



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

EML, LLC

998 Elm Hill Pike, Nashville, TN 37210

(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, Time & Frequency, Mechanical, Mass, Force, and Weighing Devices, 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

Initial Accreditation Date:

August 23, 2018

Issue Date:

December 20, 2020

Expiration Date:

March 31, 2023

Accreditation No.

100190

Certificate No.:

L20-788

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



Certificate of Accreditation: Supplement

EML, LLC

998 Elm Hill Pike, Nashville, TN 37210
 Contact Name: Frieda Evaskis Phone: 615-771-2560

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 ^{FO}	Up to 20 in	(58 + 15L) μ in	Gage Blocks & Optical Flats CP-004 B89.1.13
	20 in to 48 in	(187 + 37L) μ in	
Calipers ^{FO}	Up to 20 in	(573 + 9L) μ in	Gage Blocks & Accessory Kit CP-010
	20 in to 48 in	(577 + 36L) μ in	
Height Gages (excluding Height Masters) ^{FO}	Up to 20 in	(215 + 15L) μ in	Gage Blocks Surface Plate CP-005 CP-009
	20 in to 48 in	(225 + 30L) μ in	
Depth Gages ^{FO}	Up to 20 in	(117 + 15L) μ in	CP-007
Linear Indicators-Digital and Test Indicators ^{FO}	Up to 4 in	(115 + 2L) μ in	ASME B89.1.10M
Taper Gages ^{FO}	1 mm to 15 mm	0.001 mm	Height Gage Test Indicator; GIDEP
Rulers ^{FO}	Up to 48 in	(500 + 18L) μ in	Caliper & Range Extender CP-021
Surface Plates - Flatness ^{FO}	Up to 96 in x 48 in	(12 + 3.9DL) μ in	Mahr-Federal electronic level system ASME B89.3.7
Cylindrical Gages-Plugs, Pins ^{FO}	Up to 4 in	(52 + 17D) μ in	Gage Blocks, Linear Measuring Machine ASTM B1 Standards CP-006
Cylindrical Gages- Rings ^{FO}	0.5 in to 4 in	(52 + 17D) μ in	
Thread Plugs- Major Diameter ^{FO}	Up to 4 in	(26 + 16D) μ in	Three wire method ASTM B1 Standards
Thread Plugs- Pitch Diameter ^{FO}	4 TPI to 80 TPI	(74 + 9.7D) μ in	
Length Standards ^{FO}	Up to 20 in	(210 + 12L) μ in	Gage Blocks, Linear Measuring Machine, Height Gage GIDEP
Optical Comparator- X, Y Axis Accuracy ^{FO}	Up to 15 in	(130 + 4.6L) μ in	Glass Masters CP-018
Optical Comparator- Magnification ^{FO}	10X, 20X, 31.25X, 50X, 62.5X, & 100X	0.016 % of magnification	Magnification Master CP-018
Optical Comparator- Angle ^{FO}	30°	33 s	Angle Block CP-018
	45°	20 s	
	60°	3 min/4 s	
	90°	1 min/6 s	
Angle – Protractor ^{FO}	0.25° to 10 °	3 min/58 s	Sine Plate/Gage Blocks GIDEP
	10° to 90°	39 min/36 s	
CMM Linear Displacement ^{FO}	Up to 700 mm	(7.3 + 0.065L) μ m	Checkmaster ASME B89.4.10360.2
CMM Volumetric Accuracy ^{FO}	Up to 600 mm		Ball Bar ASME B89.4.1-2000 ASME B89.4.10360.2



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CMM Repeatability ^{FO}	25.4 mm	4.8 μ m	Calibration Sphere ASME B89.4.1-2000 ASME B89.4.10360.2

