PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Acculab Measurement Standards, Inc.

48 Dunham Suite 1550, Beverly, MA 01915

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2017
& Meets the Requirements of ANSI/NCSL Z540.1-1994 & Z540.3-2006

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, Mass, Force, & Weighing, Mechanical, Time & Frequency and Thermodynamic 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

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

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
May 05, 2015	July 02, 2024	August 31, 2026

Accreditation No.:	*Certificate No.:*
73846	L24-496

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

Acculab Measurement Standards, Inc.
48 Dunham Suite 1550, Beverly, MA 01915
Contact Name: Mr. Jim Jezowski, Phone: 978-750-4555

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

Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Micrometer [FO]	Up to 6 in	(5 µin + 3L) µin	Grade 1 Gage Blocks	MIC-01, Gidep,Cubyt
	6 in to 24 in	(25 µin + 10L) µin		
Calipers [FO]	Up to 8 in	280 µin		
	8 in to 14 in	340 µin		
	14 in to 20 in	390 µin		
	20 in to 24 in	440 µin		
Test Indicators [FO]	Up to 6 in	51 µin	Grade 1 Gage Blocks Grade AA Surface Plate	INDI-1, Gidep,Cubyt
Height Gage [FO]	Up to 6 in	120 µin	Grade 1 Gage Blocks Grade AA Surface Plate	HG-2, Gidep,Cubyt
	6 in to 12 in	190 µin		
	12 in to 18 in	280 µin		
	18 in to 24 in	370 µin		
Ring Gage, Plain [F]	Up to 1 in	22 µin	Grade 1 Gage Blocks Trimos Tulm 210	GB-1, Gidep,Cubyt
	1 in to 2 in	34 µin		
	2 in to 3 in	48 µin		
	3 in to 4 in	62 µin		
	4 in to 5 in	77 µin		
	5 in to 6 in	91 µin		
Pin Gages [FO]	Up to 1 in	22 µin	Trimos Tulm 210	PINS-1, Gidep, Cubyt
	1 in to 2 in	23 µin		
Thread Wires [F]	Up to 0.5 in	14 µin		
Cylindrical Plugs [F]	Up to 1 in	23 µin		
	1 in to 2 in	23 µin		
	2 in to 3 in	24 µin		
	3 in to 4 in	24 µin		
	4 in to 5 in	26 µin		
	5 in to 6 in	27 µin		
	6 in to 7 in	28 µin	Trimos Tulm 210	CYND-1, Gidep,Cubyt
	7 in to 8 in	29 µin		
	8 in to 9 in	31 µin		
	9 in to 10 in	32 µin		
Gage Blocks [F]	Up to 12 in	(3 µin + 5L) µin	Trimos Tulm 210	GB-1, Gidep,Cubyt

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Thread Plug Gage Pitch Diameter [F] (4 in to 80 in) Threads per in and (0.25 mm to 6 mm)	Up to 1 in	54 µin	Trimos Tulm 210, SPI Thread Wires	THD-120, Gidep,Cubyt
	1 in to 2 in	59 µin		
	2 in to 3 in	68 µin		
	3 in to 4 in	79 µin		
	4 in to 5 in	90 µin		
	5 in to 6 in	100 µin		
	6 in to 7 in	120 µin		
	7 in to 8 in	130 µin		
	8 in to 9 in	140 µin		
	9 in to 10 in	160 µin		
Thread Plugs Major Diameter [F]	Up to 1 in	22 µin	Trimos Tulm 210	THD-120, Gidep,Cubyt
	1 in to 2 in	23 µin		
	2 in to 3 in	24 µin		
	3 in to 4 in	24 µin		
	4 in to 5 in	26 µin		
	5 in to 6 in	27 µin		
	6 in to 7 in	28 µin		
	7 in to 8 in	29 µin		
	8 in to 9 in	31 µin		
	9 in to 10 in	32 µin		

