PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc., has assessed the Laboratory of:

Precision Measurements
20 Hagerty Road, Suite 1
West Chester, PA 19382

(Hereinafter called the Organization) and hereby declares that Organization 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 (as outlined by the joint ISO-ILAC-IAF Communiqué dated January 2009):

Electrical, Time & Frequency, Thermodynamic,
Mass, Force & Weighing Device and Dimensional Calibration
(As detailed in the supplement)

Such testing and/or calibration services shall only be offered at or from the address given above. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

The validity of this certificate is mandated through ongoing surveillance.

Tracy Szerszen
President/Operations Manager

Perry Johnson Laboratory
Accreditation, Inc. (PJLA)
26555 Evergreen, Suite 1325
Southfield, Michigan 48076

Initial Accreditation Date:	*Issue Date:*	*Revision Date:*	*Expiration Date:*
June 26, 2008	June 26, 2008	February 13, 2009	June 27, 2010

Accreditation No.	*Certificate No:*	*Page No:*
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Certificate of Accreditation: Supplement

Precision Measurements
20 Hagerty Road, Suite 1
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Accreditation is granted to this facility to perform the following calibrations:

Electrical

MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Electrical Calibration of RTD's Pt 395, 100 Ω	-200 °C to -80 °C	0.05 °C	Fluke 5520A/SC600
	-80 °C to 0 °C	0.05 °C	
	0 °C to 100 °C	0.07 °C	
	100 °C to 300 °C	0.09 °C	
	300 °C to 400 °C	0.10 °C	
	400 °C to 630 °C	0.12 °C	
	630 °C to 800 °C	0.23 °C	
Electrical Calibration of RTD's Pt 3926, 100 Ω	-196 °C to -80 °C	0.05 °C	Fluke 5520A/SC600
	-80 °C to 0 °C	0.05 °C	
	0 °C to 100 °C	0.07 °C	
	100 °C to 300 °C	0.09 °C	
	300 °C to 400 °C	0.10 °C	
	400 °C to 630 °C	0.12 °C	
Electrical Calibration of RTD's Pt 3916, 100 Ω	-196 °C to -190 °C	0.25 °C	Fluke 5520A/SC600
	-190 °C to -80 °C	0.04 °C	
	-80 °C to 0 °C	0.05 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 260 °C	0.07 °C	
	260 °C to 300 °C	0.08 °C	
	300 °C to 400 °C	0.09 °C	
	400 °C to 600 °C	0.10 °C	
	600 °C to 630 °C	0.23 °C	
Electrical Calibration of RTD's Pt 385, 200 Ω	-196 °C to -80 °C	0.04 °C	Fluke 5520A/SC600
	-80 °C to 0 °C	0.04 °C	
	0 °C to 100 °C	0.04 °C	
	100 °C to 260 °C	0.05 °C	
	260 °C to 300 °C	0.12 °C	
	300 °C to 400 °C	0.13 °C	
	400 °C to 600 °C	0.14 °C	
	600 °C to 630 °C	0.16 °C	

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Electrical Calibration of RTD's Pt 385, 500 Ω	-196 °C to -80 °C	0.04 °C	Fluke 5520A/SC600
	-80 °C to 0 °C	0.05 °C	
	0 °C to 100 °C	0.05 °C	
	100 °C to 260 °C	0.06 °C	
	260 °C to 300 °C	0.08 °C	
	300 °C to 400 °C	0.08 °C	
	400 °C to 600 °C	0.09 °C	
	600 °C to 630 °C	0.11 °C	
Electrical Calibration of RTD's Pt 385, 1kΩ	-196 °C to -80 °C	0.03 °C	Fluke 5520A/SC600
	-80 °C to 0 °C	0.03 °C	
	0 °C to 100 °C	0.04 °C	
	100 °C to 260 °C	0.05 °C	
	260 °C to 300 °C	0.06 °C	
	300 °C to 400 °C	0.07 °C	
	400 °C to 600 °C	0.07 °C	
	600 °C to 630 °C	0.23 °C	
Electrical Calibration of RTD's Ni 120, 120 Ω	-80 °C to 0 °C	0.08 °C	Fluke 5520A/SC600
	0 °C to 100 °C	0.08 °C	
	100 °C to 260 °C	0.14 °C	
Electrical Calibration of RTD's Cu 427, 10 Ω	-100 °C to 260 °C	0.30 °C	Fluke 5520A/SC600
DC Voltage – Generate	1.0 V to 10 V	170 µV/V	Fluke 5520A/SC600 DC Voltage – Generate
	10 V to 100 V	2.2 mV/V	
	100 V to 1 000 V	22 mV/V	
DC Voltage-Measure	0 mV to 100 mV	6.2 µV/V + 0.3 µV	HP 3458A
	0.1 V to 1 V	5.2 µV/V + 0.3 µV	
	1 V to 10 V	5.2 µV/V + 0.5 µV	
	10 V to 100 V	7.3 µV/V + 0.3 µV	
	100 V to 1 050 V	7.3 µV/V + 110 µV +12 (Vin/1 000)2 µV/V	

