PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Advanced Metrology Est.

Khalid Ibn Alwaleed Street, Alrakah Alshamaliah, Al Khobar, 31952, Saudi Arabia

(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):

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/Operations Manager

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
December 1, 2017	December 1, 2017	March 31, 2020

Accreditation No.:	*Certificate No.:*
90462	L17-528

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.pjlabs.com

Certificate of Accreditation: Supplement

Advanced Metrology Est.
Khalid Ibn Alwaleed Street, Alrakah Alshamaliah, Al Khobar, 31952, 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 (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Conductivity Meter [FO]	100 µS	0.57 µS	Conductivity Solutions
	10 00 µS	4.2 µS	
	10 000 µS	340 µS	
pH Meter/Probe [FO]	4 pH	0.032 pH	Buffer Solutions
	7 pH		
	10 pH		

Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Calipers [F]	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	
Dial/Thickness Gages [F]	1 mm to 100 mm	0.006 2 mm	
	100 mm to 300 mm		
Diameter Inside [F]	0.01 mm to 300 mm	0.008 5 mm	Universal Measuring Machine, EURAMET cg 6
Diameter Outside [F]	0.001 mm to 25 mm	0.001 6 mm	
	25 mm to 300 mm	0.008 4 mm	
	300 mm to 1 000 mm	0.57 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 [F]	0 mm to 600 mm	$(6.35 \times 10^{-3} + 5 \times 10^{-6}L)$ mm	Gage Block Set
Outside Micrometers [F]	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 [F]	0° to 90°	0.4°	Gage Blocks/Sine Bar

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Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure AC Voltage [F] (at the listed frequencies)			Transmille Precision Multi-Product Calibrator 3041A, Multi-Function Workstation EA015
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	
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 Voltage [F] (at the listed frequencies)			
10 Hz to 206 Hz	0 µA to 200 µA	0.29 µA	
206 Hz to 10 kHz	0 µA to 200 µA	0.28 µA	
Equipment to Measure AC Voltage [F] (at the listed frequencies)			
10Hz to 206Hz	200 µA to 2 mA	3 µA	
206Hz to 10kHz	200 µA to 2 mA	2 µA	
Equipment to Measure AC Voltage [F] (at the listed frequencies)			
10Hz to 206Hz	2 mA to 20 mA	0.03 mA	
206Hz to 10kHz	2 mA to 20 mA	0.02 mA	

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Equipment to Measure AC Voltage [F] (at the listed frequencies)			Transmille Precision Multi-Product Calibrator 3041A, Multi-Function Workstation EA015
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 Voltage [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 Voltage [F] (at the listed frequencies)			
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 Voltage [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 Voltage [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 Voltage [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 [FO] (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 [FO] (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 [FO] (at the listed frequencies)			Fluke 8845A and Fluke 376
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 [FO] (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 [FO] (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 [FO] (at the listed frequencies)			
10 Hz to 5 kHz	0 mA to10 mA	2 µA/A + 8 µA	
5 kHz to 10 kHz	0 mA to10 mA	4 µA/A + 25 µA	
Equipment to Output AC Current [FO] (at the listed frequencies)			
10 Hz to 5 kHz	10 mA to 100 mA	2 µA/A + 80 µA	
5 kHz to 10 kHz	10 mA to 100 mA	4 µA/A + 250 µA	
Equipment to Output AC Current [FO] (at the listed frequencies)			
10 Hz to 5 kHz	0.1 A to1 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 [FO] (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 [FO] (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 [FO] (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	
Equipment to Measure DC Voltage [F]	200 mV	1.5 µV	Transmille Precision Multi-Product Calibrator 3041A, Multi-Function Workstation EA015
	2 V	3.5 µV	
	20 V	100 µV	
	200 V	1 mV	
	1 kV	10 mV	
Equipment to Measure DC Current [F]	200 µA	5 nA	
	2 mA	100 nA	
	20 mA	400 nA	
	200 mA	6 µA	
	2 A	100 µA	
	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 mΩ	
	10 Ω	1 mΩ	
	100 Ω	1.3 mΩ	
	1 kΩ	4 mΩ	
	10 kΩ	21 mΩ	
	100 kΩ	620 mΩ	
	1 MΩ	14 Ω	
	10 MΩ	150 Ω	
	100 MΩ	5 kΩ	
Equipment to Output Capacitance [F]	1 µF	0.000 25 µF	
	10 µF	23 µF	
	100 µF	0.085 µF	
	1 000 µF	3.3 µF	
	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	Transmille Precision Multi-Product Calibrator 3041A, Multi-Function Workstation EA015
	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 µV/V + 7µV	Fluke 8845A and Fluke 376
	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 µA to 100 µA	0.001 µA/A + 0.05 µA	
	0.1 mA to 1 mA	0.001 mA/A + 0.5 µA	
	1 mA to 10 mA	0.001 mA/A + 5 µA	
	10 mA to 100 mA	0.01 mA/A + 50 µA	
	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	
	5 Hz to 10 Hz	0.1 % of Reading	
	10 Hz to 40 Hz	0.06 % of Reading	
	40 Hz to 300 Hz	0.02 % of Reading	
Equipment to Output Resistance [FO]	0 Ω to 100 Ω	0.2 mΩ/Ω + 8 mΩ	
	100 Ω to 1 kΩ	2 Ω/Ω + 0.08 Ω	
	1 kΩ to 10 kΩ	2 Ω/Ω + 8 Ω	
	10 kΩ 100 kΩ	2 Ω/Ω + 80 Ω	
	100 kΩ to1 MΩ	2 kΩ/Ω + 0.08 kΩ	
	1 MΩ to 10 MΩ	2 kΩ/Ω + 8 kΩ	
	10 MΩ to 100 MΩ	16 kΩ/Ω + 20 kΩ	

