The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

ACTION CALIBRATION SERVICES INC.

Cleveland, 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 8 January 2009*).

Presented this 20th day of January 2010.

President & CEO
For the Accreditation Council
Certificate Number 1859.01
Valid to October 31, 2011

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

ACTION CALIBRATION SERVICES
17820 Englewood Dr. #13
Cleveland, OH 44130
Joseph Ruland Phone: 440 234 9300

CALIBRATION

Valid to: October 31, 2011 Certificate Number: 1859.01

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, 5] (±)	Comments
Calipers & Verniers[3]	(0 to 6) in (6 to 36) in	(41 + 7*L*) µin (240 + 5*L*) µin	Gage blocks rod standards
Height Gages[3]	(0 to 6) in (6 to 36) in	(41 + 7*L*) µin (240 + 5*L*) µin	Gage blocks rod standards
Micrometers[3]	(0 to 6) in (6 to 36) in	(41 + 7*L*) µin (240 + 5*L*) µin	Gage blocks rod standards
Dial and Test Indicators[3]	(0 to 2) in	39 µin + 0.6*R*	Gage blocks
Digital Indicators[3]	(0 to 2) in	39 µin + 0.6*R*	Gage blocks
Pin Gages, Class ZZ only	(0.011 to 1) in	70 µin	Digital micrometer

5301 Buckeystown Pike, Suite 350 | Frederick, Maryland 21704-8373 | Phone: 301 644 3248 | Fax: 301 662 2974 | www.A2LA.org

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Rules and Tapes[3]	(0 to 360) in	270 μin/in	Linear standards
PI Tapes[3]	(2 to 72) in diameter	0.01 in	Linear standards
Precision PI Tapes[3]	(2 to 72) in diameter	0.001 in	PI disk
Optical Comparators[3] –			
Linear Accuracy Magnification Angle	(0 to 7) in (10, 20, 50, 62.5, 100, 200) X (0 to 180)º	231 μin 299 μin 0.37 º	Glass scale, rule and steel balls, lens scope
Snap Gages[3]	(0 to 6) in (6 to 24) in	(41 + 7*L*) μin (236 + 7*L*) μin	Gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of Thermocouples[3] –			
Type E	-250 °C to -200 °C -200 °C to -100 °C -100 °C to 600 °C 600 °C to 1000 °C	1.1 °C 1.1 °C 0.74 °C 1.9 °C	Omega CL-27 (calibration of chart recorders, data loggers etc.)
Type J	-210 °C to -100 °C -100 °C to 800 °C 800 °C to 1200 °C	0.83 °C 0.71 °C 0.24 °C	
Type K	-210 °C to -100 °C -100 °C to 400 °C 400 °C to 1200 °C 1200 °C to 1372 °C	1.1 °C 0.87 °C 1.6 °C 2.8 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of Thermocouples[3] (cont.) –			
Type T	-250 °C to -200 °C -200 °C to 0 °C 0 °C to 400 °C	1.6 °C 0.94 °C 0.76 °C	Omega CL-27 (calibration of chart recorders, data loggers etc.)
Electrical Simulation of RTDs[3] –			
RTD 100 Ω 385	-200 °C to 0 °C 0 °C to 400 °C 400 °C to 800 °C	0.69 °C 0.4 °C 0.38 °C	Omega CL-27 (calibration of chart recorders, data loggers etc.)
RTD 1000 Ω 385	-200 °C to 0 °C 0 °C to 400 °C 400 °C to 630 °C	0.69 °C 0.4 °C 0.38 °C	

III. Fluid Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Liquid Flow[3]	(0 to 100) gpm	3 % full scale	Gravimetric

IV. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRB Low Medium High	 1 HRB 1 HRB 1 HRB	ASTM E18

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] (cont.)	HRC Low Medium High HR30N Low Medium High HR30T Low Medium High HR15N Low Medium High HR15T Low Medium High	 1 HRC 1 HRC 0.5 HRC 0.23 HR30N 0.27 HR30N 0.17 HR30N 0.46 HR30T 0.22 HR30T 0.18 HR30T 0.35 HR15N 0.24 HR15N 0.24 HR15N 0.35 HR15T 0.24 HR15T 0.26 HR15T	ASTM E18
Scales & Balances[3]	1 mg to 8 kg (5 to 10) lb (1 to 10) g (10 to 500) g 500 g to 45 kg (10 lb to 1000) lb (1000 to 6250) (6250 to 200 000) lb	2.5 μg/g + 450 μg + 0.6*R* 0.13 % + 0.6*R* 0.09 % + 0.6*R* 0.02 % + 0.6*R* 0.01 % + 0.6*R* 0.01 % + 0.6*R* 0.09 % + 0.6*R* 0.11 % + 0.6*R*	Class 1 weights Class F weights
Pressure Gages, Transducers and Transmitters[3]	(-14.5 to 300) psi (300 to 5000) psi	1.4 psi 1.4 psi	Druck DPI 610, pressure comparison, remote sensor data loggers, chart recorders
Force – Tension and Compression[3]	Up to 20 000 lbf (20 000 to 100 000) lbf	0.01 % 16 lbf	ASTM E4, using Class F weights or load cell Load cell

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Durometers –			ASTM D2240
Scale Accuracy			
Type A, B, C, D, DO, O, OO and OOO	(0 to 100) duros	0.8 duros	
Indentor Geometry			
Length		5 µin	
Diameter		5 µin	
Angle		6 arc min	

V. Thermodynamics

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thermometers[3] –	Ambient to 300 °C	0.29 °C	Dry block calibrator monitored with an RTD thermometer
Fixed Points	-78.5 °C	0.29 °C	Dry-ice/alcohol bath monitored with an RTD
	0 °C	0.22 °C	Water ice bath monitored with an RTD
Relative Humidity – Measure[3]	10 % to 95 % RH	2.8 % RH	Psychrometer, digital RH meter
Ovens, Furnaces and Freezers[3]	-100 °C to 210 °C	0.6 °C	Single point measurements with an Omega CL-27 and RTD
	210 °C to 1200 °C	0.4 °C	ASTM E145 survey, HP 34970A

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thermocouple and RTD Calibration[3]	-78 °C to 350 °C	0.37 °C	PRT comparison
Infrared Thermometers[3]	50 °C to 150 °C	1.4 ºC	Hart 9135 IR calibrator

VI. Time and Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Digital/Mechanical Tachometer[3]	(40 to 99 999) rpm	0.1 % + 1 LSD	Direct reflective pickup tachometer
Timers and Stopwatches[3]	15 s to 24 hr	0.12 s	Reference stopwatch, NISTIME 32

---

[1] This laboratory offers commercial calibration services and field calibration services.

[2] Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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, the value is defined as the percentage of reading.

[5] In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches

and *R* is the numerical value of the resolution of the device in microinches.