



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

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

### ***Ingeniería y Metrología en Instrumentos de Control y Pruebas, S.A. de C.V.***

***Privada de la Secundaria Federal No.2, Casa # 4, Col. Villas Magisterial Ocotlán  
Tlaxcala, México. C.P. 90014***

*(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 January 2009):

### ***Dimensional, Electrical, Thermodynamic, Mechanical, Mass, Force and Weighing Devices, Chemical, Time and Frequency, Optical and Acoustic 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

*Initial Accreditation Date:*

July 18, 2006

*Issue Date:*

March 07, 2017

*Expiration Date:*

May 31, 2019

*Accreditation No.:*

54194

*Certificate No.:*

L17-110

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



# Certificate of Accreditation: Supplement

## Ingeniería y Metrología en Instrumentos de Control y Pruebas, S.A. de C.V.

Privada de la Secundaria Federal No.2, Casa # 4, Col. Villas Magisterial Ocotlán  
Tlaxcala, México. C.P. 90014

Contact: Saul Morales Phone: 246- 466-7041

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
Caliper Gauge <sup>FO</sup>	0.70 mm to 1 500 mm	(6.88 + 0.0207L) $\mu$ m	Gage Blocks Mitutoyo 516-943, 611682-031 611684-031, 611685-031
Micrometers <sup>FO</sup>	0.70 mm to 1 000 mm	(0.69 + 0.0113L) $\mu$ m	Gage Blocks Mitutoyo 516-107 611682-031, 611684-031
Monitoring Indicators and Level Type <sup>FO</sup>	0.005 mm to 50 mm	(1.35 + 0.005L) $\mu$ m	Mitutoyo 164-162
Metallic and Glass Scales Error of Indication <sup>F</sup>	0.005 mm to 2 000 mm	(40.61 + 2 x 10 <sup>-5</sup> L) $\mu$ m	Longitude Scale Mitutoyo 172-171
Flexible Tapes Measure and Flexo Meter <sup>F</sup> Error of Indication	50 000 mm	(0.105 + 9.88 x 10 <sup>-6</sup> L) mm	Mitutoyo 182-309
Height Gage <sup>F</sup>	12 mm to 1 000 mm	(12.58 + 0.0474L) $\mu$ m	Mitutoyo 515-359
Sieve <sup>O</sup>	0.01 mm to 50 mm	3.2 $\mu$ m	Mitutoyo PV500
Reticle Radius <sup>F</sup>	0.01 mm to 50 mm	3.2 $\mu$ m	Optical Comparator
Reticle for Length <sup>F</sup>	0.01 mm to 50 mm	3.2 $\mu$ m	
Digital Protractor <sup>F</sup>	0° to 360 °	0.039°	
Optical Comparators <sup>O</sup> Axis Linearity (X,Y)	X= 500 mm	8.6 $\mu$ m	Mitutoyo 172-116 Mitutoyo 183-110
	Y= 500 mm	8.6 $\mu$ m	
Angularity <sup>O</sup>	0° to 360 °	0.039°	
Axial Orientation <sup>O</sup>	1° at 4 in Y axis travel	0.075°	
Magnification <sup>O</sup>	5X	0.5 %	
	10X	0.5 %	
	20X	0.5 %	
	31.25X	0.5 %	
	50X	0.5 %	
	62.5X	0.5 %	
	100X	0.5 %	
Microscopes Scale <sup>FO</sup> (X, Y)	200 mm	2.3 $\mu$ m	Mitutoyo 172-116



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Microscopes Scale Magnification <sup>FO</sup>	5X	0.5 %	Mitutoyo 172-116
	10X	0.5 %	
	15X	0.5 %	
	20X	0.5 %	
	50X	0.5 %	
Thickness Gages <sup>FO</sup>	25 mm to 100 mm	(1.5 + 0.076L) $\mu$ m	Gage Blocks Mitutoyo 516-943
Coating Thickness Gauge <sup>FO</sup>	25 $\mu$ m to 2 000 $\mu$ m	(0.558 + 0.095L) $\mu$ m	Film standards Mitutoyo
Surface Roughness Tester Ra <sup>FO</sup>	0.42 $\mu$ m to 2.94 $\mu$ m	0.074 $\mu$ m	Mitutoyo 178-604 Roughness Specimen Cut-off: 0.8 mm and 2.5 mm Evaluation longitude: 4.0 mm and 12.5 mm.
Surface Roughness Tester Ry <sup>FO</sup>	1.7 $\mu$ m to 11.4 $\mu$ m	0.13 $\mu$ m	

