PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

JOULÉ, Equipment Services

1777 Sentry Parkway West, Suite 201, Blue Bell, PA 19422

(Hereinafter called the Organization) and hereby declares that Organization 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
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

Calibration of Electrical, Time & Frequency, Mechanical, Mass, Force & Weighing and Thermodynamics Instruments

(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. 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:

Tracy Szerszen
President

Perry Johnson Laboratory Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
September 22, 2012	November 19, 2024	December 31, 2026

Accreditation No:	*Certificate No.:*
73879	L24-877

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com

Certificate of Accreditation: Supplement

JOULÉ, Equipment Services
1777 Sentry Parkway West, Suite 201, Blue Bell, PA 19422
Contact Name: Curt Blair Phone: 215-647-6000

Accreditation is granted to the facility to perform the following calibrations:

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Equipment to Measure DC Voltage [FO]	3 mV to 330 mV	21 µV/V + 0.9 µV	Fluke 5520A	SWI: B2135
	0.33 V to 3.3 V	13 µV/V + 3 µV		
	3.3 V to 33 V	15 µV/V + 7 µV		
	33 V to 330 V	19 µV/V + 149 µV		
	330 V to 1 000 V	19 µV/V + 700 µV		
Equipment to Output DC Voltage [FO]	1 mV to 100 mV	9 µV/V + 1.6 µV	HP3458A	
	0.1 V to 1V	12 µV/V + 1.4 µV		
	1 V to 10 V	15 µV/V + 2.5 µV		
	10 V to 100 V	15 µV/V + 48 µV		
	100 V to 1 000 V	29 µV/V + 1.4 µV		
Equipment to Measure DC Current [FO]	10 µA to 330 µA	138 µA/A + 0.1 µA	Fluke 5520A	
	0.33 mA to 3.3 mA	124 µA/A + 0.1 µA		
	3.3 mA to 33 mA	141 µA/A + 0.05 µA		
	33 mA to 330 mA	145 µA/A + 0.07 µA		
	0.33 A to 1.1 A	251 µA/A + 0.2 mA		
	1.1 A to 3 A	398 µA/A + 0.2 mA		
	3 A to 11 A	620 µA/A + 0.9 mA		
Equipment to Output DC Current [FO]	0.1 mA to 1 mA	14 µA/A + 0.9 µA	HP3458A	
	1 mA to 10 mA	27 µA/A + 0.8 µA		
	10 mA to 100 mA	42 µA/A + 0.7 µA		
	0.1 A to 1 A	127 µA/A + 8 µA		
Equipment to Measure Resistance [FO]	1 Ω to 11 Ω	74 µΩ/Ω + 1 mΩ	Fluke 5520A	
	11 Ω to 110 Ω	40 µΩ/Ω + 1.5 mΩ		
	110 Ω to 1.1 kΩ	61 µΩ/Ω + 0.9 mΩ		
	1.1 kΩ to 11 kΩ	57 µΩ/Ω + 5 mΩ		
	11 kΩ to 110 kΩ	50 µΩ/Ω + 76 mΩ		
	110 kΩ to 1.1 MΩ	25 µΩ/Ω + 3 Ω		
	1.1 MΩ to 3.3 MΩ	71 µΩ/Ω + 48 Ω		
	3.3 MΩ to 11 MΩ	130 µΩ/Ω + 243 Ω		
	11 MΩ to 33 MΩ	2.3 mΩ/Ω + 2.4 kΩ		
	33 MΩ to 110 MΩ	0.55 mΩ/Ω + 3.3 kΩ		
	110 MΩ to 330 MΩ	3.5 mΩ/Ω + 0.3 MΩ		
	330 MΩ to 1 100 MΩ	16 mΩ/Ω + 0.7 MΩ		

