Accredited Laboratory

A2LA has accredited

CAL-RITE CORPORATION

Naperville, IL

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 9th day of February 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 866.01
Valid to October 31, 2022

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

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

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CALIBRATION

Valid To: October 31, 2022 Certificate Number: 0866.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 7]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Displacement Length Indicators[3] (Drop, Test and LVDT)	Up to 4 in (> 4 to 12) in	7*L* + 29 µin 12*L* + 20 µin	Gage blocks, digital micrometer head
Extensometers/COD Gage/Deflectometers[3]			ASTM E83 and ISO 9513;
Gage lengths 2 in and below	Up to 0.02 in (> 0.02 to 2.0) in	14 µin 0.20% * L	Gage blocks, extensometer calibrator; uncertainties listed in displacement
Gage lengths > 2 to 25 in	(> 2 to 25) in	70*L* + 35 µin	Gage blocks
Gage Length	Up to 8 in	0.0017 in	Caliper
Microscopes[3] – Displacement	Up to 1 in Up to 25.4 mm	55 µin 1.4 µm	ASTM E1951 stage micrometers
Alignment System Calibration	100 µe 500 µe 1000 µe 2000 µe 3000 µe	1.4 µe 1.5 µe 1.6 µe 1.9 µe 2.2 µe	Strain indicator calibrator

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 5, 6] (±)	Comments
DC Voltage – Generate Electrical Calibration of Load Indicators	± (0 to 4.4) mV/V	0.000014 mV/V	Precision simulator
Electrical Simulation of Thermocouple Indicating Devices	Type E (-250 to 1000) °C Type N (-200 to 1300) °C Type J (-210 to 1200) °C Type K (-270 to 1372) °C Type T (-250 to 400) °C	0.70 °C	Fluke 743B

III. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Scales and Balances[3]	(1 to 200) mg 300 mg 500 mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg 10 kg 20 kg (0.001 to 0.1) lb (> 0.1 to 2) lb (> 2 to 600) lb	0.023 mg 0.038 mg 0.038 mg 0.041 mg 0.039 mg 0.047 mg 0.047 mg 0.065 mg 0.080 mg 0.14 mg 0.14 mg 0.22 mg 0.38 mg 0.90 mg 0.90 mg 2.5 mg 9.5 mg 8.3 mg 14 mg 65 mg 70 mg 6.5×10^{-7} lb 0.000021 lb 0.0010 %	Euramet cg-18

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Mass Measure	(1 to 200) mg 300 mg 500 mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g 200 g 205 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg 5.1 kg 10 kg 11.8 kg 20 kg 25 kg 30 kg 32.1 kg	0.016 mg 0.026 mg 0.026 mg 0.027 mg 0.027 mg 0.029 mg 0.030 mg 0.037 mg 0.043 mg 0.068 mg 0.071 mg 0.12 mg 0.21 mg 0.22 mg 0.60 mg 0.58 mg 1.8 mg 6.7 mg 6.0 mg 9.5 mg 9.5 mg 47 mg 47 mg 50 mg 55 mg 120 mg 120 mg	Mass comparator, mass standards
Force[3] – Measure			
Tension and Compression by Deadweight with Local Gravity and Air Bouyancy Corrections	(0.001 to 125) lbf	0.0020 %	ASTM E4 and ISO 7500-1
Comparison to Load Cell in Compression	(1 to 1 000 000) lbf	0.25 %	ASTM E4 within the Class A working range, ISO 7500-1 within the Class 1 working range
Comparison to Load Cell in Tension	(1 to 250 000) lbf	0.25 %	

