SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

AMERICAN INSTRUMENT CORPORATION
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CALIBRATION

Valid To: December 31, 2020 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, 5]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meters & Sensors[3]	(4, 7, 10) pH	0.024 pH	MV & temperature, calibration standard buffers

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Generate	(0 to 100) mV (0 to 1) V (0 to 10) V	0.007 mV 0.075 mV 0.5 mV	Fluke 525B
DC Voltage[3] – Measure	(0 to 75) mV (0 to 10) V	0.0077 mV 0.46 mV	Fluke 8845A
DC Current[3] – Generate	(0 to 100) mA	0.0058 mA	Fluke 525B

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Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Current[3] – Measure	(0 to 50) mA	0.035 mA	Fluke 8845A
Resistance[3] – Generate	(5 to 400) Ω (5 to 4) kΩ	0.016 Ω 0.35 Ω	Fluke 525B
Resistance[3] – Measure	(1 to 100) Ω (100 to 1) MΩ	(1.1 % - 0.07) Ω (0.005 + 1.2 %) Ω	Fluke 8845A
Electrical Calibration of RTD Indicators[3] – Recorders, Controllers & Calibrators			
Pt 385, 100 Ω	(-200 to 800) ºC	0.14 ºC	Fluke 525B
Pt 385, 1000 Ω	(-200 to 630) ºC	0.17 ºC	

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Electrical Calibration of Thermocouple Indicators[3] – Recorders, Controllers, & Calibrators			
Type B	(600 to 800) ºC (800 to 1000) ºC (1000 to 1550) ºC (1550 to 1820) ºC	0.55 ºC 0.46 ºC 0.47 ºC 0.53 ºC	Fluke 525B
Type C	(0 to 150) ºC (150 to 650) ºC (650 to 1000) ºC (1000 to 1800) ºC (1800 to 2316) ºC	0.35 ºC 0.31 ºC 0.37 ºC 0.58 ºC 0.97 ºC	
Type J	(-210 to -100) ºC (-100 to -30) ºC (-30 to 150) ºC (150 to 760) ºC (760 to 1200) ºC	0.32 ºC 0.24 ºC 0.20 ºC 0.21 ºC 0.28 ºC	
Type K	(-270 to -100) ºC (-100 to -25) ºC (-25 to 120) ºC (120 to 1000) ºC (1000 to 1372) ºC	0.39 ºC 0.27 ºC 0.20 ºC 0.31 ºC 0.47 ºC	
Type N	(-270 to -100) ºC (-100 to -25) ºC (-25 to 120) ºC (120 to 410) ºC (410 to 1300) ºC	0.47 ºC 0.29 ºC 0.23 ºC 0.22 ºC 0.32 ºC	
Type R	(-50 to 250) ºC (250 to 400) ºC (400 to 1000) ºC (1000 to 1750) ºC	0.68 ºC 0.41 ºC 0.39 ºC 0.47 ºC	
Type S	(0 to 250) ºC (250 to 1000) ºC (1000 to 1400) ºC (1400 to 1750) ºC	0.65 ºC 0.42 ºC 0.44 ºC 0.54 ºC	
Type T	(-270 to -150) ºC (-150 to 0) ºC (0 to 120) ºC (120 to 400) ºC	0.73 ºC 0.29 ºC 0.20 ºC 0.18 ºC	

III. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers & Rockwell Superficial Hardness[3]	HRA: Low Middle High HRBW: Low Middle High HRC: Low Middle High HREW: Low Middle High HRKW: Low Middle High HR15N: Low Middle High HR30N: Low Middle High HR45N: Low Middle High HR15TW: Low Middle High HR30TW: Low Middle High	 0.30 HRA 0.20 HRA 0.17 HRA 0.45 HRBW 0.28 HRBW 0.39 HRBW 0.44 HRC 0.34 HRC 0.32 HRC 0.37 HREW 0.19 HREW 0.50 HREW 0.54 HRKW 0.54 HRKW 0.39 HRKW 0.44 HR15N 0.42 HR15N 0.52 HR15N 0.36 HR30N 0.47 HR30N 0.55 HR30N 0.52 HR45N 0.50 HR45N 0.24 HR45N 0.27 HR15TW 0.27 HR15TW 0.47 HR15TW 0.57 HR30TW 0.22 HR30TW 0.27 HR30TW	Indirect verification method per ASTM E18

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Rockwell Hardness Testers & Rockwell Superficial Hardness[3] (cont)	HR45TW: Low Middle High	 0.72 HR45TW 0.47 HR45TW 0.40 HR45TW	Indirect verification method per ASTM E18
Partial Direct Verification of Rockwell Hardness Testers[3] –			ASTM E18, ISO 6508
Verification of the Test Force	(3 to 150) kgf	(0.82 + 0.16 %) kgf	Verification of the test force is by load cell per the method of ASTM E4
Verification of the Depth – Measuring Device	(0 to 260) µm	0.0065 mm	
Indirect Verification of Brinell Hardness Testers at Test Condition(s)[3] –			
HBW 10/500/15 HBW 10/1500/15 HBW 10/3000/15	(20 to 150) HBW (45 to 700) HBW (45 to 700) HBW	1.5 HBW 6.5 HBW 4.9 HBW	Indirect verification method per ASTM E10
Direct Verification of Brinell Hardness Testers[3] –			Direct verification method per ASTM E10, E110, ISO 6506
Verification of the Test Force	≤ 3000 kgf	(0.72 + 0.082 %) kgf	Verification of the test force is by load cell per the method of ASTM E4
Verification of the Device for Measuring Indentation Diameters	(0 to 7) mm	0.0083 mm	Stage micrometer

