



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

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

***Precise Technical Solutions, LLC***  
7839 Allentown Boulevard, Suite #300, Harrisburg, PA 17112

*(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 April 2017):

***Electrical, Chemical, Mechanical, Mass, Force, and Weighing Devices,  
Thermodynamic, 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

<i>Initial Accreditation Date:</i>	<i>Issue Date:</i>	<i>Expiration Date:</i>
March 7, 2011	October 4, 2019	October 4, 2021

<i>Accreditation No.:</i>	<i>Certificate No.:</i>
69463	L19-502

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



# Certificate of Accreditation: Supplement

## Precise Technical Solutions, LLC

7839 Allentown Boulevard, Suite #300, Harrisburg, PA 17112

Contact Name: Michael Geppert Phone: 717-635-9879

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
Equipment to Measure DC Voltage <sup>FO</sup>	1 mV to 330 mV	0.073 % of reading + 1 $\mu$ V	Fluke 5520A QI-114
	330 mV to 3.3 V	0.004 1 % of reading + 2 $\mu$ V	
	3.3 V to 33 V	0.005 2% of reading + 20 $\mu$ V	
	33 V to 330 V	0.006 8 % + 150 $\mu$ V	
	330 V to 1 000 V	0.007 8 % of reading + 1.5 mV	
Equipment to Output DC Voltage <sup>FO</sup>	1 mV to 100 mV	0.005 5 % of reading + 0.3 $\mu$ V	HP 3458A Option 002 QI-114
	0.1 V to 1 V	0.001 5 % of reading + 0.3 $\mu$ V	
	1 V to 10 V	0.001 2 % of reading + 5 $\mu$ V	
	10 V to 100 V	0.001 2 % of reading + 30 $\mu$ V	
	100 V to 1 000 V	0.002 % of reading + 100 $\mu$ V	Fluke 80K-40 w/ HP 3458A QI-114
	10 kV to 20 kV	2.3 % of reading	
	20 kV to 35 kV	1.5 % of reading	
35 kV to 40 kV	2.3 % of reading		
Equipment to Measure DC Current <sup>FO</sup>	1 $\mu$ A to 330 $\mu$ A	0.019 % of reading + 0.02 $\mu$ A	Fluke 5520A QI-114
	330 $\mu$ A to 3.3 mA	0.018 % of reading + 0.05 $\mu$ A	
	3.3 mA to 33 mA	0.016 % of reading + 0.25 $\mu$ A	
	33 mA to 330 mA	0.015 % of reading + 2.5 $\mu$ A	
	330 mA to 1.1 A	0.029 % of reading + 40 $\mu$ A	
	1.1 A to 3 A	0.24 % of reading + 40 $\mu$ A	
	3 A to 11 A	0.065 % of reading + 500 $\mu$ A	
	11 A to 20 A	0.18 % of reading + 0.75 mA	
Equipment to Measure DC Current Clamp-On <sup>FO</sup>	5 A to 600 A	0.33 % of reading + 0.06A	Fluke 5520A w/ 50-Turn Coil QI-114
Equipment to Measure DC Current <sup>F</sup>	0 nA to 2 nA	0.012 nA	Keithley 6220 Precision Current Source QI-114
	2 nA to 20 nA	0.039 nA	
	20 nA to 200 nA	0.53 nA	
	0.2 $\mu$ A to 2 $\mu$ A	0.003 6 $\mu$ A	
	2 $\mu$ A to 20 $\mu$ A	0.013 $\mu$ A	
	20 $\mu$ A to 200 $\mu$ A	0.18 $\mu$ A	
	0.2 mA to 2 mA	0.002 3 mA	
	2 mA to 20 mA	0.023 mA	
	20 mA to 100 mA	0.17 mA	



