



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

J A King & Company, LLC
5805 East 15th Street, Tulsa, OK 74112

(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):

Calibration of Electrical Measurement Devices, Weighing Devices and Ovens
(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

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

Initial Accreditation Date:
January 20, 2007

Issue Date:
April 18, 2017

Expiration Date:
May 31, 2019

Accreditation No.:
79422

Certificate No.:
L17-161

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.pjlab.com



Certificate of Accreditation: Supplement

J A King & Company, LLC

5805 East 15th Street, Tulsa, OK 74112
 Contact Name: Pat Henry Phone: 918-835-6182

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

Electrical

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
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type E ^F	-250 °C to -100 °C	0.50 °C	Electrical Simulation of Thermocouple Output Fluke 5500A
	-100 °C to -25 °C	0.16 °C	
	-25 °C to 350 °C	0.14 °C	
	350 °C to 650 °C	0.16 °C	
	650 °C to 1 000 °C	0.21 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type J ^F	-210 °C to -100 °C	0.27 °C	
	-100 °C to -30 °C	0.16 °C	
	-30 °C to 150 °C	0.14 °C	
	150 °C to 760 °C	0.17 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type K ^F	760 °C to 1 200 °C	0.23 °C	
	-200 °C to -100 °C	0.33 °C	
	-100 °C to -25 °C	0.18 °C	
	-25 °C to 120 °C	0.16 °C	
	120 °C to 1 000 °C	0.26 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type R ^F	1 000 °C to 1 372 °C	0.40 °C	
	0 °C to 250 °C	0.57 °C	
	250 °C to 400 °C	0.35 °C	
	400 °C to 1 000 °C	0.33 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type S ^F	1 000 °C to 1 767 °C	0.40 °C	
	0 °C to 250 °C	0.47 °C	
	250 °C to 1 000 °C	0.36 °C	
	1 000 °C to 1 400 °C	0.37 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type T ^F	1 400 °C to 1 767 °C	0.46 °C	
	-250 °C to -150 °C	0.63 °C	
	-150 °C to 0 °C	0.24 °C	
	0 °C to 120 °C	0.16 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type E ^F	120 °C to 400 °C	0.14 °C	
	-250 °C to -200 °C	0.6 °C	
	-200 °C to -100 °C	0.3 °C	
	-100 °C to -25 °C	0.3 °C	
	-25 °C to 600 °C	0.2 °C	
	600 °C to 1 000 °C	0.2 °C	



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Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 385, 100 Ω ^F	-200 °C to -80 °C	0.05 °C	Electrical Simulation of RTD Output Fluke 5500A
	-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	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 3926, 100 Ω ^F	-200 °C to -80 °C	0.05 °C	
	-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	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 3916, 100 Ω ^F	-200 °C to -190 °C	0.25 °C	
	-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	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 385, 200 Ω ^F	-200 °C to -80 °C	0.04 °C	
	-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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Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 385, 500 Ω^F	-200 °C to -80 °C	0.04 °C	Electrical Simulation of RTD Output Fluke 5500A
	-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	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 385, 1 000 Ω^F	-200 °C to -80 °C	0.03 °C	
	-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	
Temperature Calibration, Indication, and Control Equipment used with RTD Type PtNi 385, 120 Ω (Ni 120) ^F	-80 °C to 0 °C	0.08 °C	
	0 °C to 100 °C	0.08 °C	
	100 °C to 260 °C	0.14 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Cu 427, 10 Ω^F	-100 °C to 260 °C	0.30 °C	
DC Voltage - Measure ^F	68 μ V to 329.999 9 mV	0.006 % of reading + 3 μ V	Fluke 5500A
	500 μ V to 3.299 999 V	0.005 % of reading + 5 μ V	
	5 mV to 32.999 99 V	0.005 % of reading + 50 μ V	
	30 V to 329.999 9 V	0.005 5 % of reading + 500 μ V	
	100 V to 1 020 V	0.005 5 % of reading + 1 500 μ V	
Equipment to Output DC Voltage ^F	25 μ V to 100 mV	0.005 % of reading + 3.5 μ V	HP 34401A
	100 mV to 1 V	0.004 % of reading + 75 μ V	
	1 V to 10 V	0.003 5 % of reading + 50 μ V	
	10 V to 100 V	0.004 5 % of reading + 600 μ V	
	100 V to 1 000 V	0.004 5 % of reading + 10 mV	



