



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3:2006

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CALIBRATION

Valid To: August 31, 2022

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 calibrations^{1,10}:

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 – Two Point	Up to 10 in	(25 + 17L) μin	ULM
Three Point	Up to 8 in	(62 + 3.5L + 0.6R) μin	Ring gages
Brinell Scopes – Reticle	Up to 10 mm	0.019 mm	Glass reticle
Micrometer	Up to 10 mm	0.019 mm	

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Calipers ^{3, 6} – Dial & Vernier Digital	Up to 72 in Up to 20 in (>20 to 72) in	(100 + 3.5L) μin (110 + 3.5L) μin (59 + 7.5L) μin	Gage blocks and caliper checker
Comparator Gages, Differential Probes (LVDT), Blanchette OD & 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
Concentricity Gage	Up to 4 in	36 μin	Indicator and master pin gage
Depth Micrometer – Linearity Resolution 0.001 in 0.0004 in 0.0001 in 0.000040 in Flatness Resolution 0.001 in 0.0004 in 0.0001 in 0.000040 in	Up to 12 in Up to 12 in Up to 12 in Up to 12 in Up to 12 in Up to 12 in Up to 12 in Up to 12 in	320 μin 248 μin (40 + 10L) μin (40 + 0.01L) μin 300 μin 200 μin 54 μin 47 μin	Comparison to gage blocks
Feeler Gages	Up to 0.2 in	(11 + 100L) μin	Universal length measuring machine
Flatness	Up to 5 in 5 to 12 in	8 μin 9 μin	Optical flat
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

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
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
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
Indicators ³ – Dial, Digital & Test 0.000 020 in resolution 0.000 050 in resolution 0.000 100 in resolution 0.000 500 in resolution 0.001 000 in resolution 0.000 020 in resolution 0.000 050 in resolution 0.000 100 in resolution 0.000 500 in resolution 0.001 000 in resolution 0.000 020 in resolution 0.000 050 in resolution 0.000 100 in resolution 0.000 500 in resolution 0.001 000 in resolution	Up to 1 in Up to 0.2 in Up to 12 in	30 μin 35 μin 35 μin 100 μin 200 μin 28 μin 34 μin 34 μin 34 μin 45 μin 14 μin 21 μin (100 + 4.5L) μin (166 + 0.5L) μin (300 + 0.3L) μin	Universal length measuring machine (ULM) Indicator calibrator Gage blocks, gage stand, anvil or master flat
Indicator Calibrator – Linearity Anvil Flatness	Up to 0.2 in Up to 60 μin	13 μin 8 μin	Amplifier with gage probe Optical flat

Parameter/Equipment	Range	CMC ^{2, 4, 8} (±)	Comments
Inch Bars, Reference Bars, Step Masters	Up to 40 in	$(20 + 2.2L)$	Comparison to gage blocks
Inside Micrometers	Up to 24 in	$(50 + 6L) \mu\text{in}$	Universal length measuring machine
Length Standards	Up to 24 in (>24 to 72) in	$(6 + 2L) \mu\text{in}$ $(17 + 2.3L) \mu\text{in}$	Mikrokator and gage blocks
	Up to 24 in	$(5 + 3L) \mu\text{in}$	ULM & length standards
Outside Micrometers ³ – Resolution 0.000 005 in 0.000 020 in 0.000 050 in 0.0001 in 0.001 in Anvil Parallelism	Up to 1 in Up to 1 in Up to 50 in Up to 50 in Up to 50 in Up to 1 in	12 μin 21 μin $(24 + 9L) \mu\text{in}$ $(69 + 6L) \mu\text{in}$ $(580 + 2L) \mu\text{in}$ 31 μin	Comparison to gage blocks Gage ball
Optical Coordinate Measuring Machines & Video Systems ³ – Linear Displacement Accuracy ⁷ Squareness Par centricity	Stage Length: Up to 44 in Stage Length: Up to 34 in Stage Length: (> 34 to 44) in Column Height: Up to 8 in Up to 18 in FOV ⁹	$[(0.9T - 0.08)L + (-2.3T + 240)] \mu\text{in}$ $[(1T - 0.7)L + (-0.8T + 99)] \mu\text{in}$ $[(1T - 0.7)L + (-0.8T + 180)] \mu\text{in}$ $[(1.4T)L + (-1T + 130)] \mu\text{in}$ $(5.3L + 120) \mu\text{in}$ $(110 + 0.6L) \mu\text{in}$	Glass grid Glass rule Gage blocks, indicator Glass rule or optical ball bar Glass rule

