THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

AMERICAN INSTRUMENT CORPORATION

Hartland, WI

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 18th day of March 2009.

President
For the Accreditation Council
Certificate Number: 1354.01
Valid to: December 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 Z540-1994

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CALIBRATION

Valid To: December 31, 2010 Certificate Number: 1354.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Chemical

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
pH Meters and Sensors[3]	(4, 7, 10) pH	0.026 pH	MV and temperature, calibration standard buffers

II. Dimensional

Parameter/Equipment	Range	Best Uncertainty[2, 4] (±)	Comments
Micrometers –			
Inside	(0 to 40) in	(28 + 5*L*) µin	Gage blocks
Depth	(0 to 12) in	(28 + 5*L*) µin	Gage blocks
Outside	(0 to 40) in	(28 + 5*L*) µin	Gage blocks
Calipers	(0 to 40) in	(52 + 5*L*) µin	Gage blocks

Parameter/Equipment	Range	Best Uncertainty[2, 4] (±)	Comments
Depth Gages	(0 to 8) in	(52 + 5*L*) μin	Gage blocks

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
DC Voltage[3] – Calibration of Carbon Sensors, Panel Meter, Recorders, & Controllers	(-20 to 200) mV (-2 to 20) mV	0.12 mV 3 mV	ISOCAL 9000+
DC Current[3] – Calibration of Carbon Sensors, Panel Meter, Recorders, & Controllers	(-5 to 30) mA	1.3 μA	ISOCAL 9000+
Electrical Calibration of RTD Indicators[3] – Recorders, Controllers & Calibrators			
Pt 100 Ω	(-330 to 1570) °F	0.25 °F	ISOCAL 9000+
Electrical Calibration of Thermocouple Indicators[3] – Recorders, Controllers & Calibrators			
Type B Type C Type D Type E	140 °F to 3310 °F 32 °F to 4180 °F 32 °F to 4180 °F -454 °F to 1840 °F	1.5 °F 0.95 °F 1.2 °F 0.56 °F	ISOCAL 9000+

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Electrical Calibration of Thermocouple Indicators[3] – Records, Controllers, & Calibrators (cont)			
Type G	32 °F to 4180 °F	1.2 °F	ISOCAL 9000+
Type J	-350 °F to 2200 °F	0.52 °F	
Type K	-256 °F to 2300 °F	0.62 °F	
Type N	-450 °F to 2380 °F	0.52 °F	
Type R	-60 °F to 3200 °F	1.4 °F	
Type S	-60 °F to 3200 °F	1.4 °F	
Type T	-454°F to 760 °F	0.37 °F	

IV. Mechanical

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] & Rockwell Superficial Hardness[3]	HRA:		Indirect verification method per ASTM E18
	Low	0.48 HRA	
	Med	0.38 HRA	
	High	0.34 HRA	
	HRB:		
	Low	0.70 HRB	
	Med	0.74 HRB	
	High	0.56 HRB	
	HRC:		
	Low	0.38 HRC	
	Med	0.35 HRC	
	High	0.34 HRC	
	HRE:		
	Low	0.59 HRE	
	Med	0.62 HRE	
	High	0.75 HRE	

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] & Rockwell Superficial Hardness[3] (cont)	HRF:		Indirect verification method per ASTM E18
	Low	0.53 HRF	
	Med	0.53 HRF	
	High	0.53 HRF	
	HRK:		
	Low	0.75 HRK	
	Med	0.69 HRK	
	High	0.71 HRK	
	HR15N:		
	Low	0.31 HR15N	
	Med	0.34 HR15N	
	High	0.31 HR15N	
	HR30N:		
	Low	0.49 HR30N	
	Med	0.37 HR30N	
	High	0.48 HR30N	
	HR45N:		
	Low	0.50 HR45N	
	Med	0.28 HR45N	
	High	0.30 HR45N	
	HR15T:		
	Low	0.54 HR15T	
	Med	0.40 HR15T	
	High	0.48 HR15T	
	HR30T:		
	Low	0.62 HR30T	
	Med	0.40 HR30T	
	High	0.49 HR30T	
	HR45T:		
	Low	0.69 HR45T	
	Med	0.48 HR45T	
	High	0.48 HR45T	

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Indirect Verification of Brinell Hardness Testers at Test Condition[3](s):			Indirect verification method per ASTM E10
10/500/15 10/1500/15 10/3000/15	Repeatability <225 HBW >225 HBW	 0.01*d* 0.01*d*	 *d* is the mean of the *n* mean test diameters in millimeters.
	Error	0.66 %	Uncertainty is stated as a percentage of the standardized test block hardness value
Direct Verification of Brinell Hardness Testers[3] –			Direct verification method per ASTM E10
Verification of the Test Force	(500, 1500, 3000) kgf	0.25 %	Verification of the test force is by proving ring per the method of ASTM E4
Verification of the Mean Diameter of the Indenter	(5, 10) mm	0.0023 mm	By mechanical comparison
Verification of the Device for Measuring Indentation Diameters	(0 to 6) mm	0.003 mm	Stage micrometer
Indirect Verification of Equotip (Leeb) Hardness Testers[3]	750 LD	17 LD	ASTM A956

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Indirect Verification of Microindentation Hardness Testers[3] –			
Knoop and Vickers	Repeatability under forces P (gf):		Indirect verification method per ASTM E384
	$1 \leq P < 500$		
	250 < HK ≤ 650 240 < HV ≤ 600	0.8 %	Best uncertainty is stated as the repeatability as defined in E384
	HK > 650 HV > 600	1.6 %	
	$500 \leq P < 1000$		
	250 ≤ HK ≤ 650 240 ≤ HV ≤ 600	1 %	
	HK>650 HV>600	1 %	Best uncertainty is stated as a percent error or error as defined in E384
	Error	0.45 %	
Knoop Only	(200 to 700) HK	2.8 HK	
Vickers Only			
>1 kgf	(200 to 700) HV	3.9 HV	
<1 kgf	(200 to 700) HV	4.6 HV	
RPM[3] – Calibration of Tachometer	(0 to 12 000) RPM	5.9 RPM	ISOCAL 9000+
Calibration of Photohelic[3], Magnehelic[3] and Environmental[3] Gauge	(0 to 100) inH_20	0.023 inH_20	Dwyer 477A manometer

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
Foundry Sand Test Equipment[3] –			
Core Scratch Hardness Tester	(0 to 100) in	0.10 in	Standard test block Flat surface test
Green Sand Hardness Tester	(0 to 100) B & C	0.05 in	Flat surface test
Permmeter	(0 to 500) perms	0.68 perms	Perm standard
Sand Rammer		0.012 in	Certified caliper, impact rings
Sand Strength Tester	(0 to 500) psi	3.2 psi	Certified load cell
Moisture Teller	(0 to 400) ºF	2.4 ºF	Temperature calibrator
Friability Tester	60 s	1.6 s	Certified stop watch
AFS Clay Tester	(0 to 10) min	1.6 s	Certified stop watch

V. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty[2] (±)	Comments
IR Temperature[3]	(50 to 932) °F	3 °F	Hart 9132 black body Calibration of IR indicator
	(2000 to 3200) °F	5 °F	EN DT260 Pyrometer w/ ML thermocouple

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

[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] In the statement of best uncertainty, L is the numerical value of the nominal length of the device measured in inches.