



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

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CALIBRATION

Valid To: August 31, 2020

Certificate Number: 1182.01

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, 4} (±)	Comments
Angle Blocks	Up to 90°	9"	Vision measuring system
Angle Plates & Squares	Up to 18 in	(38 + 0.64L) μin	Master square
Angle Meters	Up to 360°	35'	Sine plate
Bore Gages	Up to 8 in	(62 + 3.5L + 0.6R) μin	Ring gages
Brinell Scopes – Reticle	Up to 10 mm	0.006 mm	Glass reticle
Micrometer	Up to 10 mm	0.007 mm	

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Calipers ^{3, 6} – Dial and Vernier Digital	Up to 72 inches Up to 20 inches (> 20 to 72) inches	(100 + 3.5L) μin (110 + 3.5L) μin (59 + 7.5L) μin	Gage blocks and caliper checker
Comparator Gages & Mikrokator ³	2 μin resolution 5 μin resolution 10 μin resolution 20 μin resolution 50 μin resolution 100 μin resolution	4 μin 5 μin 8 μin 12 μin 34 μin 73 μin	Master gage blocks
Depth Micrometer – Linearity Resolution 0.001 in 0.0001 in Flatness Resolution 0.001 in 0.0001 in	Up to 12 in Up to 12 in Up to 12 in Up to 12 in	300 μin 57 μin 300 μin 57 μin	Comparison to gage blocks
Feeler Gages	Up to 0.2 in	(11 + 100L) μin	Universal length measuring machine
Gage Blocks	Up to 0.10 in (> 0.10 to 4) in (> 4 to 20) in	3.5 μin (1.7 + 1.2L) μin (7 + 0.8L) μin	Master gage blocks
Glass Graduated Rules & Reticles – Linearity Squareness	Up to 24 in Up to 12 in	(80 + 2.2L) μin (120 + 5.3L) μin	Vision measuring system

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Height Gages ³ – Resolution 0.000050 in 0.000100 in 0.000500 in 0.001000 in	Up to 48 in	(45 + 3.5L) μin (58 + 3.3L) μin (240 + 2.5L) μin (580 + 0.5L) μin	Comparison to gage blocks
Height Masters	Up to 24 in	(22 + 1.8L) μin	Comparison to gage blocks
Indicator Calibrator – Linearity Anvil Flatness	Up to 0.2 in Up to 60 μin	13 μin 8 μin	Amplifier with gage probe Optical flat
Inch Bars, Reference Bars, Step Masters	Up to 40 in	(20 + 2.2L)	Comparison to gage blocks
Inside Micrometers	Up to 24 in	(50 + 6L) μin	Universal length measuring machine
Length Standards	Up to 24 in (> 24 to 72) in Up to 24 in	(6 + 2L) μin (17 + 2.3L) μin (5 + 3L) μin	Mikrokator and gage blocks ULM & length standards
Outside Micrometers Resolution ³ – 0.000020 in 0.000050 in 0.0001 in 0.001 in Anvil Parallelism	Up to 1 in Up to 50 in Up to 50 in Up to 50 in Up to 1 in	21 μin (24 + 9L) μin (69 + 6L) μin (580 + 2L) μin 31 μin	Comparison to gage blocks Gage ball
Machine Tools ³ – Linear Displacement Accuracy	(0.1 to 80) m	(0.3 + 1.4L) μm	Laser

