



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Advent Design Corp./Tesco
925 Canal Street, Bristol, PA 19007

(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 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

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

Initial Accreditation Date:

April 11, 2019

Issue Date:

April 11, 2019

Expiration Date:

July 31, 2019

Accreditation No.:

101105

Certificate No.:

L19-196

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

Advent Design Corp./Tesco

925 Canal Street, Bristol, PA 19007
 Contact Name: Edward Otte Phone: 609-752-1238

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
Watt-Hour Standards ^F	0.01 A to 2 A (10 mWh to 2.016 kWh)	18 μ Wh/VAh	Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
	2 A to 5 A (2.016 mWh to 5.04 kWh)	20 μ Wh/VAh	
	5 A to 80 A (5.04 kWh to 80.64 kWh)	21 μ Wh/VAh	
	0.01A to 2 A (10 mWh to 2.016 kWh)	26 μ Wh/VAh	
	2 A to 5 A (2.016 Wh to 5.04 kWh)	27 μ Wh/VAh	
	5 A to 80 A (5.04 kWh to 80.64 kWh)	28 μ Wh/VAh	
Equipment to Output AC Phase (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.25 A to 50 A	0.003 °	
45 Hz to 65 Hz	0.25 A to 50 A	0.002 3 °	
65 Hz to 69 Hz	0.25 A to 50 A	0.003 °	
69 Hz to 180 Hz	0.25 A to 50 A	0.007 °	
180 Hz to 450 Hz	0.25 A to 50 A	0.018 °	
450 Hz to 850 Hz	0.25 A to 50 A	0.033 °	
850 Hz to 3 kHz	0.25 A to 50 A	0.115 °	
3 kHz to 6 kHz	0.25 A to 50 A	0.23 °	
Equipment to Output AC Phase (at the listed frequencies) ^F			
16 Hz to 45 Hz	50 A to 80 A	0.003 °	
45 Hz to 65 Hz	50 A to 80 A	0.003 °	
65 Hz to 69 Hz	50 A to 80 A	0.003 °	
69 Hz to 180 Hz	50 A to 80 A	0.008 °	
180 Hz to 450 Hz	50 A to 80 A	0.025 °	
450 Hz to 850 Hz	50 A to 80 A	0.05 °	
850 Hz to 3 kHz	50 A to 80 A	0.05 °	
3 kHz to 6 kHz	50 A to 80 A	0.003 °	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.1 V to 90 V	60 μ V/V + 0.8 mV	
45 Hz to 65 Hz	0.1 V to 90 V	42 μ V/V + 0.2 mV	
65 Hz to 850 Hz	0.1 V to 90 V	60 μ V/V + 0.8 mV	



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Equipment to Output AC Voltage (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
16 Hz to 45 Hz	90 V to 180 V	60 μ V/V + 0.16 mV	
45 Hz to 65 Hz	90 V to 180 V	44 μ V/V + 0.16 mV	
65 Hz to 850 Hz	90 V to 180 V	60 μ V/V + 0.16 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	180 V to 215 V	61 μ V/V + 3.2 mV	
45 Hz to 65 Hz	180 V to 215 V	61 μ V/V + 3.2 mV	
65 Hz to 850 Hz	180 V to 215 V	61 μ V/V + 3.2 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	215 V to 246 V	44 μ V/V + 0.16 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	246 V to 425 V	61 μ V/V + 5.8 mV	
45 Hz to 65 Hz	246 V to 425 V	61 μ V/V + 5.8 mV	
65 Hz to 850 Hz	246 V to 425 V	61 μ V/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	425 V to 490 V	44 μ V/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	490 V to 740 V	61 μ V/V + 5.8 mV	
45 Hz to 65 Hz	490 V to 740 V	61 μ V/V + 5.8 mV	
65 Hz to 850 Hz	490 V to 740 V	61 μ V/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	740 V to 850 V	44 μ V/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	850 V to 1 008 V	61 μ V/V + 10 mV	
45 Hz to 65 Hz	850 V to 1 008 V	61 μ V/V + 10 mV	
65 Hz to 850 Hz	850 V to 1 008 V	61 μ V/V + 10 mV	