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Equipment to Output DC Voltage [FO]	Up to 202 mV	5.1 µV/V + 0.2 uV	Fluke 8588A, Fluke 5522A	Gidep and Cubyt, MFR
	202 mV to 2.02 V	2.8 µV/V + 0.3 µV		
	2.02 V to 20.2 V	2.8 µV/V + 0.5 µV		
	20.2 V to 202 V	4.1 µV/V + 3 uV		
	202 V to 1.05 kV	4.3 µV/V + 0.05 mV		
Equipment to Measure DC Voltage [FO]	Up to 202 mV	5.1 µV/V + 0.2 uV	Fluke 8588A	Gidep and Cubyt, MFR
	202 mV to 2.02 V	2.8 µV/V + 0.3 µV		
	2.02 V to 20.2 V	2.8 µV/V + 0.5 µV		
	20.2 V to 202 V	4.1 µV/V + 3 uV		
	202 V to 1.05 kV	4.3 µV/V + 0.05 mV		

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Equipment to Output AC Voltage (At the listed frequencies) FO			Fluke 5700A-03 Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to 2 kHz	Up to 12 mV	250 uV/V + 1.1 uV		
2 kHz to 10 kHz	Up to 12 mV	0.33 mV/V + 1.1 µV		
10 kHz to 30 kHz	Up to 12 mV	0.34 mV/V + 1.1 µV		
30 kHz to 100 kHz	Up to 12 mV	3 mV/V + 1.1 µV		
100 kHz to 300 kHz	Up to 12 mV	10 mV/V + 4 µV		
300 kHz to 1 MHz	Up to 12 mV	20 mV/V + 4 uV		
Equipment to Output AC Voltage (At the listed frequencies) FO				
1 Hz to 2 kHz	12 mV to 120 mV	68 uV/V + 0.5uV		
2 kHz to 10 kHz	12 mV to 120 mV	110 uV/V + 0.5uV		
10 kHz to 30 kHz	12 mV to 120 mV	361 uV/V + 1uV		
30 kHz to 100 kHz	12 mV to 120 mV	510 uV/V + 5uV		
100 kHz to 300 kHz	12 mV to 120 mV	2 mV/V + 30 uV		
300 kHz to 1 MHz	12 mV to 120 mV	10 mV/V + 100 uV		
1 MHz to 2 MHz	12 mV to 120 mV	15 mV/V + 500 uV		
2 MHz to 4 MHz	12 mV to 120 mV	40 mV/V + 1 mV		
4 MHz to 8 MHz	12 mV to 120 mV	80 mV/V + 1 mV		
8 MHz to 10 MHz	12 mV to 120 mV	150 mV/V + 1 mV		
Equipment to Output AC Voltage (At the listed frequencies) FO				
1 Hz to2 kHz	120 mV to 1.2 V	64uV/V + 5 uV		
2 kHz to 10 kHz	120 mV to 1.2 V	0.11mV/V + 5 uV		
10 kHz to 30 kHz	120 mV to 1.2 V	0.21mV/V + 10 uV		
30 kHz to 100 kHz	120 mV to 1.2 V	0.5 mV/V + 50 uV		
100 kHz to 300 kHz	120 mV to 1.2 V	0.21 mV/V + 0.3 mV		
300 kHz to 1 MHz	120 mV to 1.2 V	10 mV/V + 1 mV		
1 MHz to 2 MHz	120 mV to 1.2 V	15 mV/V + 5 mV		
2 MHz to 4 MHz	120 mV to 1.2 V	40 mV/V + 10 mV		
4 MHz to 8 MHz	120 mV to 1.2 V	82mV/V + 10 mV		
8 MHz to 10 MHz	120mV to 1.2 V	154mV/V + 10 mV		