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Force[3] – Measuring Equipment (Tension and Compression)			Force calibrations include:
Calibration by Deadweight with Local Gravity and Air Buoyancy Corrections	(0.0044 to 500) lbf	0.0018 %	ASTM E74: within Class AA working range
Comparison to Load Cell in Compression	(146 to 1000) lbf (1055 to 10 000) lbf (7561 to 100 000) lbf	0.0074 % + 0.067 lbf 0.012 % + 0.070 lbf 0.011 % + 2.1 lbf	ISO 376: within Class 00, 0.5 and 1 working ranges
Comparison to Load Cell in Tension	(329 to 1000) lbf (1000 to 2000) lbf (2000 to 10 000) lbf (7056 to 100 000) lbf	0.0058 % + 0.1 lbf 0.0058 % + 0.23 lbf 0.012 % + 1.3 lbf 0.010 % + 2.6 lbf	
Verification of Test Frames[3] –			
Specimen Alignment (50 to 10 000) lbf	(100 to 3000) με	0.86 % + 11 με	ASTM E1012 alignment calibration system
Crosshead Displacement	(0 to 2) in (2 to 25) in	250 μin 0.23 %	ASTM E2309 digital indicator cable extension transducer
Crosshead Speed	(0 to 20) in/min	0.33 %	ASTM E2658 cable extension transducer with stopwatch
Strain Rate	(0.0005 to 0.007) in/in/min	0.00012 in/in/min	Calibrated extensometer within ASTM Class B1 range and stopwatch
Load Rate	(50 to 600 000) lb/min	0.35 %	Class A Load cell and stopwatch

Parameter/Equipment	Range	CMC[2, 4,5] (±)	Comments
Pressure Gauges[3]	(0 to 3000) psi	0.54 psi	Pressure calibrator
Hardness Testers[3] – Rockwell	HRA: (20 to 65) HRA (70 to 78) HRA (80 to 84) HRA HRBW: (40 to 59) HRBW (60 to 79) HRBW (80 to 100) HRBW HRC: (20 to 30) HRC (35 to 55) HRC (60 to 65 HRC HREW: (70 to 79) HREW (84 to 90) HREW (93 to 100) HREW HRFW: (60 to 75) HRFW (80 to 90) HRFW (94 to 100) HRFW HRGW: (30 to 50) HRGW (55 to 75) HRGW (80 to 94) HRGW HRHW: (80 to 94) HRHW (94 to 100)HRHW HRKW: (40 to 60) HRKW (65 to 80) HRKW (85 to 100) HRKW HRMW: Low High	 0.50 HRA 0.39 HRA 0.34 HRA 0.72 HRBW 0.72 HRBW 0.61 HRBW 0.45 HRC 0.44 HRC 0.43 HRC 0.63 HREW 0.65 HREW 0.57 HREW 0.55 HRFW 0.55 HRFW 0.61 HRFW 0.59 HRGW 0.48 HRGW 0.49 HRGW 0.61 HRHW 0.48 HRHW 0.54 HRKW 0.51 HRKW 0.46 HRKW 0.62 HRMW 0.59 HRMW	Indirect verification per ASTM E18

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Hardness Testers[3] – Rockwell (cont)	HRLW:		Indirect verification per ASTM E18
	Low	0.58 HRLW	
	High	0.48 HRLW	
	HRRW:		
	(100 to 120) HRRW	0.61 HRRW	
	HR15TW:		
	(74 to 80) HR15TW	0.63 HR15TW	
	(81 to 86) HR15TW	0.65 HR15TW	
	(87 to 93) HR15TW	0.48 HR15TW	
	HR30TW:		
	(43 to 56) HR30TW	0.58 HR30TW	
	(57 to 69) HR30TW	0.55 HR30TW	
	(70 to 83) HR30TW	0.55 HR30TW	
	HR45TW:		
	(13 to 32) HR45TW	0.58 HR45TW	
	(33 to 52) HR45TW	0.61 HR45TW	
	(53 to 73) HR45TW	0.62 HR45TW	
	HR15N:		
	(70 to 77) HR15N	0.49 HR15N	
	(78 to 88) HR15N	0.62 HR15N	
	(90 to 92) HR15N	0.45 HR15N	
	HR30N:		
	(42 to 50) HR30N	0.70 HR30N	
	(55 to 73) HR30N	0.62 HR30N	
	(77 to 82) HR30N	0.54 HR30N	
	HR45N:		
	(20 to 31) HR45N	0.49 HR45N	Indirect verification per ASTM E18 rev-05e1
	(37 to 61) HR45N	0.57 HR45N	
	(66 to 72) HR45N	0.52 HR45N	
	HR15WW:		
	Low	0.58 HR15WW	
	High	0.53 HR15WW	
	HR30WW:		
	Low	0.80 HR30WW	
	High	0.65 HR30WW	

