



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Advanced Metrology LLC.

King Fahad Road, Dammam Housing Building No. 28, Dammam, 32236, Saudi Arabia

(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):

***Chemical, Dimensional, Electrical, Mass, Force, & 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

Initial Accreditation Date:

December 1, 2017

Issue Date:

August 16, 2022

Expiration Date:

August 16, 2024

Accreditation No.:

90462

Certificate No.:

L22-302

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

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.pjllabs.com



Certificate of Accreditation: Supplement

Advanced Metrology LLC

King Fahad Road, Dammam Housing Building No. 28, Dammam, 32236,
Saudi Arabia

Contact Name: Dr. Mohammad Hourani Phone: 966-13-833-1203

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

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
Conductivity Meter ^{FO}	100 μ S	0.57 μ S	Conductivity Solutions ASTM D1125-14 method
	10 00 μ S	4.2 μ S	
	10 000 μ S	340 μ S	
pH Meter/Probe ^{FO}	4 pH	0.032 pH	Buffer Solutions
	7 pH		ASTM E70-19 method
	10 pH		

Dimensional

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
Calipers ^{FO}	1 mm to 100 mm	0.003 mm	ASME B89.1.14/2018 Gauge Blocks
	100 mm to 300 mm	0.004 mm	
	300 mm to 600 mm	0.009 1 mm	
Dial/Thickness Gages ^{FO}	1 mm to 100 mm	0.003 2 mm	ATT-UT-1 ASME Gauge Blocks
	100 mm to 300 mm		
Diameter Inside ^{FO}	0.01 mm to 300 mm	0.003 mm	Universal Measuring Machine, EURAMET cg 6
Micrometers Outside ^{FO}	0.001 mm to 25 mm	0.001 3 mm	ASME B89.1.13 Gauge Blocks
	25 mm to 300 mm	0.006 mm	
	300 mm to 1 000 mm	0.057 mm	
Gage Blocks ^F	0.000 5 mm to 100 mm	$(4.45 \times 10^{-4} + 5 \times 10^{-6}L)$ mm	Gage Block Comparator and master Gage Clocks Grade 0, The Gage Block Handbook-NIST
Height Gage ^{FO}	0 mm to 600 mm	$(6.35 \times 10^{-3} + 5 \times 10^{-6}L)$ mm	Gage Block Set ISO 13225:2012
Outside ^{FO} Diameter	1 mm to 100 mm	0.006 2 mm	Gage Blocks, DIN 862, DIN 878, DIN 879, ISO
	100 mm to 300 mm	0.007 2 mm	
	300 mm to 600 mm	0.009 1 mm	
Protractors ^{FO}	0 ° to 90 °	0.4 °	Gage Blocks/Sine Bar NABL 122-01



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Electrical

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Equipment to Measure AC Voltage ^F (at the listed frequencies)			Transmill Precision Multi-Product Calibration 3041A, Multi-Function Workstation AE015
10 Hz to 206 Hz	0 mV to 200 mV	0.1 mV	
206 Hz to 10 kHz	0 mV to 200 mV	0.1 mV	
10 kHz to 100 kHz	0 mV to 200 mV	2.5 mV	EURAMET CG-15
Equipment to Measure AC Voltage ^F (at the listed frequencies)			
10 Hz to 206 Hz	200 mV to 2 V	1 mV	
206 Hz to 10 kHz	200 mV to 2 V	1 mV	
10 kHz to 100 kHz	200 mV to 2 V	2.3 mV	
Equipment to Measure AC Voltage ^F (at the listed frequencies)			
10 Hz to 206 Hz	2 V to 20 V	10 mV	
206 Hz to 10 kHz	2 V to 20 V	6 mV	
10 kHz to 100 kHz	2 V to 20 V	20 mV	
Equipment to Measure AC Voltage ^F (at the listed frequencies)			
10 Hz to 206 Hz	20 V to 200 V	150 mV	
206 Hz to 10 kHz	20 V to 200 V	180 mV	
10 kHz to 100 kHz	20 V to 200 V	300 mV	
Equipment to Measure AC Voltage ^F (at the listed frequencies)			
10 Hz to 206 Hz	200 V to 1 kV	480 mV	
206 Hz to 10 kHz	200 V to 1 kV	440 mV	
10 kHz to 100 kHz	200 V to 1 kV	580 mV	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	0 μ A to 200 μ A	0.29 μ A	
206 Hz to 10 kHz	0 μ A to 200 μ A	0.28 μ A	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10Hz to 206Hz	200 μ A to 2 mA	3 μ A	
206Hz to 10kHz	200 μ A to 2 mA	2 μ A	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	2 mA to 20 mA	0.03 mA	
206 Hz to 10 kHz	2 mA to 20 mA	0.02 mA	