### 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>	0.001 mV to 200 mV	20 $\mu$ V	Multifunction calibrator Fluke 5100B Manual Spec + UUT resolution
	0.2 V to 2 V	150 $\mu$ V	
	2 V to 20 V	1.5 mV	
	20 V to 200 V	15 mV	
	200 V to 1 100 V	78 mV	
Equipment to Measure DC Current <sup>FO</sup>	0.1 $\mu$ A to 200 $\mu$ A	0.076 $\mu$ A	Multifunction calibrator Fluke 5100B Manual Spec + UUT Resolution
	0.2 mA to 2 mA	0.65 $\mu$ A	
	2 mA to 20 mA	6.5 $\mu$ A	
	20 mA to 200 mA	65 $\mu$ A	
	0.1 A to 2 A	640 $\mu$ A	
Equipment to Output DC Voltage <sup>FO</sup>	10 mV to 100 mV	25 $\mu$ V	Multimeter Fluke 8520A Manual Spec + UUT stability
	0.1 V to 1 V	150 $\mu$ V	
	1 V to 10 V	1.2 mV	
	10 V to 100 V	17 mV	
	100 V to 1 000 V	260 mV	



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Equipment to Measure AC Voltage At the listed frequency <sup>FO</sup>			Multifunction calibrator Fluke 5100B Manual Spec + UUT Resolution
2 mV to 200 mV	50Hz to 1 kHz	190 $\mu$ V	
0.2 V to 2 V	50Hz to 1 kHz	1.4 mV	
2 V to 20 V	50Hz to 1 kHz	13 mV	
20 V to 200 V	50Hz to 1 kHz	130 mV	
200 V to 1 100 V	50Hz to 1 kHz	650 mV	
Equipment to Measure DC Current <sup>FO</sup>			
	10 $\mu$ A to 200 $\mu$ A	76 nA	
	0.2 mA to 2 mA	660 nA	
	2 mA to 20 mA	6.5 $\mu$ A	
	20 mA to 200 mA	65 $\mu$ A	
	0.2 A to 2 A	650 $\mu$ A	
Equipment to Measure AC Current At the listed frequency <sup>FO</sup>			Fluke 8520A Manual Spec + UUT Resolution
50Hz to 1 kHz	10 $\mu$ A to 200 $\mu$ A	2.5 $\mu$ A	
50Hz to 1 kHz	0.2 mA to 2 mA	4.3 $\mu$ A	
50Hz to 1 kHz	2 mA to 20 mA	22 $\mu$ A	
50Hz to 1 kHz	20 mA to 200 mA	190 $\mu$ A	
50Hz to 1 kHz	0.2 A to 2 A	1.9 mA	
Equipment to Output AC Voltage At the listed frequency <sup>FO</sup>			Multifunction calibrator Fluke 5100B and Transconductance Amplifier Fluke 5220A Manual Specs + UUT Resolution
40Hz to 20 kHz	0.1 V to 1 V	2.4 mV	
40Hz to 20 kHz	1 V to 10 V	24 mV	
40Hz to 20 kHz	10 V to 100 V	240 mV	
40Hz to 20 kHz	100 V to 650 V	1.6 V	
Equipment to Measure AC & DC Current (Transconductance Amplifier) <sup>FO</sup>	2 A to 20 A	0.035 % of reading	



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Equipment to Measure AC & DC Current – At the listed frequency <sup>FO</sup>			Multifunction calibrator Fluke 5100B and Transconductance Amplifier Fluke 5220A Manual Specs + UUT Resolution
30Hz to 1 kHz	2 A to 20 A	0.064 % of reading	
Equipment to Measure AC & DC Current (Current Transformers with Ratio Transformation) <sup>FO</sup>	20 A to 30 A	0.25 % of reading	Multifunction calibrator Fluke 5100B in conjunction with 5220A Transconductance Amplifier and 30 turns coil Manual Spec + UUT Resolution
	30 A to 60 A	0.28 % of reading	
	60 A to 120 A	0.34 % of reading	
	120 A to 300 A	0.5 % of reading	
Equipment to Measure AC & DC Current At the listed frequency <sup>FO</sup>			Multifunction calibrator Fluke 5100B in conjunction with 5220A Transconductance Amplifier and 30 turns coil Manual Spec + UUT Resolution
45 Hz to 65 Hz	20 A to 30 A	0.48 % of reading	
45 Hz to 65 Hz	30 A to 60 A	0.51 % of reading	
45 Hz to 65 Hz	60 A to 120 A	0.59 % of reading	
45 Hz to 65 Hz	120 A to 300 A	0.63 % of reading	
Equipment to Output DC Voltage <sup>FO</sup>	1 mV to 110 mV	20 $\mu$ V	Calibrator Fluke 741 B Manual Spec + UUT Resolution
	0.11 V to 1.1 V	200 $\mu$ V	
	1.1 V to 15 V	2.7 mV	
Equipment to Measure AC & DC Current <sup>FO</sup>	0.2 mA to 1 mA Genrad 1434G 1 000 $\Omega$ , 0.1 %	0.11 % of reading	Multimeter Fluke 8520 A and reference shunt Manual Spec + UUT resolution
	1 mA to 10 mA Genrad 1434G 100 $\Omega$ , 0.1 %	0.11 % of reading	
	10 mA to 100 mA Genrad 1434G 10 $\Omega$ , 0.1 %	0.11 % of reading	
	0.70 A to 1.99 A Shunt 1 $\Omega$ , 0.1 %	0.11 % of reading	
	2 A to 10 A Shunt 0.1 $\Omega$ , 1 %	1 % of reading	
Equipment to Measure AC & DC Current At the listed frequency <sup>FO</sup>			
40 Hz to 20 kHz	0.2 mA to 1 mA	0.14 % of reading	Genrad 1434G 1 000 $\Omega$ , 0.1%
40 Hz to 20 kHz	1mA to 10 mA	0.14 % of reading	Genrad 1434G 100 $\Omega$ , 0.1%



