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

AMERICAN INSTRUMENT CORPORATION
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CALIBRATION

Valid until: December 31, 2012 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	CMC[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	CMC[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	CMC[2, 4] (±)	Comments
Depth Gages	(0 to 8) in	(52 + 5*L*) µin	Gage blocks

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[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	Martel M3001
DC Current[3] – Calibration of Carbon Sensors, Panel Meters, Recorders, & Controllers	(-5 to 30) mA	1.3 µA	Martel M3001
Electrical Calibration of RTD Indicators[3] – Recorders, Controllers & Calibrators			
Pt 100 Ω	(-330 to 1570) ºF	0.25 ºF	Martel M3001
Electrical Calibration of Thermocouple Indicators[3] – Recorders, Controllers, & Calibrators			
Type B	(140 to 3310) ºF	1.5 ºF	Martel M3001
Type C	(32 to 4180) ºF	0.95 ºF	
Type D	(32 to 4180) ºF	1.2 ºF	
Type E	(-454 to 1840) ºF	0.56 ºF	
Type G	(32 to 4180) ºF	1.2 ºF	
Type J	(-350 to 2200) ºF	0.52 ºF	
Type K	(-256 to 2300) ºF	0.62 ºF	
Type N	(-450 to 2380) ºF	0.52 ºF	
Type R	(-60 to 3200) ºF	1.4 ºF	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouple Indicators[3] – Recorders, Controllers, & Calibrators (cont)			
Type S	(-60 to 3200) ºF	1.4 ºF	Martel M3001
Type T	(-454 to 760) ºF	0.37 ºF	

IV. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers & Rockwell Superficial Hardness[3]	HRA:		Indirect verification method per ASTM E18
	Low	0.42 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	
	HRF:		
	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	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers & Rockwell Superficial Hardness[3] (cont)	HR15N: Low Med High HR30N: Low Med High HR45N: Low Med High HR15T: Low Med High HR30T: Low Med High HR45T: Low Med High	 0.31 HR15N 0.34 HR15N 0.31 HR15N 0.49 HR30N 0.37 HR30N 0.48 HR30N 0.50 HR45N 0.28 HR45N 0.30 HR45N 0.54 HR15T 0.40 HR15T 0.48 HR15T 0.62 HR30T 0.40 HR30T 0.49 HR30T 0.69 HR45T 0.48 HR45T 0.48 HR45T	Indirect verification method per ASTM E18
Indirect Verification of Brinell Hardness Testers at Test Condition(s)[3]: 10/500/15 10/1500/15 10/3000/15	 Repeatability <225 HBW >225 HBW Error	 0.01*d* 0.01*d* 0.66 %	Indirect verification method per ASTM E10 *d* is the mean of the *n* mean test diameters in millimeters Uncertainty is stated as a percentage of the standardized test block hardness value

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
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
Indirect Verification of Microindentation Hardness Testers[3] –			
Knoop and Vickers	Repeatability under forces *P* (gf):		Indirect verification method per ASTM E384
	$1 \leq P < 500$		
	$250 < HK \leq 650$ $240 < HV \leq 600$	0.8 %	Best uncertainty is stated as the repeatability as defined in E384
	$HK > 650$ $HV > 600$	1.6 %	
	$500 \leq P < 1000$		
	$250 \leq HK \leq 650$ $240 \leq HV \leq 600$	1 %	
	$HK > 650$ $HV > 600$	1 %	Best uncertainty is stated as a percent error or error as defined in E384
	Error	0.45 %	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Microindentation Hardness Testers[3] – (cont)			
Knoop Only	(200 to 700) HK	2.8 HK	Indirect verification method per ASTM E384
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+ or Tenma digital tachometer
Calibration of Photohelic, Magnehelic and Environmental Gauge[3]	(0 to 100) inH_2O	0.023 inH_2O	Dwyer 477A manometer
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	CMC[2] (±)	Comments
IR Temperature[3]	(50 to 900) ºF	3 ºF	Hart 9132 black body calibration of IR indicator or Raytek IR temperature gun

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

[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, L is the numerical value of the nominal length of the device measured in inches.

[5] In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.

The American Association for Laboratory Accreditation

World Class 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 23rd day of March 2011.

President & CEO
For the Accreditation Council
Certificate Number 1354.01
Valid to December 31, 2012

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