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Equipment to Output Resistance [FO]	1 Ω to 10 Ω	15 µΩ/Ω + 88 µΩ	HP3458A	SWI: B2835
	10 Ω to 100 Ω	35 µΩ/Ω + 100 µΩ		
	100 Ω to 1 000 Ω	25 µΩ/Ω + 0.8 mΩ		
	1 k to 10 kΩ	25 µΩ/Ω + 0.8 mΩ		
	10 kΩ to 100 kΩ	27 µΩ/Ω + 27 mΩ		
	100 kΩ to 1 MΩ	28 µΩ/Ω + 0.2 Ω		
	1 MΩ to 10 MΩ	108 µΩ/Ω + 80 Ω		
	10 MΩ to 100 MΩ	0.7 mΩ/Ω + 0.6 kΩ		
	100 MΩ to 500 MΩ	7 mΩ/Ω + 6.5 kΩ		
Equipment to Measure AC Voltage at the Listed Frequencies [FO]			Fluke 5520A	
10 Hz to 45 Hz	3 mV to 33 mV	592 µV/V + 125 µV		
45 Hz to 10 kHz	3 mV to 33 mV	23 µV/V + 140 µV		
10 kHz to 20 kHz	3 mV to 33 mV	214 µV/V + 140 µV		
20 kHz to 50 kHz	3 mV to 33 mV	804 µV/V + 137 µV		
50 kHz to 100 kHz	3 mV to 33 mV	2.9 mV/V + 132 µV		
100 kHz to 500 kHz	3 mV to 33 mV	49 mV/V + 132 µV		
Equipment to Measure AC Voltage at the Listed Frequencies [FO]				
10 Hz to 45 Hz	33 mV to 330 mV	317 µV/V + 46 µV		
45 Hz to 10 kHz	33 mV to 330 mV	254 µV/V + 26 µV		
10 kHz to 20 kHz	33 mV to 330 mV	234 µV/V + 39 µV		
20 kHz to 50 kHz	33 mV to 330 mV	417 µV/V + 21 µV		
50 kHz to 100 kHz	33 mV to 330 mV	863 µV/V + 34 µV		
100 kHz to 500 kHz	33 mV to 330 mV	1.4 mV/V + 140 µV		
Equipment to Measure AC Voltage at the Listed Frequencies [FO]				
10 Hz to 45 Hz	0.33 V to 3.3 V	405 µV/V + 0.8 mV		
45 Hz to 10 kHz	0.33 V to 3.3 V	247 µV/V + 1 mV		
10 kHz to 20 kHz	0.33 V to 3.3 V	308 µV/V + 1 mV		
20 kHz to 50 kHz	0.33 V to 3.3 V	289 µV/V + 2 mV		
50 kHz to 100 kHz	0.33 V to 3.3 V	1.5 mV/V + 5 mV		
100 kHz to 500 kHz	0.33 V to 3.3 V	1.9 µV/V + 5 mV		

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Equipment to Measure AC Voltage at the Listed Frequencies [FO]			Fluke 5520A	SWI: B2835
10 Hz to 45 Hz	3.3 V to 33 V	298 µV/V + 2 mV		
45 Hz to 10 kHz	3.3 V to 33 V	237 µV/V + 1.6 mV		
10 kHz to 20 kHz	3.3 V to 33 V	295 µV/V + 3 mV		
20 kHz to 50 kHz	3.3 V to 33 V	263 µV/V + 3 mV		
50 kHz to 100 kHz	3.3 V to 33 V	1.2 mV/V + 18 mV		
Equipment to Measure AC Voltage at the Listed Frequencies [FO]				
45 Hz to 1 kHz	33 V to 330 V	267 µV/V + 2 mV		
1 kHz to 10 kHz	33 V to 330 V	551 µV/V + 5 mV		
10 kHz to 20 kHz	33 V to 330 V	440 µV/V + 3 mV		
20 kHz to 50 kHz	33 V to 330 V	618 µV/V + 2 mV		
50 kHz to 100 kHz	33 V to 330 V	1.7 mV/V + 71 mV		
Equipment to Measure AC Voltage at the Listed Frequencies [FO]				
45 Hz to 1 kHz	330 V to 1 020 V	372 µV/V + 10 mV		
1 kHz to 5 kHz	330 V to 1 020 V	324 µV/V + 59 mV		
5 kHz to 10 kHz	330 V to 1 020 V	249 µV/V + 71 mV		
Equipment to Output AC Voltage at the Listed Frequencies [FO]			HP3458A	
1 Hz to 1 kHz	10 mV to 100 mV	5 µV/V + 8 µV		
1 Hz to 1 kHz	100 mV to 1 V	8 µV/V + 8 µV		
1 Hz to 1 kHz	1 V to 10 V	12 µV/V + 3 µV		
1 Hz to 1 kHz	10 V to 100 V	46 µV/V + 0.3 mV		
1 Hz to 1 kHz	100 V to 1 000 V	61 µV/V + 2 mV		
Equipment to Measure AC Current at the Listed Frequencies [FO]			Fluke 5520A	
45 Hz to 1 kHz	29 µA to 330 µA	0.13 % + 0.12 µA		
45 Hz to 1 kHz	0.33 mA to 3.3 mA	0.17 % + 2 µA		
45 Hz to 1 kHz	3.3 mA to 33 mA	0.03 % + 12 µA		
45 Hz to 1 kHz	33 mA to 330 mA	0.06 % + 13 µA		
45 Hz to 1 kHz	0.33 A to 1.1 A	0.04 % + 125 µA		
45 Hz to 1 kHz	1.1 A to 3 A	0.1 % + 57 µA		
45 Hz to 1 kHz	3 A to 11 A	0.1 % + 1 mA		
1 kHz to 5 kHz	3 A to 11 A	2.3 % + 6 mA		