Parameter/Equipment	Range	CMC ^{2, 4, 7} (±)	Comments
Optical Coordinate Measuring Machines & Video Systems ^{3,7} –			
Linear Displacement Accuracy	Stage Length: Up to 44 in	$[(0.9T - 0.08)L + (-2.3T + 240)] \mu\text{in}$	Glass grid
Linear Displacement Accuracy	Stage Length: Up to 34 in	$[(1T - 0.7)L + (-0.8T + 99)] \mu\text{in}$	Glass rule
	Stage Length: (> 34 to 44) in	$[(1T - 0.7)L + (-0.8T + 180)] \mu\text{in}$	Glass rule
	Column Height: Up to 8 in	$[(1.4T)L + (-1T + 130)] \mu\text{in}$	Gage blocks, indicator
Squareness	Up to 18 in	$(5.3L + 120) \mu\text{in}$	Glass rule or Optical ball bar
Optical Comparators & Optical Measuring Machines ^{3,8} –			
Magnification – Up to 8 in (> 8 to 16) in (> 16 to 24) in	10x, 20x, 25x, 30x 31.25x, 50x, 62.5x 100x, 250x, 500x	0.012 % of magnification 0.012 % of magnification 0.012 % of magnification	Glass masters, angle blocks and measuring rods
Linear Axis	X & Y Axis	$[(1.4T - 4.4)L + (-1.4T + 110)] \mu\text{in}$	
Squareness	3 in	83 μin	
Angularity	(0 to 360)°	1'	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Indicators ³ –			
Up to 1 in	0.000020 in resolution 0.000050 in resolution 0.000100 in resolution 0.000500 in resolution 0.001000 in resolution	20 μin 38 μin 30 μin 100 μin 200 μin	Universal length measuring machine (ULM)
Up to 1 in	0.000020 in resolution 0.000050 in resolution 0.000100 in resolution 0.000500 in resolution 0.001000 in resolution	36 μin 50 μin 50 μin 50 μin 100 μin	Indicator calibrator
Up to 12 in	0.000020 in resolution 0.000050 in resolution 0.000100 in resolution 0.000500 in resolution 0.001000 in resolution	(12 + 4L) μin (25 + 4L) μin (50 + 4L) μin (50 + 4L) μin (100 + 4L) μin	Gage blocks, master flat plate
Parallels, Straight Edges, 1-2-3 Blocks			
Parallel & Straight Length, Width, Height	Up to 40 in Up to 40 in	(14 + 3L) μin 37 μin	Amplifier, gage probe and surface plate
Plain Pin/Plug Gages –			
Low Accuracy High Accuracy	Up to 16 in Up to 16 in	(33 + 1.4D) μin (10 + 1.3D) μin	Universal length measuring machine
Pitch Gages –			
English Metric Acme	(2 to 84) TPI (0.25 to 11.5) mm (1 to 12) TPI	220 μin 220 μin (5.6 μm) 220 μin	Optical/vision measuring system
Precision Levels –			
Bubble Levels	Up to 15 inches	100 μin	Amplifier with gage probe
High Accuracy Electronic Levels	Up to ± 1000 arc-sec	5"	Sine plate and gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Radius Gages	Up to 12 in	(210 + 14L) μin	Optical/vision measuring system
Plain Ring Gages	(0.050 to 0.50) in Up to 18 in	15 μin (10 + 3.7D) μin	Internal comparator High accuracy ULM
Protractors			
Bevel	Up to 180°	0° 2' 50"	Optical/vision measuring system
Non-Bevel	(0 to 360)°	0° 5' 15"	Sine Plate
Roundness Measuring Systems ³ –			
Radial Departure	Up to 360°	7 μin	Precision sphere
Gage Head Calibration	200 μin	5 μin	Gage blocks
Axial Error	100 μin	7 μin	Precision sphere
Coning	100 μin	7 μin	Precision sphere
Steel Rulers & Tape Measures	Up to 300 in	(290 + 18L) μin	Vision measuring system
Sine Plates & Sine Bars –			
Angle	Up to 20 in	5"	Master gage blocks, master angle blocks, surface plate, amplifier with gage head
Parallelism	Up to 20 in	63 μin	
Spheres & Precision Balls –			
Diameter	Up to 3 in	(19 + 1.2D) μin	Universal length measuring machine, master precision balls
High Accuracy	Up to 3 in	(8.5 + 1.5D) μin	
Sphericity	Up to 3 in	(3D + 6) + 3H μin	Roundness measuring system

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Surface Plates ³ – Grades AA, A and B Flatness Repeat Reading	Up to 354 in DL Up to 0.002 in	$10\sqrt{DL}$ μin 26 μin	Precision level system, Repeat-O-Meter
Surface Finish Testers for Ra ³ – (2 to 500) μin (0.05 to 12.5) μm	(113 to 120) μin (2.88 to 3.06) μm	4 μin 0.09 μm	Master surface finish roughness specimen at indicated points in range
Surface Roughness Specimens – Ra Ry (Rmax)	(2 to 500) μin (2 to 500) μin	3 μin 7 μin	Surface finish analyzer
Threaded Plug Gages – Major Diameter Pitch Diameter	Up to 12 in Up to 12 in	$(29 + 1.7D)$ μin $(73 + 2D)$ μin	ULM and 3-wire method
Thread Wires	Up to 0.500 in diameter	13 μin	Mikrokator and master thread wires
V-Blocks – Parallelism Squareness	Up to 10 in Up to 10 in	32 μin $(63 + 10L)$ μin	Surface plate, gage pin, master square, amp. and gage head
Roundness – Form	Up to 10 in diameter	$[(3D + 6) + 3H]$ μin	Roundness measuring system
Flatness	Up to 5 in Over 5 in	8 μin 9 μin	Optical flat

