



THE AMERICAN ASSOCIATION FOR
LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

ACCU-CHECK INSTRUMENT SERVICE INC. **Lancaster, OH**

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 24th day of December 2008.

A handwritten signature in cursive script, reading "Peter Abney", positioned above a horizontal line.

President
For the Accreditation Council
Certificate Number 1009.01
Valid to July 31, 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

ACCU-CHECK INSTRUMENT SERVICE INC.
 3160 W. Fair Avenue
 Lancaster, OH 43130
 Robert Vaughan Phone: 740 654 0500

CALIBRATION

Valid until: July 31, 2010

Certificate Number: 1009.01

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	Best Uncertainty ^{2,4} (\pm)	Comments
Gage blocks	Up to 4 in (4 to 12) in	$(2.4 + 1.7L) \mu\text{in}$ $(3.2 + 1.0L) \mu\text{in}$	Pratt & Whitney (P & W) labmaster universal
Pin and Plug Gages, Master Disks	Up to 12 in	$(5.4 + 1.5D) \mu\text{in}$	P & W labmaster universal
Indicators ³	Up to 6 in	$(0.6R + 13L) \mu\text{in}$	Gage blocks
Height Gages ³	Up to 48 in	$(0.6R + 13L) \mu\text{in}$	Gage blocks
Calipers ³	Up to 120 in	$(0.6R + 13L) \mu\text{in}$	Gage blocks and rings
Micrometers ³	Up to 60 in	$(0.6R + 13L) \mu\text{in}$	Gage blocks and pins

Parameter/Equipment	Range	Best Uncertainty ^{2,4} (\pm)	Comments
Mic/Length Standards ³	Up to 8 in (8 to 54) in	$(6.7 + 1.5L) \mu\text{in}$ 43 μin	P & W labmaster Optodyne laser
Ring Gages	(0.02 to 12) in	$(4.5 + 1.9D) \mu\text{in}$	P & W labmaster & master ring gages
Thread Plugs	Up to 12 in	$(120 + 1.5D) \mu\text{in}$	Direct comparison, gage blocks and wires
Optical Comparators ³ – Travel Squareness Magnification	Up to 12 in --- 5x to 100x	$(87 + 3.3L) \mu\text{in}$ 120 μin 55 μin	Plug/master balls, angle blocks/glass master
Master Levels	(4 to 18) in	24 $\mu\text{in/in}$	Surface plate and gage blocks
Distance ³ Length Masters	Up to 20 ft	480 μin	Optodyne laser
Thread Wires ⁹	(4 to 120) T.P.I.	$(5.3 + 3D) \mu\text{in}$	P & W labmaster universal
Optical Flats – Flatness Optical Parallels - Parallelism	Up to 2 in Up to 2 in	7 μin 8 μin	Optical flat and monochromatic light P & W labmaster
1-2-3 Blocks, Box Parallels	Up to 3 in	82 μin	Transfer box
Protractors	0° to 360°	3.3”	Angle blocks

Parameter/Equipment	Range	Best Uncertainty ^{2,4} (±)	Comments
Steel Rules	Up to 72 in To 1800 mm	490 μin	Optodyne laser
Tape Measures	Up to 100 ft	(310 + 6L) μin	Comparison
Taper Gages	Up to 3 in	0.0001 in	Comparator, micrometer
Angle Blocks	0° to 90°	3''	Transfer box, sine plate
Radius Gages	Up to 3 in	0.0002 in	Comparator
Straight Edges	Up to 6 ft	93 μin	Transfer box
V-Blocks	Up to 12 in	250 μin	Transfer box, sine plate
Squares	Up to 18 in	120 μin	Square checker, electronic indicator
Cylindrical Squares	Up to 18 in	110 μin	Square checker, electronic indicator
Glass Scales	Up to 48 in	140 μin	P & W lengthmaster, Optodyne laser

II. Dimensional Testing

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
One Dimensional – Length Radius	Up to 6 in Up to 6 in	300 μin 290 μin	Optical comparator