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Equipment to Measure AC Current ^F (at the listed frequencies)			Transmill Precision Multi-Product Calibration 3041A, Multi-Function Workstation AE015
10 Hz to 206 Hz	20 mA to 200 mA	0.29 mA	
206 Hz to 10 kHz	20 mA to 200 mA	0.22 mA	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	200 mA to 2 A	2.9 mA	
206 Hz to 10 kHz	200 mA to 2 A	2.6 mA	
Equipment to Measure AC Current ^F (at the listed frequencies)			EURAMET CG-15
10 Hz to 206 Hz	2 A to 30 A	28 mA	
206 Hz to 10 kHz	2 A to 30 A	16 mA	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	30 A to 60 A	24 mA	
206 Hz to 10 kHz	30 A to 60 A	140 mA	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	60 A to 300 A	280 mA	
206 Hz to 10 kHz	60 A to 300 A	200 mA	
Equipment to Measure AC Current ^F (at the listed frequencies)			
10 Hz to 206 Hz	300 A to 1 500 A	4.1 A	
206 Hz to 10 kHz	300 A to 1 500 A	2.9 A	
Equipment to Output AC Voltage ^{F0} (at the listed frequencies)			Fluke 8845A and Fluke 376
3 kHz to 20kHz	0 mV to 100 mV	0.02 mV/V + 0.06 mV	
20 kHz to 100 kHz	0 mV to 100 mV	0.01 mV/V + 0.16 mV	
100 kHz to 300 kHz	0 mV to 100 mV	0.08 mV/V + 1 mV	
Equipment to Output AC Voltage ^{F0} (at the listed frequencies)			
3 kHz to 20 kHz	0.1 V to 1 V	0.02 mV/V + 0.06 mV	
20 kHz to 100 kHz	0.1 V to 1 V	0.01 mV/V + 0.16 mV	
100 kHz to 300 kHz	0.1 V to 1 V	0.08 mV/V + 1 mV	