Electrical

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Equipment to Output DC Voltage ^{FO}	10 mV to 100 mV	13 μ V/V + 8.8 μ V	Fluke 5500A GIDEP
	0.1 V to 1 V	12 μ V/V + 3.4 μ V	
	1 V to 10 V	12 μ V/V + 40 μ V	
	10 V to 100 V	13 μ V/V + 66 μ V	
	100 V to 1 000 V	18 μ V/V + 65 μ V	
Equipment to Measure DC Voltage ^{FO}	10 mV to 100 mV	6.8 μ V/V + 0.86 μ V	HP 3458A GIDEP
	0.1 V to 1 V	6 μ V/V + 0.8 μ V	
	1 V to 10 V	6.7 μ V/V + 1.3 μ V	
	10 V to 100 V	7 μ V/V + 32 μ V	
	100 V to 1 000 V	7.8 μ V/V + 59 μ V	
Equipment to Measure HV DC Voltage ^{FO}	(1 to 20) kV	1.1% of Reading	Fluke 80K-40 & HP 3458A GIDEP
Equipment to Output DC Current ^{FO}	Up to 3.3 mA	83 μ A/A + 26 nA	Fluke 5500A GIDEP
	3.3 mA to 33 mA	69 μ A/A + 0.3 μ A	
	33 mA to 330 mA	62 μ A/A + 0.91 μ A	
	0.33 mA to 2.2 mA	0.016 % of Reading + 15 μ A	
	2.2 mA to 11 mA	0.047 % of Reading + 0.14 mA	
Equipment to Output DC Current Clamp-On Only ^{FO}	Up to 550 A	0.3 % of Reading + 65 mA	Fluke 5500A/coil GIDEP
Equipment to Measure DC Current ^{FO}	100 μ A to 1 A	0.57 μ A	HP 3458A & Load GIDEP
Equipment to Measure DC Current ^{FO}	10 μ A to 100 μ A	20 μ A/A + 0.67 nA	HP 3458A GIDEP
	0.1 mA to 1 mA	17 μ A/A + 5.4 nA	
	1 mA to 10 mA	41 μ A/A + 37 nA	
	10 mA to 100 mA	37 μ A/A + 0.43 μ A	
	0.1 A to 1 A	98 μ A/A + 9.9 μ A	



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Equipment to Output DC Resistance ^{FO}	0.1 Ω to 11 Ω	0.046 % of Reading + 0.008 Ω	Fluke 5500A GIDEP
	11 Ω to 33 Ω	0.031 % of Reading + 0.015 Ω	
	33 Ω to 110 Ω	0.012 % of Reading + 0.015 Ω	
	110 Ω to 330 Ω	74 $\mu\Omega/\Omega$ + 0.15 Ω	
	0.33 k Ω to 1.1 k Ω	76 $\mu\Omega/\Omega$ + 0.06 Ω	
	1.1 k Ω to 3.3 k Ω	83 $\mu\Omega/\Omega$ + 0.06 Ω	
	3.3 k Ω to 11 k Ω	76 $\mu\Omega/\Omega$ + 0.6 Ω	
	11 k Ω to 33 k Ω	60 $\mu\Omega/\Omega$ + 0.6 Ω	
	33 k Ω to 110 k Ω	86 $\mu\Omega/\Omega$ + 6 Ω	
	110 k Ω to 330 k Ω	76 $\mu\Omega/\Omega$ + 6 Ω	
	0.33 M Ω to 1.1 M Ω	0.01 % of Reading + 55 Ω	
1.1 M Ω to 3.3 M Ω	0.012 % of Reading + 55 Ω		
Equipment to Output DC Resistance ^{FO}	3.3 M Ω to 11 M Ω	0.033 % of Reading + 0.55 k Ω	HP 3458A GIDEP
	11 M Ω to 33 M Ω	0.089 % of Reading + 0.55 k Ω	
	33 M Ω to 110 M Ω	0.28 % of Reading + 5.5 k Ω	
	110 M Ω to 330 M Ω	2.8 % of Reading + 17 k Ω	
Equipment to Measure DC Resistance ^{FO}	0.1 Ω to 10 Ω	23 $\mu\Omega/\Omega$ + 50 $\mu\Omega$	HP 3458A GIDEP
	10 Ω to 100 Ω	9.5 $\mu\Omega/\Omega$ + 0.5 m Ω	
	0.1 k Ω to 1 k Ω	7.5 $\mu\Omega/\Omega$ + 0.5 m Ω	
	1 k Ω to 10 k Ω	8.1 $\mu\Omega/\Omega$ + 5 m Ω	
	10 k Ω to 100 k Ω	9.7 $\mu\Omega/\Omega$ + 50 m Ω	
	0.1 M Ω to 1 M Ω	14 $\mu\Omega/\Omega$ + 2 Ω	
	1 M Ω to 10 M Ω	29 $\mu\Omega/\Omega$ + 100 Ω	
	10 M Ω to 100 M Ω	0.033 % of Reading + 1 k Ω	
	0.1 G Ω to 1 G Ω	0.42 % of Reading + 10 k Ω	