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Equipment to Measure AC & DC Current At the listed frequency <sup>FO</sup>			
40 Hz to 20 kHz	10 mA to 100 mA	0.14 % of reading	Genrad 1434G 10 $\Omega$ . 0.1%
40 Hz to 20 kHz	0.1 A to 1 A	0.14 % of reading	Shunt 1 $\Omega$ . 0.1 %
40 Hz to 20 kHz	1 A to 10 A	1.01 % of reading	Shunt 0.1 $\Omega$ . 1 %
Electrical Resistance – Generate <sup>FO</sup>	0.1 $\Omega$ to 1 $\Omega$	35 m $\Omega$	Decade box Yokogawa 2786 and Genrad 1434G Manual Spec + UUT Resolution RTD's 100 $\Omega$ to 1 000 $\Omega$ $\alpha=386,3916,3926$
	1 $\Omega$ to 10 $\Omega$	40 m $\Omega$	
	10 $\Omega$ to 100 $\Omega$	85 m $\Omega$	
	100 $\Omega$ to 1 000 $\Omega$	505 m $\Omega$	
	1 k $\Omega$ to 10 k $\Omega$	5 $\Omega$	
	10 k $\Omega$ to 100 k $\Omega$	50 $\Omega$	
Electrical Resistance – Measure <sup>FO</sup>	1 $\Omega$ to 10 $\Omega$	3.3 m $\Omega$	Multimeter Fluke 8520 A Manual Spec + UUT Stability
	10 $\Omega$ to 100 $\Omega$	25 m $\Omega$	
	100 $\Omega$ to 1 k $\Omega$	250 m $\Omega$	
	1k $\Omega$ to 10 k $\Omega$	2.5 $\Omega$	
	10 k $\Omega$ to 100 k $\Omega$	26 $\Omega$	
	100 k $\Omega$ to 1 M $\Omega$	305 $\Omega$	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 385 and Pt 3926, 25 $\Omega$ to 100 $\Omega$ <sup>FO</sup>	-200 $^{\circ}$ C to 962 $^{\circ}$ C	0.065 $^{\circ}$ C	Electrical Simulation of Thermocouple Output Thermometer Hart 1502A Manual Spec + UUT Resolution
	-200 $^{\circ}$ C to 962 $^{\circ}$ C	0.065 $^{\circ}$ C	
	-200 $^{\circ}$ C to 962 $^{\circ}$ C	0.065 $^{\circ}$ C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 $^{\circ}$ C to -100 $^{\circ}$ C	0.24 $^{\circ}$ C	Electrical Simulation of Thermocouple Output Omega DP41-TC
	-100 $^{\circ}$ C to 800 $^{\circ}$ C	0.29 $^{\circ}$ C	
	800 $^{\circ}$ to 1 200 $^{\circ}$ C	0.31 $^{\circ}$ C	