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Equipment to Output AC Voltage above 1 KV <sup>F</sup>	1 KV to 10 KV	1.5 V + 0.000 000 04 V/V	Vitretek 4700 Precision HV Meter
Equipment to Output AC Voltage above 1 KV <sup>F</sup>	1 KV to 10 KV	0.000 4 V	QI-155
Equipment to Output DC Current <sup>FO</sup>	10 $\mu$ A to 100 $\mu$ A	0.009 2 % of reading + 0.8 nA	HP 3458A (With shunt above 1 Amp) QI-114
	0.1 mA to 1 mA	0.007 5 % of reading + 5 nA	
	1 mA to 10 mA	0.001 8 % of reading +50 nA	
	10 mA to 100 mA	0.016 % of reading + 500 nA	
	0.1 A to 1 A	0.016 % of reading + 10 $\mu$ A	
	1 A to 600 A	0.34 % of reading	
Equipment to Measure DC Resistance <sup>FO</sup>	1 m $\Omega$ to 11 $\Omega$	0.065 % of reading + 0.001 $\Omega$	Fluke 5520A (Applies to 4-wire compensation only. 2-wire above 100 k $\Omega$ ) QI-114
	11 $\Omega$ to 33 $\Omega$	0.015 % of reading + 0.001 5 $\Omega$	
	33 $\Omega$ to 110 $\Omega$	0.005 3 % of reading + 0.001 4 $\Omega$	
	110 $\Omega$ to 330 $\Omega$	0.004 6 % of reading + 0.002 $\Omega$	
	330 $\Omega$ to 1.1 k $\Omega$	0.004 % of reading + 0.002 $\Omega$	
	1.1 k $\Omega$ to 3.3 k $\Omega$	0.004 6 % of reading + 0.02 $\Omega$	
	3.3 k $\Omega$ to 11 k $\Omega$	0.003 9 % of reading + 0.02 $\Omega$	
	11 k $\Omega$ to 33 k $\Omega$	0.004 5 % of reading + 0.2 $\Omega$	
	33 k $\Omega$ to 110 k $\Omega$	0.003 9 % of reading + 0.2 $\Omega$	
	110 k $\Omega$ to 330 k $\Omega$	0.005 1 % of reading + 2 $\Omega$	
	330 k $\Omega$ to 1.1 M $\Omega$	0.004 31 % of reading + 2 $\Omega$	
	1.1 M $\Omega$ to 3.3 M $\Omega$	0.009 % of reading + 30 $\Omega$	
	3.3 M $\Omega$ to 11 M $\Omega$	0.016 % of reading + 50 $\Omega$	
	11 M $\Omega$ to 33 M $\Omega$	0.044 % of reading + 2.5 k $\Omega$	
	33 M $\Omega$ to 110 M $\Omega$	0.17 % of reading + 3 k $\Omega$	
110 M $\Omega$ to 330 M $\Omega$	0.49 % of reading + 0.1 M $\Omega$		
330 M $\Omega$ to 1 100 M $\Omega$	0.91 % of reading + 0.5 M $\Omega$		



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Equipment to Output DC Resistance <sup>FO</sup>	1 m $\Omega$ to 10 $\Omega$	0.072 % of reading + 50 $\mu\Omega$	HP 3458A QI-114
	10 $\Omega$ to 100 $\Omega$	0.003 1 % of reading + 500 $\mu\Omega$	
	100 $\Omega$ to 1 k $\Omega$	0.002 1 % of reading + 0.5 m $\Omega$	
	1 k $\Omega$ to 10 k $\Omega$	0.002 1 % of reading + 5 m $\Omega$	
	10 k $\Omega$ to 100 k $\Omega$	0.002 1 % of reading + 50 m $\Omega$	
	100 k $\Omega$ to 1 M $\Omega$	0.002 % of reading + 2 $\Omega$	
	1 M $\Omega$ to 10 M $\Omega$	0.007 6 % of reading +100 $\Omega$	
	10 M $\Omega$ to 100 M $\Omega$	0.06 % of reading + 1 k $\Omega$	
	100 M to 1 G $\Omega$	0.6 % of reading + 10 k $\Omega$	
Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			
1 Hz to 40 Hz	5 mV to 10 mV	0.06 % of reading + 3 $\mu$ V	
40 Hz to 1 kHz	5 mV to 10 mV	0.031 % of reading + 1.1 $\mu$ V	
1 kHz to 20 kHz	5 mV to 10 mV	0.042 % of reading + 1.1 $\mu$ V	
20 kHz to 50 kHz	5 mV to 10 mV	0.11 % of reading + 1.1 $\mu$ V	
50 kHz to 100 kHz	5 mV to 10 mV	0.51 % of reading + 1.1 $\mu$ V	
100 kHz to 300 kHz	5 mV to 10 mV	4 % of reading + 2 $\mu$ V	
Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			
1 Hz to 40 Hz	10 mV to 100 mV	0.012 % of reading + 4 $\mu$ V	
40 Hz to 1 kHz	10 mV to 100 mV	0.009 8 % of reading + 2 $\mu$ V	
1 kHz to 20 kHz	10 mV to 100 mV	0.017 % of reading + 2 $\mu$ V	
20 kHz to 50 kHz	10 mV to 100 mV	0.03 % of reading + 2 $\mu$ V	
50 kHz to 100 kHz	10 mV to 100 mV	0.084 % of reading + 2 V	
100 kHz to 300 kHz	10 mV to 100 mV	0.31 % of reading + 10 $\mu$ V	
300 kHz to 1 MHz	10 mV to 100 mV	1 % of reading + 10 $\mu$ V	
1 MHz to 2 MHz	10 mV to 100 mV	1.7 % of reading + 10 $\mu$ V	