II. Dimensional Testing¹

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Length ⁵ –			
1-Dimensional	Up to 12 in	(68 + 1.2L) μin	Vision coordinate measuring machine
2-Dimensional	Up to (12 x 12) in	(130 + 20L) μin	
3-Dimensional	Up to (12 x 12 x 4) in	(240 + 53L) μin	
Surface Finish ⁵			
Ra	(2 to 500) μin	5 μin	Surface analyzer
Ry (Rmax)	(2 to 500) μin	7 μin	

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Scales & Balances ³	(> 10 to 500) mg (> 0.5 to 200) g > 200 g to 2 kg (> 2 to 10) kg (> 10 to 29) kg	0.42 mg 0.012 g 0.12 g 0.058 g 0.34 g	Class 3, 6 and F weights
Torque Wrenches	(5 to 50) in·lbf (40 to 400) in·lbf (100 to 1000) ft·lbf (25 to 250) ft·lbf (60 to 600) ft·lbf	0.9 % of reading 1.8 % of reading 1.2 % of reading 0.8 % of reading 1.5 % of reading	Torque tester

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness Testers ³	HRA: < 70 (≥ 70 and < 80) ≥ 80	0.68 HRA 0.65 HRA 0.62 HRA	Indirect verification per ASTM E18
	HRBW: < 60 (≥ 60 and < 80) ≥ 80	1.2 HRBW 1.1 HRBW 0.84 HRBW	
	HRC: < 35 (≥ 35 and < 60) ≥ 60	0.72 HRC 1.1 HRC 0.72 HRC	
	HR15N: < 78 (≥ 78 and < 90) ≥ 90	1.1 HR15N 1.2 HR15N 0.87 HR15N	
	HR30N: < 55 (≥ 55 and < 77) ≥ 77	1.1 HR30N 0.73 HR30N 0.68 HR30N	
	HR45N: < 37 (≥ 37 and < 66) ≥ 66	0.86 HR45N 0.86 HR45N 0.69 HR45N	
	HR15TW: < 81 (≥ 81 and < 87) ≥ 87	0.96 HR15TW 0.85 HR15TW 0.93 HR15TW	
	HR30TW: < 57 (≥ 57 and < 70) ≥ 70	1.1 HR30TW 0.79 HR30TW 0.91 HR30TW	
	HR45TW: < 33 (≥ 33 and < 53) ≥ 53	1.3 HR45TW 1.3 HR45TW 0.96 HR45TW	

¹ This laboratory offers commercial dimensional testing, calibration and field calibration services.

- 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 In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches or meters; 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 and H is the height at which the part was measured in inches. Pitch diameter is measured by the three-wire method. Major diameter is calibrated by direct measurement. In the statement of CMC, DL is the diagonal length of the Unit under test in inches; and, Q is the torque of the unit under test in ft·lbf, unless otherwise noted.
- ⁵ 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.
- ⁶ Repeatability of the Unit Under Test has not been utilized in the calculation of the CMC value for this measurement parameter.
- ⁷ In the statement of CMC, $T =$ greater of 1 °F or ABS value of gage environmental temperature from 68 °F.
- ⁸ In the statement of CMC, $T =$ greater of 4 °F or ABS value of gage environmental temperature from 68 °F.



Accredited Laboratory

A2LA has accredited

A.A. JANSSON, INC.

Waterford, MI

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/NCCL Z540-1-1994 and 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 16th day of August 2018.

A handwritten signature in blue ink, appearing to be "A. Jansson".

Senior Director, Accreditation Services
For the Accreditation Council
Certificate Number 1182.01
Valid to August 31, 2020
Revised on August 26, 2019

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