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Equipment to Output AC Voltage ^{F0} (at the listed frequencies)			Fluke 8845A and Fluke 376 EURAMET CG-15
3 kHz to 20 kHz	1 V to 10 V	0.02 V/V + 0.06 V	
20 kHz to 100 kHz	1 V to 10 V	0.01 V/V + 0.16 V	
100 kHz to 300 kHz	1 V to 10 V	0.08 V/V + 1 V	
Equipment to Output AC Voltage ^{F0} (at the listed frequencies)			
3 kHz to 20 kHz	10 V to 100 V	0.02 V/V + 0.06 V	
20 kHz to 100 kHz	10 V to 100 V	0.01 V/V + 0.16 V	
100 kHz to 300 kHz	10 V to 100 V	0.08 V/V + 1 V	
Equipment to Output AC Voltage ^{F0} (at the listed frequencies)			
3 kHz to 20kHz	100 V to 750 V	0.02 V/V + 0.06 V	
20 kHz to 100 kHz	100 V to 750 V	0.01 V/V + 0.16 V	
100 kHz to 300 kHz	100 V to 750 V	0.08 V/V + 1 V	
Equipment to Output AC Current ^{F0} (at the listed frequencies)			
10 Hz to 5 kHz	0 mA to 10 mA	2 μ A/A + 8 μ A	
5 kHz to 10 kHz	0 mA to 10 mA	4 μ A/A + 25 μ A	
Equipment to Output AC Current ^{F0} (at the listed frequencies)			
10 Hz to 5 kHz	10 mA to 100 mA	2 μ A/A + 80 μ A	
5 kHz to 10 kHz	10 mA to 100 mA	4 μ A/A + 250 μ A	
Equipment to Output AC Current ^{F0} (at the listed frequencies)			
10 Hz to 5 kHz	0.1 A to 1 A	2 mA/A + 0.8 mA	
5 kHz to 10 kHz	0.1 A to 1 A	4 mA/A + 5 mA	
Equipment to Output AC Current ^{F0} (at the listed frequencies)			
10 Hz to 5 kHz	1 A to 3 A	2 mA/A + 2.4 mA	
5 kHz to 10 kHz	1 A to 3 A	4 mA/A + 15 mA	
Equipment to Output AC Current ^{F0} (at the listed frequencies)			
10 Hz to 5 kHz	3 A to 10 A	2 mA/A + 8 mA	
5 kHz to 10 kHz	3 A to 10 A	4 mA/A + 50 mA	



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Equipment to Output AC Current ^{F0} (at the listed frequencies)			Fluke 8845A and Fluke 376
5 Hz to 500 Hz	10 A to 1 000 A	4 % of Reading	
5 Hz to 500 Hz	1 000 A to 2 500 A	5 % of Reading	EURAMET CG-15
Equipment to Measure DC Voltage ^F	200 mV	1.5 μ V	Transmill Precision Multi-Product Calibration 3041A, Multi-Function Workstation AE015
	2 V	3.5 μ V	
	20 V	100 μ V	
	200 V	1 mV	
	1 kV	10 mV	
Equipment to Measure DC Current ^F	200 μ A	5 nA	EURAMET CG-15
	2 mA	100 nA	
	20 mA	400 nA	
	200 mA	6 μ A	
	2 A	100 μ A	
	30 A	10 mA	
	60 A	35 mA	
	300 A	35 mA	
	1 500 A	35 mA	
Equipment to Measure Resistance ^F	1 Ω	0.8 m Ω	
	10 Ω	1 m Ω	
	100 Ω	1.3 m Ω	
	1 k Ω	4 m Ω	
	10 k Ω	21 m Ω	
	100 k Ω	620 m Ω	
	1 M Ω	14 Ω	
	10 M Ω	150 Ω	
	100 M Ω	5 k Ω	
Equipment to Output Capacitance ^F	1 μ F	0.000 25 μ F	
	10 μ F	23 μ F	
	100 μ F	0.085 μ F	
	1 000 μ F	3.3 μ F	
	20 nF	0.04 nF	
	50 nF	0.1 nF	
	100 nF	0.1 nF	
	1 000 nF	0.25 nF	



