



PERRY JOHNSON LABORATORY ACCREDITATION, INC

Certificate of Accreditation

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

ECS Metrology
600 Eagleview Boulevard, Suite 300, Exton, PA 19341

(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):

Electrical, Chemical, Mass, Force, and Weighing Devices, Mechanical, Thermodynamic and Time & Frequency Calibration
(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
Accreditation, Inc. (PJLA)

Initial Accreditation Date:

September 29, 2017

Issue Date:

January 04, 2024

Expiration Date:

January 04, 2026

Accreditation No.:

94034

Certificate No.:

L24-17

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.pjilabs.com



Certificate of Accreditation: Supplement

ECS Metrology

600 Eagleview Boulevard, Suite 300, Exton, PA 19341
 Contact Name: Scott French Phone: 610-880-4170

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

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Pipettes ^{FO}	0.2 μ L	0.11 μ L	High Resolution Micro Balances, Liquid Thermometers, and Evaporation Traps; WI: ECS SOP-001 IAW ISO 8655
	1 μ L	0.11 μ L	
	2 μ L	0.11 μ L	
	5 μ L	0.11 μ L	
	10 μ L	0.13 μ L	
	20 μ L	0.15 μ L	
	50 μ L	0.15 μ L	
	100 μ L	0.17 μ L	
	200 μ L	0.22 μ L	
	500 μ L	2.5 μ L	
	1 000 μ L	5 μ L	
	2 500 μ L	13 μ L	
	5 000 μ L	25 μ L	
10 000 μ L	50 μ L		

Mass, Force, and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Balances ^O	10 mg to 60 g	$(2.0 \times 10^{-4} + 1.86 \times 10^{-6} \text{ Wt})\text{g}$	Class 1 Test Weights ECS_SOP_003
	60 g to 200 g	$(1 \times 10^{-4} + 2.58 \times 10^{-6} \text{ Wt})\text{g}$	
	200 g to 5 kg	$(4.14 \times 10^{-3} + 2.03 \times 10^{-6} \text{ Wt}) \text{g}$	
Mass ^F	Up to 5 g Class 5,6, and NIST Class F	0.007 mg	AnD BM-22, Class 1 Weight ECS_SOP_009 modified substitution
	5 g to 22 g Class 5,6, and NIST Class F	0.015 mg	AnD BM-22, Class 1 Weight ECS_SOP_009 modified substitution
	10 g to 60 g Class 5,6, and NIST Class F	0.036 mg	Radwag AS 60/220.R2 ECS_SOP_009 modified substitution
	60 g to 220 g Class 5,6, and NIST Class F	0.14 mg	AnD GR-200 ECS_SOP_009 modified substitution
	220 g to 1 000 g Class 5,6, and NIST Class F	2 mg	Radwag PS 1000.R1 ECS_SOP_009 modified substitution



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Thermodynamic

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Equipment to Measure Temperature Thermometer/Sensor ^{FO}	-20 °C to 150 °C	0.08 °C	Platinum RTD Water baths ECS SOP 005
	-200 °C to 0 °C	0.73 °C	Type K,T, J Thermocouples
	Up to 300 °C	0.66 °C	Martel Multifunction Calibrator MC-1210
	300 °C to 600 °C	1.4 °C	Graphtec Calibrator GL240
	600 °C to 1 000 °C	2.3 °C	Platinum RTD Water baths
	1 000 °C to 1 372 °C	3.2 °C	ECS_SOP_005
Infrared Devices ^F	-20 °C to 300 °C	0.88 °C	REED Instruments BX 500 Black Body Calibrator ECS SOP 005

Chemical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
pH Meter ^{FO}	4.00 pH	0.02 pH	pH Buffer Solutions ECS_SOP_006
	7.00 pH	0.02 pH	
	10.00 pH	0.02 pH	

Time & Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Tachometer ^{FO}	10 to 99 999 RPM	0.17 % of reading	Multifunction Calibrator MC-1210 ECS SOP 008
Timers ^{FO}	up to 24 hours	0.19 s/day	Stopwatch/WWVB ECS SOP 007
Centrifuge, Rate of Rotation ^{FO}	10 RPM to 999 999 RPM	17 % of reading	Photo tachometer ECS SOP 004
Frequency Measure ^{FO}	1 Hz to 10 kHz	0.05 % +.1 hz	Martel MC 1210 Calibrator ECS SOP 008



