



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

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CALIBRATION

Valid To: February 29, 2012

Certificate Number: 0750.01

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 ²	CMC ^{3,4} (±)	Comments
Gage Blocks –			
Length	(0 to 4) in (0 to 100) mm (5 to 20) in (100 to 500) mm	(1.3 + 0.8L) μin (0.033 + 0.0008L) μm (1 + 1L) μin (0.025 + 0.001L) μm	Electromechanical comparison to master gage blocks
Central Length Difference	(0 to 2) in (0 to 50) mm (2 to 4) in (50 to 100) mm	0.60 μin 0.015 μm 0.80 μin 0.020 μm	Electromechanical comparison between gage block pairs
Length Standards/ Micrometer Standards			
Flat End	(0 to 40) in (0 to 1000) mm	(4 + 4L) μin (0.1 + 0.004L) μm	Comparison to master gage blocks
Spherical End	(0 to 40) in (0 to 1000) mm	(30 + 5L) μin (0.76 + 0.13 L) μm	

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Length (of Dimensional Gages)	(0 to 40) in (0 to 1000) mm	(10 + 0.7L) μin (0.25 + 0.0007L) μm	Legex CMM
Height Masters	(0 to 40) in (0 to 1000) mm	(3 + 2L) μin (0.076 + 0.002L) μm	Comparison to master gage blocks
Check Masters/ Step Gages -			Legex CMM
Commercial Grade	(0 to 40) in (0 to 1000) mm	(20 + 1.2L) μin (0.5 + 0.0012L) μm	
Master Grade	(0 to 40) in (0 to 1000) mm	(10 + 0.7L) μin (0.25 + 0.0007L) μm	
Diameter of Sphere	(0 to 3) in (0 to 76) mm	15 μin 0.38 μm	High accuracy ULM
Cylindrical Plug Gage	(0 to 4) in diameter (0 to 102) mm diameter	(12 + 3D) μin (0.3 + 0.003D) μm	High accuracy ULM
Pin Gages	(0 to 4) in diameter (0 to 102) mm diameter	(15 + 3D) μin (0.38 + 0.003D) μm	High accuracy ULM
Ring Gages	(0 to 12) in (0 to 305) mm	(20 + 3.5L) μin (0.51 + 0.0035L) μm	Master ring gages
Thread Measuring Wires	(0 to 140) TPI	16 μin	High accuracy ULM
Pitch Micrometer Standard	(1 to 6) in (25 to 150) mm	(50 + 8L) μin (1.3 + 0.008L) μm	High accuracy ULM
Screw Thread Anvils	60° and 55°	2.2 min	Optical comparator

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Calipers	(0 to 12) in (0 to 300) mm	(100 + 2L) μin (0.05 + 0.006L) μm	Comparison to master gage blocks
	(12 to 60) in (300 to 1500) mm	(120 + 4L) μin (3 + 0.004L) μm	
Height Gages	(0 to 40) in (0 to 1000) mm	(4 + 6L) μin (0.1 + 0.006L) μm	Comparison to Height master step gage
Micrometers –			Comparison to master gage blocks
Outside	(0 to 1) in (0 to 25) mm	8 μin 0.2 μm	
	(1 to 40) in (25 to 1000) mm	(2 + 6L) μin (0.05 + 0.006L) μm	
Inside	(0 to 40) in (0 to 1000) mm	(12 + 6L) μin (0.3 + 0.006L) μm	
Depth	(0 to 12) in (0 to 300) mm	(10 + 6L) μin (0.25 + 0.006L) μm	
Indicating and Snap	(0 to 1) in (0 to 25) mm	8 μin 0.2 μm	
	(1 to 4) in (25 to 100) mm	(2 + 6L) μin (0.05 + 0.006L) μm	
V-Anvil Micrometers	(0 to 2) in (0 to 50) mm	(24 + 4L) μin (0.6 + 0.004L) μm	Comparison to master pin gages
Micrometer Heads	(0 to 2) in (0 to 51) mm	28 μin 0.7 μm	High accuracy ULM
Dial and Test Indicators	(0 to 0.2) inch (0 to 5) mm	25 μin 0.6 μm	Dial calibration tester
	(0 to 2) inch (0 to 50) mm	110 μin 1.5 μm	