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Equipment to Measure Resistance ^F	28 m Ω to 10.99 Ω	0.012 % of reading + 0.008 Ω	Fluke 5500A
	11 Ω to 32.999 Ω	0.012 % of reading + 0.015 Ω	
	33 Ω to 109.999 Ω	0.009 % of reading + 0.015 Ω	
	110 Ω to 329.999 Ω	0.009 % of reading + 0.015 Ω	
	330 Ω to 1.099 99 k Ω	0.009 % of reading + 0.06 Ω	
	1.1 k Ω to 3.299 99 k Ω	0.009 % of reading + 0.06 Ω	
	3.3 k Ω to 10.999 9 k Ω	0.009 % of reading + 0.6 Ω	
	11 k Ω to 32.999 k Ω	0.009 % of reading + 0.6 Ω	
	33 k Ω to 109.999 k Ω	0.011 % of reading + 6 Ω	
	110 k Ω to 329.999 k Ω	0.012 % of reading + 6 Ω	
	330 k Ω to 1.099 99 M Ω	0.015 % of reading + 55 Ω	
	1.1 M Ω to 3.299 99 M Ω	0.015 % of reading + 55 Ω	
	3.3 M Ω to 10.999 9 M Ω	0.06 % of reading + 550 Ω	
	11 M Ω to 32.999 9 M Ω	0.1 % of reading + 550 Ω	
33 M Ω to 109.999 M Ω	0.5 % of reading + 5.5 k Ω		
110 M Ω to 330 M Ω	0.5 % of reading + 16.5 k Ω		
Equipment to Output Resistance ^F	42 m Ω to 100 Ω	0.01 % of reading + 4 m Ω	HP 34401A
	100 Ω to 1 k Ω	0.01 % of reading + 10 m Ω	
	1 k Ω to 10 k Ω	0.01 % of reading + 100 m Ω	
	10 k Ω to 100 k Ω	0.01 % of reading + 1 Ω	
	100 k Ω to 1 M Ω	0.01 % of reading + 10 Ω	
	1 M Ω to 10 M Ω	0.04 % of reading + 100 Ω	
	10 M Ω to 100 M Ω	0.8 % of reading + 10 k Ω	
Equipment to Measure AC Voltage At the listed frequencies ^F			Fluke 5500A
10 Hz to 45 Hz	1 mV to 32.999 mV	0.35 % of reading + 20 μ V	
45 Hz to 10 kHz	1 mV to 32.999 mV	0.15 % of reading + 20 μ V	
10 kHz to 20 kHz	1 mV to 32.999 mV	0.20 % of reading + 20 μ V	
20 kHz to 50 kHz	1 mV to 32.999 mV	0.25 % of reading + 20 μ V	
50 kHz to 100 kHz	1 mV to 32.999 mV	0.35 % of reading + 33 μ V	
100 kHz to 500 kHz	1 mV to 32.999 mV	1.00 % of reading + 60 μ V	



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Equipment to Measure AC Voltage At the listed frequencies ^F			Fluke 5500A
10 Hz to 45 Hz	33 mV to 329.999 mV	0.25 % of reading + 50 μ V	
45 Hz to 10 kHz	33 mV to 329.999 mV	0.05 % of reading + 20 μ V	
10 kHz to 20 kHz	33 mV to 329.999 mV	0.1 % of reading + 20 μ V	
20 kHz to 50 kHz	33 mV to 329.999 mV	0.16 % of reading + 40 μ V	
50 kHz to 100 kHz	33 mV to 329.999 mV	0.24 % of reading + 170 μ V	
100 kHz to 500 kHz	33 mV to 329.999 mV	0.7 % of reading + 330 μ V	
Equipment to Measure AC Voltage At the listed frequencies ^F			
10 Hz to 45 Hz	0.33 V to 3.299 99 V	0.15 % of reading + 250 μ V	
45 Hz to 10 kHz	0.33 V to 3.299 99 V	0.03 % of reading + 60 μ V	
10 kHz to 20 kHz	0.33 V to 3.299 99 V	0.08 % of reading + 60 μ V	
20 kHz to 50 kHz	0.33 V to 3.299 99 V	0.14 % of reading + 300 μ V	
50 kHz to 100 kHz	0.33 V to 3.299 99 V	0.24 % of reading + 1 700 μ V	
100 kHz to 500 kHz	0.33 V to 3.299 99 V	0.5 % of reading + 3 300 μ V	
Equipment to Measure AC Voltage At the listed frequencies ^F			
10 Hz to 45 Hz	3.3 V to 32.999 9 V	0.15 % of reading + 2 500 μ V	
45 Hz to 10 kHz	3.3 V to 32.999 9 V	0.04 % of reading + 600 μ V	
10 kHz to 20 kHz	3.3 V to 32.999 9 V	0.08 % of reading + 2 600 μ V	
20 kHz to 50 kHz	3.3 V to 32.999 9 V	0.19 % of reading + 5 000 μ V	
50 kHz to 100 kHz	3.3 V to 32.999 9 V	0.24 % of reading + 17 000 μ V	
Equipment to Measure AC Voltage At the listed frequencies ^F			
45 Hz to 1 kHz	33 V to 329.999 V	0.05 % of reading + 6.6 mV	
1 kHz to 10 kHz	33 V to 329.999 V	0.08 % of reading + 15 mV	
10 kHz to 20 kHz	33 V to 329.999 V	0.09 % of reading + 33 mV	
Equipment to Measure AC Voltage At the listed frequencies ^F			
45 Hz to 1 kHz	330 V to 1 020 V	0.05 % of reading + 80 mV	
1 kHz to 5 kHz	330 V to 1 020 V	0.2 % of reading + 100 mV	
5 kHz to 10 kHz	330 V to 1 020 V	0.2 % of reading + 500 mV	



