



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

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

***Cal Tec Labs, Inc.***  
***501 Mansfield Ave., Pittsburgh, PA 15205***

*(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):

***Dimensional, Electrical, Mechanical, Time & Frequency, Thermodynamic, Mass, Force, and Weighing 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:*

November 23, 2013

*Issue Date:*

July 18, 2022

*Expiration Date:*

July 18, 2024

*Accreditation No.:*

74269

*Certificate No.:*

L22-433

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](http://www.pjllabs.com)*



# Certificate of Accreditation: Supplement

## Cal Tec Labs, Inc.

501 Mansfield Ave., Pittsburgh, PA 15205  
 Contact Name: George Urban Phone: 412-919-1377

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

### 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
Micrometers Outside <sup>FO</sup>	0.05 in to 48 in	(50 + 15L) $\mu$ m	Gage Blocks, End Rod Standards D10-04
Micrometer Depth <sup>FO</sup>	0.05 in to 12 in	(95 + 9L) $\mu$ m	Gage Blocks Size Control Depth Master D14-00
Indicators <sup>FO</sup>	0.1 in to 2 in	91 $\mu$ m	Mitutoyo Digital Micrometer Head D15-01
Calipers <sup>FO</sup> (OD, ID, Depth)	0.05 in to 24 in	(250 + 11L) $\mu$ m	Size Control Kalmaster Size Control Depth Master D12-01
Gage Blocks <sup>FO</sup>	0.005 in to 4 in	(2.5 + 3.3L) $\mu$ m	Gage Blocks Pratt & Whitney Labmaster D16-00
Length Standards <sup>FO</sup>	1 in to 48 in	(41 + 15L) $\mu$ m	Scherr Tumico End Measuring Rod Standards Micrometer Head Dial Indicator, Trimos Height Gage D17-00
Pin Gages / Pain Plug Gages <sup>FO</sup>	0.012 in to 2 in	76 $\mu$ m	Master Plug Gage Z- Mike Laser Micrometer D18-00
Surface Finish Equipment / Profilometers <sup>FO</sup>	16 $\mu$ m Ra	3.1 $\mu$ m Ra	Mahr Precision Roughness Specimen P51-00
	118 $\mu$ m Ra		

### 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
Equipment to Measure DC Voltage <sup>FO</sup>	Up to mV to 330 mV	74 $\mu$ V/V + 3 $\mu$ V	Fluke 5502A E150
	0.33 mV to 33 V	59 $\mu$ V/V + 5 $\mu$ V	
	3.3 V to 33 V	59 $\mu$ V/V + 50 $\mu$ V	
	33 V to 330 V	65 $\mu$ V/V + 500 $\mu$ V	
	330 V to 1 020 V	65 $\mu$ V/V + 1 500 $\mu$ V	
Equipment to Output DC Voltage <sup>FO</sup>	Up to mV to 100 mV	9.2 $\mu$ V/V + 7.6 $\mu$ V	Keysight 34470A E111
	100 mV to 1 V	43 $\mu$ V/V + 4.1 $\mu$ V	
	1V to 10 V	5.6 $\mu$ V/V + 4.1 $\mu$ V	
	10 V to 100 V	18 mV/V + 6.6 $\mu$ V	
	100 V to 1 000 V	83 mV/V + 6.6 $\mu$ V	