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Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			HP 3458A QI-114
1 Hz to 40 Hz	100 mV to 1 V	0.012 % of reading + 40 $\mu$ V	
40 Hz to 1 kHz	100 mV to 1 V	0.009 5 % of reading + 20 $\mu$ V	
1 kHz to 20 kHz	100 mV to 1 V	0.017 % of reading + 20 $\mu$ V	
20 kHz to 50 kHz	100 mV to 1 V	0.036 % of reading + 20 $\mu$ V	
50 kHz to 100 kHz	100 mV to 1 V	0.084 % of reading + 20 $\mu$ V	
100 kHz to 300 kHz	100 mV to 1 V	0.43 % of reading + 0.1 mV	
300 kHz to 1 MHz	100 mV to 1 V	1 % of reading + 0.1 mV	
1 MHz to 2 MHz	100 mV to 1 V	1.5 % of reading + 0.1 mV	
Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			
1 Hz to 40 Hz	1 V to 10 V	0.012 % of reading + 0.4 mV	
40 Hz to 1 kHz	1 V to 10 V	0.009 5 % of reading + 0.2 mV	
1 kHz to 20 kHz	1 V to 10 V	0.024 % of reading + 0.2 mV	
20 kHz to 50 kHz	1 V to 10 V	0.036 % of reading + 0.2 mV	
50 kHz to 100 kHz	1 V to 10 V	0.084 % of reading + 0.2 mV	
100 kHz to 300 kHz	1 V to 10 V	0.35 % of reading + 1 mV	
300 kHz to 1 MHz	1 V to 10 V	1 % of reading + 1 mV	
1 MHz to 2 MHz	1 V to 10 V	1.5 % of reading + 1 mV	
Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			
1 Hz to 40 Hz	10 V to 100 V	0.024 % of reading + 4 mV	
40 Hz to 1 kHz	10 V to 100 V	0.022 % of reading + 2 mV	
1 kHz to 20 kHz	10 V to 100 V	0.022 % of reading + 2 mV	
20 kHz to 50 kHz	10 V to 100 V	0.038 % of reading + 2 mV	
50 kHz to 100 kHz	10 V to 100 V	0.12 % of reading + 2 mV	
100 kHz to 300 kHz	10 V to 100 V	0.48 % of reading + 10 mV	
300 kHz to 1 MHz	10 V to 100 V	1.8 % of reading + 10 mV	