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Equipment to measure Capacitance ^{FO}	0.33 nF to 0.49 nF	0.14 % of Reading + 59 pF	Fluke 5500A GIDEP
	0.5 nF to 1.09 nF	0.16 % of Reading + 59 pF	
	1.1 nF to 3.29 nF	0.22 % of Reading + 59 pF	
	3.33 nF to 10.9 nF	0.38 % of Reading + 59 pF	
	11 nF to 32.9 nF	0.28 % of Reading + 130 pF	
	33 nF to 109.9 nF	0.14 % of Reading + 570 pF	
	110 nF to 329.9 nF	0.05 % of Reading + 5.8 nF	
	330 μ F to 1.09 μ F	0.14 % of Reading + 5.7 nF	
	1.1 μ F to 3.29 μ F	0.08 % of Reading + 58 nF	
	3.3 μ F to 10.9 μ F	0.23 % of Reading + 56 nF	
	11 μ F to 32.9 μ F	0.11 % of Reading + 580 nF	
	33 μ F to 109.9 μ F	0.38 % of Reading + 530 nF	
	110 μ F to 329.9 μ F	0.28 % of Reading + 5.6 μ F	
0.33 mF to 0.33 mF	0.17 % of Reading + 58 μ F		
Equipment to Output AC Current (at the listed frequencies) ^{FO}			
10 Hz to 20 Hz	0.03 mA to 0.33 mA	0.2 % of Reading + 680 nA	
20 Hz to 45 Hz	0.03 mA to 0.33 mA	0.08 % of Reading + 700 nA	
0.045 kHz to 1 kHz	0.03 mA to 0.33 mA	0.09 % of Reading + 740 nA	
1 kHz to 5 kHz	0.03 mA to 0.33 mA	0.4 % of Reading + 650 nA	
5 kHz to 10 kHz	0.03 mA to 0.33 mA	1.4 % of Reading + 510 nA	



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Equipment to Output AC Current (at the listed frequencies) ^{FO}			Fluke 5500A GIDEP
10 Hz to 20 Hz	0.33 mA to 3.3 mA	0.2 % of Reading + 5.5 μ A	
20 Hz to 45 Hz	0.33 mA to 3.3 mA	0.05 % of Reading + 5.7 μ A	
0.045 kHz to 1 kHz	0.33 mA to 3.3 mA	0.05 % of Reading + 5.7 μ A	
1 kHz to 5 kHz	0.33 mA to 3.3 mA	0.2 % of Reading + 5.5 μ A	
5 kHz to 10 kHz	0.33 mA to 3.3 mA	0.6 % of Reading + 4.5 μ A	
Equipment to Output AC Current (at the listed frequencies) ^{FO}			Fluke 5500A/coil GIDEP
10 Hz to 20 Hz	3.3 mA to 33 mA	0.3 % of Reading + 5.1 μ A	
20 Hz to 45 Hz	3.3 mA to 33 mA	0.2 % of Reading + 5.7 μ A	
0.045 kHz to 1 kHz	3.3 mA to 33 mA	0.1 % of Reading + 5.8 μ A	
1 kHz to 5 kHz	3.3 mA to 33 mA	0.3 % of Reading + 5.1 μ A	
5 kHz to 10 kHz	3.3 mA to 33 mA	0.7 % of Reading + 4.2 μ A	
Equipment to Output AC Current (at the listed frequencies) ^{FO}			
10 Hz to 20 Hz	33 mA to 330 mA	0.3 % of Reading + 51 μ A	
20 Hz to 45 Hz	33 mA to 330 mA	0.2 % of Reading + 31 μ A	
0.045 kHz to 1 kHz	33 mA to 330 mA	0.2 % of Reading + 35 μ A	
1 kHz to 5 kHz	33 mA to 330 mA	0.3 % of Reading + 9.3 μ A	
5 kHz to 10 kHz	33 mA to 330 mA	0.8 % of Reading + 170 μ A	
Equipment to Output AC Current (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	0.33 A to 2.2 A	0.2 % of Reading + 510 μ A	
0.045 kHz to 1 kHz	0.33 A to 2.2 A	0.2 % of Reading + 580 μ A	
Equipment to Output AC Current (at the listed frequencies) ^{FO}			
1 kHz to 5 kHz	0.33 A to 2.2 A	0.9 % of Reading + 410 μ A	
Equipment to Output AC Current (at the listed frequencies) ^{FO}			
45 Hz to 65 Hz	2.2 A to 11 A	0.06 % of Reading + 5.8 mA	
65 Hz to 500 Hz	2.2 A to 11 A	0.1 % of Reading + 5.5 mA	
0.5 kHz to 1 kHz	2.2 A to 11 A	0.4 % of Reading + 4.1 mA	
Equipment to Output AC Current- Clamp Only (at the listed frequencies) ^{FO}			
65 Hz to 440 Hz	Up to 110 A	1 % of Reading + 38 mA	
45 Hz to 65 Hz	Up to 550 A	1 % of Reading + 770 mA	
Equipment to Measure AC Current @ 60 Hz ^{FO}	100 mA to 1 A	6 μ A	HP 3458A & Load GIDEP