Parameter/Equipment	Range	CMC ^{2, 4, 8} (±)	Comments
Optical Comparators & Optical Measuring Machines ³ – Magnification – Up to 8 in (>8 to 16) in (>16 to 24) in Linear Axis ⁸ Squareness Angularity	10x, 20x, 25x, 30x 31.25x, 50x, 62.5x 100x, 250x, 500x X & Y Axis 3 in (0 to 360)°	0.012 % of magnification 0.012 % of magnification 0.012 % of magnification [(1.4T – 4.4)L + (-1.4T + 110)] μin 83 μin 1'	Glass masters, angle blocks and measuring rods
Parallels, Straight Edges, 1-2-3 Blocks – Parallel & Straight Length, Width, Height	Up to 40 in Up to 40 in	(10 + 3L) μin 37 μin	Amplifier, gage probe and surface plate
Pitch Gages – English Metric Acme	(2 to 84) TPI (0.25 to 11.5) mm (1 to 12) TPI	220 μin 5.6 μm 220 μin	Optical/vision measuring system
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
Plain Ring Gages	(0.050 to 0.70) in Up to 18 in	15 μin (10 + 3.7D) μin	Internal comparator High accuracy ULM
Precision Levels – Bubble Levels High Accuracy Inclometers, Digital Protractors	Up to 15 in Up to ± 1000 arc-sec	100 μin 1 arc-sec	Amplifier with gage probe Sine plate and gage blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Protractors			
Bevel	Up to 180°	0° 2' 50"	Optical/vision measuring system
Non-Bevel	(0 to 360)°	0° 5' 15"	Sine Plate, gage blocks
Radius Gages	Up to 12 in	(210 + 14L) μin	Optical/vision measuring system
Roundness – Form	Up to 10 in diameter	[(3D + 6) + 3H] μin	Roundness measuring system
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} (\pm)	Comments
Surface Plates ³ – Grades AA, A and B Flatness Repeat Reading	Up to 354 in <i>DL</i> Up to 0.002 in	$10\sqrt{DL}$ μ in 26 μ in	Precision level system, Repeat-O-Meter
Surface Finish Testers for Ra ³ – (2 to 500) μ in (0.05 to 12.5) μ m	(113 to 120) μ in (2.88 to 3.06) μ m	4 μ in 0.09 μ m	Master surface finish roughness specimen at indicated points in range
Surface Roughness Specimens – Ra Ry (Rmax)	(2 to 500) μ in (2 to 500) μ in	3 μ in 7 μ in	Surface finish analyzer
Threaded Plug Gages – Major Diameter Pitch Diameter	Up to 12 in Up to 12 in	$(29 + 1.7D)$ μ in $(73 + 2D)$ μ in	ULM and 3-wire method
Thread Wires – Working Master	Up to 0.500 in diameter Up to 0.500 in diameter	13 μ in 10 μ in	Mikrokator and master thread wires Universal length measuring machine
V-Blocks – Parallelism Squareness	Up to 10 in Up to 10 in	32 μ in $(63 + 10L)$ μ in	Surface plate, gage pin, master square, amp. and gage head

