CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board/ACLASS
500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Palen Kimball, LLC
1717 University Ave West
St. Paul, MN 55104

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

ISO/IEC 17025:2005

while demonstrating technical competence in the field(s) of

CALIBRATION

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1814
Certificate Number

ACLASS Approval

Certificate Valid 10/31/2013-10/31/2015
Version No. 001 Issued: 10/14/2013

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. 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 January 2009*).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994

Palen Kimball, LLC

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CALIBRATION

Valid to: October 31, 2015 Certificate Number: AC - 1814

I. Electromagnetic-DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage[2] - Source	Up to 220 mV 220 mV to 1 100 V	2.3 µV/V + 1.6 µV 1.95 µV/V + 0.20 mV	Fluke 5700A	OEM-Sourced and Laboratory Developed Procedures
DC Voltage[2] - Measure	Up to 220 mV 220 mV to 1 100 V (1 to 10) kV (10 to 100) kV	17 µV/V + 1.6 µV 17 µV/V + 0.20 mV 0.53 mV/V 1.7 mV/V	Keithley 2002 L&N 7190A Weston 9858	
DC Current[2] - Source	10 µA to 2 A (2 to 11) A	0.16 mA/A + 0.10 µA 0.66 mA/A	Fluke 5700A Fluke 5520A	
DC Current[2]- Measure	(10 to 100) A (100 to 2 500) A	0.47 mA/A 1.5 mA/A	Keithley 2002; L&N 4221, 4222, 4020B, 4025B, 4030B, 4040B Wolf Reichsanstalt 0.0001 Ω, 0.001 Ω, & 0.01 Ω, Weston 9992	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance[2] - Source	10 Ω to 10 MΩ	7.0 µΩ/Ω	L&N Standard Resistors	OEM-Sourced and Laboratory Developed Procedures
Resistance[2] - Measure	Up to 2 MΩ (2 to 11) MΩ (11 to 110) MΩ 110 MΩ to 1.1 GΩ	0.10 mΩ/Ω + 0.24 mΩ 0.20 mΩ/Ω 804 µΩ/Ω 8480 µΩ/Ω	Keithley 2002	
AC Voltage[2] - Source	**2.2 mV to 220 V** 40 Hz to 20 kHz (20 to 50) kHz (50 to 300) kHz **220 V to 1.1 kV** 50 Hz to 1 kHz	 0.16 mV/V + 10 µV 0.53 mV/V + 10 µV 1.7 mV/V + 30 µV 0.48 mV/V	Fluke 5700A	
AC Voltage[2] - Measure at 60 Hz	1 to 10 kV 10 to 100 kV	2.5 mV/V 6.6 mV/V	Fluke 189, S-702 Keithley 2002, Weston 9858	
AC Current[2] - Source	**9 µA to 220 mA** 40 Hz to 1 kHz 10 Hz to 5 kHz **220 mA to 2.2 A** 40 Hz to 1 kHz **(2.2 to 11) A** 45 to 500 Hz **(10 to 1 000) A** 60 Hz	 0.33 mA/A + 0.4 µA 1 mA/A + 8 µA 0.26 mA/A + 8 µA 1.2 mA/A + 4 mA 0.71 mA/A	Fluke 5700A Fluke 5520A L&N 7180A Keithley 2002	
AC Current[2] - Measure	**9 µA to 220 mA** 50 Hz to 1 kHz 20 Hz to 10 kHz **220 mA to 2.2 A** 50 Hz to 1 kHz **(2.0 to 10) A** 20 Hz to 10 kHz **(10 to 1 000) A** 60 Hz	 0.18 mA/A + 0.4 µA 0.47 mA/A + 8 µA 0.30 mA/A + 8 µA 0.69 mA/A + 4 mA 0.38 mA/A	Keithley 2002 L&N 7180A	