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Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			Fluke 5500A GIDEP
10 Hz to 45 Hz	Up to 33 mV	0.18 % of Reading + 20 μ V	
45 Hz to 10 kHz	Up to 33 mV	0.088 % of Reading + 20 μ V	
10 kHz to 20 kHz	Up to 33 mV	0.12 % of Reading + 20 μ V	
20 kHz to 50 kHz	Up to 33 mV	0.14 % of Reading + 20 μ V	
50 kHz to 100 kHz	Up to 33 mV	0.21 % of Reading + 33 μ V	
100 kHz to 500 kHz	Up to 33 mV	0.52 % of Reading + 60 μ V	
Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	33 mV to 330 mV	0.13 % of Reading + 50 μ V	
45 Hz to 10 kHz	33 mV to 330 mV	0.033 % of Reading + 20 μ V	
10 kHz to 20 kHz	33 mV to 330 mV	0.056 % of Reading + 20 μ V	
20 kHz to 50 kHz	33 mV to 330 mV	0.089 % of Reading + 40 μ V	
50 kHz to 100 kHz	33 mV to 330 mV	0.13 % of Reading + 0.17 mV	
100 kHz to 500 kHz	33 mV to 330 mV	0.56 % of Reading + 0.33 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	0.33 V to 3.3 V	0.075 % of Reading + 0.25 mV	
45 Hz to 10 kHz	0.33 V to 3.3 V	0.016 % of Reading + 60 μ V	
10 kHz to 20 kHz	0.33 V to 3.3 V	0.041 % of Reading + 60 μ V	
20 kHz to 50 kHz	0.33 V to 3.3 V	0.074 % of Reading + 0.3 mV	
50 kHz to 100 kHz	0.33 V to 3.3 V	0.12 % of Reading + 1.7 mV	
100 kHz to 500 kHz	0.33 V to 3.3 V	0.3 % of Reading + 3.3 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	3.3 V to 33 V	0.75 % of Reading + 2.5 mV	
45 Hz to 10 kHz	3.3 V to 33 V	0.023 % of Reading + 0.6 mV	
10 kHz to 20 kHz	3.3 V to 33 V	0.042 % of Reading + 2.6 mV	
20 kHz to 50 kHz	3.3 V to 33 V	0.097 % of Reading + 5 mV	
50 kHz to 100 kHz	3.3 V to 33 V	12 % of Reading + 17 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			
0.045 kHz to 1 kHz	33 V to 330 V	0.28 % of Reading + 6.6 mV	
1 kHz to 10 kHz	33 V to 330 V	0.042 % of Reading + 15 mV	
10 kHz to 20 kHz	33 V to 330 V	0.046 % of Reading + 33 mV	