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Digimatic Indicators	(0 to 2) in (0 to 50) mm	$(6 + 4L) \mu\text{in}$ $(0.15 + 0.004L) \mu\text{m}$	Comparison to master gage blocks
Dial Indicator Tester	(0 to 2) in (0 to 50) mm	20 μin 0.05 μm	Comparison to master gage blocks
Mu-Checker/Amplifier	(0 to 0.05) in (0 to 1.5) mm	4 μin 0.1 μm	Comparison to master gage blocks
Linear Gage with Counter	(0 to 2.00) in (0 to 50) mm	$(6 + 4L) \mu\text{in}$ $(0.15 + 0.004L) \mu\text{m}$	Comparison to gage blocks
Inside Diameter Measuring Instruments (Boremetrics, Holtest, and Bore Gages)	(0 to 12) in (0 to 300) mm	$(20 + 6D) \mu\text{in}$ $(0.5 + 0.006D) \mu\text{m}$	Ring gages
Laser Scan Micrometer	(0 to 2.5) in diameter (0 to 63.5) mm diameter	35 μin 0.89 μm	Comparison to master pin gages
Surface Finish Measuring Instrument	(0 to 400) μin (0 to 10) μm	2.1 μin 0.053 μm	Comparison to master surface specimen
Radius Gages	(0.01 to 1) in (0.25 to 25.4) mm	0.0005 in 0.012 mm	Optical comparator
Angle Gages	(5 to 180) degrees	1.9 arc minutes	Optical comparator
Thickness Gages (Feeler Type)	(0.001 to 0.050) in (0.025 to 1.27) mm	45 μin 1.1 μm	High accuracy ULM
Wire Gages	Size: (0 to 36)	500 μin	Optical comparator
Tap & Drill Gage	(0 to 0.500) in (0 to 12.70) mm	360 μin 9 μm	Optical comparator
Screw Pitch Gages (Leaf Type)	Any Pitch (in or mm)	400 μin 10 μm	Optical comparator

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Precision Levels	(0 to 12) in (0 to 305) mm	100 μin 2.5 μm	Sine bar and gage blocks
Digital Protractors	(0 to 90) degrees	0.06 degrees	Sine bar and gage blocks
Thickness Measuring Gages (Digital)	(0 to 2) in (0 to 51) mm	300 μin 7.6 μm	Comparison to gage blocks
Thickness Measuring Gages (Dial)	(0 to 2) in (0 to 51) mm	300 μin 7.6 μm	Comparison to gage blocks
Coating Thickness Gage(Digi-Derm and Lamina Checker)	(0 to 0.060) in thick (0 to 1.5) mm thick	48 μin 1.2 μm	Comparison to master films
Ultrasonic Thickness Gage (Mu Gage)	(0 to 20) in (0 to 600) mm	(480 + 25L) μin (12 + 0.025) μm	Comparison to gage blocks
Films (Plastic)	(0 to 0.250) in (0 to 6) mm	20 μin 0.50 μm	High accuracy ULM
Sine Bars	5 in 10 in 127 mm 254 mm	30 μin 48 μin 0.76 μm 1.2 μm	High accuracy ULM and gage blocks
V-Blocks	(0 to 4) in (0 to 102) mm	64 μin 1.6 μm	Mu checker with lever head probe
Riser Blocks	(0 to 24) in height (0 to 600) mm height	(3 + 2H) μin (0.08 + 0.002H) μm	Comparison to master gage blocks
Parallel Bars	(0 to 3) in width & height (0 to 76) mm width & height	30 μin 0.76 μm	Comparison to master gage blocks

Parameter/Equipment	Range ²	CMC ^{3,4} (\pm)	Comments
Adjustable Parallels	(0 to 3.00) in height (0 to 75) mm height	40 μ in 1 μ m	Comparison to gage blocks
Precision Vise	(0 to 6.00) in clamping (0 to 150) mm clamping	72 μ in 1.8 μ m	Comparison to gage blocks and straightedge
Line Scales	(0 to 16) in long (0 to 410) mm	(50 + 5L) μ in (1.3 + 0.005L) μ m	High accuracy quick vision machine
	(0 to 16) in long (0 to 410) mm	24 μ in 0.6 μ m	Comparison method on high accuracy quick vision machine
Pixel Calibration Charts	(0 to 0.16) in (0 to 4) mm	50 μ in 1.3 μ m	Comparison method on high accuracy quick vision machine
Squares	(0 to 24) in (0 to 610) mm	6 μ in/in 0.006 μ m/mm	Comparison to master square
	(0 to 40) in (0 to 1000) mm	(3 + 0.7L) μ in (0.076 + 0.0007L) μ m	Legex CMM using reversal technique
Roundness	Normal Method: (0 to 16) in diameter (0 to 400) mm diameter	(0.8 + 0.6H) μ in (0.02 + 6H/10 000) μ m	High accuracy roundness machine
	Reversal Method: (0 to 2) in diameter (0 to 50) mm diameter	0.2 μ in 0.005 μ m	
Circular Flatness (Optical flat)	Normal Method: (0 to 16) in diameter (0 to 400) mm diameter	(0.9 + 0.3D) μ in (0.023 + 3D/10 000) μ m	High accuracy roundness tester
Flatness	(0 to 12) in diameter (0 to 300) mm diameter	2 μ in 0.05 μ m	Comparison to master optical flat under monochromatic light source