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Equipment to Output AC Voltage (At the listed frequencies) FO			Fluke 5700A-03 Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to2 kHz	1.2 V to 12 V	64 uV/V + 50 uV		
2 kHz to 10 kHz	1.2 V to 12 V	0.11 mV/V + 50 uV		
10 kHz to 30 kHz	1.2 V to 12 V	0.21 mV/V + 100 uV		
30 kHz to 100 kHz	1.2 V to 12 V	0.5 mV/V + 500 uV		
100 kHz to 300 kHz	1.2 V to 12 V	0.21 mV/V + 3 mV		
300 kHz to 1 MHz	1.2 V to 12 V	10 mV/V + 10 mV		
1 MHz to 2 MHz	1.2 V to 12 V	15 mV/V + 50 mV		
2 MHz to 4 MHz	1.2 V to 12 V	40 mV/V + 100 mV		
4 MHz to 8 MHz	1.2 V to 12 V	82 mV/V + 100 mV		
8 MHz to 10 MHz	1.2 V to 12 V	154 mV/V + 100 mV		
Equipment to Output AC Voltage (At the listed frequencies) FO				
1 Hz to 2 kHz	12 V to 120 V	70 uV/V + 500 uV		
2 kHz to 10 kHz	12 V to 120 V	90 uV/V + 500 uV		
10 kHz to 30 kHz	12 V to 120 V	210 uV/V + 1 mV		
30 kHz to 100 kHz	12 V to 120 V	590 uV/V + 5 mV		
100 kHz to 300 kHz	12 V to 120 V	3.7 mV/V + 50 mV		
300 kHz to 1 MHz	12 V to 120 V	11 mV/V + 500 mV		
Equipment to Output AC Voltage (At the listed frequencies) FO				
1 Hz to 2 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
2 kHz to 10 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
10 kHz to 30 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
30 kHz to 100 kHz	120 V to 1.05 kV	510 uV/V + 100 mV		
Equipment to Measure AC Voltage (At the listed frequencies) FO			Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to 2 kHz	Up to 12 mV	250 uV/V + 1.1 uV		
2 kHz to 10 kHz	Up to 12 mV	0.33 mV/V + 1.1 µV		
10 kHz to 30 kHz	Up to 12 mV	0.34 mV/V + 1.1 µV		
30 kHz to 100 kHz	Up to 12 mV	3 mV/V + 1.1 µV		
100 kHz to 300 kHz	Up to 12 mV	10 mV/V + 4 µV		
300 kHz to 1 MHz	Up to 12 mV	20 mV/V + 4 uV		

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Equipment to Measure AC Voltage (At the listed frequencies) FO			Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to 2 kHz	12 mV to 120 mV	68 uV/V + 0.5 uV		
2 kHz to 10 kHz	12 mV to 120 mV	110 uV/V + 0.5 uV		
10 kHz to 30 kHz	12 mV to 120 mV	361 uV/V + 1 uV		
30 kHz to 100 kHz	12 mV to 120 mV	510 uV/V + 5 uV		
100 kHz to 300 kHz	12 mV to 120 mV	2 mV/V + 30 uV		
300 kHz to 1 MHz	12 mV to 120 mV	10 mV/V + 100 uV		
1 MHz to 2 MHz	12 mV to 120 mV	15 mV/V + 500 uV		
2 MHz to 4 MHz	12 mV to 120 mV	40 mV/V + 1 mV		
4 MHz to 8 MHz	12 mV to 120 mV	80 mV/V + 1 mV		
8 MHz to 10 MHz	12 mV to 120 mV	150 mV/V + 1 mV		
Equipment to Measure AC Voltage (At the listed frequencies) FO				
1 Hz to2 kHz	120 mV to 1.2 V	64 uV/V + 5 uV		
2 kHz to 10 kHz	120 mV to 1.2 V	0.11 mV/V + 5 uV		
10 kHz to 30 kHz	120 mV to 1.2 V	0.21 mV/V + 10 uV		
30 kHz to 100 kHz	120 mV to 1.2 V	0.5 mV/V + 50 uV		
100 kHz to 300 kHz	120 mV to 1.2 V	0.21 mV/V + 0.3 mV		
300 kHz to 1 MHz	120 mV to 1.2 V	10 mV/V + 1 mV		
1 MHz to 2 MHz	120 mV to 1.2 V	15 mV/V + 5 mV		
2 MHz to 4 MHz	120 mV to 1.2 V	40 mV/V + 10 mV		
4 MHz to 8 MHz	120 mV to 1.2 V	82 mV/V + 10 mV		
8 MHz to 10 MHz	120 mV to 1.2 V	154 mV/V + 10 mV		
Equipment to Measure AC Voltage (At the listed frequencies) FO				
1 Hz to2 kHz	1.2 V to 12 V	64 uV/V + 50 uV		
2 kHz to 10 kHz	1.2 V to 12 V	0.11 mV/V + 50 uV		
10 kHz to 30 kHz	1.2 V to 12 V	0.21 mV/V + 100 uV		
30 kHz to 100 kHz	1.2 V to 12 V	0.5 mV/V + 500 uV		
100 kHz to 300 kHz	1.2 V to 12 V	0.21 mV/V + 3 mV		
300 kHz to 1 MHz	1.2 V to 12 V	10 mV/V + 10 mV		
1 MHz to 2 MHz	1.2 V to 12 V	15 mV/V + 50 mV		
2 MHz to 4 MHz	1.2 V to 12 V	40 mV/V + 100 mV		
4 MHz to 8 MHz	1.2 V to 12 V	82 mV/V + 100 mV		
8 MHz to 10 MHz	1.2 V to 12 V	154 mV/V + 100 mV		