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Equipment to Output AC Voltage (at the listed frequencies) ^{FO}			Fluke 5500A GIDEP
0.045 kHz to 1 kHz	330 V to 1 000 V	0.044 % of Reading + 80 mV	
1 kHz to 5 kHz	330 V to 1 000 V	0.1 % of Reading + 0.1 mV	
5 kHz to 8 kHz	330 V to 1 000 V	0.1 % of Reading + 0.5 V	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			HP 3458A GIDEP
10 Hz to 40 Hz	10 mV to 100 mV	0.011 % of Reading + 4 μ V	
0.04 kHz to 1 kHz	10 mV to 100 mV	0.015 % of Reading + 2 μ V	
1 kHz to 20 kHz	10 mV to 100 mV	0.014 % of Reading + 2 μ V	
20 kHz to 50 kHz	10 mV to 100 mV	0.032 % of Reading + 2 μ V	
50 kHz to 100 kHz	10 mV to 100 mV	0.082 % of Reading + 2 μ V	
100 kHz o 300 kHz	10 mV to 100 mV	0.49 % of Reading + 10 μ V	
0.3 MHz to 1 MHz	10 mV to 100 mV	1 % of Reading + 10 μ V	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 40 Hz	0.1 V to 10 V	0.012 % of Reading + 40 μ V	
0.04 kHz to 1 kHz	0.1 V to 10 V	0.013 % of Reading + 20 μ V	
1 kHz to 20 kHz	0.1 V to 10 V	0.019 % of Reading + 20 μ V	
20 kHz to 50 kHz	0.1 V to 10 V	0.022 % of Reading + 20 μ V	
50 kHz to 100 kHz	0.1 V to 10 V	0.045 % of Reading + 20 μ V	
100 kHz o 300 kHz	0.1 V to 10 V	0.21 % of Reading + 0.1 mV	
0.3 MHz to 1 MHz	0.1 V to 10 V	0.82 % of Reading + 0.1 mV	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
1 Hz to 40 Hz	10 V to 100 V	0.018 % of Reading + 4 mV	
0.04 kHz to 1 kHz	10 V to 100 V	0.019 % of Reading + 2 mV	
1 kHz to 20 kHz	10 V to 100 V	0.019 % of Reading + 2 mV	
20 kHz to 50 kHz	10 V to 100 V	0.029 % of Reading + 2 mV	
50 kHz to 100 kHz	10 V to 100 V	0.10 % of Reading + 2 mV	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
0.04 kHz to 1 kHz	100 V to 1 000 V	0.25 % of Reading + 20 mV	
Equipment to Measure HV AC Voltage ^{FO}	(1 to 20) kV	1.3% of Reading	Fluke 80K-40 & HP 3458A GIDEP



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Temperature Calibration, Indication and Control Equipment used with Thermocouple Type B ^{FO}	600 °C to 800 °C	0.45 °C	Fluke 5500A Electrical Simulation of Thermocouple Output GIDEP
	800 °C to 1 000 °C	0.36 °C	
	1 000 °C to 1 500 °C	0.32 °C	
	1 500 °C to 1 820 °C	0.35 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type C ^{FO}	0 °C to 150 °C	0.32 °C	
	150 °C to 650 °C	0.28 °C	
	650 °C to 1 000 °C	0.33 °C	
	1 000 °C to 1 800 °C	0.51 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type E ^{FO}	1 800 °C to 2 316 °C	0.85 °C	
	-250 °C to -100 °C	0.3 °C	
	-100 °C to -25 °C	0.21 °C	
	-25 °C to 350 °C	0.18 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J ^{FO}	350 °C to 650 °C	0.11 °C	
	650 °C to 1 000 °C	0.11 °C	
	-210 °C to -100 °C	0.31 °C	
	-100 °C to -30 °C	0.2 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J ^{FO}	-30 °C to 150 °C	0.18 °C	
	150 °C to 760 °C	0.16 °C	
	760 °C to 1 200 °C	0.15 °C	
	Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K ^{FO}	-200 °C to -100 °C	0.4 °C
-100 °C to -25 °C		0.23 °C	
-25 °C to 120 °C		0.17 °C	
120 °C to 1 000 °C		0.14 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K ^{FO}	1 000 °C to 1 372 °C	0.18 °C	
	-200 °C to -100 °C	0.41 °C	
	-100 °C to -25 °C	0.24 °C	
	-25 °C to 120 °C	0.22 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type N ^{FO}	120 °C to 410 °C	0.21 °C	
	410 °C to 1 300 °C	0.29 °C	
	0 °C to 250 °C	0.58 °C	
	250 °C to 400 °C	0.36 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type R ^{FO}	400 °C to 1 000 °C	0.35 °C	
	1 000 °C to 1 767 °C	0.41 °C	



