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

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II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 5, 7] (±)	Comments
DC Voltage – Generate[3]	Up to 220 mV > 220 mV to 2.2 V (> 2.2 to 11) V (> 11 to 22) V (> 22 to 220) V (> 220 to 1100) V	10 µV/V + 0.4 µV 6 µV/V + 0.7 µV 4 µV/V + 2.5 µV 7 µV/V + 4.0 µV 6 µV/V + 40 µV 8 µV/V + 400 µV	Fluke 5730A
DC Voltage – Measure[3]	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	13 µV/V + 0.3 µV 13 µV/V + 0.3 µV 14 µV/V + 0.5 µV 14 µV/V + 40 µV 14 µV/V + 100 µV	Agilent 3458A opt 002
DC Current – Generate[3] Clamp Meters	< 220 µA 220 µA to 2.2 mA (> 2.2 to 22) mA (> 22 to 220) mA > 220 mA to 2.2 A (20 to 120) A (0 to 1000) A	0.005 % + 6 nA 43 µA/A + 7 nA 45 µA/A + 40 nA 52 µA/A + 0.7 nA 0.01 % + 12 nA 0.02 % + 10 mA 1.7 % + 900 mA	Fluke 5730A Fluke 52120A Fluke 5500 50-turn coil, Fluke 5730A with Fluke 52120A
DC Current – Measure[3]	10 µA to 10 mA (10 to 100) mA (0.1 to 1) A	31 µA/A + 0.05 µA 37 µA/A + 0.5 µA 0.012 % + 10 µA	Agilent 3458A opt 002

Parameter/Equipment	Range	CMC[2, 4, 5, 7] (±)	Comments
Resistance – Generate[3]			
Fixed Points	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	100 µΩ/Ω 98 µΩ/Ω 24 µΩ/Ω 25 µΩ/Ω 11 µΩ/Ω 11 µΩ/Ω 9 µΩ/Ω 8 µΩ/Ω 8 µΩ/Ω 8 µΩ/Ω 10 µΩ/Ω 11 µΩ/Ω 15 µΩ/Ω 21 µΩ/Ω 42 µΩ/Ω 54 µΩ/Ω 0.02 %	Fluke 5730A
Variable	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	43 µΩ/Ω + 0.01 Ω 33 µΩ/Ω + 0.02 Ω 30 µΩ/Ω + 0.02 Ω 30 µΩ/Ω + 0.02 Ω 30 µΩ/Ω + 0.02 Ω 31 µΩ/Ω + 0.2 Ω 30 µΩ/Ω + 0.1 Ω 31 µΩ/Ω + 1 Ω 30 µΩ/Ω + 1 Ω 34 µΩ/Ω + 10 Ω 38 µΩ/Ω + 10 Ω 62 µΩ/Ω + 150 Ω 130 µΩ/Ω + 250 Ω 260 µΩ/Ω + 2.5 kΩ 510 µΩ/Ω + 3 kΩ 3.0 kµΩ/Ω + 100 kΩ 15 kµΩ/Ω + 500 kΩ	Fluke 5522A
Resistance – Measure[3]	(0.1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (0.1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ	24 µΩ/Ω + 50 µΩ 20 µΩ/Ω + 0.5 mΩ 13 µΩ/Ω + 0.5 mΩ 13 µΩ/Ω + 5 mΩ 13 µΩ/Ω + 50 mΩ 19 µΩ/Ω + 5 Ω 64 µΩ/Ω + 200 Ω 0.060 % + 1 kΩ	Agilent 3458A opt 002