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Temperature Calibration, Indication and Control Equipment used with Thermocouple K <sup>FO</sup>	-200 °C to -100 °C	0.24 °C	Electrical Simulation of Thermocouple Output Omega DP41-TC
	-100 °C to 400 °C	0.26 °C	
	400 °C to 1 200 °C	0.31 °C	
	1 200 °C to 1 372 °C	0.32 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple T <sup>FO</sup>	-250 °C to -200 °C	0.25 °C	
	-200 °C to 0 °C	0.24 °C	
	0 °C to 400 °C	0.26 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple E <sup>FO</sup>	-250 °C to -200 °C	0.25 °C	
	-200 °C to -100 °C	0.24 °C	
	-100 °C to 600 °C	0.27 °C	
	600 °C to 1 000 °C	0.3 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple R <sup>FO</sup>	-20 °C to 0 °C	0.24 °C	
	0 °C to 100 °C	0.25 °C	
	100 °C to 1 767 °C	0.34 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple S <sup>FO</sup>	-20 °C to 0 °C	0.24 °C	
	0 °C to 200 °C	0.25 °C	
	200 °C to 1 400 °C	0.32 °C	
	1 400 °C to 1 767 °C	0.34 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple N <sup>FO</sup>	-200 °C to -100 °C	0.24 °C	
	-100 °C to 900 °C	0.29 °C	
	900 °C to 1 300 °C	0.32 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple B <sup>FO</sup>	600 °C to 800 °C	0.29 °C	
	800 °C to 1 000 °C	0.3 °C	
	1 000 °C to 1 820 °C	0.35 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple C <sup>FO</sup>	0 °C to 800 °C	0.29 °C	
	800 °C to 1 200 °C	0.31 °C	
	1 200 °C to 1 800 °C	0.35 °C	
	1 800 °C to 2 316 °C	0.37 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple J <sup>FO</sup>	-210 °C to -100 °C	0.36 °C	Electrical Simulation of Thermocouple Output Fluke 741B
	-100 °C to 800 °C	0.24 °C	
	800 ° to 1 200 °C	0.24 °C	



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Temperature Calibration, Indication and Control Equipment used with Thermocouple K <sup>FO</sup>	-200 °C to -100 °C	0.47 °C	Electrical Simulation of Thermocouple Output Fluke 741B
	-100 °C to 400 °C	0.36 °C	
	400 °C to 1 200 °C	0.36 °C	
	1 200 °C to 1 372 °C	0.36 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple T <sup>FO</sup>	-250 °C to -200 °C	1.1 °C	
	-200 °C to 0 °C	0.47 °C	
	0 °C to 400 °C	0.36 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple E <sup>FO</sup>	-250 °C to -200 °C	0.7 °C	
	-200 °C to -100 °C	0.36 °C	
	-100 °C to 600 °C	0.36 °C	
	600 °C to 1 000 °C	0.24 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple R <sup>FO</sup>	-20 °C to 0 °C	1.4 °C	
	0 °C to 100 °C	1.3 °C	
	100 °C to 1 767 °C	1.1 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple S <sup>FO</sup>	-20 °C to 0 °C	1.4 °C	
	0 °C to 200 °C	1.3 °C	
	200 °C to 1 400 °C	1.1 °C	
	1 400 °C to 1 767 °C	1.2 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple N <sup>FO</sup>	-200 °C to -100 °C	1.1 °C	
	-100 °C to 900 °C	0.94 °C	
	900 °C to 1 300 °C	0.47 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple B <sup>FO</sup>	600 °C to 800 °C	1.2 °C	
	800 °C to 1 000 °C	0.94 °C	
	1 000 °C to 1 820 °C	0.94 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 385, Pt 3916 and Pt 3926, 25Ω to 100Ω	-195 °C to 800 °C	0.066 °C	Electrical Simulation of RTD Output Fluke 744
pH Simulation – Generate <sup>FO</sup>	0.01 pH to 14 pH	0.006 pH	Multifunction Fluke 5100A @ 25°C
pH Simulation – Measure <sup>FO</sup>	0.01 pH to 14 pH	0.006 pH	Multimeter Fluke 8520 A @ 25°C





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Conductivity Simulation-Generate <sup>FO</sup>	0.1 μS/cm to 20 mS/cm	0.06 % of reading	Resistance Decade Genrad 1434G
Conductivity Simulation-Measure <sup>FO</sup>	0.1 μS/cm to 20 mS/cm	0.06 % of reading	Multimeter Fluke 8520 A

### Thermodynamic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Industrial Thermometer – Indicator and Sensor RTD Pt385 100Ω <sup>FO</sup>	-40 °C to 0 °C	0.06 °C	Thermometer Hart Scientific 1502 A
Industrial Thermometer – Indicator and Sensor RTD Pt3916 100Ω <sup>FO</sup>	-40 °C to 0 °C	0.06 °C	
Industrial Thermometer – Indicator and Sensor RTD Pt3926 100Ω <sup>FO</sup>	-40 °C to 0 °C	0.06 °C	
Industrial Thermometer Indicator and Sensor RTD Pt385, 100Ω <sup>FO</sup>	0 °C to 600 °C	0.28 °C	
Industrial Thermometer Indicator and Sensor RTD Pt3916 100Ω <sup>FO</sup>	0 °C to 600 °C	0.28 °C	
Industrial Thermometer – Indicator and Sensor RTD Pt3926 100Ω <sup>FO</sup>	0 °C to 600 °C	0.28 °C	
Industrial Thermometer Indicator and Sensor RTD Pt385 100Ω <sup>FO</sup>	-196 °C to 700 °C	0.26 °C	Omega DP41-Sensor RTD's Measure
Industrial Thermometer Indicator and Sensor RTD Pt3916 100Ω <sup>FO</sup>	-196 °C to 650 °C	0.26 °C	
Industrial Thermometer Indicator and Sensor RTD Pt3926 100Ω <sup>FO</sup>	-196 °C to 650 °C	0.26 °C	