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Temperature Calibration, Indication and Control Equipment used with Thermocouple Type S ^{FO}	0 °C to 250 °C	0.48 °C	Fluke 5500A Electrical Simulation of Thermocouple Output GIDEP	
	250 °C to 400 °C	0.37 °C		
	400 °C to 1 000 °C	0.38 °C		
	1 000 °C to 1 767 °C	0.47 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T ^{FO}	-250 °C to -150 °C	0.96 °C		
	-150 °C to 0 °C	0.57 °C		
	0 °C to 120 °C	0.31 °C		
	120 °C to 400 °C	0.17 °C		
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type U ^{FO}	-200 °C to 0 °C	0.57 °C		
	0 °C to 600 °C	0.29 °C		
Oscilloscopes Level Sine Amp 50 kHz Ref. ^{FO}	5 mV to 5 V(p-p)	0.3 mV + 3 % of Reading		Fluke 5500A /SC600 GIDEP
Oscilloscopes Level Sine Flatness 5 mV to 5.5 V Relative to 50 kHz Ref ^{FO}	50 kHz to 100 MHz	0.1 mV + 2 % of Reading		
	100 MHz to 300 MHz	0.1 mV + 2.5 % of Reading		
	300 MHz to 600 MHz	0.1 mV + 4.5 % of Reading		
Oscilloscopes Square Wave 1 M Ω , 100 Hz ^{FO}	1 mV to 150 V(p-p)	40 μ V + 0.2 % of Reading		
Oscilloscopes Square Wave 50 Ω , 1 kHz ^{FO}	1 mV to 6.6 V(p-p)	40 μ V + 0.35 % of Reading		
Time Marker Output Into 50 Ω ^{FO}	1 ns to 20 ms	5 μ s/s		
Rise Time ^{FO}	\leq 300 ps	12 ps		

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
Stopwatches/Timers ^{FO}	0.4 hr to 24 hr	0.2 s	HP 55300A GPS /5385A Counter NIST SP 960-12
Rotational Speed Indicating Device	10 RPM to 100,000 RPM	0.34 RPM	HP 55300A GPS/ HP 3325B / HP5385 Counter GIDEP



Certificate of Accreditation: Supplement

EML, LLC

998 Elm Hill Pike, Nashville, TN 37210
 Contact Name: Frieda Evaskis Phone: 615-771-2560

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
Indirect Verification of Rockwell Hardness Testers HRA ^{FO}	20 HRA to 65 HRA	0.58 HRA	Hardness Standards ASTM E18
	70 HRA to 78 HRA	0.5 HRA	
	80 HRA to 84 HRA	0.37 HRA	
Indirect Verification of Rockwell Hardness Testers HRBW ^{FO}	40 HRBW to 59 HRBW	0.74 HRBW	
	60 HRBW to 79 HRBW	0.92 HRBW	
	80 HRBW to 100 HRBW	0.73 HRBW	
Indirect Verification of Rockwell Hardness Testers HRC ^{FO}	20 HRC to 30 HRC	0.88 HRC	
	35 HRC to 55 HRC	0.7 HRC	
	60 HRC to 65 HRC	0.42 HRC	
Indirect Verification of Rockwell Hardness Testers HR15N ^{FO}	70 HR15N to 77 HR15N	0.86 HR15N	
	78 HR15N to 88 HR15N	0.63 HR15N	
	90 HR15N to 92 HR15N	1.4 HR15N	
Indirect Verification of Rockwell Hardness Testers HR30N ^{FO}	42 HR30N to 50 HR30N	0.96 HR30N	
	55 HR30N to 73 HR30N	0.64 HR30N	
	77 HR30N 82 HR30N	0.67 HR30N	
Indirect Verification of Rockwell Hardness Testers HR15TW ^{FO}	74 HR15TW to 80 HR15TW	0.62 HR15TW	
	81 HR15TW to 86 HR15TW	0.58 HR15TW	
	87 HR15TW to 93 HR15TW	0.45 HR15TW	
Torque Tools ^{FO}	5 in·lbf to 150 in·lbf	0.38 % of Reading	Snap-on Versatest torque calibration system GIDEP
	150 in·lbf to 400 in·lbf	0.4 % of Reading	
	400 in·lbf to 1 000 in·lbf	0.4 % of Reading	
	60 ft·lbf to 600 ft·lbf	0.52 % of Reading	
Torque Testers/Analyzers ^{FO}	5 in·lbf to 150 in·lbf	0.03 % of Reading + 0.52 in·lbf	TorqueArms/Wheels and Class F Weights GIDEP
	150 in·lbf to 400 in·lbf	0.14 % of Reading + 0.014 in·lbf	
	400 in·lbf to 1 000 in·lbf	0.07 % of Reading + 0.49 in·lbf	
	50 ft·lbf to 600 ft·lbf	0.013 % of Reading + 0.3 ft·lbf	
Thickness Gages ^{FO}	Up to 60 mil	0.04 mil	Coating thickness Standards GIDEP
	60 mil to 157 mil	0.08 mil	
	158 mil to 305 mil	0.16 mil	
Photohelic, Magnehelic & Environmental Gauge ^{FO}	up to 150 in H2O	0.02 in H2O	Fluke 700P Pressure Modules GIDEP ASME B40.100