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Electrical

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Resistance Measure ^F	0.05 Ω to 4 000 Ω	025 % +/- .5 Ohms	Martel MC 1210 Calibrator ECS_SOP_010_Electrical
Temperature Calibration Indication and Control Equipment used with Thermocouple Type K ^F	-200 $^{\circ}\text{C}$ to 0 $^{\circ}\text{C}$ Up to 1 000 $^{\circ}\text{C}$ 1 000 $^{\circ}\text{C}$ to 1 372 $^{\circ}\text{C}$	0.35 $^{\circ}\text{C}$ 0.18 $^{\circ}\text{C}$ 0.16 $^{\circ}\text{C}$	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type J ^F	-210 $^{\circ}\text{C}$ to 0 $^{\circ}\text{C}$ Up to 800 $^{\circ}\text{C}$ 800 $^{\circ}\text{C}$ to 1 200 $^{\circ}\text{C}$	0.24 $^{\circ}\text{C}$ 0.13 $^{\circ}\text{C}$ 0.18 $^{\circ}\text{C}$	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type T ^F	-200 $^{\circ}\text{C}$ to 0 $^{\circ}\text{C}$ Up to 400 $^{\circ}\text{C}$	0.35 $^{\circ}\text{C}$ 0.13 $^{\circ}\text{C}$	
DC Voltage Source ^F	2 mV to 20 V	0.015 % +/- 2 mv	
DC Current Source ^F	0.002 mA to 24 mA	015 % +/- .002 mA	
pH Meter Electrical Simulation ^F	1 to 14 pH	0.02 pH	pH Simulator ECS SOP 006
Equipment to Measure DC Voltage ^F	Up to 200 mV	31 $\mu\text{V}/\text{V}$ + 4.4 μV	Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
	0.2 V to 2 V	31 $\mu\text{V}/\text{V}$ + 27 μV	
	2 V to 20 V	25 $\mu\text{V}/\text{V}$ + .24 mV	
	20 V to 200 V	31 $\mu\text{V}/\text{V}$ + .95 mV	
	200 V to 1 025 V	31 $\mu\text{V}/\text{V}$ + 6.0 mV	
Equipment to Measure DC Current ^F	Up to 200 μA	0.012 % of reading + .04 μA	Transmille 3041 Multifunction Calibrator Current Coils\ ECS_SOP_010_Electrical
	0.2 mA to 2 mA	0.009 2 % of reading + .086 μA	
	2 mA to 20 mA	0.005 7 % of reading + 1.4 μA	
	20 mA to 200 mA	0.009 2 % of reading + 49 μA	
	0.2 A to 2 A	0.017 % of reading + .36 mA	
	2 A to 30 A	0.046 % of reading + 2.0 mA	
	30 A to 1 500 A	0.5 % of reading	
Equipment to Measure AC Voltage (at the listed frequencies) ^{F0}			Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
10 Hz to 44 Hz	Up to 202 mV	0.23 % of reading + 59 μV	
45 Hz to 999 Hz	Up to 202 mV	0.046 % of reading + 26 μV	
1 k Hz to 19.999 k HZ	Up to 202 mV	0.10 % of reading + 53 μV	
20 k Hz to 99.999 k HZ	Up to 202 mV	0.35 % of reading + .13 mV	
100 k Hz to 500 k HZ	Up to 202 mV	0.92 % of reading + .60 mV	
10 Hz to 44 Hz	0.2 V to 2.02 V	0.23 % of reading + .41 mV	
45 Hz to 999 Hz	0.2 V to 2.02 V	0.046 % of reading + .11 mV	