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Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			Fluke 5502A E150
10 Hz to 45 Hz	Up to 33 mV	0.17 % + 20 $\mu$ V	
45 Hz to 10 kHz	Up to 33 mV	0.12 % + 20 $\mu$ V	
10 kHz to 20 kHz	Up to 33 mV	0.17 % + 20 $\mu$ V	
20 kHz to 50 kHz	Up to 33 mV	0.23 % + 20 $\mu$ V	
50 kHz to 100 kHz	Up to 33 mV	0.4 % + 33 $\mu$ V	
100 kHz to 500 kHz	Up to 33 mV	1.2 % + 60 $\mu$ V	
Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	33 mV to 330 mV	0.058 % + 20 $\mu$ V	
45 Hz to 10 kHz	33 mV to 330 mV	0.035 % + 20 $\mu$ V	
10 kHz to 20 kHz	33 mV to 330 mV	0.081 % + 20 $\mu$ V	
20 kHz to 50 kHz	33 mV to 330 mV	0.12 % + 20 $\mu$ V	
50 kHz to 100 kHz	33 mV to 330 mV	0.27 % + 40 $\mu$ V	
100 kHz to 500 kHz	33 mV to 330 mV	0.58 % + 170 $\mu$ V	
Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	0.33 V to 3.3 V	0.058 % + 60 $\mu$ V	
45 Hz to 10 kHz	0.33 V to 3.3 V	0.035 % + 60 $\mu$ V	
10 kHz to 20 kHz	0.33 V to 3.3 V	0.081 % + 60 $\mu$ V	
20 kHz to 50 kHz	0.33 V to 3.3 V	0.12 % + 60 $\mu$ V	
50 kHz to 100 kHz	0.33 V to 3.3 V	0.27 % + 0.2 mV	
100 kHz to 500 kHz	0.33 V to 3.3 V	0.58 % + 0.9 mV	
Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	3.3 V to 33 V	0.058 % + 0.8 mV	
45 Hz to 10 kHz	3.3 V to 33 V	0.035 % + 0.6 mV	
10 kHz to 20 kHz	3.3 V to 33 V	0.081 % + 0.6 mV	
20 kHz to 50 kHz	3.3 V to 33 V	0.12 % + 06 mV	
50 kHz to 100 kHz	3.3 V to 33 V	0.27 % + 0.2 mV	



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Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			Fluke 5502A E150
45 Hz to 1 kHz	33 V to 330 V	0.058 % + 3 mV	
1 kHz to 10 kHz	33 V to 330 V	0.092 % + 9 mV	
10 kHz to 20 kHz	33 V to 330 V	0.1 % + 9 mV	
20 t kHz o 50 kHz	33 V to 330 V	0.14 % + 9 mV	
50 kHz to 100 kHz	33 V to 330 V	0.28 % + 80 mV	
1 kHz to 10 kHz	33 V to 330 V	0.092 % + 9 mV	
Equipment to Measure AC Voltage At the Listed Frequencies <sup>FO</sup>			
45 Hz to 1 kHz	330 V to 1 020 V	0.058 % + 20 mV	
1 kHz to 5 kHz	330 V to 1 020 V	0.092 % + 20 mV	
5 kHz to 10 kHz	330 V to 1 020 V	0.1 % + 20 mV	
Equipment to Output AC Voltage At the Listed Frequencies <sup>FO</sup>			
1 Hz to 10 Hz	1 mV to 100 mV	70 $\mu$ V/V + 123 $\mu$ V	
10 Hz to 40 Hz	1 mV to 100 mV	20 $\mu$ V/V + 123 $\mu$ V	
40 Hz to 100 Hz	1 mV to 100 mV	20 $\mu$ V/V + 105 $\mu$ V	
100 Hz to 2 kHz	1 mV to 100 mV	83 uV/V + 104 $\mu$ V	
2 kHz to 10 kHz	1 mV to 100 mV	110 uV/V + 103 $\mu$ V	
10 kHz to 30 kHz	1 mV to 100 mV	125 uV/V + 304 $\mu$ V	
30 kHz to 100 kHz	1 mV to 100 mV	150 uV/V + 706 $\mu$ V	
Equipment to Output AC Voltage At the Listed Frequencies <sup>FO</sup>			
1 Hz to 10 Hz	1 V to 100 V	60 $\mu$ V/V + 105 $\mu$ V	
10 Hz to 40 Hz	1 V to 100 V	10 mV/V + 104 $\mu$ V	
40 Hz to 100 Hz	1 V to 100 V	10 mV/V + 82 $\mu$ V	
100 Hz to 2 kHz	1 V to 100 V	81 mV/V + 63 $\mu$ V	
2 kHz to 10 kHz	1 V to 100 V	100 mV/V + 82 $\mu$ V	
10 kHz to 30 kHz	1 V to 100 V	120 mV/V + 201 $\mu$ V	
30 kHz to 100 kHz	1 V to 100 V	150 mV/V + 501 $\mu$ V	
Equipment to Output AC Voltage At the Listed Frequencies <sup>FO</sup>			
100 kHz to 300 kHz	1 V to 100 V	1.22 % range + 0.45 % reading	
300 kHz to 1 MHz	1 V to 100 V	3.06 % range + 1.41 %reading	