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Pressure & Vacuum Gages ^{FO}	-15 psig to 100 psig	0.09 psig	Fluke 700P Pressure Modules GIDEP ASME B40.100
	100 psig to 500 psig	0.21 psig	
	500 psig to 1 000 psig	0.56 psig	
	1 000 psig to 5 000 psig	2.1 psig	
	5 000 psig to 10 000 psig	13 psig	
Magnehelic Gauge ^{FO}	Up to 150 in H2O	0.02 in H2O	Fluke 700P GIDEP

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
Force- Compression and Tension ^{FO}	Up to 100 lbf	0.15 % of Reading + 0.05 lbf	Rice-Lake and Omega Load Cells GIDEP
	100 lbf to 500 lbf	0.11 % of Reading + 0.22 lbf	
	500 lbf to 1 500 lbf	0.22 % of Reading + 2.5 lbf	
	1 500 lbf to 10 000 lbf	0.27 % of Reading + 11 lbf	
	10 000 lbf to 30 000 lbf	0.13 % of Reading + 38 lbf	
Mass ^F	1g to 20 g	0.057 mg	ASTM Class 1 Weights and Analytical Balance NIST 105-1 ANSI/ASTM E617
	50 g	0.087 mg	
	100 g	0.046 mg	
	200 g	0.23 mg	
	500 g	0.53 mg	
	1 kg	1.4 mg	
	2 kg	2.9 mg	
	3 kg	2.5 mg	
	5 kg	4 mg	
	10 kg	180 mg	
20 kg	160 mg		
Balances & Scales ^{FO}	1 g to 100 g	5.4 μ g/g + 41 μ g	NIST Class 1 Weights NIST Handbook 44
	100 g to 250 g	47 μ g/g + 140 μ g	
	250 g to 6 100 g	0.39 μ g/g + 1.5 mg	
	6 100 g to 34 kg	12 μ g/g + 10 mg	NIST Class F Weights NIST Handbook 44
	5 lb to 1 000 lb	0.1 % of Reading	



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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
Temperature Measurement ^{FO}	-200 °C to -80 °C	0.014 °C	Fluke 525B & Fluke 5628 PRT GIDEP
	-80 °C to 0 °C	0.021 °C	
	0 °C	0.021 °C	
	0 °C to 100 °C	0.021 °C	
	100 °C to 300 °C	0.031 °C	
	300 °C to 400 °C	0.035 °C	
	400 °C to 600 °C	0.047 °C	
Temperature- Analog and Digital Thermometers ^{FO}	-50 °C to 0 °C	0.083 °C	Fluke 525B & Fluke 5628 and Dry Block GIDEP
	0 °C	0.061 °C	
	0 °C to 100 °C	0.083 °C	
	100 °C to 300 °C	0.086 °C	
	300 °C to 400 °C	0.088 °C	
	400 °C to 600 °C	0.093 °C	
Infrared Thermometers ^{FO}	Up to 100 °C	1.3 °C	Omega BB4A Blackbody Calibrator GIDEP
	200 °C to 400 °C	2.2 °C	
	400 °C to 900 °C	2.6 °C	
Humidity Indicators ^{FO}	10 % RH to 40 % RH	2.4 % RH	Vaisala HMP76/M170 & Salts GIDEP NBS 81A (1977)
	50 % to 90 % RH	3.1 % RH	

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 % of Reading 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 calibrations:

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 D represents diameter in inches or millimeters as appropriate to the uncertainty statement.
7. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
8. The term DL represents diagonal length of measured area of a surface plate.
9. The term "X" preceded by a number represents the number of times a lense system magnifies an image relative to its actual size. CMC stated as "% of Reading of magnification" represents the CMC of magnification expressed as a percentage of the total magnification.