Parameter/Equipment	Range	Best Uncertainty ^{2,4} (\pm)	Comments
One Dimensional (cont.) – Diameter Center to Center Height Angles	Up to 6 in Up to 6 in Up to 32 in 0° to 360°	290 μ in 300 μ in 180 μ in 5'	Optical comparator

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range ¹¹	Best Uncertainty ^{2,8,10} (\pm)	Comments
DC Current ³ – Generate	10 μ A to 2 A	0.025 % + 0.0025 % + 0.01 μ A	Fluke 5102B-03-05
DC Voltage ³ – Generate	(0 to 1100) V	0.005 % + 0.001 % + 5 μ V	Fluke 5102B-03-05
DC Voltage ³ – Measure	0.1 VDC 1.0 VDC 10.0 VDC 100 VDC 1000 VDC	0.015 % + 6 digits 0.014 % + 1 digit 0.013 % + 1 digit 0.015 % + 1 digit 0.015 % + 1 digit	HP 3455A
Resistance ³ – Generate (Four Terminal)	1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω	0.02 % 0.01 % 0.005 % 0.005 % 0.005 % 0.005 % 0.01 % 0.05 %	Fluke 5102B-03-05

Parameter/Equipment	Range ¹¹	Best Uncertainty ^{2, 8, 10} (\pm)	Comments
Resistance ³ – Measure, (Four Terminal)	0.1 k Ω 1 k Ω 10 k Ω 100 k Ω 1000 k Ω 10000 k Ω	0.006 % + 7 digits 0.006 % + 2 digits 0.008 % + 3 digits 0.005 % + 4 digits 0.015 % + 6 digits 0.1 % + 6 digits	HP 3455A
High Voltage ³ – Measure			
DC Voltage	(0 to 20) kV (20 to 35) kV (35 to 40) kV	2.0 % 1.0 % 2.0 %	Extech Instruments MM560 DMM & Fluke 80K40 high voltage probe
AC Voltage	(0 to 28) kV	5.0 %	
Electrical Calibration of Thermocouple Indicators ³ –			
Type J	- 274 °F to 2192 °F	0.03 % + 0.20 °F	Extech Microcal 1+
Type K	-184 °F to 2372 °F	0.03 % + 0.20 °F	
Type T	-184 °F to 752 °F	0.03 % + 0.20 °F	
Type R	932 °F to 3092 °F	0.03 % + 0.17 °F	
Type S	1472 °F to 3200 °F	0.03 % + 0.17 °F	
Type E	-238 °F to 1832 °F	0.03 % + 0.20 °F	
Oscilloscope ³ –			
DC Gain	17.5 mV to 7 V	0.008 % + 0.001 % + 5 μ V	Fluke 5102B
Flatness	50 kHz Reference 250 kHz to 100 MHz (100 to 250) MHz	3.0 % (X1 range) 1 % of 50 kHz ref. 3 % of 50 kHz ref.	Tektronix scope calibrator
Time Marker	5 s to 10 ns	1 part in 10 ⁷ (or 0.1 μ s/s)	
Standard Amplitude – 50 Ω @ 1 kHz 1 M Ω @ 1 kHz	100 μ V to 5 Vp-p 200 μ V to 100 Vp-p	0.25 % + 1 μ V 0.025 % + 1 μ V	

Parameter/Range	Frequency	Best Uncertainty ^{2, 8, 10} (\pm)	Comments
AC Current ³ – Generate 10 μ A to 2 A	50 Hz to 1 kHz	0.07 % + 0.01 % + 2 μ A	Fluke 5102B-03-05
AC Voltage ³ – Generate 1 mV to 1100 V 1 mV to 20 V	50 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz	0.05 % + 0.006 % + 50 μ V 0.05 % + 0.006 % + 50 μ V 0.08 % + 0.009 % + 50 μ V 0.08 % + 0.009 % + 50 μ V	Fluke 5102B-03-05
AC Voltage ³ – Measure 1 V to 1000 V 1 V to 10 V	30 Hz to 20 kHz (20 to 100) kHz (100 to 250) kHz (250 to 500) kHz 500 kHz to 1 MHz	0.07 % + 70 digits 0.07 % + 160 digits 2.2 % + 350 digits 5.3 % + 700 digits 6.6 % + 3900 digits	HP 3455A

