CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

A&P Calibrations, Inc.

6920 Koll Center Parkway, Suite 223
Pleasanton, CA 94566

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

and national standards

ANSI/NCSL Z540-1-1994 (R2002)

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of activities to which this accreditation applies

AC-1540
Certificate Number

ANAB Approval

Certificate Valid Through: 04/28/2021
Version No. 006 Issued: 03/13/2019

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).

ANSI National Accreditation Board

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 Phone: 925-417-6608

CALIBRATION

Valid to: **April 28, 2021** 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 330 mV to 3.3V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	0.83 mV 13 µV 0.4 mV 6 mV 0.52 V	Fluke 5520A Multi Product Calibrator
DC Voltage - Measure [1]	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to1 kV	52 µV 16 µV 10 µV 0.13 mV 0.41 mV	Agilent 3458A Multimeter
DC Current - Source [1]	Up to 330 µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1 A	0.12 mA 0.19 mA 0.21 mA 2.2 mA 12 mA	Fluke 5520A Multi Product Calibrator
DC Current - Measure [1]	Up to 100 nA 100 nA to 1 µA (1 to 100) µA 100 µA to 1 mA (1to 10) mA (10 to 100) mA 100 mA to 1 A	0.89 nA 59 nA 25 µA 11 µA 68 µA 0.23 mA 0.12 mA	Agilent 3458A Multimeter

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 10 Hz to 500 kHz 10 Hz to 500 kHz 10 Hz to 100 kHz 10 Hz to 100 kHz 45 Hz to 10 kHz	 Up to 33 mV (33 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	 1.4 mV 13 mV 0.12 V 0.25 V 0.81 V 1.2 V	Fluke 5520A Multi Product Calibrator with Agilent 3458A Multimeter
AC Current - Source & Measure [1] 10 Hz to 30 kHz 10 Hz to 30 kHz 10 Hz to 30 kHz 10 Hz to 13 kHz 10 Hz to 10 kHz	 (30 to 330) µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1 A	 5.8 µA 47 µA 0.28 mA 8 mA 39 mA	Fluke 5520A Multi Product Calibrator with Agilent 3458A Multimeter
AC Current - Source & Measure [1] (10 to 60) Hz (45to 60) Hz	 (1 to 3) A (3 to 11) A	 0.22 A 0.28 A	Fluke 5520A Multi Product Calibrator with Fluke 321 AC Clamp and 50 Turn Coil
Resistance – Source Fixed Point [1]	10 MΩ	1.6 kΩ	Fluke 5520A Multi Product Calibrator, Megger CB101, AEMC BR07 Decade Resistor
Electrical Simulation of Thermocouples - Source & Measure [1]	Type J (-196 to 1 000) °C Type K (-196 to 1 000) °C Type T (-100 to 400) °C	 0.44 °C 0.37 °C 0.63 °C	Fluke 5520A Multi Product Calibrator

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Pressure [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

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
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	0.04 µL 0.06 µL 0.06 µL 0.08 µL 0.08 µL 0.22 µL 0.29 µL 0.58 µL 2.9 µL 4.1 µL 8.3 µL 11 µL 32 µL	Volumetric and Gravimetric Calibration Referenced to Mass Balances, ANSI/ASTM E617 Mass Standards, and Pipette Checker Software
Balances [1]	Up to 10 mg (10 to 100) mg 100 mg to 1 g (1 to 10) g (10 to 30) g (30 to 40) g (40 to 60) g	0.19 mg 0.19 mg 0.19 mg 0.38 mg 0.19 mg 0.19 mg 0.19 mg	Class 1 Weights

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Temperature [1]	(-196 to 400) °C	0.07 °C	Hart Scientific 5628 SPRT, Hart Scientific 1590 Super-Thermometer, Hart 2562 and 2565 Black Stack, Scanner Module, PRT Hart Scientific 1521 Meter, Triple Point
Humidity[1]	(15 to 80) %RH	2 %RH	Rotronic Model HC2S Humidity Probe

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency - Measure [1,2]	1 Hz to 20 MHz	6×10^{-5} Hz/Hz	Agilent 5316A/B Counters

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. f represents the measured frequency value.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1540.

Vice President