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Equipment to Measure Frequency ^F	100 Hz	0.000 02 Hz	Transmill Precision Multi-Product Calibration 3041A, Multi-Function Workstation AE015 EURAMET CG-15
	1 000 Hz	0.000 2 Hz	
	1 kHz	0.000 002 kHz	
	10 kHz	0.000 002 kHz	
	100 kHz	0.000 02 kHz	
	10 MHz	20 Hz	
	300 MHz	600 Hz	
	600 MHz	1.2 kHz	
Equipment to Output DC Voltage ^{FO}	0 mV to 100 mV	0.1 μ V/V + 7 μ V	Fluke 8845A and Fluke 376 EURAMET CG-15
	0.1 V to 1 V	0.08 mV/V + 0.07 mV	
	1 V to 10 V	0.07 mV/V + 0.14 mV	
	10 V to 100 V	0.09 mV/V + 1 mV	
	100 V to 1000 V	0.09 mV/V + 12 mV	
Equipment to Output DC Current ^{FO}	0 μ A to 100 μ A	0.001 μ A/A + 0.05 μ A	EURAMET CG-15
	0.1 mA to 1 mA	0.001 mA/A + 0.5 μ A	
	1 mA to 10 mA	0.001 mA/A + 5 μ A	
	10 mA to 100 mA	0.01 mA/A + 50 μ A	
	0.1 A to 1 A	1 mA/A + 0.5 mA	
	1 A to 3 A	1 mA/A + 1.5 mA	
	3 A to 10 A	1 mA/A + 5 mA	
	10 A to 1 000 A	4 % of Reading	
Equipment to Measure Frequency ^{FO}	3 Hz to 5 Hz	0.2 % of Reading	EURAMET CG-15
	5 Hz to 10 Hz	0.1 % of Reading	
	10 Hz to 40 Hz	0.06 % of Reading	
	40 Hz to 10 MHz	0.02 % of Reading	
Equipment to Output Resistance ^{FO}	0 Ω to 100 Ω	0.2 m Ω / Ω + 8 m Ω	EURAMET CG-15
	100 Ω to 1 k Ω	2 Ω / Ω + 0.08 Ω	
	1 k Ω to 10 k Ω	2 Ω / Ω + 8 Ω	
	10 k Ω to 100 k Ω	2 Ω / Ω + 80 Ω	
	100 k Ω to 1 M Ω	2 k Ω / Ω + 0.08 k Ω	
	1 M Ω to 10 M Ω	2 k Ω / Ω + 8 k Ω	
	10 M Ω to 100 M Ω	16 k Ω / Ω + 20 k Ω	



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Temperature Indicators and Simulators ^{FO}	-200 °C to 1 750 °C	0.4 °C	Temperature Calibrator LR-Cal model LTC 100 EURAMET cg 11 V3
Temperature Sources / Blocks ^{FO}	-200 °C to 1 370 °C	0.4 °C	
Thermocouples with Indicator ^{FO}	-200 °C to 1 200 °C	0.4 °C	Temperature Calibrator LR-Cal model LTC 100 EURAMET cg 8 V2
Tachometers	60,000 RPM	1.03 RPM	Transmill Precision Multi-Product Calibration 3041A, Multi-Function Workstation AE015; Frequency Counter; Stopwatch EURAMET- CG15
Electrical measuring devices:			
Inductance ^F	10 H	6 mH	
Phase Angle Full Range ^F	90°	0.5°	
Power Consumption Energy ^{FO}	750 kWh	0.001 5 kWh	
Reactive Power ^{FO}	750 kVAr	0.000 26 kVAr	
Time ^{FO}	2 Hz	0.000 1 Hz	

Mass, Force, & 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
Analytical Balances ^{FO}	1 mg to 320 g	$(1 \times 10^{-4} + 9.36 \times 10^{-7}W)$	Class E2 Weights OIML-R E76-1
Electronic Balances ^{FO}	320 g to 20 kg	$(3.96 \times 10^{-3} + 1.48 \times 10^{-5}Wt) g$	Class F1 Weights IML-R E76-1
Weighing Balances ^{FO}	20 kg to 3 000 kg	$(2.99 \times 10^{-1} + 5.1 \times 10^{-5}Wt) g$	Class M1 Weights OIML-R E76-1
Weights and Weight Sets ^F	1 mg	0.016 mg	Double Substitution with Air Buoyancy Correction, Class E2 Mass Set, Mass Comparators, OIML 111-1
	2 mg	0.016 mg	
	5 mg	0.016 mg	
	10 mg	0.016 mg	
	20 mg	0.016 mg	
	50 mg	0.017 mg	
	100 mg	0.017 mg	
	200 mg	0.017 mg	



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Mass, Force, & Weighing Devices

