolution >= 0.1 μm	1 μm	ISO 10360-3
Scanning Probing Errors (Tij)	Spheres with Nominal Diameter: 25 mm	0.12 μm	ISO 10360-4 master sphere
Surface Finish Measuring Machines (Profilometers) ³	Ra: (0.3 to 3.2) μm Rz: (1.5 to 10) μm Pt: (0.36 to 2.6) μm Rsm: (15 to 100) μm	0.048 μm 0.080 μm 0.080 μm 0.080 μm	ISO 12179 surface finish standards, optical flat

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Surface Geometry Analyzers (Contours Instruments) ³	Angle: 90° X = Up to 1 mm X = (1 to 10) mm X = (10 to 200) mm Z = (1 to 50) mm Radius: (2.5 to 80) mm	1.5' 1.3 μm 1.6 μm (1.7 + 4.5L) μm (0.12 + 5.0L) μm (1.7 + 4.5L) μm	ISO 12179, gage blocks, master spheres, contour standards
Roughness Standards	Ra: Up to 3.2 μm Rz: Up to 10 μm Pt: Up to 2 μm Rsm: Up to 100 μm	0.020 μm 0.022 μm 0.033 μm 0.075 μm	ISO 5436-1, ISO 12179; Taylor Hobson Form Talysurf PGI, NOVUS surface finish measuring machines
Gage Blocks – Steel: Deviation of Central Length Variation in Length Ceramic: Deviation of Central Length Variation in Length	 (0.50 to 10) mm (>10 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (0.50 to 10) mm (>10 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (0.50 to 10) mm (>10 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm (0.50 to 10) mm (>10 to 25) mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm	 0.024 μm 0.030 μm 0.044 μm 0.062 μm 0.081 μm 0.022 μm 0.023 μm 0.025 μm 0.028 μm 0.031 μm 0.024 μm 0.031 μm 0.048 μm 0.067 μm 0.087 μm 0.022 μm 0.023 μm 0.024 μm 0.026 μm 0.029 μm	NMX-CH-3650-IMNC ASME B89.1.9 Gage blocks-ISO; Grade K, electromechanical comparator
Micrometer	Up to 1000 mm	(0.85 + 16L) μm	JIS 7502:2016, gage blocks

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Calipers	Up to 1000 mm	$(1.0 + 21L) \mu\text{m}$	ISO 13385-1, ISO 13385-2, gage blocks, ring gage
Articulated Arm Coordinate Measuring Machines (AACMM) ³ –			ASME B89.4.22
Volumetric Performance	Radius: Up to 1500 mm	$(4.5 + 7.0L) \mu\text{m}$	Length standards, step gages
Effective Diameter Performance	Sphere Diameter: 30 mm (nominal)	2.0 μm	Master sphere
Roundness Measuring Machines ³			ISO 4291
Sensitivity	(0.4 to 10) μm (160 to 500) μm	65 nm + 46 nm/ μm 0.090 μm	Optical flat, gage blocks
Radial Error	(6 to 25) mm	0.050 μm	Roundness standard
Axial Error	(15 to 70) mm	0.040 μm	Optical flat
Optical Comparators ³ – Vision Systems & Measuring Microscopes			JIS B 7184
X and Y Axis – Error of Indication	Up to 300 mm (300 to 500) mm	$(1.1 + 3.5L) \mu\text{m}$ $(3.0 + 4.5L) \mu\text{m}$	Glass scales
Z Axis – Error of Indication	Up to 300 mm	$(2.4 + 3.2L) \mu\text{m}$	Gage blocks
Angle ⁶	Up to 180°	1.3'	Angular reticule
Universal Length Machine (ULMs, UMMs) ³	Up to 1000 mm Up to 2000 mm	$(0.25 + 2.0L) \mu\text{m}$ $(0.25 + 1.6L) \mu\text{m}$	Gage blocks Laser interferometer