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Industrial Thermometer Indicator and Thermocouple Type J <sup>FO</sup>	-196 °C to 760 °C	0.31 °C	Omega DP41-Termocouple Measure
Industrial Thermometer Indicator and Thermocouple Type K <sup>FO</sup>	-196°C to 1 372 °C	0.31 °C	
Industrial Thermometer Indicator and Thermocouple Type T <sup>FO</sup>	-196 °C to 400 °C	0.31 °C	
Industrial Thermometer Indicator and Thermocouple Type E <sup>FO</sup>	-196 °C to 1 000 °C	0.31 °C	
Industrial Thermometer Indicator and Thermocouple Type R <sup>FO</sup>	-50 °C to 1 768 °C	0.31 °C	
Industrial Thermometer – Indicator and Thermocouple Type S <sup>FO</sup>	-50 °C to 1 768 °C	0.31 °C	
Liquids in Glass Thermometers <sup>FO</sup>	0 °C to 420 °C	0.3 °C	Thermometer Hart Scientific 1502 A
Liquids in Glass Thermometers <sup>FO</sup>	420 °C to 600 °C	0.35 °C	Omega DP41-TC Measurement
Sterilizer and Climatic Chambers, Ovens, Incubators <sup>FO</sup>	-100 °C to 340 °C	0.5 °C	Hydra Fluke 2625
Water Baths. Temperature Control and Bain-Marie <sup>FO</sup>	-100 °C to 340 °C	0.09 °C	Thermometer Hart Scientific 1502 A
Furnaces Sensor <sup>FO</sup>	50 °C to 900 °C	0.25 °C	Omega DP41-TC Measurement
Bi-Metal Thermometers <sup>FO</sup>	0 °C to 600 °C	0.5 °C	
Thermostats <sup>FO</sup>	0 °C to 600 °C	0.7 °C	
Humidity Meters <sup>F</sup>	10 % RH to 90 % RH	0.6 % RH	Vaisala PTU301 Measurement
	11.3 % RH	0.9 % RH	Vaisala Standard Salts Cal
	32.9 % RH	0.6 % RH	
	75.5 % RH	0.7 % RH	
	97.5 % RH	1.7 % RH	
Infrared / No contact Thermometers <sup>F</sup>	25 °C to 350 °C	0.7 °C	Thermometer Hart Scientific 1502 A and Blackbody
Liquids in Glass Thermometers <sup>F</sup>	-20 °C to 0 °C	0.25 °C	Thermometer Hart Scientific 1502 A



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Privada de la Secundaria Federal No.2, Casa # 4, Col. Villas Magisterial Ocotlán  
Tlaxcala, México. C.P. 90014

Contact: Saul Morales Phone: 246- 466-7041

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

### 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 and Balances <sup>O</sup>	1 mg to 211.07 g (Res.= 0.001 g)	0.58 mg	Class E2 Weights
	1 g to 201 g (Res.= 0.01 g)	$(1.35 \times 10^{-9}Wt^2 + 1.14 \times 10^{-11}Wt + 11.2)$ mg	Class F2 Weights
	200 g to 2 400 g (Res.= 0.5 g)	$(6.88 \times 10^{-8}Wt^2 + 5.59 \times 10^{-5}Wt + 0.611)$ g	Class F1 Weights
	5 g to 1 105 g (Res.= 0.005 g)	$(1.32 \times 10^{-7}Wt^2 + 1.91 \times 10^{-6}Wt + 8.77)$ mg	Class F2 Weights
	50 g to 4 050 g (Res.= 0.001 g)	$(4.11 \times 10^{-8}Wt^2 + 1.16 \times 10^{-4}Wt + 0.603)$ g	Class F1 Weights
	5 kg to 50 kg (Res.= 0.001 kg)	1.2 g	Class F2 Weights
	20 kg to 1 155 kg (Res.= 0.01 kg)	70 g	Class M1 Weights
	10 mg to 101.1 g (Res.= 0.01 g)	12 mg	Class M1 Weights
	1 g to 2 110 g (Res.= 1 g)	1.2 g	Class M2 Weights
	Scales and Balances <sup>O</sup>	20 kg to 7 000 kg (Res.= 0.1 kg)	0.12 kg
Mass M1-M2-M3 <sup>F</sup>	5 kg	14 mg	Substitution Class F2 Mass Ohaus DV215 CD
	10 kg	20 mg	
	20 kg	54 mg	
Force – Compression and Tension - Measure <sup>FO</sup>	49 N to 490 N	0.3 % of reading	Class F1 and F2 Mass
	490 N to 9 807 N	0.2 % of reading	ABB/Altech 20210 – Load Cell
	98 N to 980 N	0.3 % of reading	Class M1 and M2