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of Thermocouple Indicators[3] –			
Type J	(-210 to -140) °C (-140 to 760) °C	0.32 °C 0.32 °C	Xitron 2000
Type K	(-140 to 1372) °C	0.33 °C	
Type T	(-200 to 100) °C (100 to 400) °C	0.32 °C 0.32 °C	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage – Generate[3]			
(0 to 2.2) mV	(10 to 40) Hz	0.03 % + 4 µV	
	20 Hz to 40 kHz	0.03 % + 4 µV	
	(0.04 to 20) kHz	0.02 % + 4 µV	
	(20 to 50) kHz	0.03 % + 4 µV	
	(50 to 100) kHz	0.06 % + 5 µV	
	(100 to 300) kHz	0.11 % + 10 µV	
	(300 to 500) kHz	0.15 % + 20 µV	
	(0.5 to 1) MHz	0.28 % + 20 µV	
(2.2 to 22) mV	(10 to 20) Hz	0.03 % + 4 µV	
	(20 to 40) Hz	0.02 % + 4 µV	
	(0.04 to 20) kHz	0.01 % + 4 µV	
	(20 to 50) kHz	0.03 % + 4 µV	
	(50 to 100) kHz	0.06 % + 5 µV	
	(100 to 300) kHz	0.13 % + 10 µV	
	(300 to 500) kHz	0.79 % + 20 µV	
	(0.5 to 1) MHz	0.83 % + 20 µV	

III. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Torque Wrenches[3] – Measure	(10 to 100) lbf·in (30 to 300) lbf·in (25 to 500) lbf·ft (500 to 2000) lbf·ft	1 % 2 % 1 % 2 %	Sturtevant Richmont system 5AC AKO TSD6000-3
Scales & Balances[3]	(100 to 200) g 200 g to 2 kg (2 to 10) kg (25 to 50) lb (50 to 100) lb (100 to 300) lb	2.2 mg 200 mg 1 g 0.014 lb 0.031 lb 0.071 lb	Verification with NIST S & ASTM Class 1 weights Verification with NIST Class F weights
Pressure Gauges & Transducers –			
Hydraulic	(5 to 15 000) psig	0.04 %	
Pneumatic	(-14.5 to 15) psig (-14.5 to 300) psig	0.02 % of F.S. 0.016 %	

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[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.

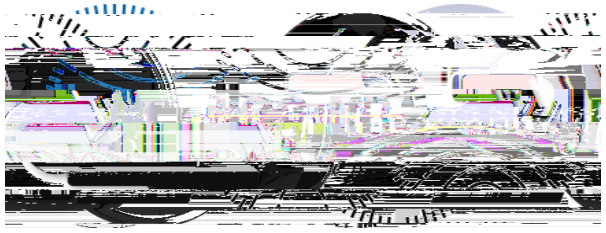
[5] Based on using the standard at the temperature the Agilent 3458A was calibrated (tcal ± 5°C) and an auto calibration (ACAL) was performed within the previous 24 hours (±1°C of ambient temperature). The CMC is expressed as either a specific value that covers the full range, a combination of the fraction of the reading/output plus a range specification, or as a combination of the fraction of the reading/output plus a fraction of the range specification. For factory traceability to NIST, add 5 µA/A additional error to AC/DC Current and 2 µV/V additional error for AC Voltage.

[6] In the statement of CMC, *L* represents the nominal length of the device in inches; *R* represents the resolution of the device in microinches.

[7] The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

[8] 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.

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



A2LA has accredited

ELEMENT MATERIALS TECHNOLOGY HUNTSVILLE

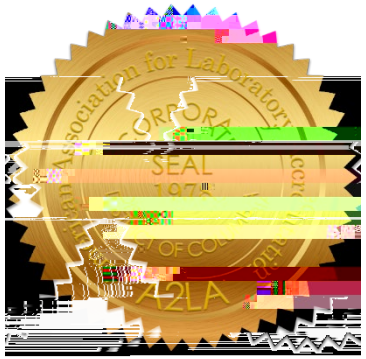
Huntsville, AL

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/NCSLZ540-1-1994 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 F4(mo)15 (0.2017 4()117 4F7011 f0002 Tc 0.07 w F2.o4f1 i*



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