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Equipment to Output AC Voltage At the Listed Frequencies <sup>FO</sup>			Keysight 34470A E111
1 Hz to 10 Hz	100 V to 700 V	104 $\mu$ V + 70 $\mu$ V/V	
10 Hz to 40 Hz	100 V to 700 V	250 mV + 20 $\mu$ V/V	
40 Hz to 10 kHz	100 V to 700 V	850 mV + 10mV/V	
10 kHz to 30 kHz	100 V to 700 V	850 mV + 40 mV/V	
30 kHz to 100 kHz	100 V to 700 V	850 mV + 200 mV/V	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-250 to -100 °C	0.59 °C	Fluke 5502A P21-00
	-100 °C to -25 °C	0.23 °C	
	-25 °C to 350 °C	0.21 °C	
	350 °C to 650 °C	0.23 °C	
	650 °C to 1 000 °C	0.28 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 °C to -100 °C	0.34 °C	
	-100 °C to -30 °C	0.23 °C	
	-30 °C to 150 °C	0.21 °C	
	150 °C to 760 °C	0.24 °C	
	760 °C to 1 200 °C	0.30 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to -100 °C	0.38 °C	
	-100 °C to -25 °C	0.25 °C	
	-25 °C to 120 °C	0.23 °C	
	120 °C to 1 000 °C	0.33 °C	
	1 000 °C to 1 372 °C	0.48 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-250 °C to -150 °C	0.74 °C	
	-150 °C to 0 °C	0.31 °C	
	0 °C to 120 °C	0.23 °C	
	120 °C to 400 °C	0.21 °C	



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Equipment to Measure Resistance <sup>FO</sup>	Up to 11 $\Omega$	0.015 % + 0.001 $\Omega$	Fluke 5502A E150
	11 $\Omega$ to 33 $\Omega$	0.014 % + 0.001 5 $\Omega$	
	33 $\Omega$ to 110 $\Omega$	0.01 % + 0.001 4 $\Omega$	
	110 $\Omega$ to 330 $\Omega$	0.01 % + 0.002 $\Omega$	
	0.33 k $\Omega$ to 1.1 k $\Omega$	0.01 % + 0.002 $\Omega$	
	1.1 k $\Omega$ to 3.3 k $\Omega$	0.01 % + 0.02 $\Omega$	
	3.3 k $\Omega$ to 11 k $\Omega$	0.01 % + 0.02 $\Omega$	
	11 k $\Omega$ to 33 k $\Omega$	0.01 % + 0.2 $\Omega$	
	33 k $\Omega$ to 110 k $\Omega$	0.013 % + 0.2 $\Omega$	
	110 k $\Omega$ to 330 k $\Omega$	0.014 % + 2 $\Omega$	
	0.33 M $\Omega$ to 1.1 M $\Omega$	0.017 % + 2 $\Omega$	
	1.1 M $\Omega$ to 33 M $\Omega$	0.017 % + 30 $\Omega$	
	3.3 M $\Omega$ to 11 M $\Omega$	0.069 % + 50 $\Omega$	
	11 M $\Omega$ to 33 M $\Omega$	0.12 % + 2.5 k $\Omega$	
	33 M $\Omega$ to 110 M $\Omega$	0.58 % + 3 k $\Omega$	
110 M $\Omega$ to 330 M $\Omega$	0.58 % + 0.1 M $\Omega$		
330 M $\Omega$ to 1 100 M $\Omega$	1.7 % + 0.5 M $\Omega$		
Equipment to Measure Resistance <sup>FO</sup>	10 $\Omega$ to 100 $\Omega$	3 m $\Omega$ / $\Omega$ + 9 $\mu\Omega$	Keysight 34470A E160
	100 $\Omega$ to 1 k $\Omega$	5.2 m $\Omega$ /k $\Omega$ + 7 m $\Omega$	
	1 k $\Omega$ to 10 k $\Omega$	10 m $\Omega$ /k $\Omega$ + 7 m $\Omega$	
	10 k $\Omega$ to 100 k $\Omega$	12 m $\Omega$ /k $\Omega$ + 7 m $\Omega$	
	100 k $\Omega$ to 1 M $\Omega$	170 $\Omega$ /M $\Omega$ + 12 $\Omega$	
	1 M $\Omega$ to 10 M $\Omega$	650 $\Omega$ /M $\Omega$ + 13 $\Omega$	
	10 M $\Omega$ to 100 M $\Omega$	650 $\Omega$ /M $\Omega$ + 47 $\Omega$	