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Equipment to Output AC Voltage (at the listed frequencies) <sup>FO</sup>			HP 3458A QI-114
1 Hz to 40 Hz	100 V to 1 000 V	0.044 % of reading + 40 mV	
40 Hz to 1 kHz	100 V to 1 000 V	0.042 % of reading + 20 mV	
1 kHz to 20 kHz	100 V to 1 000 V	0.062 % of reading + 20 mV	
20 kHz to 50 kHz	100 V to 1 000 V	0.12 % of reading + 20 mV	
50 kHz to 100 kHz	100 V to 1 000 V	0.3 % of reading + 20 mV	
Equipment to Measure AC Voltage (at the listed frequencies) <sup>FO</sup>			Fluke 5520A QI-114
10 Hz to 45 Hz	1 mV to 33 mV	0.13 % of reading + 6 $\mu$ V	
45 Hz to 10 kHz	1 mV to 33 mV	0.05 % of reading + 6 $\mu$ V	
10 kHz to 20 kHz	1 mV to 33 mV	0.053 % of reading + 6 $\mu$ V	
20 kHz to 50 kHz	1 mV to 33 mV	0.16 % of reading + 6 $\mu$ V	
50 kHz to 100 kHz	1 mV to 33 mV	0.53 % of reading + 12 $\mu$ V	
100 kHz to 500 kHz	1 mV to 33 mV	1.3 % of reading + 50 $\mu$ V	
Equipment to Measure AC Voltage (at the listed frequencies) <sup>FO</sup>			
10 Hz to 45 Hz	33 mV to 330 mV	0.063 % of reading + 8 $\mu$ V	
45 Hz to 10 kHz	33 mV to 330 mV	0.023 % of reading + 8 $\mu$ V	
10 kHz to 20 kHz	33 mV to 330 mV	0.024 % of reading + 8 $\mu$ V	
20 kHz to 50 kHz	33 mV to 330 mV	0.04 % of reading + 8 $\mu$ V	
50 kHz to 100 kHz	33 mV to 330 mV	0.11 % of reading + 32 $\mu$ V	
100 kHz to 500 kHz	33 mV to 330 mV	0.32 % of reading + 70 $\mu$ 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	0.036 % of reading + 50 $\mu$ V	
45 Hz to 10 kHz	0.33 V to 3.3 V	0.022 % of reading + 60 $\mu$ V	
10 kHz to 20 kHz	0.33 V to 3.3 V	0.026 % of reading + 60 $\mu$ V	
20 kHz to 50 kHz	0.33 V to 3.3 V	0.04 % of reading + 50 $\mu$ V	
50 kHz to 100 kHz	0.33 V to 3.3 V	0.087 % of reading + 0.13 mV	
100 kHz to 500 kHz	0.33 V to 3.3 V	0.37 % of reading + 0.6 mV	



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Equipment to Measure AC Voltage (at the listed frequencies) <sup>FO</sup>			Fluke 5520A QI-114
10 Hz to 45 Hz	3.3 V to 33 V	0.037 % of reading + 0.65 mV	
45 Hz to 10 kHz	3.3 V to 33 V	0.022 % of reading + 0.6 mV	
10 kHz to 20 kHz	3.3 V to 33 V	0.031 % of reading + 0.6 mV	
20 kHz to 50 kHz	3.3 V to 33 V	0.043 % of reading + 0.6 mV	
50 kHz to 100 kHz	3.3 V to 33 V	0.12 % of reading + 1.6 mV	
Equipment to Measure AC Voltage (at the listed frequencies) <sup>FO</sup>			
10 Hz to 45 Hz	33 V to 330 V	0.05 % of reading + 2 mV	
45 Hz to 10 kHz	33 V to 330 V	0.028 % of reading + 6 mV	
10 kHz to 20 kHz	33 V to 330 V	0.037 % of reading + 6 mV	
20 kHz to 50 kHz	33 V to 330 V	0.053 % of reading + 6 mV	
50 kHz to 100 kHz	33 V to 330 V	0.26 % of reading + 50 mV	
Equipment to Measure AC Voltage (at the listed frequencies) <sup>FO</sup>			
45 Hz to 1 kHz	330 V to 1 020 V	0.64 % of reading + 10 mV	
1 kHz to 5 kHz	330 V to 1 020 V	0.58 % of reading + 10 mV	
5 kHz to 10 kHz	330 V to 1 020 V	0.64 % of reading + 10 mV	
Equipment to Measure AC Current (at the listed frequencies) <sup>FO</sup>			
45 Hz to 5 kHz	1 $\mu$ A to 100 $\mu$ A	0.42 % of reading + 0.03 $\mu$ A	
45 Hz to 5 kHz	100 $\mu$ A to 1 mA	0.37 % of reading + 0.2 $\mu$ A	
45 Hz to 5 kHz	1 mA to 10 mA	0.15 % of reading + 2 $\mu$ A	
45 Hz to 5 kHz	10 mA to 100 mA	0.14 % of reading + 20 $\mu$ A	
45 Hz to 5 kHz	100 mA to 1 A	0.23 % of reading + 200 $\mu$ A	
Equipment to Measure AC Current (at the listed frequencies) <sup>FO</sup>			
45 Hz to 1 kHz	29 $\mu$ A to 330 $\mu$ A	0.76 % of reading + 0.1 $\mu$ A	
45 Hz to 1 kHz	0.33 mA to 3.3 mA	0.29 % of reading + 0.15 $\mu$ A	
45 Hz to 1 kHz	3.3 mA to 33 mA	0.24 % of reading + 2 $\mu$ A	
45 Hz to 1 kHz	33 mA to 330 mA	1.1 % of reading + 20 $\mu$ A	
45 Hz to 1 kHz	0.33 A to 1.1 A	0.13 % of reading + 0.1 mA	
45 Hz to 1 kHz	1.1 A to 3 A	0.27 % of reading + 0.1 mA	
45 Hz to 1 kHz	3 A to 11 A	0.29 % of reading + 0.1 mA	