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Straightness (Straight Edge)	Normal Method: (0 to 13.8) in long (0 to 350) mm long	12 μin 0.3 μm	High accuracy roundness tester
	Reversal Method: (0 to 13.8) in long (0 to 350) mm long	1 μin 0.025 μm	
Parallelism (On Cylindrical Squares)	Reversal Method: (0 to 13.8) in height (0 to 350) mm height	0.25 μin/in 0.25 μm/m	High accuracy roundness tester
Pitch Standard (Formtracer & Contracer)	(0 to 8) in long (0 to 200) mm long	(36 + 3.5L) μin (0.9 + 3.5L) μm	High accuracy form-tracer machine
Surface Finish Specimen	Ra (0 to 200) μin	2 μin	Surface finish tester
	Ra (0 to 5.1) μm	0.051 μm	
	Ra (200 to 500) μin	3 μin	
	Ra (5.1 to 12.7) μm	0.076 μm	
Step Height Specimen	(0 to 0.120) in height (0 to 3) mm height	3 μin 0.075 μm	High accuracy form-tracer machine
Surface Finish Spherical Surface	Ra (0 to 400) μin Ra (0 to 10) μm	3 μin 0.075 μm	High accuracy form-tracer machine
Thickness and Parallelism (Optical Parallels)	Thickness (0 to 2) in diameter and 1 in thickness (0 to 50) mm diameter and 25 mm thickness	5 μin	Comparison to master gage blocks
		0.130 μm	
	Parallelism (0 to 2) in diameter and 1 in thickness (0 to 50) mm diameter and 25 mm thickness	3 μin	
		0.075 μm	

Parameter/Equipment	Range ²	CMC ^{3,4} (±)	Comments
Angle Gage Blocks	Up to 90°	1 arc second	High accuracy CMM
Overlay Charts – Radius/Diameter Angle Grid/Length	(0 to 16) in diameter (0 to 400) mm diameter (0 to 360)° (0 to 16) in (0 to 400) mm	(85 + 8D) μin (2.2 + 0.008D) μm 25 arc seconds (85 + 8L) μin (2.2 + 0.008D) μm	High accuracy vision machine
Reticles – Radius/Diameter Angle Grid/Length	(0 to 1) in diameter (0 to 25) mm diameter (0 to 360)° (0 to 1) in (0 to 25) mm	60 μin 1.5 μm 15 arc seconds 60 μin 1.5 μm	High accuracy vision machine

II. Mechanical

Parameter/Equipment	Range ²	CMC ³ (±)	Comments
Hardness Tester (Leeb Scale)	(500 to 900) HLD	18 HLD	ASTM A956-06
Hardness Test Blocks (Leeb Scale)	(500 to 900) HLD	20 HLD	ASTM A956-06

III. Thermodynamic

Parameter/Equipment	Range	CMC ³ (±)	Comments
Temperature ⁵	0 °C to 30 °C	0.14 °C	By comparison

¹ This laboratory offers commercial calibration services.

² Metric equivalencies for these ranges and associated Calibration and Measurement Capability are also available.

³ Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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.

⁴ In the statement of Calibration and Measurement Capability, L is the length in inches/millimeters; D is the diameter in inches/millimeters; H is the height in inches/millimeters and R is the resolution in $\mu\text{in}/\mu\text{m}$.

⁵ For internal laboratory calibration only. Not available as a commercial calibration service.



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

MITUTOYO AMERICA CORP. - CALIBRATION LABORATORY

Elk Grove Village, IL

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 any additional program requirements in the field of calibration. 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 24th day of March 2010.





President & CEO

For the Accreditation Council
Certificate Number 750.01
Valid to February 29, 2012

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