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Equipment to Measure DC Current <sup>FO</sup>	Up to 330 $\mu$ A	0.017 % + 0.02 $\mu$ A	Fluke 5502A E150
	0.33 mA to 3.3 mA	0.015 % + 0.05 $\mu$ A	
	3.3 mA to 33 mA	0.012 % + 0.25 $\mu$ A	
	33 mA to 330 mA	0.015 % + 2.5 $\mu$ A	
	0.33 A to 1.1 A	0.044 % + 44 $\mu$ A	
	1.1 A to 3 A	0.045 % + 44 $\mu$ A	
	3 A to 11 A	0.073 % + 0.5 mA	
	11 A to 20.5 A	0.12 % + 0.75 mA	
Equipment to Measure DC Current <sup>FO</sup>	10 A to 16.5 A	0.25 % + 0.002 A	Fluke 5502A Fluke 5500A/Coil E120
	16.5 A to 150 A	0.26 % + 0.015 A	
	150 A to 1 025 A	0.28 % + 0.05 A	
Equipment to Output DC Current <sup>FO</sup>	1 A to 3 A	5.4 mA/A + 260 $\mu$ A	Keysight 34470A E111
	3 A to 10 A	27 mA/A + 260 $\mu$ A	
	1 mA to 10 mA	8.4 $\mu$ A/A + 26 $\mu$ A	
	10 mA to 100 mA	67 $\mu$ A/A + 51 $\mu$ A	
	100 mA to 1 A	1.1 mA/A + 151 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			Fluke 5502A E150
10 Hz to 20 Hz	Up to 330 $\mu$ A	0.23 % + 0.1 $\mu$ A	
20 Hz to 45 Hz	Up to 330 $\mu$ A	0.17 % + 0.1 $\mu$ A	
45 Hz to 1 kHz	Up to 330 $\mu$ A	0.14 % + 0.1 $\mu$ A	
1 kHz to 5 kHz	Up to 330 $\mu$ A	0.35 % + 0.15 $\mu$ A	
5 kHz to 10 kHz	Up to 330 $\mu$ A	0.92 % + 0.2 $\mu$ A	
10 kHz to 30 kHz	Up to 330 $\mu$ A	1.8 % + 0.4 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 20 Hz	0.33 mA to 3.3 mA	0.23 % + 0.15 $\mu$ A	
20 Hz to 45 Hz	0.33 mA to 3.3 mA	0.14 % + 0.15 $\mu$ A	
45 Hz to 1 kHz	0.33 mA to 3.3 mA	0.12 % + 0.15 $\mu$ A	
1 kHz to 5 kHz	0.33 mA to 3.3 mA	0.23 % + 0.2 $\mu$ A	
5 kHz to 10 kHz	0.33 mA to 3.3 mA	0.58 % + 0.3 $\mu$ A	
10 kHz to 30 kHz	0.33 mA to 3.3 mA	1.2 % + 0.6 $\mu$ A	



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### Electrical

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Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			Fluke 5502A E150
10 Hz to 20 Hz	3.3 mA to 33 mA	0.21 % + 2 $\mu$ A	
20 Hz to 45 Hz	3.3 mA to 33 mA	0.1 % + 2 $\mu$ A	
45 Hz to 1 kHz	3.3 mA to 33 mA	0.046 % + 2 $\mu$ A	
1 kHz to 5 kHz	3.3 mA to 33 mA	0.092 % + 2 $\mu$ A	
5 kHz to 10 kHz	3.3 mA to 33 mA	0.23 % + 3 $\mu$ A	
10 kHz to 30 kHz	3.3 mA to 33 mA	0.46 % + 4 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 20 Hz	33 mA to 330 mA	0.21 % + 20 $\mu$ A	
20 Hz to 45 Hz	33 mA to 330 mA	0.1 % + 20 $\mu$ A	
45 Hz to 1 kHz	33 mA to 330 mA	0.046 % + 20 $\mu$ A	
1 kHz to 5 kHz	33 mA to 330 mA	0.12 % + 50 $\mu$ A	
5 kHz to 10 kHz	33 mA to 330 mA	0.23 % + 0.1 mA	
10 kHz to 30 kHz	33 mA to 330 mA	0.46 % + 0.2 mA	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	0.33 A to 1.1 A	0.21 % + 0.1 mA	
45 Hz to 1 kHz	0.33 A to 1.1 A	0.058 % + 0.1 mA	
1 kHz to 5 kHz	0.33 A to 1.1 A	0.069 % + 1 mA	
5 kHz to 10 kHz	0.33 A to 1.1 A	2.9 % + 5 mA	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	1.1 A to 3 A	0.21 % + 0.1 mA	
45 Hz to 1 kHz	1.1 A to 3 A	0.058 % + 0.1 mA	
1 kHz to 5 kHz	1.1 A to 3 A	0.069 % + 1 mA	
5 kHz to 10 kHz	1.1 A to 3 A	2.9 % + 5 mA	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 45 Hz	3 A to 11 A	0.21 % + 0.1 mA	
45 Hz to 1 kHz	3 A to 11 A	0.058 % + 0.1 mA	
1 kHz to 5 kHz	3 A to 11 A	0.069 % + 1 mA	