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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 ° (-5.891 mV to 54.807 mV)	0.4 °C	
Thermocouples FO	-200 °C to 1 200 °C (-7.89 mV to 69.539 mV)	0.4 °C	Temperature Calibrator LR-Cal model LTC 100 EURAMET cg 8 V2
Inductance F	10 H	6 mH	Transmille Precision Multi-Product Calibrator 3041A, Multi-Function Workstation EA015
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 BaseF	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 (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Analytical Balances FO	1 mg to 320 g	$(2.1 \times 10^{-3} + 2.1 \times 10^{-5}\text{Wt})$	Class E2 Weights OIML-R E76-1
Electronic Balances FO	320 g to 20 kg	$(3.96 \times 10^{-3} + 1.48 \times 10^{-2}\text{Wt})$	Class F1 Weights IML-R E76-1
Weighing Balances FO	20 kg to 3 000 kg	$(2.99 \times 10^{-1} + 5.1 \times 10^{-5}\text{Wt})$	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	
	500 mg	0.017 mg	
	1 g	0.018 mg	
	2 g	0.02 mg	
	5 g	0.02 mg	
	10 g	0.025 mg	
	20 g	0.03 mg	

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Mass, Force, & Weighing Devices

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Weights and Weight Sets [F]	50 g	0.034 mg	Double Substitution with Air Buoyancy Correction, Class E2 Mass Set, Mass Comparators, OIML 111-1
	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

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Pressure Gages / Switches / Valves [FO]	0 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	1.0 psi	
	10 000 psi to 36 000 psi	5 psi	
Tension and Compression Machines [O]	0 kg to 500 kg	0.29 kg	Load Cell or Standard Weights
	5 kN to 2 000 kN	2.3 kN	
Torque Testers [F]	0 Nm to 25 Nm	0.31 Nm	Torque Arm EURAMET cg14
	25 Nm to 1 500 Nm	0.31 Nm	
Torque Wrench [F]	0 Nm to 25 Nm	0.31 Nm	Torque Testing ISO 6789
	25 Nm to 400 Nm	0.31 Nm	
	400 Nm to 1 500 Nm	0.31 Nm	
Vacuum Gage [FO]	-0.95 bar to 0 bar	0.058 psi	Master Vacuum Gage and Vacuum Pump DKD R61E
Volumetric Flasks [F]	0 L to 20 L	$(2 \times 10^{-1} + 4.9 \times 10^{-4} V)$ L	Weight Set and Balance, OIML R43, OIML R120, EURAMET cg 19
Volumetric Meters [O]	0 L to 100 L	$(1.95 \times 10^{-1} + 4.99 \times 10^{-3} V)$ L	Stainless Steel cans, OIML R120, EURAMET cg 19

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Thermodynamic

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Humidity Measuring Instruments [FO]	10 % to 95 %	0.51 % RH	Kambic Chamber PKK50 with Rotronic HygroLog HL-20D
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 RTD(PT100) ASTM E77 ASTM E563 ASTM E1
	130 °C to 600 °C	0.44 °C	
RTDs (PT100) [FO]	-40 °C to 130 °C	0.46 °C	
	130 °C to 600 °C	0.53 °C	
Temperature Gage / Thermometer [FO]	-40 °C to 130 °C	0.46 °C	
	130 °C to 600 °C	0.53 °C	

Time & Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Sound Level Meter [F]	94 dB	0.65 dB	Sound Level Calibrator REED SC-05
	114 dB		

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.

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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.