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Equipment to Output AC Voltage At the listed frequencies ^F			HP 34401A
3 Hz to 5 Hz	3 mV to 100 mV	1. % of reading + 40 μ V	
5 Hz to 10 Hz	1.5 mV to 100 mV	0.35 % of reading + 40 μ V	
10 Hz to 20 kHz	0.5 mV to 100 mV	0.06 % of reading + 40 μ V	
20 kHz to 50 kHz	0.5 mV to 100 mV	0.12 % of reading + 50 μ V	
50 kHz to 100 kHz	2 mV to 100 mV	0.6 % of reading + 80 μ V	
100 kHz to 300 kHz	14 mV to 100 mV	4 % of reading + 500 μ V	
Equipment to Output AC Voltage At the listed frequencies ^F			
3 Hz to 5 Hz	1 V to 750 V	1 % of reading + 225 mV	
5 Hz to 10 Hz	1 V to 750 V	0.35 % of reading + 225 mV	
10 Hz to 20 kHz	1 V to 750 V	0.06 % of reading + 225 mV	
20 kHz to 50 kHz	1 V to 750 V	0.12 % of reading + 375 mV	
50 kHz to 100 kHz	1 V to 750 V	0.6 % of reading + 600 mV	
100 kHz to 300 kHz	1 V to 750 V	4 % of reading + 3.75 V	
Equipment to Measure AC Current At the listed frequencies ^F			Fluke 5500A
10 Hz to 20 Hz	0.029 mA to 0.329 99 mA	0.25 % of reading + 0.15 μ A	
20 Hz to 45 Hz	0.029 mA to 0.329 99 mA	0.13 % of reading + 0.15 μ A	
45 Hz to 1 kHz	0.029 mA to 0.329 99 mA	0.13 % of reading + 0.25 μ A	
1 kHz to 5 kHz	0.029 mA to 0.329 99 mA	0.4 % of reading + 0.15 μ A	
5 kHz to 10 kHz	0.029 mA to 0.329 99 mA	1.25 % of reading + 0.15 μ A	
Equipment to Measure AC Current At the listed frequencies ^F			
10 Hz to 20 Hz	0.33 mA to 3.299 9 mA	0.2 % of reading + 0.3 μ A	
20 Hz to 45 Hz	0.33 mA to 3.299 9 mA	0.1 % of reading + 0.3 μ A	
45 Hz to 1 kHz	0.33 mA to 3.299 9 mA	0.1 % of reading + 0.3 μ A	
1 kHz to 5 kHz	0.33 mA to 3.299 9 mA	0.2 % of reading + 0.3 μ A	
5 kHz to 10 kHz	0.33 mA to 3.299 9 mA	0.6 % of reading + 0.3 μ A	
Equipment to Measure AC Current At the listed frequencies ^F			
10 Hz to 20 Hz	3.3 mA to 32.999 mA	0.2 % of reading + 3 μ A	
20 Hz to 45 Hz	3.3 mA to 32.999 mA	0.1 % of reading + 3 μ A	
45 Hz to 1 kHz	3.3 mA to 32.999 mA	0.09 % of reading + 3 μ A	
1 kHz to 5 kHz	3.3 mA to 32.999 mA	0.2 % of reading + 3 μ A	
5 kHz to 10 kHz	3.3 mA to 32.999 mA	0.6 % of reading + 3 μ A	