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Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			Fluke 5502A with LCOMP On E150
10 Hz to 100 Hz	Up to 330 $\mu$ A	0.29 % + 0.2 $\mu$ A	
100 Hz to 1 kHz	Up to 330 $\mu$ A	0.69 % + 0.5 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 100 Hz	(0.33 to 3.3) mA	0.29 % + 0.3 $\mu$ A	
100 Hz to 1 kHz	(0.33 to 3.3) mA	0.69 % + 0.8 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 100 Hz	(0.33 to 3.3) mA	0.29 % + 0.2 $\mu$ A	
100 Hz to 1 kHz	(0.33 to 3.3) mA	0.69 % + 0.5 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 100 Hz	(0.33 to 3.3) mA	0.092 % + 40 $\mu$ A	
100 Hz to 1 kHz	(0.33 to 3.3) mA	0.23 % + 10 $\mu$ A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 100 Hz	(0.33 to 3) A	0.14 % + 0.2 $\mu$ A	
100 Hz to 400 Hz	(0.33 to 3) A	0.35 % + 1 mA	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
10 Hz to 100 Hz	(3 to 20.5) A	0.14 % + 2 mA	
100 Hz to 400 Hz	(3 to 20.5) A	1.2 % + 5 mA	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			5502A, 50 turnCoil E120
45 Hz to 65 Hz	(16.5 to 150) A	0.029 % + 0.003 A	
65 Hz to 440 Hz	(16.5 to 150) A	0.083 % + 0.003 A	
Equipment to Measure AC Current At the Listed Frequencies <sup>FO</sup>			
45 Hz to 65 Hz	(150 to 1 025) A	0.32 % + 0.025 A	
65 Hz to 440 Hz	(150 to 1 025) A	0.87 % + 0.027 A	



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Capacitance – Source	220 pF to 400 pF	0.58 % + 0.01 nF	Fluke 5502A E160
	0.4 nF to 1.1 nF	0.58 % + 0.01 nF	
	1.1 nF to 3.3 nF	0.58 % + 0.01 nF	
	3.3 nF to 11 nF	0.29 % + 0.01 nF	
	11 nF to 33 nF	0.29 % + 0.1 nF	
	33 nF to 110 nF	0.29 % + 0.1 nF	
	110 nF to 330 nF	0.29 % + 0.3 nF	
	0.33 $\mu$ F to 1.1 $\mu$ F	0.29 % + 1 nF	
	1.1 $\mu$ F to 3.3 $\mu$ F	0.29 % + 3 nF	
	3.3 $\mu$ F to 11 $\mu$ F	0.29 % + 10 nF	
	11 $\mu$ F to 33 $\mu$ F	0.46 % + 30 nF	
	33 $\mu$ F to 110 $\mu$ F	0.52 % + 0.1 $\mu$ F	
	110 $\mu$ F to 330 $\mu$ F	0.52 % + 0.3 $\mu$ F	
	0.33 mF to 1.1 mF	0.52 % + 1 $\mu$ F	
	1.1 mF to 3.3 mF	0.52 % + 3 $\mu$ F	
3.3 mF to 11 mF	0.52 % + 10 $\mu$ F		
11 mF to 33 mF	0.87 % + 30 $\mu$ F		
33 mF to 110 mF	1.2 % + 100 $\mu$ F		
Equipment to Output AC Current At the Listed Frequencies <sup>FO</sup>			Keysight 34470A E111
10 Hz to 5 kHz	1 mA to 10 mA	60 $\mu$ A/A + 216 $\mu$ A	
10 Hz to 5 kHz	10 mA to 100 mA	100 $\mu$ A/A + 216 $\mu$ A	
10 Hz to 1 kHz	100 mA to 1 mA	320 $\mu$ A/A + 508 $\mu$ A	Fluke 5502A/SC600 E170
Bandwidth <sup>FO</sup>	50 kHz to 600 MHz	5.1 % of reading	
At 50 kHz Reference 6 div			
Time Marker Output <sup>FO</sup>	2 ns to 100 ms	3.9 % of reading	
Amplitude <sup>FO</sup>	5 mV to 5.5 V	2.3 % of reading	