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PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance[2] - Source	1 nF at 1 kHz 190 pF to 3.3 nF 3.3 nF to 11 µF 11 µF to 11 mF (11 to 33) mF (33 to 110) mF	32 µF/F 0.75 mF/F + 0.01 nF 0.38 mF/F + 0.1 nF 0.69 mF/F + 10 µF 1.14 mF/F + 30 µF 1.7 mF/F + 0.10 mF	ESI SC 1000, Fluke 5520A GR1404A, GR 1403D, GR1615P1, GR1615A, Gertsch CRB-2B	OEM-Sourced and Laboratory Developed Procedures
Capacitance[2] - Measure at 1 kHz	1 pF to 10 µF	0.012 mF/F	GenRad 1615A	
Inductance[2] Source at 1kHz	100 µH to 10 H	0.081 mH/H	GenRad 1482B, 1482E, 1482H, 1482L, 1482P, 1632A	
Inductance[2] - Measure	10 µH to 10 H	0.18 mH/H	GenRad 1632A	
Power[2] - Source at 60 Hz	20 W to 20 kW	2 mW/W	Fluke 5520A	
Electrical Simulation & Measure of Thermocouple Indicators[2]	**Type J** (-210 to 1 200) °C **Type K** (-200 to 1 372) °C **Type T** (-250 to 400) °C **Type E** (-200 to 1 000) °C	0.27 °C 0.45 °C 0.72 °C 0.45 °C	Fluke 5520A	
Electrical Simulation of RTDs[2]	**Pt 385 (100 Ω)** -200 °C to 630 °C **Pt 385 (200 Ω)** -200 °C to 630 °C **Pt 3926 (100 Ω)** -200 °C to 630 °C **Pt 3916 (100 Ω)** -200 °C to 630 °C	0.18 °C 0.24 °C 0.18 °C 0.37 °C	Fluke 5520A	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Oscilloscopes[2] Amplitude Square wave 45 Hz to 1 kHz	2.6 mV to 66 V	4.1 mV/V + 0.15 mV	Fluke 5520A/SC1100	OEM-Sourced and Laboratory Developed Procedures
Leveled Sine Wave Amplitude (50kHz reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	30 mV/V + 0.50 mV 66 mV/V + 0.50 mV 61 mV/V + 0.50 mV		
Flatness (50 kHz reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	3.0 mV/V + 0.50 mV 6.0 mV/V + 0.50 mV 66 mV/V + 0.50 mV 61 mV/V + 0.50 mV		
Time Marker into 50 Ω Load-Source	5 s to 100 ms 50 ms to 2 µs 1 µs to 2 ns	15 µs/s + 1 mHz 5.1 µs/s + 15 mHz 4.4 µs/s		
Rise Time	< 2 ns	< 451 ps		

II. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature[2] - Measure	(-20 to 100) °C	0.06 ºC	Hart 1504 with 5610 Thermistor	OEM-Sourced and Laboratory Developed Procedures
	(-200 to 420) °C	0.02 ºC	Azonix A11011, Burns Engineering 12001 PRT	
Humidity[2]	(0 to 90) %RH	1.4 %RH	Vaisala HM70, HMP77B probe	

III. Time and Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency[2]	60 kHz 1MHz 10 MHz	0.000065 µHz/Hz 0.000065 µHz/Hz 0.000065 µHz/Hz	WWVB Phase Chart Recorder, GPS Disciplined Oscillator	OEM-Sourced and Laboratory Developed Procedures

IV. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure and Vacuum Gages[2]	Up to 10 in H_2O Up to 100 psia Up to 300 psi Up to 7 500 psi Up to 30 in Hg (-15 to 30) psig Up to 500) psig (-5 to 5) psig Up to 100 psig Up to 500 psig Up to 10 000 psig	0.01 in H_2O 0.07 psi 0.2 psi 5.0 psi 0.04 in Hg 0.04 psi 0.25 psi 0.003 psi 0.054 psi 0.41 psi 8.4 psi	Pressure Calibrator and Modules, Fluke, Heise, Ametek, Druck Model PM620	OEM-Sourced and Laboratory Developed Procedures

V. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Calipers[2]	Up to 24 in	(0.6R + 11L) µin	Gage Blocks	OEM-Sourced and Laboratory Developed Procedures
Micrometers[2]	Up to 24 in	(0.6R + 11L) µin		

Notes:

1. *Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.*
2. *This scope also applies to calibration services on-site at customer-designated locations. 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. .*
3. *In the statement of Calibration and Measurement Capability, L is the numerical value of the nominal length of the device measured in inches; R is the numerical value of the resolution of the device in microinches.*
4. *This scope is part of and must be included with the Certificate of Accreditation No AC-1814.*

Vice-President

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