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Equipment to Measure AC Voltage (At the listed frequencies) FO			Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to2 kHz	120 mV to 1.2 V	64 uV/V + 5 uV		
2 kHz to 10 kHz	120 mV to 1.2 V	0.11 mV/V + 5 uV		
10 kHz to 30 kHz	120 mV to 1.2 V	0.21 mV/V + 10 uV		
30 kHz to 100 kHz	120 mV to 1.2 V	0.5 mV/V + 50 uV		
100 kHz to 300 kHz	120 mV to 1.2 V	0.21 mV/V + 0.3 mV		
300 kHz to 1 MHz	120 mV to 1.2 V	10 mV/V + 1 mV		
1 MHz to 2 MHz	120 mV to 1.2 V	15 mV/V + 5 mV		
2 MHz to 4 MHz	120 mV to 1.2 V	40 mV/V + 10 mV		
4 MHz to 8 MHz	120 mV to 1.2 V	82 mV/V + 10 mV		
8 MHz to 10 MHz	120mV to 1.2 V	154 mV/V + 10 mV		
Equipment to Measure AC Voltage (At the listed frequencies) FO				
1 Hz to2 kHz	1.2 V to 12 V	64 uV/V + 50 uV		
2 kHz to 10 kHz	1.2 V to 12 V	0.11mV/V + 50 uV		
10 kHz to 30 kHz	1.2 V to 12 V	0.21mV/V + 100 uV		
30 kHz to 100 kHz	1.2 V to 12 V	0.5 mV/V + 500 uV		
100 kHz to 300 kHz	1.2 V to 12 V	0.21 mV/V + 3 mV		
300 kHz to 1 MHz	1.2 V to 12 V	10 mV/V + 10 mV		
1 MHz to 2 MHz	1.2 V to 12 V	15 mV/V + 50 mV		
2 MHz to 4 MHz	1.2 V to 12 V	40 mV/V + 100 mV		
4 MHz to 8 MHz	1.2 V to 12 V	82 mV/V + 100 mV		
8 MHz to 10 MHz	1.2 V to 12 V	154 mV/V + 100 mV		
Equipment to Measure AC Voltage (At the listed frequencies) FO				
1 Hz to 2 kHz	12 V to 120 V	70 uV/V + 500 uV		
2 kHz to 10 kHz	12 V to 120 V	90 uV/V + 500 uV		
10 kHz to 30 kHz	12 V to 120 V	210 uV/V + 1 mV		
30 kHz to 100 kHz	12 V to 120 V	590 uV/V + 5 mV		
100 kHz to 300 kHz	12 V to 120 V	3.7 mV/V + 50 mV		
300 kHz to 1 MHz	12 V to 120 V	11 mV/V + 500 mV		