### 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 Manometers <sup>F</sup>	100 kPa to 10 050 kPa	0.15 % of reading	Ametek TDQ-100000-1 Dead Weight Tester
	10 050 kPa to 100 500 kPa	0.16 % of reading	
Pressure Transducers <sup>FO</sup>	100 kPa to 10 050 kPa	0.17 % of reading	Ametek DQ-100000-1 DMM Fluke 8520A + Shunt - Dead Weight Tester
	10 000 kPa to 100 500 kPa	0.18 % of reading	



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### 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
Pressures Gages – Direct Comparison <sup>FO</sup>	137 kPa to 1 378.951 kPa	2.1 kPa	Ametek CPC200 No. 9795000 and No. 92407
	4.1 MPa to 41 MPa	31 kPa	Foxboro 41MPa. Part # D0175 WC Reference Model IGP10- 22 F sensor 316 L No. 212426
Pressure Transducers (mA and or V) – Direct Comparison <sup>FO</sup>	137 kPa to 1378.951 kPa	2.2 kPa	Ametek CPC-200 No. 9795000 and No. 92407 DMM Fluke 8520A + Shunt
	4.1 MPa to 41 MPa	31 kPa	Foxboro 41MPa. Part # D0175 WC Reference Model IGP10-22 F sensor 316 L No. 212426 DMM Fluke 8520A + Shunt
Vacuum Meters (Manovacuum meters) – Direct Comparasion <sup>FO</sup>	-7 kPa to 0.1 kPa	0.029 kPa	Love controls No. 1033045
	0.1 kPa to 7 kPa	0.029 kPa	
	-67.708 kPa to -0.1 kPa	0.2 kPa	Foxboro IAP10- D22DIC-M1L1 No.97121443
Vacuum Meters <sup>FO</sup>	-78 kPa to -1 kPa	0.24 kPa	Fluke No. 98158401 700 PV4 Fluke 741B No. 8366015
Mercury Column Gauge Meters Direct Comparison <sup>F</sup>	-78 kPa to -1 kPa	0.24 kPa	Fluke No. 98158401 700 PV4
Vacuum Transducer Direct Comparison <sup>FO</sup>	-78 kPa to -1 kPa	0.25 kPa	Fluke No. 98158401 700 PV4 Fluke 741B No. 8366015 DMM Fluke 8520A
Absolute Pressure Gages Direct Comparison <sup>FO</sup>	77.985 kPa to 2 067.533 kPa	1.9 kPa	Foxboro IAP10-22D1F - M1L1No.02391565
Pressure Gages Direct Comparison <sup>FO</sup>	200 kPa to 2 067.533 kPa	1.9 kPa	Foxboro IAP10- D22D1F-M1L1
Absolute Pressure Transducers (mA / V) Direct Comparison <sup>FO</sup>	77.985 kPa to 2 067.533 kPa	1.9 kPa	Foxboro IAP10-22D1F- M1L1No.02391565 DMM Fluke 8520A



