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

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CALIBRATION

Valid To: August 31, 2018 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]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Angle Blocks	Up to 90°	9″	Vision measuring system
Angle Plates and Squares	Up to 18 in	(38 + 0.64*L*) µin	Master square
Angle Meters	Up to 360°	35′	Sine plate
Bevel Protractors and Angle Gages	Up to 180°	0° 2′ 50″	Optical/vision measuring system
Bore Gages	Up to 8 in	(62 + 3.5*L* +0.6*R*) 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] –			
Dial and Vernier	Up to 72 inches	(710 + 2.5L) µin	Gage blocks and caliper checker
Digital	Up to 20 inches (>20 to 72) inches	(310 + 2.6L) µin (980 + 2.5L) µin	
Differential Probes (LVDT)	Up to 5 µin resolution	5 µin	Gage blocks
Comparator Gages & Mikrokator[3]	2 µin resolution 5 µin resolution 10 µin resolution 20 µin resolution 50 µin resolution	3 µin 5 µin 8 µin 12 µin 34 µin	Gage blocks
Depth Micrometer –			
Linearity Resolution 0.001 in 0.0001 in	 Up to 12 in Up to 12 in	 300 µin 57 µin	 Comparison to gage blocks
Flatness Resolution 0.001 in 0.0001 in	 Up to 12 in Up to 12 in	 300 µin 57 µin	
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 and 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] – High Accuracy	 Up to 48 in	 (64 + 1.7*L* +0.6*R*) µin	 Comparison to gage blocks
Height Masters	Up to 24 in	(22 + 1.8*L*) 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 60 in	(20 + 2*L*) µin	Comparison to gage blocks
Inside Micrometers	Up to 24 in	(50 + 6*L*) µin	Universal length measuring machine
Length Standards	Up to 24 in (>24 to 72) in Up to 24 in	(6 + 2*L*) µin (17 + 2.3*L*) µin (5 + 3*L*) µin	Mikrokator and gage blocks ULM & length standards
Machine Tools[3] – Linear Displacement Accuracy	 (0.1 to 80) m	 (0.3 + 1.4*L*) µm	 Laser
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 + 9*L*) µin (69 + 6*L*) µin (580 + 2*L*) µin 31 µin	 Comparison to gage blocks Gage ball

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Optical Coordinate Measuring Machines and Video Systems[3] –			
Linear Displacement Accuracy	Stage Length: Up to 44 in	$[(0.9T - 0.08)L + (-2.3T + 240)]$ µin	Glass grid
Linear Displacement Accuracy	Stage Length: Up to 34 in	$[(1T - 0.7)L + (8T + 99)]$ µin	Glass rule
	Stage Length: (>34 to 44) in	$[(1T - 0.7)L + (-0.8T + 180)]$ µin	Glass rule
	Column Height: Up to 8 in	$[(1.4T)L + (-1T + 140)]$ µin	Gage blocks, indicator
Squareness	Up to 18 in	$(5.3L + 120)$ µin	Glass rule or Optical ball bar (T = greater of 1 ºF or ABS value of gage environmental temperature from 68 °F)
Optical Comparators and Optical Measuring Machines[3] –			
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 (T = greater of 1 ºF or ABS value of gage environmental temperature from 68 °F)
Linear Axis	X & Y Axis	$[(1.4T - 4.4)L + (-1.4T + 110)]$ µin	
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 + 4*L*) µin (25 + 4*L*) µin (50 + 4*L*) µin (50 + 4*L*) µin (100 + 4*L*) µin	Gage blocks, master flat plate
Parallels	Up to 36 in	(24 + 3*L*) µin	Amplifier, gage probe and surface plate
Plain Pin/Plug Gages –			
Low Accuracy High Accuracy	Up to 16 in Up to 16 in	(33 + 1.4*D*) µin (10 + 1.3*D*) 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
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	Up to 300 in	(290 + 18L) µin	Vision measuring system
Sine Plates and Sine Bars –			
Angle Parallelism	Up to 20 in Up to 20 in	5″ 63 µin	Master gage blocks, master angle blocks, surface plate, amplifier with gage head
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	
Surface Plates[3] –			
Grades AA, A and B			
Flatness	Up to 354 in DL	10$\sqrt{DL}$ µin	Precision level system,
Repeat Reading	Up to 0.002 in	26 µin	Repeat-O-Meter