II. Dimensional Testing¹

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Length ⁵ – Measure			
1-Dimensional	Up to 12 in	$(68 + 1.2L) \mu\text{in}$	Vision coordinate measuring machine
2-Dimensional	Up to (12 x 12) in	$(130 + 20L) \mu\text{in}$	
3-Dimensional	Up to (12 x 12 x 4) in	$(240 + 53L) \mu\text{in}$	
Surface Finish ⁵ –			
Ra	(2 to 500) μin	5 μin	Surface analyzer
Ry (Rmax)	(2 to 500) μin	7 μin	
Flatness ⁵	Up to 5 in 5 to 12 in	8 μin 9 μin	Optical flat
Roundness – Form ⁵	Up to 10 in diameter	$[(3D + 6) + 3H] \mu\text{in}$	Roundness measuring system

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Scales & Balances ³	(>0 to ≤ 500) mg > 500 mg to ≤ 5 g (> 5 to ≤ 10) g (> 10 to ≤ 30) g (> 30 to ≤ 50) g (> 50 to ≤ 80) g (> 80 to ≤ 100) g (> 100 to ≤ 150) g (> 150 to ≤ 200) g (> 200 to ≤ 300) g (> 300 to ≤ 500) g (> 500 to ≤ 1000) g (> 1 to ≤ 1.5) kg (> 1.5 to ≤ 2) kg (> 2 to ≤ 3) kg (> 3 to ≤ 4) kg (> 4 to ≤ 5) kg (> 5 to ≤ 6) kg (> 6 to ≤ 8) kg (> 8 to ≤ 10) kg (> 10 to ≤ 15) kg (> 15 to ≤ 20) kg (> 20 to ≤ 25) kg (> 25 to ≤ 29.532) kg	0.05 mg 0.05 mg 0.05 mg 0.05 mg 0.06 mg 0.06 mg 0.06 mg 0.06 mg 0.06 mg 0.07 mg 1.2 mg 6.3 mg 12 mg 14 mg 24 mg 27 mg 29 mg 0.78 mg 12 mg 1.1 mg 1.6 mg 1.3 mg 1.9 mg 2.1 mg 31 mg	Class 2, 3, 6 and F weights
Torque Wrenches	(5 to 50) in·lbf (40 to 400) in·lbf (100 to 1000) in·lbf (25 to 250) ft·lbf (60 to 600) ft·lbf	1.9 % 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	0.68 HRA	Indirect verification per ASTM E18
	(≥ 70 and < 80)	0.65 HRA	
	≥ 80	0.62 HRA	
	HRBW: < 60	1.2 HRBW	
	(≥ 60 and < 80)	1.1 HRBW	
	≥ 80	0.84 HRBW	
	HRC: < 35	0.72 HRC	
	(≥ 35 and < 60)	1.1 HRC	
	≥ 60	0.72 HRC	
	HR15N: < 78	1.1 HR15N	
	(≥ 78 and < 90)	1.2 HR15N	
	≥ 90	0.87 HR15N	
HR30N: < 55	1.1 HR30N		
(≥ 55 and < 77)	0.73 HR30N		
≥ 77	0.68 HR30N		
HR45N: < 37	0.86 HR45N		
(≥ 37 and < 66)	0.86 HR45N		
≥ 66	0.69 HR45N		
HR15TW: < 81	0.96 HR15TW		
(≥ 81 and < 87)	0.85 HR15TW		
≥ 87	0.93 HR15TW		
HR30TW: < 57	1.1 HR30TW		
(≥ 57 and < 70)	0.79 HR30TW		
≥ 70	0.91 HR30TW		
HR45TW: < 33	1.3 HR45TW		
(≥ 33 and < 53)	1.3 HR45TW		
≥ 53	0.96 HR45TW		

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- 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. 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.
- ⁹ In the statement of CMC, FOV = Field of View
- ¹⁰ This scope meets A2LA's *P112 Flexible Scope Policy*.



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 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3:2006, 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 17th day of November 2020.

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

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1182.01
Valid to August 31, 2022

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