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Equipment to Output AC Current (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
16 Hz to 850 Hz	0.01 A to 0.1 A	60 μ A/A + 5 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.1 A to 0.25 A	60 μ A/A + 5 μ A	
45 Hz to 65 Hz	0.1 A to 0.25 A	46 μ A/A + 2.5 μ A	
65 Hz to 850 Hz	0.1 A to 0.25 A	60 μ A/A + 5 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.25 A to 0.5 A	61 μ A/A + 10 μ A	
45 Hz to 65 Hz	0.25 A to 0.5 A	46 μ A/A + 3 μ A	
65 Hz to 850 Hz	0.25 A to 0.5 A	61 μ A/A + 10 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.5 A to 1 A	61 μ A/A + 10 μ A	
45 Hz to 65 Hz	0.5 A to 1 A	47 μ A/A + 6 μ A	
65 Hz to 850 Hz	0.5 A to 1 A	61 μ A/A + 10 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	1 A to 2 A	61 μ A/A + 40 μ A	
45 Hz to 65 Hz	1 A to 2 A	46 μ A/A + 20 μ A	
65 Hz to 850 Hz	1 A to 2 A	61 μ A/A + 40 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	2 A to 5 A	64 μ A/A + 100 μ A	
45 Hz to 65 Hz	2 A to 5 A	49 μ A/A + 50 μ A	
65 Hz to 850 Hz	2 A to 5 A	64 μ A/A + 100 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	5 A to 10 A	65 μ A/A + 200 μ A	
45 Hz to 65 Hz	5 A to 10 A	49 μ A/A + 100 μ A	
65 Hz to 850 Hz	5 A to 10 A	65 μ A/A + 200 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	10 A to 21 A	69 μ A/A + 400 μ A	
45 Hz to 65 Hz	10 A to 21 A	49 μ A/A + 200 μ A	
65 Hz to 850 Hz	10 A to 21 A	69 μ A/A + 400 μ A	



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Equipment to Output AC Current (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
40 Hz to 45 Hz	21 A to 50 A	74 μ A/A + 1 000 μ A	
45 Hz to 65 Hz	21 A to 50 A	49 μ A/A + 500 μ A	
65 Hz to 850 Hz	21 A to 50 A	74 μ A/A + 1 000 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
40 Hz to 450 Hz	50 A to 80 A	106 μ A/A + 2 800 μ A	
450 Hz to 850 Hz	50 A to 80 A	118 μ A/A + 2 800 μ A	
Equipment to Output Frequency ^F	16 Hz to 850 Hz	50 μ Hz/Hz + 10 μ Hz/Hz of range	Agilent 3458A opt 001 & opt 002 TESCO WI: WI-19-10-029; Z540.1
Equipment to Output DC Voltage ^F	0 V to 11.5 V	91 μ V/V + 2 mV	
	11.5 V to 22.5 V	91 μ V/V + 4 mV	
	22.5 V to 45 V	91 μ V/V + 8 mV	
	45 V to 90 V	91 μ V/V + 16 mV	
	90 V to 180 V	91 μ V/V + 32 mV	
	180 V to 325 V	92 μ V/V + 60 mV	
Equipment to Output DC Current ^F	325 V to 504 V	92 μ V/V + 100 mV	
	0.01 A to 0.25 A	89 μ A/A + 25 μ A	
	0.25 A to 0.5 A	89 μ A/A + 50 μ A	
	0.5 A to 1 A	89 μ A/A + 100 μ A	
	1 A to 2 A	89 μ A/A + 200 μ A	
Equipment to Measure Frequency ^F	2 A to 5 A	89 μ A/A + 500 μ A	
	5 A to 10 A	89 μ A/A + 1 000 μ A	
Equipment to Measure DC Voltage ^F	1 Hz to 40 Hz	500 μ Hz/Hz	
	40 Hz to 10 MHz	100 μ Hz/Hz	
	0.01 μ V to 100 mV	5 μ V/V + 3 μ V/V of range	
	100 mV to 1 V	4 μ V/V + 0.3 μ V/V of range	
	1 V to 10 V	4 μ V/V + 0.05 μ V/V of range	
	10 V to 100 V	6 μ V/V + 0.3 μ V/V of range	
	100 V to 1 000 V	6 μ V/V + 0.1 μ V/V of range	