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Equipment to Measure AC Voltage (At the listed frequencies) FO			Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to 2 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
2 kHz to 10 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
10 kHz to 30 kHz	120 V to 1.05 kV	90 uV/V + 25 mV		
30 kHz to 100 kHz	120 V to 1.05 kV	510 uV/V + 100 mV		
Equipment to Output Resistance FO	1 Ω	4.1 µΩ	Guildline 9330-1	MFR Procedure, Gidep,cubyt
	10 Ω	0.21 MΩ	Guildline 9330-10	
	100 Ω	1.8 MΩ	Guildline 9330-100	
	1 kΩ	11 MΩ	Guildline 9330-1k	
	10 kΩ	41 MΩ	Guildline 9330-10k	
	100 kΩ	1.1 Ω	Guildline 9330-100k	
	1 MΩ	17 Ω	Guildline 9330-1M	
	10 MΩ	0.72 kΩ	Guildline 9330-10M	
Equipment to Output DC Current FO	Up to 2 Ω	11 µΩ/Ω + 4 µΩ	Fluke 8588A	Gidep and Cubyt, MFR
	2 Ω to 20 Ω	7.7 µΩ/Ω + 14 µΩ		
	20 Ω to 200 Ω	7.2 µΩ/Ω + 50 µΩ		
	200 Ω to 2 kΩ	7.1 µΩ/Ω + 0.5 mΩ		
	2 kΩ to 20 kΩ	7.2 µΩ/Ω + 5 mΩ		
	20 kΩ to 200 kΩ	7.3 µΩ/Ω +50 mΩ		
	200 Ω to 2 MΩ	8.2 µΩ/Ω + 1 Ω		
	2 MΩ to 20 MΩ	11 µΩ/Ω + 10 Ω		
	20 MΩ to 200 MΩ	39 µΩ /Ω + 100 Ω		
	200 MΩ to 2 GΩ	505 µΩ /Ω + 10 kΩ		
	20 µA to 200 µA	8.2 µA/A + 0.4nA		
	200 µA to 2 mA	7.6 µA/A + 4 nA		
	2 mA to 20 mA	8.9 µA/A + 40 nA		
	20 mA to 200 mA	33 µA/A + 0.10 µA		
	200 mA to 2 A	0.1 mA/A + 1 µA		
	2 A to 10 A	0.174 mA/A + 4 µA		
	10 A to 21 A	0.461 mA/A + 145 µA		