IV. Mechanical

Parameter/Equipment	Range	Best Uncertainty ^{2, 10} (\pm)	Comments
Torque Wrenches ³	(0.001 to 100) in·lb (100 to 250) in·lb (0 to 1250) in·lb (0 to 600) ft·lb (1250 to 2000) in·lb (600 to 1000) ft·lb	0.10 % + 1 digit 0.15 % + 1 digit 0.5 % 0.5 % 1.3 % + 0.5 in·lb 1.3 % + 0.5 ft·lb	Mountz TL-100I Snap-on digital tester Proto 6188 Proto 6190

Parameter/Equipment	Range ¹¹	Best Uncertainty ^{2, 10} (\pm)	Comments
Scales and Balances ³	1 mg	0.4 μ g	NIST Handbook 44, Class 1 weights
	2 mg	0.42 μ g	
	3 mg	0.41 μ g	
	5 mg	0.4 μ g	
	10 mg	0.44 μ g	
	20 mg	0.37 μ g	
	30 mg	0.4 μ g	
	50 mg	0.46 μ g	
	100 mg	0.6 μ g	
	500 mg	0.79 μ g	
	1 g	1.2 μ g	
	2 g	1.5 μ g	
	3 g	2 μ g	
	5 g	3.2 μ g	
	10 g	6.2 μ g	
	20 g	5.8 μ g	
	30 g	6.8 μ g	
	50 g	9.4 μ g	
	100 g	16 μ g	
	200 g	40 μ g	
	500 g	0.045 mg	Class C weights
	1 kg	0.099 mg	
	2 kg	0.2 mg	
	3 kg	0.65 mg	
	4 kg	1.1 mg	
	5 kg	1.2 mg	
	6 kg	1.3 mg	
	7 kg	1.4 mg	
	7.4 kg	1.5 mg	Class 6 & 7 weights
	0.125 oz (3.6 g)	0.04 mg	
	0.25 oz (7.1 g)	0.068 mg	
	0.5 oz (14 g)	0.086 mg	
	1 oz (29 g)	0.092 mg	
	2 oz (57 g)	0.095 mg	
	4 oz (0.12 kg)	0.38 mg	
	8 oz (0.22 kg)	0.64 mg	
	1 lb (0.45 kg)	6.1 mg	
	5 lb (2.3 kg)	21 mg	
	10 lb (4.5 kg)	24 mg	
	20 lb (9.1 kg)	0.2 g	
	25 lb (11 kg)	0.2 g	
	50 lb (23 kg)	0.21 g	
100 lb (45 kg)	0.42 g		

Parameter/Equipment	Range ¹¹	Best Uncertainty ^{2, 10} (\pm)	Comments
Scales and Balances ³ (cont.)	200 lb (91 kg) 300 lb (136 kg) 400 lb (181 kg) 500 lb (227 kg)	0.84 g 1.3 g 1.7 g 2.1 g	Class 6 & 7 weights
Vacuum ³	(0 to 30) inHg	0.04 %	Druck 610
Pressure	(30 to 10 000) psi	0.1 %	Deadweight tester, weights
Pressure ³	(0 to 300) psi (0 to 1000) psi (0 to 5000) psi	0.054 % of full scale	Druck 610
Force, Load Cells ³	(0 to 500) lbf (25 to 3000) lbf (3000 to 5000) lbf (5000 to 10 000) lbf	0.6 lbf 3.9 lbf 5.1 lbf 25 lbf	Load cell, DRO, Dillon tension & compression tester, ASTM E74
Permanent Laboratory and On-Site Indirect Verification of Hardness Testers ³ – Rockwell and Portable Rockwell	(60.5 to 92.0) HRA Low, Middle, High (0 to 100) HRBW Low, Middle, High (20 to 80) HRC Low, Middle, High (40.1 to 86.5) HRD Low, Middle, High (57 to 100) HREW Low, Middle, High (57 to 99.6) HRFW Low, Middle, High	0.21 HRA 0.44 HRBW 0.35 HRC 0.17 HRD 0.51 HREW 0.51 HRFW	Indirect verification per ASTM E18, E110

