



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

A&P Calibrations, Inc.
6920 Koll Center Parkway, Suite 223
Pleasanton, CA 94566

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 28 April 2023

Certificate Number: AC-1540



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
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).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AND

ANSI/NCSL Z540-1-1994 (R2002)

A&P Calibrations, Inc.

6920 Koll Center Parkway, Suite 223
Pleasanton, CA 94566
Cara Rich 925-417-6608

CALIBRATION

Valid to: **April 28, 2023**

Certificate Number: **AC-1540**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹	Up to 330 mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1 000) V	0.83 mV 13 µV 0.4 mV 6 mV 0.52 V	Fluke 5522A Multiproduct Calibrator
DC Voltage – Measure ¹	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	52 µV 16 µV 10 µV 0.13 mV 0.41 mV	Agilent 3458A 8.5 Digit Multimeter
DC Current – Source ¹	Up to 330 µA (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1) A	0.12 mA 0.19 mA 0.21 mA 2.2 mA 12 mA	Fluke 5522A Multiproduct Calibrator
DC Current – Measure ¹	Up to 100 nA (0.1 to 1) µA (1 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	0.89 nA 59 nA 25 µA 11 µA 68 µA 0.23 mA 0.12 mA	Agilent 3458A 8.5 Digit Multimeter



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source/Measure ¹	10 Hz to 500 kHz Up to 33 mV (33 to 330) mV (0.33 to 3.3) V	1.4 mV 13 mV 0.12 V	Fluke 5522A Multiproduct Calibrator, Agilent 3458A 8.5 Digit Multimeter
	10 Hz to 100 kHz (3.3 to 33) V (33 to 330) V	0.25 V 0.81 V	
	45 Hz to 10 kHz (330 to 1 000) V	1.2 V	
AC Current – Source/Measure ¹	10 Hz to 30 kHz (30 to 330) μ A (0.33 to 3.3) mA (3.3 to 33) mA	5.8 μ A 47 μ A 0.28 mA	Fluke 5522A Multiproduct Calibrator, Agilent 3458A 8.5 Digit Multimeter
	10 Hz to 13 kHz (33 to 330) mA	8 mA	
	10 Hz to 10 kHz (0.33 to 1) A	39 mA	
	(10 to 60) Hz (1 to 3) A	0.22 A	Fluke 5522A Multiproduct Calibrator, Fluke 321 AC Clamp Meter, 50-turn Coil
	(45 to 60) Hz (3 to 11) A	0.28 A	
Resistance – Source/Measure ¹	1 Ω to 1 k Ω 1 k Ω to 1 M Ω 1 M Ω to 1 G Ω	0.13 Ω 2 m Ω 2.7 Ω	Fluke 5522A Multiproduct Calibrator, Agilent 3458A 8.5 Digit Multimeter
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type J (-196 to 1 000) $^{\circ}$ C	0.44 $^{\circ}$ C	Fluke 5522A Multiproduct Calibrator
	Type K (-196 to 1 000) $^{\circ}$ C	0.37 $^{\circ}$ C	
	Type T (-100 to 400) $^{\circ}$ C	0.63 $^{\circ}$ C	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Balances ^{1,2}	Up to 1 g (1 to 10) g (10 to 60) g	5.4 µg 0.69 µg/g 4.3 µg/g	ASTM E617 Class 1 Weights and internal calibration procedure utilized in the calibration of the weighing system.
	60 g to 30 kg	10 µg/g	NIST Class F Weights and internal calibration procedure utilized in the calibration of the weighing system.
Liquid Flow Meters ¹ (Fixed Points)	0.1 lpm 0.5 lpm 1 lpm 10 lpm 20 lpm 24 lpm	0.000 35 lpm 0.000 63 lpm 0.001 19 lpm 0.001 41 lpm 0.001 18 lpm 0.000 75 lpm	Sartorius CP34001S Electronic Balance characterized with master weights.
Pressure Devices ¹	(0.1 to 300) psig (300 to 1 000) psig	0.015 % of reading + 0.008 6 psi 0.015 % of reading + 0.012 psi	Ruska Fluke 7252i Dual Channel Pressure Controller/Calibrator
Pipettes and Other Volumetric Devices ¹	2 µl 5 µl 10 µl 20 µl 50 µl 100 µl 200 µl 300 µl 1 ml 2 ml 5 ml 10 ml 20 ml	40 nl 60 nl 60 nl 80 nl 80 nl 0.22 µl 0.29 µl 0.58 µl 2.9 µl 4.1 µl 8.3 µl 11 µl 32 µl	Mass Balances, ASTM E617 Class 1 Weights, Pipette Checker Software and Volumetric/Gravimetric Methods utilized in the calibration of the device.

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Devices ¹	0 °C	0.04 °C	Water Triple Point Cell

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Devices ¹	-80 °C 100 °C	0.03 °C 0.03 °C	Comparison to PRT, Hart 1521 Thermometer, Hart 2562 and 2565 Black Stacks, Scanner Module
	(-196 to 400) °C	0.07 °C	Comparison to Hart 5628 SPRT, Hart 1594A Super Thermometer
Humidity Devices ¹	(15 to 80) % RH	2 % RH	Comparison to Rotronic HC2S Humidity Probe

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1540.



R. Douglas Leonard Jr., VP, PILR SBU