



THE AMERICAN ASSOCIATION FOR
LABORATORY 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 18 June 2005*).

Presented this 6th day of March 2008.

A handwritten signature in cursive script, reading "Peter Abney".

President
For the Accreditation Council
Certificate Number 750.01
Valid to March 31, 2010
Revised: February 17, 2010



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

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

MITUTOYO AMERICA CORP. – CALIBRATION LABORATORY
 2025 Tonne Rd.
 Elk Grove Village, IL 60007
 Amosh Kumar Phone: 847 593 7750

CALIBRATION

Valid To: March 31, 2010

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	Best Uncertainties ^{3,4} (±)	Comments
Gage Blocks	(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
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 + 0.127 L) μm	
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

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (\pm)	Comments
Check Masters/ Step Gages - Commercial Grade Master Grade	(0 to 40) in (0 to 1000) mm (0 to 40) in (0 to 1000) mm	 (20 + 1.2L) μ in (0.5 + 0.0012L) μ m (10 + 0.7L) μ in (0.25 + 0.0007L) μ m	Legex CMM
Diameter of Sphere	(0 to 3) in (0 to 76) mm	15 μ in 0.38 μ m	High accuracy ULM
Cylindrical Plug Gage	(0 to 4) in diameter (0 to 102) mm diameter	(12 + 3D) μ in (0.3 + 0.003D) μ m	High accuracy ULM
Pin Gages	(0 to 4) in diameter (0 to 102) mm diameter	(15 + 3D) μ in (0.38 + 0.003D) μ m	High accuracy ULM
Ring Gages	(0 to 12) in (0 to 305) mm	(20 + 3.5L) μ in (0.51 + 0.0035L) μ m	Master ring gages
Thread Measuring Wires	(0 to 140) TPI	16 μ in	High accuracy ULM
Pitch Micrometer Standard	(1 to 6) in (25 to 150) mm	(50 + 8L) μ in (1.3 + 0.008L) μ m	High accuracy ULM
Micrometers – Outside Inside	(0 to 40) in (0 to 1000) mm (0 to 40) in (0 to 1000) mm	 (50 + 6L) μ in (1.3 + 0.006L) μ m (50 + 7L) μ in (1.3 + 0.007L) μ m	Comparison to master gage blocks
Depth Micrometers	(0 to 12) in (0 to 305) mm	(32 + 10L) μ in (0.81 + 0.01L) μ m	Comparison to gage blocks

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (\pm)	Comments
Indicating and Snap Micrometers	(0 to 2.00) in (0 to 50) mm	$(0.6R) \mu\text{in}$ $(0.6R) \mu\text{m}$	Comparison to gage blocks
V-Anvil Micrometers	(0 to 2.00) in (0 to 50) mm	$(28 + 0.36R) \mu\text{in}$ $(0.7 + 0.36R) \mu\text{m}$	Comparison to master pin gages
Micrometer Heads	(0 to 2) in (0 to 51) mm	$40 \mu\text{in}$ $1 \mu\text{m}$	High accuracy ULM
Screw Thread Anvils	60° and 55°	2.2 min	Optical comparator
Calipers	(0 to 60) in (0 to 1500) mm	$(200 + 10L) \mu\text{in}$ $(5.1 + 0.01L) \mu\text{m}$	Comparison to master gage blocks
Dial Indicators	(0 to 2) inch (0 to 50) mm	$(14 + 0.23R) \mu\text{in}$ $(0.35 + 0.23R) \mu\text{m}$	Dial calibration tester
Digimatic Indicators	(0 to 2) in (0 to 50) mm	$35 \mu\text{in}$ $0.89 \mu\text{m}$	Comparison to master gage blocks
Dial Indicator Tester	(0 to 2) in (0 to 50) mm	$20 \mu\text{in}$ $0.05 \mu\text{m}$	Comparison to master gage blocks
Mu-Checker/Amplifier	(0 to 0.05) in (0 to 1.5) mm	$(2 + 0.6R) \mu\text{in}$ $(0.05 + 0.6R) \mu\text{m}$	Comparison to master gage blocks
Linear Gage with Counter	(0 to 2.00) in (0 to 50) mm	$(2 + 0.6R) \mu\text{in}$ $(0.05 + 0.6R) \mu\text{m}$	Comparison to gage blocks
Height Gages	(0 to 40) in (0 to 1000) mm	$(280 + 3L) \mu\text{in}$ $(7.1 + 0.003L) \mu\text{m}$	Comparison to Height master step gage