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Surface Finish Testers for Ra[3] –			
(2 to 500) µin	(113 to 120) µin	4 µin	Master surface finish roughness specimen at indicated points in range
(0.05 to 12.5) µm	(2.88 to 3.06) µm	0.09 µm	
Surface Roughness Specimens –			
Ra Ry (Rmax)	(2 to 500) µin (2 to 500) µin	5 µin 8 µin	Surface finish analyzer
Threaded Plug Gages –			
Major Diameter Pitch Diameter	Up to 12 in Up to 12 in	(29 + 1.7*D*) µin (73 + 2*D*) µin	ULM and 3-wire method
Thread Wires	Up to 0.500 in diameter	13 µin	ULM and master thread wires
V-Blocks –			
Parallelism Squareness	Up to 10 in Up to 10 in	32 µin (63 + 10*L*) µin	Surface plate, gage pin, master square, amp. and gage head
Roundness – Form	Up to 10 in diameter	[(3*D* + 6) + 3*H*] µin	Roundness measuring system
Flatness	Up to 5 in Over 5 in	8 µin 9 µin	Optical flat
Non-Bevel Protractors	(0 to 360)°	0° 5′ 15″	Sine Plate

II. Dimensional Testing[1]

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

III. Mechanical

Parameter/Equipment	Range	CMC [2, 4] (±)	Comments
Scales and 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	4 in·lb to 250 ft·lbf (>250 to 600) ft·lbf	(0.017Q + 0.025) ft·lbf (0.01Q + 3.5) ft·lbf	Torque tester

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] –	HRA:		Indirect verification per ASTM E18
	(20 to 65) HRA	0.68 HRA	
	(70 to 78) HRA	0.65 HRA	
	(80 to 84) HRA	0.62 HRA	
	HRBW:		
	(40 to 59) HRBW	1.2 HRBW	
	(60 to 79) HRBW	1.1 HRBW	
	(80 to 100) HRBW	0.84 HRBW	
	HRC:		
	(20 to 30) HRC	0.72 HRC	
	(35 to 55) HRC	1.1 HRC	
	(59 to 65) HRC	0.72 HRC	
	HR15N:		
	(70 to 77) HR15N	1.1 HR15N	
	(78 to 88) HR15N	1.2 HR15N	
	(90 to 92) HR15N	0.87 HR15N	
	HR30N:		
	(42 to 50) HR30N	1.1 HR30N	
	(55 to 73) HR30N	0.73 HR30N	
	(77 to 82) HR30N	0.68 HR30N	
	HR45N:		
	(20 to 31) HR45N	0.86 HR45N	
	(37 to 61) HR45N	0.86 HR45N	
	(66 to 72) HR45N	0.69 HR45N	
	HR15TW:		
	(74 to 80) HR15TW	0.96 HR15TW	
	(81 to 86) HR15TW	0.85 HR15TW	
	(87 to 93) HR15TW	0.93 HR15TW	
	HR30TW:		
	(43 to 56) HR30TW	1.1 HR30TW	
	(57 to 69) HR30TW	0.79 HR30TW	
	(70 to 83) HR30TW	0.91 HR30TW	
	HR45TW:		
	(13 to 32) HR45TW	1.3 HR45TW	
	(33 to 52) HR45TW	1.3 HR45TW	
	(53 to 73) 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] This test is not equivalent to that of a calibration.

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/NCSLI 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*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 25th day of August 2016.

President and CEO
For the Accreditation Council
Certificate Number 1182.01
Valid to August 31, 2018

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