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Pressure Transducers (mA / V) – Direct Comparison <sup>FO</sup>	200 kPa to 2 068.427 kPa	1.9 kPa	Foxboro IAP10- D22D1F-M1L1 DMM Fluke 8520A
Pressure Gages – Direct Comparison <sup>FO</sup>	2 060 kPa to 20 684.3 kPa	8.2 kPa	Foxboro IGP10- D22E1F-M1L1 No.00212419
Pressure Transducers (mA / V) – Direct Comparison <sup>FO</sup>	2 060 kPa to 20 684.3 kPa	8.2 kPa	Foxboro IGP10- D22E1F-M1L1 No.00212419 DMM Fluke 8520A
Pressure Gages- Direct Comparison <sup>FO</sup>	0.69 kPa to 6.9 kPa	0.011 kPa	Fluke 700 P02 No.83850208
Pressure Transducers (mA / V) – Direct Comparison <sup>FO</sup>	0.69 kPa to 6.9 kPa	0.011 kPa	Fluke 700 P02 No.83850208 DMM Fluke 8520A
Pressure Gages– Direct Comparison <sup>FO</sup>	0.025 4 kPa to 0.25 kPa	0.007 kPa	Fluke 700 P00 No.83051011 DMM Fluke 8520A
Pressure Transducers (mA / V) – Direct Comparison <sup>FO</sup>	0.025 4 kPa to 0.25 kPa	0.007 kPa	Fluke 700 P00 No.83051011 DMM Fluke 8520A
Air Velocity Anemometers <sup>F</sup>	0.1 m/s to 30 m/s	(0.175 2 + 0.019 9Va) m/s	Omega HHF-6001
Superficial Tension Test <sup>O</sup>	0.008 N/m to 0.065 N/m (8 dyne/cm to 65 dyne/cm)	0.000 6 N/m (0.6 dyne/cm)	Class E2 Mass ASTM D-971
Security and Light Valves <sup>F</sup>	0.6 MPa to 41 MPa	30 kPa	Foxboro 41MPa. Part # D0175 WC reference Model IGP10-22 F sensor 316 L No. 212426
Torsional Par Wrenches <sup>FO</sup>	0.1 N·m to 250 N·m	0.62 N·m	Torsional par Traducer: BUSTER Model:Trascal7280
	250 N·m to 440 N·m	1.2 N·m	
	440 N·m to 1 000 N·m	2.7 N·m	
Torsional Par Transducers <sup>F</sup>	0.1 N·m to 500 N·m	(0.006 4 + 0.000 1T) N·m	Arm and Class F1 M
Indirect Verification of Rockwell Hardness Testers HRC <sup>O</sup>	25 HRC to 45 HRC	0.32 HRC	ASTM E 18-08a and Calibrated Rockwell Hardness Test Blocks
	46 HRC to 65 HRC	0.32 HRC	
	66 HRC to 70 HRC	0.32 HRC	



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### 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
Direct Verification of Durometer Hardness <sup>F</sup> Tester Types A, B, C, D, DO, E, M, O, OO, OOO, OOO-S. Extension at zero reading			ASTM D 2240 -05
Indenter Shape (Not all parameters apply to all of Durometer Types) Indenter Diameter Indenter Tip Diameter Indenter Tip Radius Indenter Tip Angle	2.46 mm to 2.554 mm  1.25 to 50 mm 1.27 to 12 mm 0.1 to 11 mm 30° to 35 °	5.2 $\mu$ m  5.2 $\mu$ m 5.2 $\mu$ m 5.2 $\mu$ m 0.03°	Optical Comparators PV 500  Optical Comparators PV 500
Durometer Indenter Spring Types A, B, C, D, DO, E, M, O, OO, OOO, OOO-S.	0.55 N to 8.05 N 4.5 N to 45 N	0.7 N 1 N	Ohaus Explorer Pro 32000 uc
Micropipettes <sup>F</sup>	1 $\mu$ L to 500 $\mu$ L	$(1.6 \times 10^{-2} + 3 \times 10^{-3}V) \mu$ L	Mettler PM-480
Pipettes <sup>F</sup>	1 mL to 100 mL	$(2.2 \times 10^{-3} + 7.9 \times 10^{-5}V)$ mL	Ohaus Discovery
Burettes <sup>F</sup>	1 mL to 100 mL	$(8.1 \times 10^{-4} + 1.9 \times 10^{-4}V)$ mL	Ohaus Explorer
Probes <sup>F</sup>	100 mL to 1 000 mL	$(7.0 \times 10^{-1} + 3.2 \times 10^{-3}V)$ mL	
Volumetric Flask <sup>F</sup>	1 mL to 250 mL	$(1.3 \times 10^{-3} + 3.3 \times 10^{-4}V)$ mL	
	250 mL to 2 000 mL	$(7.0 \times 10^{-2} + 3.2 \times 10^{-5}V)$ mL	
	2 000 mL to 20 000 mL	$(8.8 + 1.1 \times 10^{-3}V)$ mL	
Density Digital Density Meters <sup>FO</sup>	0.000 1 g/cm <sup>3</sup> to 1 g/cm <sup>3</sup>	$5.8 \times 10^{-5}$ g/cm <sup>3</sup>	Reference Materials CENAM CNM-IM-730- 021/2008
Oxygen Meters <sup>FO</sup>	5 mg/L to 14 mg/L	0.03 mg/L	Reference Materials CENAM CNM-IM-730- 021/2008 ASTM D888-92



