THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

ACTION CALIBRATION SERVICES INC.
Cleveland, OH

for technical competence in the field of

Calibration

The accreditation covers the specific calibrations listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "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.

Presented this 26th day of February 2004.

American Association for Laboratory Accreditation
Corporate SEAL 1978 District of Columbia
A2LA

President
For the Accreditation Council
Certificate Number 1859.01
Valid to October 31, 2005

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999
& ANSI/NCSL Z540-1-1994

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

CALIBRATION

Valid to: October 31, 2005 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. Time and Frequency

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

II. Dimensional

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Calipers & Verniers	(0 to 36) in	(290 + 140*L*) µin	Gage blocks, rod standards; *L* is the length in inches.
Height Gages	(0 to 36) in	(110 + 140*L*) µin	Gage blocks; *L* is the length in inches.

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Micrometers – Outside Inside Depth	 (0 to 36) in (0 to 36) in (0 to 36) in	 (72 + 140*L*) µin (58 + 140*L*) µin (34 + 140*L*) µin	Gage blocks, rod standards; *L* is the length in inches.
Dial and Test Indicators	(0 to 2) in	160 µin	Gage blocks
Digital Indicators	(0 to 2) in	0.025 % + 1 LSD	Gage blocks
Pin Gages	(0.011 to 1.00) in	160 µin	Digital micrometer
Rules and Tapes	(0 to 360) in	(13 000 + 2300*L*) µin	Gage blocks, linear standards; *L* is the length in feet.
PI Tapes	(2 to 72) in diameter	0.010 in	Linear standards
Precision PI Tapes	(2 to 72) in diameter	0.001 in	PI disk

III. Mechanical

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers	(30 to 100) HRB (20 to 68) HRC	1.2 HRB 1.2 HRC	ASTM E18
Indirect Verification of Brinell Hardness Testers	(16 to 600) HBW	5 HBW	ASTM E10

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
"Indirect Verification" of Durometers	Shore A and D, (0 to 100) units	N/A	Test blocks (rubber or spring type) used for checking durometer opertation are not to be relied upon as calibration standards. The direct verification procedures in ASTM D2240 are the only valid calibration methods. However, this check is offered as a service to customers who choose not to check their durometer themselves.
Scales & Balances[3]	1 mg to 32 kg (0.005 to 400 000) lb	--- ---	Class 1 & F weights
Pressure Gages, Transducers and Transmitters	(-14.5 to 300) psi (300 to 5000) psi	1.4 psi 1.4 psi	Druck DPI 610 Pressure comparison
Force – Tension and Compression	Up to 40 000 lbf (10 to 100 000) lbf	0.01 % reading 0.01 % reading	ASTM E4, E74, calibrated using Class F weights Load cell

IV. Fluid Quantities

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Flow Indicators (Water)	(0 to 100) gpm	3 % FS	Gravimetric determination
Mass Flow (Volumetric) - Liquid	(0 to 50 slpm) (106 scfh)	3 % FS	Scale, Stopwatch Mass comparison

V. Thermodynamic

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Liquid-in-Glass Thermometers	-50 °C to 300 °C	0.8 °C	Digital calibrator (RTD probe, dry block calibrator)
Relative Humidity	10 % to 95 % non-condensing 11 % to 75 %	2 % 1.4 %	Psychrometer Digital RH meter Saturated salts
Chart Recorders and Data Loggers[4]	0 °C to 300 °C, (0 to 5000) psi	2 % full scale	Omega CL-27 Temperature and pressure calibration; applies only to chart recorders and data loggers with remote sensors
Ovens, Furnaces, Freezers	210 °C to 1200 °C	0.4 °C	HP 34970A Uniformity survey per ASTM E145
Measurement of Thermocouple Output –			Omega CL-27; Thermocouple error not included
Type E	-250 °C to -100 °C -100 °C to 1000 °C	0.66 °C 0.36 °C	
Type J	-210 °C to -100 °C -100 °C 1200 °C	0.66 °C 0.36 °C	
Type K	-210 °C to -100 °C -100 °C to 1372 °C	0.66 °C 0.36 °C	
Type T	-250 °C to -200 °C -200 °C 400 °C	0.66 °C 0.36 °C	

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Measurement of RTD Resistance –			Omega CL-27
RTD 100 Ω 385	-200 °C to 0 °C 0 °C to 800 °C	0.66 °C 0.36 °C	
RTD 1000 Ω 385	-200 °C to 0 °C 0 °C to 630 °C	0.66 °C 0.36 °C	

VI. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Thermocouple Simulation –			Omega CL-27; Electrical calibration of thermocouple indicator
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	
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	
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	

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
RTD Simulation –			Omega CL-27
RTD 100 Ω 385	-200 °C to 0 °C 0 °C to 400 °C 400 °C to 800 °C	0.69 °C 0.40 °C 0.38 °C	
RTD 1000 Ω 385	-200 °C to 0 °C 0 °C to 400 °C 400 °C to 630 °C	0.69 °C 0.40 °C 0.38 °C	

[1] This laboratory offers commercial calibration services and on-site calibration services.

[2] Best Uncertainties represent expanded uncertainties using a coverage factor $k = 2$ which provides a level of confidence of approximately 95 %. The uncertainties achievable on a customer's site can 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.

[3] The uncertainty of scale verification is highly dependent on local conditions such as the resolution of the scale. Any statement of best uncertainty would therefore be misleading. The class of the best weights used by the laboratory is shown in the Comments column.

[4]On-site calibration service is available for this calibration. 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."