### 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 <sup>O</sup>	1 g to 10 kg	260 mg	NIST Handbook 105-1 (Class F) Test Weights P23-00



# Certificate of Accreditation: Supplement

## Cal Tec Labs, Inc.

501 Mansfield Ave., Pittsburgh, PA 15205  
 Contact Name: George Urban Phone: 412-919-1377

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
Pressure <sup>FO</sup>	5 psig to 300 psig	0.33 psi	Fluke 702 with module 700PO7, P25-00
	100 psi to 10 000 psi	0.82 % of reading	Deadweight Pressure System (Mansfield & Green T-100) P25-00
Torque Wrench <sup>FO</sup>	5 lbf•in to 25 lbf•in	1.3 lbf•in	Mark-10 TT02, P24-00
	20 lbf•in to 100 lbf•in	1.8 lbf•in	
	100 lbf•in to 200 lbf•in	3.9 lbf•in	CDI 10002-I-DTT P24-00
	200 lbf•in to 600 lbf•in	5 lbf•in	
	600 lbf•in to 1 000 lbf•in	6 lbf•in	
	60 lbf•ft to 300 lbf•ft	2 lbf•ft	CDI 6004-F-DTT P24-00
	300 lbf•ft to 600 lbf•ft	3.6 lbf•ft	

### Time and 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
Equipment to Measure Frequency <sup>FO</sup>	10 Hz to 100 Hz	0.15 Hz	Fluke 5502A E140
	100 Hz to 1 kHz	0.16 Hz	
	1 kHz to 10 kHz	0.6 Hz	
	10 kHz to 100 kHz	6 Hz	
	100 kHz to 1 MHz	6 kHz	
	1 MHz to 10 MHz	6 kHz	Hewlett Packard 8648C Signal Generator E140
	10 MHz to 100 MHz	6 kHz	
	100 MHz to 300 MHz	6 kHz	
Equipment to Measure Frequency <sup>FO</sup>	1 MHz to 10 MHz	62 Hz	Tektronix FCA 3003 Timer/Counter/Analyzer E141
	10 MHz to 100 MHz	610 Hz	
	100 MHz to 500 MHz	3.1 kHz	
	500 MHz to 1 GHz	6.1 kHz	
	1 GHz to 2 GHz	13 kHz	
	1 GHz to 3.2 GHz	13 kHz	
	10 Hz to 100 Hz	0.15 Hz	
	100 Hz to 1 kHz	0.16 Hz	
	1 kHz to 10 kHz	0.6 Hz	
	10 kHz to 100 kHz	6 Hz	
	100 kHz to 1 MHz	6 kHz	



# Certificate of Accreditation: Supplement

## Cal Tec Labs, Inc.

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

### 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
Equipment to Measure Frequency <sup>FO</sup>	1 MHz to 10 MHz	6 kHz	Tektronix FCA 3003 Timer/Counter/Analyzer E141
	10 MHz to 100 MHz	6 kHz	
	100 MHz to 300 MHz	6 kHz	
Timers/Stopwatches <sup>FO</sup>	Up to 24 hrs	0.5 s	NIST 960-12
Tachometers, Photo <sup>FO</sup>	60 rpm to 100 000 rpm	0.67%	Fluke 5502A P-48

### Thermodynamic 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
Thermometers & Temperature Indicators <sup>FO</sup>	95 °F to 707 °F	0.81 °C	Fluke 9100S Drywell Calibrator P21-02

1. The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represent the smallest measurement uncertainties attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is 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 <sup>FO</sup> means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer<sup>FO</sup> would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
4. 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.