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DC Voltage-Measure	10 kV to 20 kV	2.3 % of reading	Fluke 80K-40 with HP 3458A
	20 kV to 35 kV	1.5 % of reading	
	35 kV to 40 kV	2.3 % of reading	
DC Current – Generate	1 A to 20.5 A	0.18 %	Fluke 5520A/6
DC Current – Measure	100 pA to 100 µA	24 µA/A + 0.8 nA	HP 3458A with Weston shunt
	0.1 mA to 1 mA	24 µA/A + 5 nA	
	1 mA to 10 mA	24 µA/A 50 nA	
	10 mA to 100 mA	41 µA/A + 0.5 µA	
	0.1 A to 1 A	0.013 % + 10 µA	
	1 A to 600 A	0.29 % of reading	
DC Resistance – Generate	0 Ω to 10 Ω	450 µΩ/Ω + 0.001 Ω	Fluke 5520A/SC600
	10 Ω to 100 Ω	3.3 mΩ/Ω + 0.001 4 Ω	
	100 Ω to 1 kΩ	30 mΩ/Ω + 0.002 Ω	
	1 kΩ to 10 kΩ	0.30 Ω/Ω + 0.02 Ω	
	100 kΩ to 1 000 kΩ	0.037 % + 2 Ω	
	1 MΩ to 10 MΩ	0.015 % + 50 Ω	
	10 MΩ to 100 MΩ	0.072 % + 3 000 Ω	
DC Resistance- Measure	0.1 Ω to 10 Ω	19 µΩ/Ω + 0.05 mΩ	HP 3458A
	10 Ω to 100 Ω	15 µΩ/Ω+ 0.5 mΩ	
	0.1 kΩ to 1 kΩ	13 µΩ/Ω+ 0.5 mΩ	
	1 kΩ to 10 kΩ	13 µΩ/Ω+ 5 mΩ	
	10 kΩ to 100 kΩ	13 µΩ/Ω+ 0.05 Ω	
	0.1 MΩ to 1 MΩ	24 µΩ/Ω+ 2 Ω	
	1 MΩ to 10 MΩ	65 µΩ/Ω+ 100 Ω	
	10 MΩ to 100 MΩ	0.058 % + 1 kΩ	
	0.1 GΩ to 1.2 GΩ	0.58 % + 10 k Ω	

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AC Voltage – Generate 45 Hz to 10 kHz	1 mV to 330 mV	0.026 %	Fluke 5520A/6
	330 mV to 3.3 V	0.054 %	
	3.3 V to 33 V	0.026 %	
	33 V to 330 V	0.042 %	
AC Voltage- Measure 3 µV to 10 mV	1 Hz to 40 Hz	0.03 % + 3 µV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	0.02 % + 1.1 µV	
	1 kHz to 20 kHz	0.03 % + 1.1 µV	
	20 kHz to 50 kHz	0.12 % + 1.1 µV	
	50 kHz to 100 kHz	0.58 % + 1.1 µV	
	100 kHz to 300 kHz	4.6 % + 2 µV	
AC Voltage- Measure 10 mV to 100 mV	1 Hz to 40 Hz	80 µV/V + 4 µV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	80 µV/V + 2 µV	
	1 kHz to 20 kHz	0.02 % + 2 µV	
	20 kHz to 50 kHz	0.03 % + 2 µV	
	50 kHz to 100 kHz	0.09 % + 2 µV	
	100 kHz to 300	0.35 % + 10 µV	
	0.3 MHz to 1 MHz	1.2 % + 10 µV	
	1 MHz to 2 MHz	1.7 % + 10 µV	
AC Voltage- Measure 0.1 V to 1 V	1 Hz to 40 Hz	80 µV/V + 40 µV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	80 µV/V + 20 µV	
	1 kHz to 20 kHz	0.02 % + 20 µV	
	20 kHz to 50 kHz	0.03 % + 20 µV	
	50 kHz to 100 kHz	0.09 % + 20 µV	
	100 kHz to 300	0.35 % + 100 µV	
	0.3 MHz to 1 MHz	1.2 % + 100 µV	
	1 MHz to 2 MHz	1.7 % + 100 µV	