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Equotip (Leeb) Hardness Testers[3]	750 LD	16 LD	ASTM A956
Indirect Verification of Microindentation Hardness Testers[3] –			
Knoop	(25 to 2000) HK	(3.7 + 0.007 %) HK	Indirect verification method per ASTM E384
Vickers	(25 to 2000) HV	(2.1 + 0.014 %) HV	
Partial Direct Verification of Microindentation Hardness Testers[3] – (Vickers and Knoop)			ASTM E384, ISO 6507
Verification of the Test Force	(50 to 1000) gf	(0.16 + 0.11 %) gf	Verification of the test force is by load cell per the method of ASTM E4
Verification of the Device for Measuring Indentation Diagonals	(0 to 7) mm	0.0083 mm	Stage micrometer
Partial Direct Verification of Macroindentation Hardness Testers[3] – (Vickers)			ASTM E384, ISO 6507
Verification of the Test Force	(1 to 120) kg	(0.83 + 0.13 %) kg	Verification of the test force is by load cell per the method of ASTM E4
Verification of the Device for Measuring Indentation Diagonals	(0 to 7) mm	0.0083 mm	Stage micrometer

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Torque Wrenches[3]	(5 to 250) in·lbf	(0.029 + 1.4 %) in lbf	Torque calibrator
Pressure Gauges[3]	(0 to 1) psi (1 to 30) psi (30 to 500) psi	0.005 psi 0.088 psi 0.29 % psi	Pressure calibrator
RPM[3] – Calibration of Tachometer	(0 to 10 000) RPM	(0.58 + 0.065 %) RPM	Fluke 8845A
Calibration of Photohelic, Magnehelic & Environmental Gauge[3]	(0 to 100) in·H_2O	0.28 in·H_2O	Dwyer 477A manometer
Foundry Sand Test Equipment[3] –			
Core Scratch Hardness Tester	Up to 100 in	0.94 in	Standard test block, flat surface test
Green Sand Hardness Tester	(0 to 100) B & C	0.056 in	Flat surface test
Permmeter	(0 to 500) perms	0.94 perms	Perm standard
Sand Rammer	--------	0.012 in	Certified caliper, impact rings
Sand Strength Tester	(0 to 500) psi	(0.71 + 2.3 %) psi	Certified load cell
Moisture Teller	(0 to 400) ºF	0.59 ºF	Temperature calibrator

IV. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
IR Temperature – Measure[3]	(125 to 900) ºF	(3.3 + 0.86 %) ºF	Raytek ST60
Temperature – Measure[3]	(200 to 1000) ºC (1000 to 1372) ºC	1.1 ºC 2.5 ºC	Martel PTC-1010 with a type K thermocouple
Liquid-in-Glass Thermometers & Temperature Measuring Devices[3]	(0 to 100) ºC	0.25 ºC	Constant temperature bath, certified sensor
Relative Humidity – Measure	(10 to 95) % RH (33 and 74) % RH	2.1 % RH 2.5 % RH	Rotronics HygroClip2 Salt Solutions
Climatic – Freezers, Refrigerators, Incubators, Ovens, and Furnaces			
Type K	(0 to 1372) °C	0.58 ºC	Martel MC1010 with precision thermocouples
Type N	(0 to 1372) °C	0.47 ºC	
Thermal Processing Equipment – System Accuracy Test (SAT)			(AMS2750, AIAG CQI-9)
Type N	(0 to 1372) °C	0.47 ºC	Martel MC1010 with precision thermocouples
Type T	(-250 to 400) °C	0.7 ºC	
Thermal Processing Equipment – Temperature Uniformity Surveys (TUS)	(0 to 1372) °C	(1.3 + 1.9 %) ºC	(AMS2750, AIAG CQI-9) Recorder with type K thermocouple

V. Time & Frequency

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Frequency – Measure[3]	(1.0 to 1000) Hz	(0.12 - 0.01 %) Hz	Fluke 8845A
Frequency – Measuring Equipment[3]	(1.0 to 1000) Hz	0.0058 Hz	MHS-5200A

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

[2] Calibration and Measurement Capability Uncertainty (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. CMCs 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, percentages are to be read as percent of reading, unless otherwise noted.

[5] This scope meets A2LA's *P112 Flexible Scope Policy*.

[6] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[7] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

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 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 April 2017*).

Presented this 12th day of February 2019.

Senior Director, Accreditation Services
For the Accreditation Council
Certificate Number 1354.01
Valid to December 31, 2020

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