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Viscosity Dynamic <sup>FO</sup>	0 mPa·s o 6.7 mPa·s	0.015 mPa·s	Reference Materials Brookfield 071408 CNM-CC-710-335/2010 CNM-CC-710-336/2010 CNM-CC-710-337/2010 CNM-CC-710-338/2010 CNM-CC-710-339/2010
	6.7 mPa·s to 48.4 mPa·s	0.12 mPa·s	
	48.4 mPa·s to 303 mPa·s	0.11 mPa·s	
	303 mPa·s to 950 mPa·s	0.3 mPa·s	
	950 mPa·s to 2 213 mPa·s	0.4 mPa·s	
	2 213 mPa·s to 12 500 mPa·s	3.9 mPa·s	
	12 500 mPa·s to 22 532 mPa·s	8.8 mPa·s	
Kinematic Viscosity Ubbelohden <sup>O</sup>	5.55 mm <sup>2</sup> /s @ 40 °C	0.01 mm <sup>2</sup> /s	CNM-CC-710-335/2010
	8.84 mm <sup>2</sup> /s @ 25 °C	0.017 mm <sup>2</sup> /s	
	31.17 mm <sup>2</sup> /s @ 40 °C	0.095 mm <sup>2</sup> /s	CNM-CC-710-336/2010
	58.82 mm <sup>2</sup> /s @ 25 °C	0.14 mm <sup>2</sup> /s	
	23.15 mm <sup>2</sup> /s @ 100 °C	0.53 mm <sup>2</sup> /s	CNM-CC-710-337/2010
	171.25 mm <sup>2</sup> /s @ 40 °C	0.93 mm <sup>2</sup> /s	
	364.94 mm <sup>2</sup> /s @ 25 °C	1.05 mm <sup>2</sup> /s	

### Optical

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
Light Meters Luxometers <sup>F</sup>	1 lux to 40 000 lux	2.2 % of reading	Lutron Lx-1108 CIE 69-1987
Spectrophotometers <sup>FO</sup> UV-Visible (Absorbance) at listed wavelengths (325 nm to 900 nm)	0.20 to 0.96	0.02	Reference materials Cobalt Chloride Hexahydrate 1905132 Product Number 2208

### Acoustic

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
Sonometers - Low Level <sup>F</sup>	35 dB to 74 dB	2 dB	Sonometer Electrical Electronic TEST-1351 And Spectro Signal Generato
Sonometers - High Level <sup>F</sup>	74 dB to 130 dB		



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### 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
Tachometers <sup>FO</sup>	6 r/min to 99 000 r/min	0.058 r/min (Res.= 0.1 r/min)	Frequency Calibration Altek 241
		0.57 r/min (Res.= 1 r/min)	

### Chemical

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
pH Meters <sup>FO</sup>	4 pH to 10 pH	0.02 pH	pH buffer Solutions J.T. BAKER 5657(4pH) J.T. BAKER 5656(7pH) J.T. BAKER 5655(10pH) DMR 283a CENAM DMR-206 Ib/IIB CENAM DMR-3Li CENAM
Conductivity <sup>FO</sup>	4 $\mu$ S/cm to 84 $\mu$ S/cm	1 $\mu$ S/cm	Conductivity Solutions DMR-296b (148.16 $\mu$ S) CENAM 12K82 (Hanna) 21B72 (Hanna) 10D72 (Hanna)
	84 $\mu$ S/cm to 148.16 $\mu$ S/cm	1.5 $\mu$ S/cm	
	148.16 $\mu$ S/cm to 1 413 $\mu$ S/cm	5.8 $\mu$ S/cm	
	1 413 $\mu$ S/cm to 12 850 $\mu$ S/cm	57 $\mu$ S/cm	
Refractometers <sup>FO</sup>	0.006 nm to 1.332 99 nm	0.000 2 nm	Reference Materials CNM-MR-520-110/2007 DMR-98b CENAM CNM-IM-730-021/2008
	1.472 3 nm to 1.467 9 nm	0.000 9 nm	
	1.4 nm to 1.7 nm	0.000 2 nm	
Density Immersion <sup>FO</sup>	0.5 g/cm <sup>3</sup> to 1.6 g/cm <sup>3</sup> (Res.= 0.000 2 g/cm <sup>3</sup> )	0.000 12 g/cm <sup>3</sup>	Balance Ohaus Model Explorer

- 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.





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

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.
4. The presence of a superscript O 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.
6. 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.
7. The term D represents diameter in inches or millimeters as appropriate to the uncertainty statement.
8. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
9. The term T represents torque in N•m (including SI multiple and submultiple units) for the international system of units (the SI) or ozf•in, lbf•in and lbf•ft for the USC system of units.
10. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.
11. The term V represents Volume in liters or milliliters (including SI multiple and submultiple units) as appropriate to the uncertainty statement.
12. The term Va represents the air velocity in meters/second or feet/second (including SI multiple and submultiple units) appropriate to the uncertainty statement