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Equipment to Measure DC Current ^F	0.01 nA to 100 nA	30 μ A/A + 400 μ A/A of range	Agilent 3458A opt 001 & opt 002 TESCO WI: WI-19-10-029; Z540.1
	100 nA to 1 μ A	20 μ A/A + 40 μ A/A of range	
	1 μ A to 10 μ A	20 μ A/A + 10 μ A/A of range	
	10 μ A to 100 μ A	20 μ A/A + 8 μ A/A of range	
	100 μ A to 1 mA	20 μ A/A + 5 μ A/A of range	
	1 mA to 10 mA	20 μ A/A + 5 μ A/A of range	
	10 mA to 100 mA	35 μ A/A + 5 μ A/A of range	
	100 mA to 1 A	110 μ A/A + 10 μ A/A of range	
Equipment to Measure DC Resistance ^F	0.01 $\mu\Omega$ to 10 Ω	15 $\mu\Omega/\Omega$ + 5 $\mu\Omega/\Omega$ of range	
	10 Ω to 100 Ω	12 $\mu\Omega/\Omega$ + 5 $\mu\Omega/\Omega$ of range	
	100 Ω to 1 k Ω	10 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega/\Omega$ of range	
	1 k Ω to 10 k Ω	10 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega/\Omega$ of range	
	10 k Ω to 100 k Ω	10 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega/\Omega$ of range	
	100 k Ω to 1 M Ω	15 $\mu\Omega/\Omega$ + 2 $\mu\Omega/\Omega$ of range	
	1 M Ω to 10 M Ω	50 $\mu\Omega/\Omega$ + 10 $\mu\Omega/\Omega$ of range	
	10 M Ω to 100 M Ω	500 $\mu\Omega/\Omega$ + 10 $\mu\Omega/\Omega$ of range	
100 M Ω to 1 G Ω	5 000 $\mu\Omega/\Omega$ + 10 $\mu\Omega/\Omega$ of range		
AC Energy - Watt-Hour Measure ^F	Up to 5 MHz	10 μ Wh/VAh + 100 nWh	Fluke 6105A TESCO WI: WI-19-10-029 Z540.1
Equipment to Measure AC Current (at the listed frequencies) ^F			Agilent 3458A opt 001 & opt 002 TESCO WI: WI-19-10-029; Z540.1
10 Hz to 20 Hz	0 μ A to 100 μ A	4 000 μ A/A + 0.03 % of range	
20 Hz to 45 Hz	0 μ A to 100 μ A	1 500 μ A/A + 0.03 % of range	
45 Hz to 100 Hz	0 μ A to 100 μ A	600 μ A/A + 0.03 % of range	
100 Hz to 5 kHz	0 μ A to 100 μ A	600 μ A/A + 0.03 % of range	
Equipment to Measure AC Current (at the listed frequencies) ^F			
10 Hz to 20 Hz	100 μ A to 100 mA	4 000 μ A/A + 0.22 % of range	
20 Hz to 45 Hz	100 μ A to 100 mA	1 500 μ A/A + 0.02 % of range	
45 Hz to 100 Hz	100 μ A to 100 mA	600 μ A/A + 0.03 % of range	
100 Hz to 5 kHz	100 μ A to 100 mA	300 μ A/A + 0.02 % of range	
5 kHz to 20 kHz	100 μ A to 100 mA	600 μ A/A + 0.02 % of range	
20 kHz to 50 kHz	100 μ A to 100 mA	4 000 μ A/A + 0.04 % of range	
50 kHz to 100 kHz	100 μ A to 100 mA	5 500 μ A/A + 0.15 % of range	



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Equipment to Measure AC Current (at the listed frequencies) ^F			Agilent 3458A opt 001 & opt 002 TESCO WI: WI-19-10-029; Z540.1
10 Hz to 20 Hz	100 mA to 1 A	4 000 μ A/A + 0.22 % of range	
20 Hz to 45 Hz	100 mA to 1 A	1 500 μ A/A + 0.02 % of range	
45 Hz to 100 Hz	100 mA to 1 A	600 μ A/A + 0.02 % of range	
100 Hz to 5 kHz	100 mA to 1 A	1 000 μ A/A + 0.02 % of range	
Equipment to Measure AC Voltage (at the listed frequencies) ^F			
20 Hz to 100 kHz	0.01 μ V to 100 V	1 000 μ V/V + 0.05 % of range	
20 Hz to 100 kHz	100 V to 1 000 V	1 200 μ V/V + 0.002 % of range	

- 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.