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Equipment to Measure AC Current (at the listed frequencies) <sup>FO</sup>			Fluke 5520A w/ Coil QI-114
45 Hz to 440 Hz	11 A to 20 A	0.38 % of reading + 5 mA	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-250 °C to -100 °C	0.8 °C	Electrical Simulation of Thermocouple Output Fluke 5520A QI-103
	-100 °C to 650 °C	0.4 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 °C to -100 °C	0.47 °C	
	-100 °C to 760 °C	0.33 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to -100 °C	0.52 °C	
	-100 °C to 120 °C	0.31 °C	
	120 °C to 1 000 °C	0.37 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type R <sup>FO</sup>	0 °C to 250 °C	0.65 °C	
	250 °C to 1 000 °C	0.47 °C	
	1 000 °C to 1 760 °C	0.74 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-250 °C to -150 °C	0.9 °C	
	-150 °C to 0 °C	0.51 °C	
	0 °C to 400 °C	0.35 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 395, 100 $\Omega$ <sup>FO</sup>	-200 °C to -80 °C	0.07 °C	
	-80 °C to 0 °C	0.07 °C	
	0 °C to 100 °C	0.09 °C	
	100 °C to 300 °C	0.11 °C	
	300 °C to 400 °C	0.12 °C	
	400 °C to 630 °C	0.14 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 3926, 100 $\Omega$ <sup>FO</sup>	630 °C to 800 °C	0.27 °C	
	-200 °C to -80 °C	0.07 °C	
	-80 °C to 0 °C	0.07 °C	
	0 °C to 100 °C	0.09 °C	
	100 °C to 300 °C	0.11 °C	
	300 °C to 400 °C	0.12 °C	
400 °C to 630 °C	0.14 °C		





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Temperature Calibration, Indication, and Control Equipment used with RTD Pt 3916, 100 $\Omega$ <sup>FO</sup>	-200 °C to -190 °C	0.29 °C	Electrical Simulation of Thermocouple Output Fluke 5520A QI-103
	-190 °C to -80 °C	0.06 °C	
	-80 °C to 0 °C	0.07 °C	
	0 °C to 100 °C	0.08 °C	
	100 °C to 260 °C	0.09 °C	
	260 °C to 300 °C	0.1 °C	
	300 °C to 400 °C	0.11 °C	
	400 °C to 600 °C	0.12 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 385, 200 $\Omega$ <sup>FO</sup>	-200 °C to -80 °C	0.06 °C	
	-80 °C to 0 °C	0.06 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 260 °C	0.07 °C	
	260 °C to 300 °C	0.14 °C	
	300 °C to 400 °C	0.15 °C	
	400 °C to 600 °C	0.17 °C	
	600 °C to 630 °C	0.19 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 385, 500 $\Omega$ <sup>FO</sup>	-200 °C to -80 °C	0.06 °C	Electrical Simulation of RTD Output Fluke 5520A QI-103
	-80 °C to 0 °C	0.07 °C	
	0 °C to 100 °C	0.11 °C	
	100 °C to 260 °C	0.08 °C	
	260 °C to 300 °C	0.1 °C	
	300 °C to 400 °C	0.1 °C	
	400 °C to 600 °C	0.11 °C	
	600 °C to 630 °C	0.13 °C	
Tec Services PH-5 Photometer Leakage <sup>FO</sup>	0 % to 0.025 %	0.000 45 % of Reading	Keithley 6220 Precision Current Source QI-211 & QI-123
	0.025 % to 0.25 %	0.002 4 % of Reading	
	0.25 % to 2.5 %	0.006 9 % of Reading	
	2.5 % to 25 %	0.048 % of Reading	
	25 % to 250 %	0.23 % of Reading	
Optical Tachometers <sup>F</sup>	10 RPM to 99 900 RPM	0.003 9 RPM + 0.000 001 27 RPM/RPM	Fluke 5520A Calibrator QI-200