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Contour Standards – X, Z Length Radius	Up to 160 mm Up to 80 mm	(3.0 + 15L) μm (3.0 + 15L) μm	VDI/VDE 2629 Taylor Hobson Talysurf PGI 200
Roundness Standards – Radius	Up to 150 mm	46 nm	ISO 4291 Roundness/cylindrical profile measuring instrument
Length Standards (Bars, Rods, Micrometers Setting Standards, and Fixtures Used as Length Standards)	(10 to 550) mm Up to 1500 mm	(0.81 + 1.0L) μm (1.7 + 7.0L) μm	Universal Length Machine (ULM) CMM used as comparator (substitution method), step gages
Surface Plates – Flatness Only	(160 x 100) mm to (4000 x 1600) mm	(1.7 + 1.6L) μm	NMX-CH-8512- 2:IMNC; grades 0, 1, 2 and 3 level, photoelectric autocollimator, differential levels
Height Gages	Up to 1000 mm	(0.7 + 3.8L) μm	ISO 13225:2012 gage blocks
Length Indicators (Dial, Test/Lever, Linear Amplifiers)			Mitutoyo I-Checker
0.001 μm to 0.2 mm	0.1 μm to 0.2 mm	0.35 μm	ISO 9493
	(0.2 to 101.6) mm (Res.= 0.001 mm)	(1.1 + 2.0L) μm	ISO 463, ISO 13102
	0.1 μm to 1.6 mm (Res.= 0.01 mm)	2.6 μm	ISO 9493

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Cylindrical Gages – Plain (Rings)			ANSI/ASME B89.1.6
Internal Diameter	(3 to 150) mm Class "Z, ZZ"	1.4 µm	Universal length machine (ULM)
Roundness	Diameter: Up to 400 mm Height: Up to 500 mm	0.15 µm	Roundness machine
Cylindrical Gages – Plain External Diameters (Plug Gages, Disks, Pin Thread Wires)	(0.1 to 100) mm	(0.48 + 5.2L) µm	Universal length machine (ULM)
Spheres –			ISO 3290-1, ISO 3290-2
Diameter	(1.5 to 100) mm	(0.41 + 5.0L) µm	Class G 10 to G 200, universal length machine (ULM)
Roundness	Diameter: Up to 400 mm, Height: Up to 500 mm	0.15 µm	Roundness machine
Feeler/Thickness Gauges	(0.01 to 3) mm	1.7 µm	JIS B 7524; universal length machine (ULM)

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Wire Cloth and Sieves	0.075 mm to 40 mm	(2 + 220L) μm	ISO 3310-1, ISO 3310-2; vision system
Cylindrical Gages – Thread Plugs			Universal length machine (ULM), thread wires; metric and unified 60° threads
Simple Pitch Diameter	(0.35 to 8) mm (4 to 64) tpi (3 to 40) tpi (2 to 16) tpi	(2.5 + 3.0L) μm	Whitworth 55°, ACME 29°
Major Diameter	Up to 100 mm	(2.5 + 3.0L) μm	Universal length machine (ULM)
Cylindrical Gages – Thread Rings			Universal length machine (ULM), spherical probe
Simple Pitch Diameter	(0.6 to 3) mm (10 to 40) tpi (10 to 16) tpi	2.2 μm	Metric and unified 60° threads
Major Diameter	(3 to 100) mm	2.2 μm	Whitworth 55°, ACME 29°
Radius Gages	0.5 μm to 25.4 mm	1.6 μm	JIS B 7541; vision system