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Equipment to Measure DC Current [FO]	Up to 20 µA	24 µA/A + 0.4nA	Fluke 8588A	Gidep and Cubyt,MFR
	20 µA to 200 µA	8.2 µA/A + 0.4 nA		
	200 µA to 2 mA	7.6 µA/A + 4 nA		
	2 mA to 20 mA	8.9 µA/A + 40 nA		
	20 mA to 200 mA	33 µA/A + 0.10 µA		
	200 mA to 2 A	0.1 mA/A + 1 µA		
	2 A to 10 A	0.174 mA/A + 4 µA		
	10 A to 30 A	0.461 mA/A + 145 µA		
Equipment to Output AC Current (At the listed frequencies) [FO]			Fluke 5700A-03, Fluke 8588A	
1 Hz to 2 kHz	Up to 20 µA	2.01 mA/A + 2.5 nA		
2 kHz to 10 kHz	Up to 20 µA	2.01 mA/A + 2.5 nA		
10 kHz to 20 kHz	Up to 20 µA	2.01 mA/A + 2.5 nA		
Equipment to Output AC Current (At the listed frequencies)				
1 Hz to 2 kHz	Up to 200 µA	0.26 mA/A + 5 nA		
2 kHz to 10 kHz	Up to 200 µA	0.51 mA/A + 5 nA		
10 kHz to 20 kHz	Up to 200 µA	0.72 mA/A + 5 nA		
Equipment to Output AC Current (At the listed frequencies) [FO]				
1 Hz to 2 kHz	200 µA to 2 mA	0.26 mA/A + 50 nA		
2 kHz to 10 kHz	200 µA to 2 mA	0.51 mA/A + 50 nA		
10 kHz to 20 kHz	200 µA to 2 mA	0.72 mA/A + 50 nA		
Equipment to Output AC Current (At the listed frequencies) [FO]				
1 Hz to 2 kHz	2 mA to 20 mA	0.26 mA/A + 500 nA		
2 kHz to 10 kHz	2 mA to 20 mA	0.51 mA/A + 500 nA		
10 kHz to 20 kHz	2 mA to 20 mA	0.72 mA/A + 500 nA		
Equipment to Output AC Current (At the listed frequencies) [FO]				
1 Hz to 2 kHz	20 mA to 200 mA	0.26 mA/A + 5 µA		
2 kHz to 10 kHz	20 mA to 200 mA	0.5 mA/A + 5 µA		
10 kHz to 20 kHz	20 mA to 200 mA	0.7 mA/A + 5 µA		

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Equipment to Output AC Current (At the listed frequencies) FO			Fluke 5700A-03, Fluke 8588A	Gidep and Cubyt, MFR
1 Hz to 2 kHz	200 mA to 2 A	0.26 mA/A + 100 µA		
2 kHz to 5 kHz	200 mA to 2 A	0.51 mA/A + 100 µA		
Equipment to Output AC Current (At the listed frequencies) FO			Fluke 5522A, Fluke 8588A	
1 Hz to 2 kHz	2 A to 21 A	0.8 mA/A + 500 µA		
2 kHz to 5 kHz	2 A to 21 A	0.8 mA/A + 500 µA		
Equipment to Measure AC Current (At the listed frequencies) FO			Fluke 8588A	
1 Hz to 30 kHz	0.1 µA to 10 µA	2.01 mA/A + 25 nA		
Equipment to Measure AC Current (At the listed frequencies) FO				
1 Hz to 2 kHz	10 µA to 200 µA	0.26 mA/A + 5 nA		
2 kHz to 10 kHz	10 µA to 200 µA	0.51 mA/A + 5 nA		
10 kHz to 30 kHz	10 µA to 200 µA	0.72 mA/A + 5 nA		
30 kHz to 100 kHz	10 µA to 200 µA	4.01 mA/A + 10 nA		
Equipment to Measure AC Current (At the listed frequencies) FO				
1 Hz to 2 kHz	200 µA to 2 mA	0.26 mA/A + 50 nA		
2 kHz to 10 kHz	200 µA to 2 mA	0.51 mA/A + 50 nA		
10 kHz to 30 kHz	200 µA to 2 mA	0.72 mA/A + 50 Na		
30 kHz to 100 kHz	200 µA to 2 mA	4.01 mA/A + 100 Na		
Equipment to Measure AC Current (At the listed frequencies) FO				
1 Hz to 2 kHz	2 mA to 20 mA	0.26 mA/A + 500 nA		
2 kHz to 10 kHz	2 mA to 20 mA	0.51 mA/A + 500 nA		
10 kHz to 30 kHz	2 mA to 20 mA	0.72 mA/A + 500 nA		
30 kHz to 100 kHz	2 mA to 20 mA	4.01 mA/A + 1000 nA		
Equipment to Measure AC Current (At the listed frequencies) FO				
1 Hz to 2 kHz	20 mA to 200 mA	0.26 mA/A + 5 µA		
2 kHz to 10 kHz	20 mA to 200 mA	0.5 mA/A + 5 µA		
10 kHz to 30 kHz	20 mA to 200 mA	0.7 mA/A + 5 µA		