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AC Voltage- Measure 1 V to 10 V	1 Hz to 40 Hz	80 µV/V + 0.4 mV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	80 µV/V + 0.2 mV	
	1 kHz to 20 kHz	0.02 % + 0.2 mV	
	20 kHz to 50 kHz	0.03 % + 0.2 mV	
	50 kHz to 100 kHz	0.09 % + 0.2 mV	
	100 kHz to 300	0.35 % + 1 mV	
	0.3 MHz to 1 MHz	1.2 % + 1 mV	
	1 MHz to 2 MHz	1.7 % + 1 mV	
AC Voltage- Measure 10 V to 100 V	1 Hz to 40 Hz	0.02 % + 4 mV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	0.02 % + 4 mV	
	20 kHz to 50 kHz	0.04 % + 2 mV	
	50 kHz to 100 kHz	0.14 % + 2 mV	
	100 kHz to 300	0.46 % + 10 mV	
	0.3 MHz to 1 MHz	1.7 % + 10 mV	
AC Voltage- Measure 100 V to 700 V	1 Hz to 40 Hz	0.05 % + 40 mV	HP 3458 A Synchronous sub-sampled mode
	40 Hz to 1 kHz	0.05 % + 20 mV	
	1 kHz to 20 kHz	0.07 % + 20 mV	
	20 kHz to 50 kHz	0.14 % + 20 mV	
Electrical Simulation of Thermocouple Indicators Type J Fluke 5520A/6	-210°C to 1 200°C	0.34°C	
Electrical Simulation of Thermocouple Indicators Type K Fluke 5520A/6	-200°C to 1 372°C	0.49°C	
Electrical Simulation of Thermocouple Indicators Type T Fluke 5520A/6	-250°C to 400°C	0.74°C	

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Phase Modulation-Measure 200 Hz to 10 kHz	150 kHz to 10 MHz	4 % of reading + 1 digit	HP 8902A w/ 11793A
	10 MHz to 1.3 GHz	3 % of reading + 1 digit	
Phase Modulation-Measure 200 Hz to 20 kHz	1.3 GHz to 26.5 GHz	4 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	150 kHz to 10 MHz	2 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 20 Hz to 10 kHz Depths: to 99 %	150 kHz to 10 MHz	3 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 50 Hz to 50 kHz Depths: 5 % to 99 %	10 MHz to 1.3 GHz	1 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 20 Hz to 100 kHz Depths: to 99 %	10 MHz to 1.3 GHz	3 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 20 Hz to 100 kHz Depths: 5 % to 99 %	1.3 GHz to 26.5 GHz	1.5 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Measure Rate: 20 Hz to 100 kHz Depths: to 99 %	1.3 GHz to 26.5 GHz	3 % of reading + 1 digit	HP 8902A w/ 11793A
Amplitude Modulation-Generate Rate: 50 Hz to 100 kHz Depths: 5 % to 99 %	10 kHz to 0.99 GHz	0.1 %	HP 8656B
Frequency Modulation-Measure Rate 20 Hz to 10 kHz Dev.: ≤40 kHz peak	250 kHz to 10 MHz	2 % of reading + 1 digit	HP 8902A w/ 11793A

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MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Frequency Modulation-Measure Rate 50 Hz to 100 kHz Dev.: ≤400 kHz peak	10 MHz to 1.3 GHz	1 % of reading + 1 digit	HP 8902A w/ 11793A
Frequency Modulation-Measure Rate 20 Hz to 200 kHz Dev.: ≤400 kHz peak	10 MHz to 1.3 GHz	5 % of reading + 1 digit	HP 8902A w/ 11793A
Frequency Modulation-Measure Rate 50 Hz to 100 kHz Dev.: ≤400 kHz peak	1.3 GHz to 26.5 GHz	1 % of reading + 1 digit	HP 8902A w/ 11793A
Frequency Modulation-Measure Rate 20 Hz to 200 kHz Dev.: ≤400 kHz peak	1.3 GHz to 26.5 GHz	5 % of reading + 1 digit	HP 8902A w/ 11793A