II. Dimensional Testing/Calibration¹

Parameter/Equipment	Range	CMC ^{2,5} (\pm)	Comments	
Length – 1D, 2D, 3D Measurements (Size, Position and Geometric/Form) ⁴	Up to 2860 mm In a cube of: X = Up to 2400 mm, Y = Up to 1200 mm, Z = Up to 1000 mm	(2.5 + 6.0L) μ m	CMM, hand tools; part drawings, customer requirements	
	Up to 3700 mm	91 μ m	Articulating arm, CMM part drawings, customer requirements	
Profile and Surface Texture ⁴ –	Profile Surface Texture Up to a 30 mm Scan	Z: Up to 50 mm, X: Up to 200 mm	Profile and surface texture machine; part drawings, customer requirements	
		Z: Amplitude/Average parameters (R, W, P _a , P _q)		2.0 μ m
		Z: Point/Spacing parameters (R _{Sm} , W _{Sm} , P _{Sm} , HSC, P _c)		50 nm
		Hybrid parameters		150 nm
Geometry/Form (Roundness, Cylindricity Straightness, Flatness & Parallelism) ⁴	Probe Arm Range: Diameter = Up to 400 mm, Height Z = Up to 500 mm	140 nm	0.15 μ m	Roundness machine, CMM; part drawings and customer requirements

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Non-Contact Measurements Angle Length Radius	Angle 0° a 360° Up to 640 mm Up to 300 mm	3.5' arc (1.5 + 3.0L) μm (1.6 + 3.0L) μm	Vision system
Geodesical/Survey Instruments Optical Level Theodolite	Magnification up to 50x 0° to 360°	0.71 mm 2.3' arc	Functional tests ISO 17123-2 ISO 17123-3

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
DC Voltage – Generate	(33 to 100) mV c.c. (>0.1 to 1) V c.c. (>1 to 10) V c.c. (>10 to 100) V c.c. (>100 to 1000) V c.c.	0.000 003 6 V 0.000 017 V 0.000 19 V 0.0026 V 0.024 V	Fluke 5522A
DC Voltage – Measure	(10 to 100) mV c. c. (>0.1 to 1) V c. c. (>1 to 10) V c. c. (>10 to 100) V c.c. (>100 to 1000) V c.c.	0.000 004 7 V 0.000 014 V 0.000 11 V 0.0013 V 0.018 V	Transmille 8081 DMM
DC Current – Generate	(3.3 to 10) μA c.c. (>10 to 100) μA c.c. (>0.1 to 1) mA c.c. (>1 to 10) mA c.c. (>10 to 100) mA c.c. (>0.1 to 1) A c.c. (>1 to 10) A c.c.	0.000 000 025 A 0.000 000 041 A 0.000 000 18 A 0.000 001 5 A 0.000 015 A 0.000 32 A 0.0071 A	Fluke 5522A

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Resistance – Generate	(1 to 10) Ω (>10 to 100) Ω (>100 to 1000) Ω (>1 to 10) kΩ (>10 to 100) kΩ (>0.1 to 1) MΩ (>1 to 10) MΩ	0.012 Ω 0.021 Ω 0.058 Ω 0.71 Ω 5.0 Ω 78 Ω 1800 Ω	Fluke 5522A

Parameter/Range	Frequency	CMC ^{2,7} (±)	Comments
AC Voltage – Generate (3.3 to 100) mV (>0.1 to 1) V (>1 to 10) V (>10 to 100) V (>100 to 1000) V	45 Hz to 1 kHz	0.000 035 V 0.000 32 V 0.0032 V 0.034 V 0.43 V	Fluke 5522A
AC Voltage – Measure (10 to 100) mV (0.1 to 1) V (>1 to 10) V (>10 to 100) V (>100 to 750) V	10 Hz to 20 kHz	0.000 053 V 0.000 42 V 0.0042 V 0.042 V 0.33 V	Transmille 8081 DMM
AC Current – Generate (33 to 10) mA (>10 to 100) mA (>0.1 to 1) A (>1 to 10) A	(45 to 100) Hz	0.000 016 A 0.000 21 A 0.0019 A 0.018 A	Fluke 5522A
AC Current – Measure (0.1 to 1) A c.a. (1 to 3) A c.a. (3 to 10) A c.a.	10 Hz to 5 kHz 10 Hz to 5 kHz 40 Hz to 1 kHz	0.000 58 A 0.0039 A 0.087 A	Transmille 8081 DMM