Certificate of Accreditation: Supplement

Acculab Measurement Standards, Inc.
48 Dunham Suite 1550, Beverly, MA 01915
Contact Name: Mr. Jim Jezowski, Phone: 978-750-4555

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

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Equipment to Measure AC Current (At the listed frequencies) FO			Fluke 8588A	Gidep and Cubyt,MFR
1 Hz to 2 kHz	200 mA to 2 A	0.26 mA/A + 100 µA		
2 kHz to 10 kHz	200 mA to 2 A	0.5 mA/A + 100 µA		
10 kHz to 30 kHz	200 mA to 2 A	0.7 mA/A + 100 µA		
Equipment to Measure AC Current (At the listed frequencies) FO				
10 Hz to 2 kHz	2 A to 20 A	0.8 mA/A + 500 µA		
2 kHz to 20 kHz	2 A to 20 A	0.8 mA/A + 500 µA		
Equipment to Measure AC Current (At the listed frequencies) FO				
10 Hz to 2 kHz	20 A to 30 A	0.8 mA/A + 6 mA		
2 kHz to 20 kHz	20 A to 30 A	1.2 mA/A + 6 mA		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type B FO	600 °C to 800 °C	0.44 °C	Fluke 5522A	
	800 °C to 1 000 °C	0.34 °C		
	1 000 °C to 1 550 °C	0.33 °C		
	1 550 °C to 1 820 °C	0.33 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type C FO	Up to 150 °C	0.3 °C		
	150 °C to 650 °C	0.26 °C		
	650 °C to 1 000 °C	0.31 °C		
	1 000 °C to 1 800 °C	0.5 °C		
	1 800 °C to 2 316 °C	0.84 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type E FO	-210 °C to -100 °C	0.5 °C	Fluke 5522A	Electrical Simulation of Thermocouple Output Gidep and Cubyt, MFR
	-100 °C to -30 °C	0.16 °C		
	-30 °C to 150 °C	0.14 °C		
	150 °C to 760 °C	0.16 °C		
	760 °C to 1 200 °C	0.21 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J FO	-200 °C to -100 °C	0.27 °C		
	-100 °C to -25 °C	0.16 °C		
	-25 °C to 350 °C	0.14 °C		
	350 °C to 650 °C	0.17 °C		
	650 °C to 1 000 °C	0.23 °C		

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Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K [FO]	-200 °C to -100 °C	0.33 °C	Fluke 5522A	Electrical Simulation of Thermocouple Output Gidep and Cubyt, MFR
	-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		
	1 000 °C to 1 372 °C	0.4 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type N [FO]	-200 °C to -100 °C	0.4 °C		
	-100 °C to -25 °C	0.22 °C		
	-25 °C to 120 °C	0.19 °C		
	120 °C to 410 °C	0.18 °C		
	410 °C to 1 300 °C	0.27 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type R [FO]	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		
	1 000 °C to 1 767 °C	0.4 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type S [FO]	0 °C	0.47 °C		
	250 °C to 400 °C	0.36 °C		
	400 °C to 1 000 °C	0.37 °C		
	1 000 °C to 1 767 °C	0.46 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T [FO]	-250 °C to -150 °C	0.63 °C		
	-150 °C to 0 °C	0.24 °C		
	Up to 120 °C	0.16 °C		
	120 °C to 400 °C	0.14 °C		
Temperature Calibration, Indication and Control Equipment used with RTD Pt 385 100 Ω [FO]	-200 °C to -80 °C	0.05 °C	Fluke 5522A Fluke 8588A	Electrical Simulation of Thermocouple Output Gidep and Cubyt, MFR
	-80 °C to 0 °C	0.05 °C		
	Up to 100 °C	0.07 °C		
	100 °C to 300 °C	0.09 °C		
	300 °C to 400 °C	0.1 °C		
	400 °C to 630 °C	0.12 °C		
	630 °C to 800 °C	0.14 °C		