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Conductivity Meter/Probe <sup>FO</sup>	45 $\mu$ S to 4 500 $\mu$ S	1.1 % of reading	Standard Solutions QI-122
Equipment to Measure Conductivity <sup>FO</sup>	84 $\mu$ S·cm	0. $\mu$ S·cm	Conductivity Solution Procedure QI-122
	200 $\mu$ S·cm	0.97 $\mu$ S·cm	
	1411 $\mu$ S·cm	5.4 $\mu$ S·cm	
	199231 $\mu$ S·cm	600 $\mu$ S·cm	
Equipment to Measure pH <sup>F</sup>	4 pH	0.013 pH	pH Solution QI-105
	7 pH		
	10 pH		

### 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>F</sup>	-14 psig to 250 psig	0.048 % of reading	Ruska 7250 xi Dead Weight Tester QI-101
	200 psig to 10 000 psig	0.049 % of reading	
Pipettes, Burettes, Diluters, Dispensers, Repeaters, Syringes, Liquid Handlers, and Automated Dispensing Machines <sup>F</sup>	0.1 $\mu$ L to 2.5 $\mu$ L	2.6 % of Value + 60 nL	Mettler Toledo MCP105 W/ Calibry Software ISO 8655-1 thru 7 Procedure QI -154
	2.5 $\mu$ L to 10 $\mu$ L	0.31 % of Value + 120 nL	
	10 $\mu$ L to 20 $\mu$ L	0.28 % of Value + 0.12 $\mu$ L	
	20 $\mu$ L to 100 $\mu$ L	0.14 % of Value + 0.31 $\mu$ L	
	100 $\mu$ L to 200 $\mu$ L	0.79 % of Value + 0 $\mu$ L	
	200 $\mu$ L to 1 000 $\mu$ L	0.67 % of Value + 1.2 $\mu$ L	
	1 000 $\mu$ L to 5000 $\mu$ L	0.067 % of Value +13 $\mu$ L	
	5 000 $\mu$ L to 10 000 $\mu$ L	0.15 % of Value + 34 $\mu$ L	



# Certificate of Accreditation: Supplement

## Precise Technical Solutions, LLC

7839 Allentown Boulevard, Suite #300, Harrisburg, PA 17112  
 Contact Name: Michael Geppert Phone: 717-635-9879

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
Mass Flow Meters and Controllers <sup>F</sup>	25 sccm	0.13 sccm	Cal Trak SL-800 Procedure QI-203
	50 sccm	0.32 sccm	
	75 sccm	0.3 sccm	
	100 sccm	0.29 sccm	
	125 sccm	0.33 sccm	
	150 sccm	0.3 sccm	
	175 sccm	0.34 sccm	
	200 sccm	0.37 sccm	
	225 sccm	0.41 sccm	
	250 sccm	0.51 sccm	
	275 sccm	0.56 sccm	
	300 sccm	0.54 sccm	
	325 sccm	0.6 sccm	
	350 sccm	0.64 sccm	
	375 sccm	0.67 sccm	
	400 sccm	0.7 sccm	
	425 sccm	0.76 sccm	
450 sccm	0.87 sccm		
475 sccm	0.86 sccm		

### 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
Scales <sup>O</sup>	5 lb to 25 lb	0.01 lb	Class F Weights NIST HB44 QI-107
	25 lb to 100 lb	0.02 lb	
	100 lb to 1 000 lb	0.1 lb	
	1 g to 500 g	0.07 g	
	500 g to 5 kg	0.19 g	
	5 kg to 50 kg	1.8 g	