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
DC Current – Measure	(1 to 10) mA c. c. (>10 to 100) mA c. c. (>0.1 to 1) A c. c. (>1 to 3) A c. c. (>3 to 10) A c. c.	0.000 006 5 A 0.000 013 A 0.000 62 A 0.0022 A 0.070 A	Transmille 8081 DMM
Resistance – Measure	(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	0.0068 Ω 0.0082 Ω 0.000 062 kΩ 0.000 62 kΩ 0.0062 kΩ 0.000 062 MΩ 0.000 82 MΩ 0.10 MΩ	Transmille 8081 DMM
Electrical Simulation of Thermocouple Indicators – Type B Type C Type E Type J Type K Type N Type R Type S Type T	(600 to 1820) °C (0 to 2316) °C (-250 to 1000) °C (-210 to 1200) °C (-200 to 1372) °C (-200 to 1300) °C (0 to 1767) °C (0 to 1767) °C (-250 to 400) °C	0.18 °C 0.16 °C 0.094 °C 0.094 °C 0.10 °C 0.11 °C 0.20 °C 0.21 °C 0.094 °C	Fluke 5522A

IV. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Force Measuring Devices ³ – Tension and Compression	(0.2 to 25) N (>25 to 500) N (>500 to 1600) N (>200 to 1600) N (1 to 10) kN (>10 to 100) kN (33 to 334) kN (89 to 890) kN	0.032 % of rdg 0.0039 % of rdg 0.0026 % of rdg 0.0057 % of rdg 0.0024 % of rdg 0.0028 % of rdg 0.043 % of rdg 0.050 % of rdg	ISO 376; dead weight calibrations using mass standards Load cells and digital indicators
Force Measuring Machines – Tension and Compression Compression Only	(0.2 to 25) N (>25 to 500) N (>500 to 1600) N (>200 to 1600) N (1 to 10) kN (>10 to 100) kN (33 to 334) kN (89 to 890) kN (222 to 2224) kN	0.032 % of rdg 0.0039 % of rdg 0.0026 % of rdg 0.0057 % of rdg 0.0024 % of rdg 0.0028 % of rdg 0.043 % of rdg 0.050 % of rdg 0.057% of rdg	ISO 7500-1 Dead weight calibrations with mass standards Load cells and digital indicators Load cells and digital indicators
Torque Instruments – Wrenches, Drivers and Indicators	(0.2 to 2) N·m (1 to 10) N·m (2.5 to 25) N·m (15 to 150) N·m (40 to 400) N·m (150 to 1500) N·m	0.13 % of rdg 0.12 % of rdg 0.13 % of rdg 0.27 % of rdg 0.27 % of rdg 0.32 % of rdg	ISO 6789 load cells-torque, mass as dead weights
Load Cells – Torque	(50 to 150) N·m (150 to 500) N·m (500 to 2400) N·m	0.17 % of rdg 0.10 % of rdg 0.051 % of rdg	Mass as dead weights, loading arm

V. Thermodynamic

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Temperature – Measuring Equipment	(-45 to 140) °C (50 to 700) °C	0.10 °C 0.25 °C	RTD, Fluke 9170, Fluke 9173,
	0.01°C Fixed point	0.05°C	PRT reference
Infrared Thermometers	(35 to 500) °C	0.35 °C	Fluke 4181 black body

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
Frequency – Generate (1 to 5) Vp-p	(10 to 120) Hz (120 to 1000) Hz (1 to 10) kHz	0.29 Hz 3.5 Hz 0.029 kHz	Fluke 5522A

VII. Mechanical Testing

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following test on materials (metals, plastic, etc).

Test Description

Tension and Compression Forces
Tensiles, Yield Strength, Elongation

Test Method

ASTM E8, ASTM E9, customer specific requirements.
ASTM E8, customer specific requirements.

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 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.
- ⁵ In the statement of CMC, *L* is the numerical value of the nominal length of the device measured in meters.
- ⁶ Applicable to optical comparators.
- ⁷ 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. CMC's 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.
- ⁸ 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.
- ⁹ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

MESS SERVICIOS METROLOGICOS S. DE R.L. DE C.V.

Queretaro, MEXICO

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 14th day of August 2019.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3047.01
Valid to May 31, 2021

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