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Equipment to Measure AC Current At the listed frequencies ^F			Fluke 5500A	
10 Hz to 20 Hz	33 mA to 329.99 mA	0.2 % of reading + 30 μ A		
20 Hz to 45 Hz	33 mA to 329.99 mA	0.1 % of reading + 30 μ A		
45 Hz to 1 kHz	33 mA to 329.99 mA	0.09 % of reading + 30 μ A		
1 kHz to 5 kHz	33 mA to 329.99 mA	0.2 % of reading + 30 μ A		
5 kHz to 10 kHz	33 mA to 329.99 mA	0.6 % of reading + 30 μ A		
Equipment to Measure AC Current At the listed frequencies ^F				
10 Hz to 45 Hz	0.33 A to 2.199 99 A	0.2 % of reading + 300 μ A		
45 Hz to 1 kHz	0.33 A to 2.199 99 A	0.1 % of reading + 300 μ A		
1 kHz to 5 kHz	0.33 A to 2.199 99 A	0.75 % of reading + 300 μ A		
Equipment to Measure AC Current At the listed frequencies ^F				
45 Hz to 65 Hz	2.2 A to 11 A	0.06 % of reading + 2 000 μ A		
65 Hz to 500 Hz	2.2 A to 11 A	0.1 % of reading + 2 000 μ A		
500 Hz to 1 kHz	2.2 A to 11 A	0.33 % of reading + 2 000 μ A		
Equipment to Output AC Current At the listed frequencies ^F			HP 34401A	
3 Hz to 5 Hz	31 mA to 1.0 A	1.0 % of reading + 400 μ A		
5 Hz to 10 Hz	10 mA to 1.0 A	0.3 % of reading + 400 μ A		
10 Hz to 5 kHz	4 mA to 1.0 A	0.1 % of reading + 400 μ A		
Equipment to Output AC Current At the listed frequencies ^F				
3 Hz to 5 Hz	105 mA to 3 A	1.1 % of reading + 1.8 mA		
5 Hz to 10 Hz	35 mA to 3 A	0.35 % of reading + 1.8 mA		
10 Hz to 5 kHz	20 mA to 3 A	0.15 % of reading + 1.8 mA		
Equipment to Measure DC Current ^F				Fluke 5500A
	1.5 μ A to 3.3 mA	0.013 % of reading + 0.05 μ A		
	10 μ A to 33 mA	0.01 % of reading + 0.25 μ A		
	110 μ A to 330 mA	0.01 % of reading + 3.3 μ A		
	800 μ A to 2.2 A	0.03 % of reading + 44.0 μ A		
	21 mA to 11 A	0.06 % of reading + 330 μ A		
Equipment to Output DC Current ^F			HP 34401A	
	20 μ A to 10 mA	0.05 % of reading + 2 μ A		
	165 μ A to 100 mA	0.05 % of reading + 5 μ A		
	3.3 mA to 1 A	0.1 % of reading + 100 μ A		
	13 mA to 3 A	0.12 % of reading + 600 μ A		



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Equipment to Measure Capacitance ^{FO}	0.33 nF to 0.499 9 nF	0.5 % of reading + 0.01 nF	Fluke 5500A
	0.5 nF to 1.099 9 nF	0.5 % of reading + 0.01 nF	
	1.1 nF to 3.299 9 nF	0.5 % of reading + 0.01 nF	
	3.3 nF to 10.999 nF	0.5 % of reading + 0.01 nF	
	11 nF to 32.999 nF	0.25 % of reading + 0.1 nF	
	33 nF to 109.99 nF	0.25 % of reading + 0.1 nF	
	110 nF to 329.99 nF	0.25 % of reading + 0.3 nF	
Equipment to Measure Capacitance ^{FO}	0.33 μ F to 1.099 9 μ F	0.25 % of reading + 1 nF	Fluke 5500A
	1.1 μ F to 3.299 9 μ F	0.35 % of reading + 3 nF	
	3.3 μ F to 10.999 μ F	0.35 % of reading + 10 nF	
	11 μ F to 32.999 μ F	0.4 % of reading + 30 nF	
	33 μ F to 109.99 μ F	0.5 % of reading + 100 nF	
	110 μ F to 329.99 μ F	0.7 % of reading + 300 nF	
	330 μ F to 1.1 mF	1 % of reading + 300 nF	

Mass, Force, and Weighing Devices

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Weighing Devices ^{FO}	100 mg to 150 000 g	$(2.35 \times 10^{-3} + 1.58 \times 10^{-4} \text{Wt})$ g	Class 2 Weights
	0.5 kg to 680.4 kg	$(2.31 \times 10^{-1} + 2.0 \times 10^{-4} \text{Wt})$ g	Class F Weights

Thermodynamic

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Ovens Type J Thermocouples ^F	0 °C to 593.33 °C	2.1 °C	Fluke 744
Ovens Type K Thermocouples ^F	0 °C to 593.33 °C	2.3 °C	

- 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.



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Trace 1 Calibrations

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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 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.
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.
6. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.