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (±)	Comments
Inside Diameter Measuring Instruments (Boremetrics, Holtest, and Bore Gages)	(0 to 12) in (0 to 305) mm	$(45 + 10D) \mu\text{in}$ $(1.1 + 0.01D) \mu\text{m}$	Ring gages
Laser Scan Micrometer	(0 to 2.5) in diameter (0 to 75) mm diameter	$(35 + R) \mu\text{in}$ $(0.89 + R) \mu\text{m}$	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
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

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (\pm)	Comments
Thickness Measuring Gages (Dial)	(0 to 2) in (0 to 51) mm	300 μ in 7.6 μ m	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 μ in 1.2 μ m	Comparison to master films
Ultrasonic Thickness Gage (Mu Gage)	(0 to 20) in (0 to 600) mm	(480 + 25L) μ in (12 + 0.025) μ m	Comparison to gage blocks
Films (Plastic)	(0 to 0.250) in (0 to 6) mm	20 μ in 0.50 μ m	High accuracy ULM
Sine Bars	5 in 10 in 127 mm 254 mm	30 μ in 48 μ in 0.76 μ m 1.2 μ m	High accuracy ULM and gage blocks
V-Blocks	(0 to 4) in (0 to 102) mm	64 μ in 1.6 μ m	Mu checker with lever head probe
Riser Blocks	(0 to 24) in height (0 to 600) mm height	(3 + 2H) μ in (0.08 + 0.002H) μ m	Comparison to master gage blocks
Parallel Bars	(0 to 3) in width & height (0 to 76) mm width & height	30 μ in 0.76 μ m	Comparison to master gage blocks
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

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (\pm)	Comments
Line Scales	(0 to 16) in long (0 to 410) mm	$(50 + 5L) \mu\text{in}$ $(1.3 + 0.005L) \mu\text{m}$	High accuracy quick vision machine
	(0 to 16) in long (0 to 410) mm	24 μin 0.6 μm	Comparison method on high accuracy quick vision machine
Pixel Calibration Charts	(0 to 0.16) in (0 to 4) mm	50 μin 1.3 μm	Comparison method on high accuracy quick vision machine
Squares	(0 to 24) in (0 to 610) mm	6 $\mu\text{in/in}$ 0.006 $\mu\text{m/mm}$	Comparison to master square
	(0 to 40) in (0 to 1000) mm	$(3 + 0.7L) \mu\text{in}$ $(0.076 + 0.0007L) \mu\text{m}$	Legex CMM using reversal technique
Roundness	Normal Method: (0 to 16) in diameter (0 to 400) mm diameter	$(0.8 + 0.6H) \mu\text{in}$ $(0.02 + 6H/10\ 000) \mu\text{m}$	High accuracy roundness machine
	Reversal Method: (0 to 2) in diameter (0 to 50) mm diameter	0.2 μin 0.005 μm	
Circular Flatness (Optical flat)	Normal Method: (0 to 16) in diameter (0 to 400) mm diameter	$(0.9 + 0.3D) \mu\text{in}$ $(0.023 + 3D/10\ 000) \mu\text{m}$	High accuracy roundness tester
Flatness	(0 to 6) in diameter (0 to 150) mm diameter	2 μin 0.05 μm	Comparison to master optical flat under monochromatic light source
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	

Parameter/Equipment	Range ²	Best Uncertainties ^{3,4} (±)	Comments
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 Ra (0 to 5.1) μm Ra (200 to 500) μin Ra (5.1 to 12.7) μm	2 μin 0.051 μm 3 μin 0.076 μm	Surface finish tester
Step Height Specimen	(0 to 0.120) in height (0 to 3) mm height	14 μin 0.36 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)			Comparison to master gage blocks
Thickness	(0 to 2) in diameter and 1 in thickness (0 to 50) mm diameter and 25 mm thickness	5 μin 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	

II. Thermodynamic

Parameter/Equipment	Range	Best Uncertainties ³ (\pm)	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 best uncertainties are also available.

³ “Best Uncertainty” 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 of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.

⁴ In the statement of best uncertainty, 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.