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Equipment to Measure AC Voltage (at the listed frequencies) ^{F0}			Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
1 k HZ to 19.999 k HZ	0.2 V to 2.02 V	0.10 % of reading + .34 mV	
20 k HZ to 99.999 k HZ	0.2 V to 2.02 V	0.29 % of reading + 2.4 mV	
100 k HZ to 500 k HZ	0.2 V to 2.02 V	0.52 % of reading + 24 mV	
10 Hz to 44 Hz	2 V to 20.2 V	0.23 % of reading + 3.5 mV	
45 Hz to 999 Hz	2 V to 20.2 V	0.04 % of reading + 1.1 mV	
1 k HZ to 19.999 k HZ	2 V to 20.2 V	0.08 % of reading + 3.0 mV	
20 k HZ to 99.999 k HZ	2 V to 20.2 V	0.25 % of reading + 38 mV	
10 Hz to 44 Hz	20 V to 202 V	0.07 % of reading + 23 mV	
45 Hz to 999 Hz	20 V to 202 V	0.046 % of reading + 9.2 mV	
1 k HZ to 19.999 k HZ	20 V to 202 V	0.10 % of reading + .0.09 mV	
10 Hz to 44 Hz	200 V to 1 020 V	0.07 % of reading + 0.25 V	
45 Hz to 999 Hz	200 V to 1 020 V	0.046 % of reading + 92 mV	
1 k HZ to 10 k HZ	200 V to 1 020 V	0.17 % of reading + 0.47 V	
Equipment to Measure Resistance ^F	.1 Ω	0.017 % of reading + 0.005 8 Ω	Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
	1 Ω	0.01 % of reading + 0.005 8 Ω	
	10 Ω	0.01 % of reading + 0.005 8 Ω	
	100 Ω	0.005 7 % of reading + 0.005 7 Ω	
	1 k Ω	0.004 6 % of reading + .046 Ω	
	10 k Ω	0.004 6 % of reading + .46 Ω	
	100 k Ω	0.004 6 % of reading + 4.6 Ω	
	1 M Ω	0.011 % of reading + 46 Ω	
	10 M Ω	0.040 % of reading + .46 K Ω	
	100 M Ω	0.58 % of reading + 4.6 K Ω	
	1 G Ω	1.1 % of reading + 45 K Ω	
Equipment to Measure Capacitance ^F	1 nF	0.29 % of reading	Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
	10 nf	0.29 % of reading	
	20 nf	0.29 % of reading	
	50 nf	0.29 % of reading	
	100 nf	0.29 % of reading	
	1 uF	0.46 % of reading	
	10 uF	0.7 % of reading	



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Equipment to Measure Inductance ^F	1 mH	0.58 % of reading	Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
	10 mH	0.58 % of reading	
	19 mH	0.58 % of reading	
	29 mH	0.58 % of reading	
	50 mH	0.58 % of reading	
	100 mH	0.58 % of reading	
	1 H	0.58 % of reading	
	10 H	0.58 % of reading	
Equipment to Measure Frequency ^F	10 Hz to 500 k Hz	0.000 020 % of reading	Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
Equipment to Measure AC Current (at the listed frequencies) ^{FO}			Transmille 3041 Multifunction Calibrator ECS_SOP_010_Electrical
20 uA to 202 uA	10 Hz to 44 Hz	0.23 % of reading +.39 uA	
	45 Hz to 999 Hzr	0.08 % of reading +.32 uA	
	1 kHz to 10 kHz	0.92 % of reading +.76 uA	
0.2 mA to 2.02 mA	10 Hz to 44 Hz	0.23 % of reading +1.5 uA	
	45 Hz to 999 Hz	0.07 % of reading +.49 uA	
	1 kHz to 10 kHz	0.92 % of reading +3.4 uA	
2 mA to 20.2 mA	10 Hz to 44 Hz	0.23 % of reading + 16 uA	
	45 Hz to 999 Hz	0.07 % of reading + 5.4 uA	
	1 kHz to 10 kHz	0.58 % of reading + 18 uA	
20 mA to 202 mA	10 Hz to 44 Hz	0.23 % of reading + .15 mA	
	45 Hz to 999 Hz	0.07 % of reading + 72 uA	
	1 kHz to 10 kHz	0.70 % of reading + .31 mA	
0.2 A to 2.02 A	10 Hz to 44 Hz	0.23 % of reading + 1.6 mA	
	45 Hz to 999 Hz	0.10 % of reading + 1.0 mA	
	1 kHz to 10 kHz	0.70 % of reading + 3.5 mA	
2 A to 30.0 A	30 Hz to 44 Hz	0.10 % of reading + 15 mA	
	45 Hz to 999 Hz	0.10 % of reading + 32 mA	
	1k Hz to 10k Hz	0.35 % of reading + 32 mA	
30 A to 1 500 A	10 Hz to 500 Hz	5.8 % of reading	Transmille 3041 Multifunction Calibrator Current Coils ECS_SOP_010_Electrical



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

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 FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations.
4. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location.
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.