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### 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
Class I Weighing Device Balances <sup>O</sup>	1 mg to 5 g (Resolution = 0.000 001 g)	0.000 056 mg	ASTM E1617 Class 1 Test Weights, and NISTIR 6919 Chapter 3 QI-107
	1 mg to 40 g (Resolution = 0.000 01 g)	0.000 15 g	
	1 mg to 200 g (Resolution = 0.000 1 g)	0.000 49 g	
	1 mg to 200 g (Resolution = 0.001 g)	0.003 4 g	
Class II Weighing Device Scales and Balances <sup>O</sup>	10 mg to 10 000 g (Resolution = 0.1 g)	0.36 g	ASTM E1617 Class 1 Test Weights, NIST Handbook 44 and NISTIR 6919 Chapters 3 and 4 QI-107
Class III Weighing Device Scales and Balances <sup>O</sup>	5 lb to 100 lb (Resolution = 0.1 lb)	0.32 lb	NIST Class F Test Weights, NIST Handbook 44 and NISTIR 6919 Chapters 3, 4, and 5 QI-107
Torque Wrenches <sup>F</sup>	Up to 100 lbf-in	0.000 35 lbf-in + 0.005 3 lbf-in/lbf-in	TSD 6500 Torque Calibrator Procedure QI-115
	Up to 300 lbf-ft	0.22 lbf-ft + 0.000 454 lbf-ft/lbf-ft	
Hydraulic Pressure Gauges <sup>F</sup>	200 psi to 10 000 psi	2 psi	P3114-3 Deadweight Tester Procedure QI-101



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### Thermodynamic

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 Temperature <sup>F</sup>	-196 °C	0.011 °C	Hart 1502A w/ 5614 PRT Using Liquid Nitrogen QI-103
	-78 °C	0.008 8 °C	Hart 1502A w/ 5614 PRT Using Dry Ice Sublimation point QI-103
	-196 °C	0.12 °C	Hart 1590 Super Thermometer II w/ AM1960 PRT Using Liquid Nitrogen QI-103
	-78 °C	0.29 °C	Hart 1590 Super Thermometer II w/ AM1960 PRT using Dry Ice Sublimation Point QI-103
	-45 °C to 0 °C	0.014 °C	Hart 1590 Super Thermometer II w/ AM1960 PRT and Baths QI-103
	0 °C to 50 °C	0.042 °C	
	50 °C to 100 °C	0.042 °C	
	100 °C to 150 °C	0.04 °C	
	150 °C to 200 °C	0.16 °C	
	200 °C to 250 °C	0.046 °C	
	250 °C to 300 °C	0.04 °C	
	300 °C to 350 °C	0.094 °C	
	350 °C to 400 °C	0.084 °C	
	Equipment to Measure Temperature <sup>FO</sup>	-45 °C to 0 °C	0.011 °C
0 °C to 50 °C		0.021 °C	
50 °C to 100 °C		0.104 3 °C	
100 °C to 150 °C		0.008 8 °C	
150 °C to 200 °C		0.022 °C	
200 °C to 250 °C		0.016 °C	
250 °C to 300 °C		0.025 °C	
300 °C to 350 °C		0.021 °C	
350 °C to 400 °C	0.022 °C		



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### Thermodynamic

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 Temperature <sup>FO</sup>	400 °C to 450 °C	0.13 °C	IsoTech Milli K w/ Type R Thermocouple and Hart Scientific 9112 Calibration furnace, and Isotech 465 High temp Furnace QI-103
	450 °C to 850 °C	0.12 °C	
	850 °C to 900 °C	0.14 °C	
	900 °C to 950 °C	0.42 °C	
	950 °C to 1 000 °C	0.16 °C	IsoTech Milli K w/ Type R Thermocouple and Hart Scientific 9112 Calibration furnace, and Isotech 465 High temp Furnace QI-103
	1 000 °C to 1 050 °C	0.73 °C	
	1 050 °C to 1 100 °C	0.76 °C	
	1 100 °C to 1 150 °C	1.2 °C	
Equipment to Measure IR Temperature <sup>FO</sup>	1 150 °C to 1 200 °C	1.3 °C	Fluke 4181 Blackbody Source QI-117
	35 °C to 100 °C	0.76 °C	
	100 °C to 200 °C	1.2 °C	
	200 °C to 350 °C	2.2 °C	
IR Thermometers <sup>F</sup>	350 °C to 500 °C	2.6 °C	9133 IR Calibrator QI-117
	-35 °C to 150 °C	5 300 ppm + 1.3 °C	

### 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
Timers and Stopwatches <sup>F</sup>	Up to 24 hr	0.05 S/D	Timometer 4500 QI-112

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 F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer <sup>F</sup> would mean that the laboratory performs this calibration at its fixed location.



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4. The presence of a superscript <sup>o</sup> means that the laboratory performs calibration of the indicated parameter onsite at customer locations. Example: Outside Micrometer <sup>o</sup> 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 <sup>FO</sup> would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.