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Weights and Weight Sets ^F	500 mg	0.017 mg	Double Substitution with Air Buoyancy Correction, Class E2 Mass Set, Mass Comparators, OIML 111-1
	1 g	0.018 mg	
	2 g	0.02 mg	
	5 g	0.02 mg	
	10 g	0.025 mg	
Weights and Weight Sets ^F	20 g	0.03 mg	Double Substitution with Air Buoyancy Correction, Class E2 Mass Set, Mass Comparators, OIML 111-1
	50 g	0.034 mg	
	100 g	0.053 mg	
	200 g	0.11 mg	
	500 g	0.26 mg	
	1 kg	0.51 mg	
	2 kg	1.8 mg	
	5 kg	3 mg	
	10 kg	9.5 mg	
20 kg	18 mg		

Mechanical

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Pressure Gages / Switches / Valves ^{FO}	0.07 psi to 100 psi	0.022 psi	Master Pressure Gages with pumps, DKD R61E
	100 psi to 1 000 psi	0.19 psi	
	1 000 psi to 10 000 psi	1 psi	
	10 000 psi to 36 000 psi	5 psi	
Tension and Compression Machine/Devices ^{FO}	Up to 5000 kg	0.29 kg	Load Cell or Standard Weights
	10 kN to 2 000 kN	2.3 kN	
Torque Testers ^F	Up to 25 Nm	0.28 %	Torque Arm EURAMET cg14
	25 Nm to 1 500 Nm	0.28 %	
Torque Wrench ^F	Up to 25 Nm	0.37 %	Torque Testing ISO 6789
	25 Nm to 400 Nm	0.31 %	
	400 Nm to 1 500 Nm	0.28 %	
Vacuum Gage ^{FO}	-14 psi to 0 psi	0.058 psi	Master Vacuum Gage and Vacuum Pump DKD R61E



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Pipettes ^F (Volumetric Flasks)	Up to 100 mL	$(2.5 \times 10^{-5} + 1.0 \times 10^{-5}V) \mu\text{L}$	Balance, ISO 8655; ISO/TR 20461
Volumetric Flasks ^F	100 mL to 20 L	$(2 \times 10^{-1} + 4.9 \times 10^{-4}V) \text{ mL}$	Weight Set and Balance, OIML R43, OIML R120, EURAMET cg 19
Volumetric Meters ^O	Up to 100 L	$(1.95 \times 10^{-1} + 4.99 \times 10^{-3}V) \text{ L}$	Stainless Steel cans, OIML R120, EURAMET cg 19
Motor	5 RPM to 200 000 RPM	1.2 RPM	GMP Master tachometer

Thermodynamic

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Humidity Measuring Instruments ^{FO}	10 % to 95 %	0.51 % RH	Kambic Chamber PKK50 with Rotronic HygroLog HL-20D NABL 129
IR Thermometers ^{FO}	-40 °C to 130 °C	0.34 °C	Temperature dry block LR-Cal model PULSAR 35CU-2l , Kambic oil bath model OBM-LT and 4 wire platinum resistance
	130 °C to 600 °C	0.44 °C	
RTDs (PT100) ^{FO}	-40 °C to 130 °C	0.09 °C	RTD(PT100) ASTM E77 ASTM E563 ASTM E1
	130 °C to 600 °C	0.36 °C	
Temperature Gage / Thermometer ^{FO}	-40 °C to 130 °C	0.09 °C	
	130 °C to 600 °C	0.36 °C	

Time & Frequency

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Sound Level Meter ^F	94 dB	0.6 dB	Sound Level REED SC-05 Calibrator IEC 61672-1
	114 dB		



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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 F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer^F would mean that the laboratory performs this calibration at its fixed location.
4. The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations. Example: Outside Micrometer^O would mean that the laboratory performs this calibration onsite at the customer's location.
5. 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. Example: Outside Micrometer^{FO} would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
6. 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.
7. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
8. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.
9. The term V represents volume as appropriate to the uncertainty statement.