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Equipment to Output AC Current at the listed Frequencies [FO]				
45 Hz to 5 kHz	1 to 10 mA	10 µA/A + 3 µA	HP3458A	SWI: B2835
45 Hz to 5 kHz	10 to 100 mA	336 µA/A + 0.4 µA		
45 Hz to 5 kHz	0.1 to 1 A	376 µA/A + 4 µA		
Equipment to Measure Capacitance [FO]	1.1 nF to 3.299 9 nF	0.5 % + 0.01 nF	Fluke 5520A	
	3.3 nF to 10.999 9 µF	0.25 % + 0.03 nF		
	0.33 µF to 1.099 99 µF	0.25 % + 6 nF		
	1.1 µF to 3.299 99 µF	0.25 % + 4 nF		
	3.3 µF to 10.999 9 µF	0.25 % + 13 nF		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J (Resolution = 0.1°C) [FO]	-210 °C to -100 °C	0.56 °C		SWI:B2100
	-100 °C to -30 °C	0.30 °C		
	-30 °C to 150 °C	0.26 °C		
	150 °C to 760 °C	0.39 °C		
	760 °C to 1 200 °C	0.63 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K (Resolution = 0.1°C) [FO]	-200 °C to -100 °C	0.52 °C		
	-100 °C to -25 °C	0.31 °C		
	-25 °C to 120 °C	0.33 °C		
	120 °C to 1 000 °C	0.55 °C		
	1 000 °C to1 372 ° C	0.66 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T (Resolution = 0.1°C) [FO]	-250 °C to 150 °C	0.67 °C		
	-150 °C to 0 °C	0.32 °C		
	0 °C to 120 °C	0.33 °C		
	120 °C to 400 °C	0.56 °C		
Temperature Calibration, Indication and Control Equipment used with RTD 385 100 Ω RTD [FO]	-200 °C to 0 °C	0.28 °C		
	0 °C to 100 °C	0.17 °C		
	100 °C to 400 °C	0.18 °C		
	400 °C to 630 °C	0.24 °C		
	630 °C to 800 °C	0.27 °C		
Temperature Calibration, Indication and Control Equipment used with RTD 3926 100 Ω [FO]	-200 °C to 0 °C	0.19 °C		
	0 °C to 100 °C	0.13 °C		
	100 °C to 300 °C	0.27 °C		
	300 °C to 400 °C	0.29 °C		
	400 °C to 630 °C	0.32 °C		

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Temperature Calibration, Indication and Control Equipment used with RTD 385 1 kΩ [FO]	-200 °C to 0 °C	0.31 °C	Fluke 5520A Electrical Simulation of RTD Output	SWI:B2100
	0 °C to 100 °C	0.18 °C		
	100 °C to 300 °C	0.23 °C		
	300 °C to 600 °C	0.30 °C		
	600 °C to 630 °C	0.34 °C		

Time and Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Timers and Stopwatches [FO]	Up to 24 hr	0.26 s/Day	Fluke PM6666	SWI: B2800

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Pressure Gages and Measuring Devices [FO]	Up to 9 psi	0.006 psi	Crystal n-Vision Module 30 PSI	SWI:B2000
	9 psi to 30 psi	0.02 psi		
	-14 psi to 0 psi	0.02 psi	Crystal n-Vision Module 300 PSI	
	30 psi to 90 psi	0.05 psi		
	90 psi to 300 psi	0.16 psi		
	300 psi to 900 psi	0.92 psi	Crystal n-Vision Module 3 000 PSI	
	900 psi to 3 000 psi	3 psi		
	3 000 psi to 10 000 psi	20 psi	Crystal n-Vision Module 10 000 PSI	

Thermodynamic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Humidity Measuring Devices [FO]	10 % RH to 90 % RH	1.0 % RH at 25 °C	Kaymont M2000SP	SWI: B2150
Liquid-in-Glass Thermometers and Temperature Measuring Devices [FO]	-80 °C to 0 °C	0.42 °C	Fluke 5520A,GE M2801, Fluke 5628, constant temperature liquid bath, dry well constant temperature block	SWI: B2100
	0.1 °C to 100 °C	0.28 °C		
	100.1 °C to 300 °C	0.37 °C		
	300.1 °C to 600 °C	0.58 °C		
	600.1 °C to 900 °C	0.86 °C		

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Mass, Force, and Weighing Device

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Balances and Scales [FO]	1 mg to 500 mg	0.03 mg	Class 1 Weights	SWI: B2600
	500 mg to 100 g	0.08 mg		
	100 g to 200 g	0.1 mg		
	200 g to 500 g	1.1 mg		
	500 g to 1 kg	5.6 mg		
	1 kg to 5 kg	8.3 mg		
	5 kg to 10 kg	28 mg		
	10 kg to 20 kg	56 mg		
	20 kg to 30 kg	84 mg		
Pipette [FO]	1 µL	0.04 µL	AnD HM202 Balance / Class 1 weights/ Gravimetric Analysis	SWI: B2600
	2 µL	0.05 µL		
	5 µL	0.06 µL		
	10 µL	0.06 µL		
	20 µL	0.07 µL		
	50 µL	0.11 µL		
	100 µL	0.23 µL		
	200 µL	0.34 µL		
	500 µL	0.96 µL		
	1 000 µL	2.6 µL		
	5 000 µL	10 µL		
	10 000 µL	19 µL		

1. The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor *k* (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.

2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.

3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location.

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Accreditation is granted to the facility to perform the following calibrations:

4. The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations.

5. Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.