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Electrical

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Temperature Calibration, Indication and Control Equipment used with RTD Pt 3926 100 Ω FO	-200 °C to -80 °C	0.05 °C	Fluke 5522A Fluke 8588A	Electrical Simulation of Thermocouple Output Gidep and Cubyt, MFR
	-80 °C to 0 °C	0.05 °C		
	Up to 100 °C	0.07 °C		
	100 °C to 300 °C	0.09 °C		
	300 °C to 400 °C	0.1 °C		
	400 °C to 630 °	0.12 °C		
Temperature Calibration, Indication and Control Equipment used with RTD Pt 385 120 Ω FO	-80 °C to 0 °C	0.08 °C		
	Up to 100 °C	0.08 °C		
	100 °C to 260 °C	0.09 °C		
Temperature Calibration, Indication and Control Equipment used with RTD Pt 385 100 Ω FO	-200 °C to 800 °C	0.002 5 % of Resistance		
Devices to output High Voltage DC and 60Hz FO	1 kV to 6 kV	0.01 kV/kV	Fluke 80k6 Fluke 87V	Gidep and Cubyt, MFR
	6 kV to 25 kV	0.02 kV/kV	Fluke 80k40 Fluke 87V	
Capacitance: @ 1 kHz FO	100 nF	0.5 mF/F	GenRad 1409-T	
Inductance: @ 1 kHz FO	100 mH	1.3 mH/H	GenRad 1482-L	

Mass, Force, Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Balances/Scales FO	Up to 500 mg	16 µg	Rice Lake ASTM Class 1 and Troemner ASTM Class 1	Gidep and Cubyt, MFR
	500 mg to 5 g	41 µg		
	5 g to 10 g	60 µg		
	10 g to 20 g	89 µg		
	20 g to 50 g	0.14 mg		
	50 g to 35kg	2.7 µg/g		

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Pressure gages and transducers FO	1 psi to 100 psi	0.02 psi	Princo PPS-500	Gidep and Cubyt, MFR
	100 to 1 000 psi	0.23 psi	Ametek T-100	
	1 000 to 10 000 psi	2.3 psi		
Torque Wrenches, drivers and transducers FO	Up to 100 lb·in	0.51 lb·in	AKO 650-B	
	100 lb·in to 600 lb·ft	0.32 lb·ft		

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Time & Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Time and Frequency -Source [FO]	10 MHz	2 parts in 10^{-12}	Hewlett Packard Z3805A GPS Disciplined Standard	Gidep and Cubyt, MFR
	1 PPS			
	Up to 20 MHz	1 parts in 10^{-11}	HP Z3805A/HP 3325A	
	20MHz to 2 GHz		HP Z3805A/Marconi 2019	
	2 GHz to 6.5 GHz		HP Z3805A/HP 8683A	
Time and Frequency -Measure [FO]	Up to 100 MHz	2 parts in 10^{-10}	HP 5334A/HP Z3805A GPS Disciplined Standard	
	100 MHz to 1.3 GHz		Fluke 7220A/HP Z3805A GPS Disciplined Standard HP 5351B/HP Z3805A GPS Disciplined Standard	
	1.3GHz to 8 GHz			
Stopwatches/Timers [FO]	Up to 48 hours	1 parts in 10^{-9}	Timemometer	

Thermodynamic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Humidity Indicators [F]	11.31 % RH	0.37 % RH	Salt Solutions	Gidep and Cubyt, MFR
	43.15 % RH	0.41 % RH		
	75.47 % RH	0.28 % RH		
Temperature Sensors/Probes [FO]	-190 °C to 0 °C	0.19 °C	Fluke 1523/5827A PRT	
	Up to 200 °C	0.18 °C		
	200 °C to 300 °C	0.26 °C		
	300 °C to 410 °C	0.29 °C		

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.

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

3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter 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.

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 locatio