Parameter/Equipment	Range	Best Uncertainty ^{2, 10} (\pm)	Comments
Permanent Laboratory and On-Site Indirect Verification of Hardness Testers ³ (cont.) – Rockwell and Portable Rockwell	(2.5 to 82.5) HRGW Low, Middle, High (87.0 to 100) HRHW Low, Middle, High	0.92 HRGW 1.2 HRHW	Indirect verification per ASTM E18, E110
Permanent Laboratory and On-Site Indirect Verification of Hardness Testers ³ – Rockwell and Portable Rockwell	(19.6 to 96.5) HRN Low, Middle, High (1.0 to 93.1) HRTW Low, Middle, High (70.0 to 100) HR15W Low, Middle, High	0.54 HRN 0.73 HRTW 0.54 HR15W	Indirect verification per ASTM E18, E110
Permanent Laboratory and On-Site Indirect Verification of Brinell Hardness Testers at Test Condition(s) – 10 mm/3000 kg/15 s	Repeatability: < 225 HBW > 225 to < 650 HBW Error (60 to 950) BHN	0.04 <i>d</i> 0.02 <i>d</i> 1.2 % 2 HBW	Indirect verification method per ASTM E10 <i>d</i> is the mean of the <i>n</i> mean test diameters in millimeters. Uncertainty is stated as a percentage of the standardized test block hardness value.

Parameter/Equipment	Range	Best Uncertainty ^{2, 10} (\pm)	Comments
Permanent Laboratory Direct Verification of Brinell Hardness Testers –			
Verification of the test force ⁷	(500 to 3000) kgf	0.04 %	Direct verification per ASTM E10
Verification of the mean diameter of the indenter	(1 to 10) mm	0.93 μ m	By mechanical comparison
Verification of the device for measuring indentation diameters	(0 to 7) mm	0.005 mm	Direct verification per ASTM E10 By mechanical comparison

V. Thermodynamics

Parameter	Range ¹¹	Best Uncertainty ² (\pm)	Comments
Relative Humidity	33 % RH 75 % RH	3 % RH 3 % RH	ASTM E104 and saturated salts
Liquid-In-Glass Thermometers	(32 to 212) °F	0.6 °F	Comparison to digital thermometer in water bath at fixed points (32 °F and 212 °F)

VI. Time and Frequency

Parameter	Range	Best Uncertainty ² (\pm)	Comments
Timing Devices	(0 to 3600) s	0.1 s	NIST RP 960-12, digital timing standard

-
- ¹ This laboratory offers commercial calibration service and field calibration service, where noted.
- ² “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, to the environment 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 uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty 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 uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC.
- ⁴ L is the length in inches of the unit under test. R is the resolution in inches of the unit under test. D is the diameter in inches of the unit under test.
- ⁵ The dimensional characteristics of the diamond indenter are not verified; these indenters are verified through the performance tests only.
- ⁶ The diameter is measured by mechanical comparison.
- ⁷ Verification of the test force is by load cell per the method of ASTM E4.
- ⁸ Uncertainty stated as the percentage of output plus the percentage of range plus floor.
- ⁹ The uncertainty of the thread wire pertains to a single wire.
- ¹⁰ In the statement of best uncertainty, the value is defined as the percentage of reading, unless otherwise noted.
- ¹¹ Where ranges are not specified, the best measurement uncertainty stated is for the cardinal points only.