Dimensional

MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Micrometer, Height, and Depth Gages	0 in to 24 in	(67 + 1.6L) µin	Gage Blocks
Dial Indicators	0 in to 2 in	(70 + 1.6L) µin	Gage Blocks
Pin Gages	0 in to 4 in	(19 + 15L) µin	Gage Blocks
Rulers/Tape Measure	0 ft to 25 ft	0.009 0 in	Gage Blocks with Calipers
Wire Cloth and Sieves	0.15 mm to 12.5 mm	5.2 µm	Optical Comparator
Optical Comparators-Linearity (bed travel indication)	0 in to 12 in	2 000 µin	Glass Scale, Spherical Ball Set, Gage Blocks
Conductivity-Measuring Equipment	45 µS, 450 µS, 1 500 µS, 4 500 µS	1.2 % of reading	Standard Solutions
pH-Measuring Equipment	4 pH, 7 pH, 10 pH	0.020 pH units	Standard Solutions
Viscosity Meter Calibration	To 33 % of Scale	2.7 %	Viscosity Solutions
	33 % to 66 % of Scale	1.8 %	
	66 % to 100 % of Scale	1.7 %	

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Mass, Force, and Weighing Devices

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Scales and Balances	1 mg to 100 mg	0.026 mg	Class 1 Weights
	10 mg to 500 mg	0.043 mg	
	1 g to 50 g	0.15 mg	
	50 g to 300 g	0.90 mg	
	300 g to 500 g	1.7 mg	
	0.5 kg to 1 kg	3.7 mg	
	1 kg to 3 kg	8 mg	
	3 kg to 5 kg	12 mg	
	5 kg to 10 kg	34 mg	
	1 lb to 5 lb	0.000 60 lb	Class F Weights
	3 lb to 10 lb	0.001 lb	
	10 lb to 25 lb	0.004 lb	
	25 lb to 50 lb	0.006 lb	
	50 lb to 100 lb	0.02 lb	
	100 lb to 600 lb	0.02 lb	
Force-Load Cells/Force Gauges Tension	0 lbf to 600 lbf	0.98 lbf	Class F Weights

Mechanical

MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Torque Transducers	0 lbf·f to 1 000 lbf·ft	0.26 % of reading	AKO TSD –0251 torque system
RPM Measuring Equipment	0 rpm to 100 000 rpm	0.59 % of reading	Agilent 53132A
Gas Flow	5 sccm to 500 sccm	0.29 % of Full Scale	SL-800 Gas Flow Calibrator
	50 sccm to 5 000 sccm	0.29 % of Full Scale	
Gas Concentration Alarms-Carbon Monoxide (CO)	25 ppm	2.8 ppm	Standard Gases
	50 ppm	5.5 ppm	
Gas Concentration Alarms-Sulfur Dioxide ($SO_{2)}$	10 ppm	2 ppm	

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Air Velocity-Measure	300 ft/min to 500 ft/min	1.5 % of reading	
	500 ft/min to 2 000 ft/min	1.6 % of reading	
	2 000 ft/min to 2 800 ft/min	1.8 % of reading	
	2 800 ft/min to 4 500 ft/min	2.2 % of reading	
	4 500 ft/min to 7 000 ft/min	1.7 % of reading	
Pressure	-14 psig to 300 psig	0.011 % of full scale	Ruska 7250
	300 psig to 2 000 psig	0.012 % of reading	
	2 000 psig to 10 000 psig	0.019 % of reading	Pressurements 3114-3

Thermodynamic

MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Temperature-Measure	-196 °C to 100 °C	0.036 °C	Hart 1502A with 5699 RTD
	100 °C to 660 °C	0.061 °C	
Liquid-In-Glass Thermometers	-70 °C to 110 °C	0.03 °C + 0.25 R	Liquid Bath and PRT
	28 °C to 300 °C	0.04 °C + 0.25 R	
IR Temperature-Measuring Equipment Blackbody Sources	285 °C to 870 °C	3.1 °C + 0.005 °C/°C	Blackbody Source, IR Thermometer

Time and Frequency

MEASURED QUANTITY, INSTRUMENT OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	REMARKS
Frequency- Measuring Equipment	0.01 Hz to 225 MHz	2.5 µHz/Hz + 5µHz	Agilent 53132A
Timers/Stopwatches	5 s to 24 hr	0.04 s	Agilent 53132A

1. Remarks: This column shall include pertinent information about the calibration of the Measured Instrument or parameter. The information should include the type of standards used and any pertinent information about the measurement method. This column is not to be used for commercial advertisement of laboratory services.
2. The term L represents length in inches or millimeters appropriate to the uncertainty statement.