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Hardness Testers[3] – Rockwell (cont)	HR15YW: Low High HR15TS: (74 to 80) HR15TS (81 to 86) HR15TS (87 to 93) HR15TS HR30TS: (43 to 56) HR30TS (57 to 69) HR30TS (70 to 83) HR30TS HR30BS: (40 to 59) HR30BS (60 to 79) HR30BS (80 to 100) HR30BS	 0.53 HR15YW 0.55 HR15YW 0.70 HR15TS 0.70 HR15TS 0.46 HR15TS 0.57 HR30TS 0.55 HR30TS 0.47 HR30TS 0.75 HR30BS 0.71 HR30BS 0.64 HR30BS	Indirect verification per ASTM E18 rev-05e1
Hardness Testers – Brinell HBW 10/3000/15 HBW 10/3000/30 HBW 10/1500/15 HBW 10/1000/10 HBW 5/750/30 HBW 10/500/5 HBW 2.5/187.5/30 HBW 2.5/62.5/10	 (95 to 650) HBW (96 to 650) HBW (48 to 327) HBW (32 to 218) HBW (96 to 650) HBW (16 to 109) HBW (96 to 650) HBW (32 to 218) HBW	 7.3 HBW 4.1 HBW 1.7 HBW 1.8 HBW 11 HBW 4.3 HBW 9.9 HBW 6.4 HBW	Indirect verification method per ISO 6506-2, ASTM E10

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Hardness Testers – Brinell (cont) Direct Verification of Brinell Hardness Testers			Indirect verification method per ISO 6506-2, ASTM E10
Direct Verification of the Test Force	(62.5, 187.5, 500, 750, 1000, 1500, 3000) kgf	0.25 %	Load cells within ASTM E4 Class A working range
Verification of the Brinell Scope[5]	(0 to 10) mm Type A and Type B	1.4 µm	Stage micrometer
Verification of test cycle	Up to 15 sec	0.08 sec	Stopwatch
Leeb Hardness Testers[3]	759 HLD	9.6 HLD	ASTM A956
Microindentation Hardness Testers (Knoop and Vickers)[3] –			
For Loads Less than 1000 g	(100 to 250) HK (250 to 650) HK > 650 HK (100 to 240) HV (240 to 600) HV > 600 HV	1.0 % HK 1.1 % HK 1.1 % HK 1.1 % HV 0.9 % HV 0.8 % HV	Indirect verification method per ASTM E384
For Loads Greater than 1000 g	Low HV Mid HV High HV	1.2 % HV 1.2 % HV 1.2 % HV	
X-Y Stage	(0 to 1) inch (0 to 25.4) mm	53 µin 1.4 µm	Stage micrometer

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Indirect Verification of Charpy Impact Testers[3]			
Specimen Evaluation	Low Energy Mid Energy High Energy	1.2 J 2.8 J 5.0 J	ISO 148-2
Specimen Temperature Bath Verification	-40 °C	0.25 °C	Precision thermometer
Direct Verification of Charpy Impact Testers[3]			
Anvil to Anvil Measure	40 mm	0.042 mm	ASTM E23 and ISO 148-2; Caliper and telescope gage
Center Strike Measure	20 mm	0.17 mm	Caliper
Charpy Base Level	0°	0.14°	Precision level
Charpy Bolt Torque	(30 to 150) lbf*ft	5.1 %	Torque wrench

IV. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Temperature Measure[3]	(-80 to 590) ºC	0.09 ºC	Fluke 1529 with 5628 PRT
	(0 to 1000) ºC	1.0 ºC 2.0	Fluke 743B with Type K TC
Humidity Measure[3]	(11 to 95) % RH	0.86 % RH	Vaisala HMP77B

V. Time

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Time[3]	(0 to 24) hrs	0.04 sec/24 hrs	Timometer

[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. 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 percent of reading unless otherwise indicated.

[5] Uncertainties may differ depending on the performance of artifact being measured at the time of calibration and the resolution of the device under test.

[6] 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.

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