



# CERTIFICATE OF ACCREDITATION

## The ANSI National Accreditation Board

Hereby attests that

**Techmaster de Mexico SA de CV**  
Calle Seminario No. 8610 Int. 11,  
Col. Niños Heroes, Deleg. La Presa. C.P. 22120  
Tijuana, B.C., Mexico  
(and satellite locations as listed on the scope)

Fulfills the requirements of

**ISO/IEC 17025:2017**

and national standard

**ANSI/NCSL Z540-1-1994 (R2002)**

In the field of

**CALIBRATION, TESTING and DIMENSIONAL MEASUREMENT**

This certificate is valid only when accompanied by a current scope of accreditation document.  
The current scope of accreditation can be verified at [www.anab.org](http://www.anab.org).

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 29 October 2022  
Certificate Number: AC-1342



This laboratory 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 (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017  
AND ANSI/NCSL Z540-1-1994 (R2002)**

**Techmaster de Mexico SA de CV**

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**CALIBRATION, DIMENSIONAL MEASUREMENT AND TESTING**

Valid to: **October 29, 2022**

Certificate Number: **AC-1342**

**CALIBRATION**

**Acoustics and Vibration**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound - Source	(94, 114) dB (251 to 1 000) Hz	0.29 dB	Sound Calibrator Tijuana Mexicali Juarez Monterrey Queretaro

### Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound - Measure	(30 to 140) dB	0.43 dB	Sound Level Meter Tijuana Mexicali Juarez Monterrey Queretaro
Vibration - Source	(0.2 to 20) gpk (7 to 100) Hz 100 Hz to 5 kHz (5 to 10) kHz	3.5 % of reading + 0.03 g 3.1 % of reading + 0.03 g 3.6 % of reading + 0.03 g	Portable Vibration Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Vibration - Measure	Up to 500 g (1 to 10 Hz) (10 Hz to 2kHz) (2 kHz to 10 kHz)	3.5 % of reading + 0.06 g 2.3 % of reading + 0.06 g 4.4 % of reading + 0.06 g	Portable Vibration Meter Tijuana Mexicali Juárez Monterrey Queretaro

### Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH	1.681 pH 4.011 pH 6.987 pH 10.03 pH	0.03 pH 0.04 pH 0.04 pH 0.03 pH	pH Solutions Tijuana Mexicali Juarez Monterrey Queretaro
Viscosity Dynamic <sup>4</sup>	10 mPa·s (cP) 100 mPa·s (cP) 1 000 mPa·s (cP) 5 000 mPa·s (cP) 12 500 mPa·s (cP) 100 000 mPa·s (cP) 200 000 mPa·s (cP)	0.26 mPa·s (cP) 1.1 mPa·s (cP) 5.1 mPa·s (cP) 7.4 mPa·s (cP) 48 mPa·s (cP) 80 mPa·s (cP) 210 mPa·s (cP)	Standard Solutions: S6, S60, D500, N350, S2000, D7500, S8000 Tijuana Mexicali Juarez Monterrey Queretaro



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**Chemical Quantities**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity <sup>4</sup>	2 µmhos/cm 10 µmhos/cm 100 µmhos/cm 1 000 µmhos/cm 1 400 µmhos/cm 10 000 µmhos/cm 100 000 µmhos/cm	0.25 µmhos/cm 1.2 µmhos/cm 15 µmhos/cm 120 µmhos/cm 180 µmhos/cm 2 200 µmhos/cm 8 000 µmhos/cm	Conductivity Solutions Tijuana Mexicali Juarez Monterrey Queretaro

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage - Source	(2.2 to 220) mV 200 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	11 µV/V + 0.48 µV 6.2 µV/V + 0.87 µV 4.2 µV/V + 3 µV 4.2 µV/V + 5.2 µV 6.1 µV/V + 99 µV 8 µV/V + 0.53 mV	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
DC Voltage - Measure	(2 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V 200 V to 1 kV	6.7 µV/V + 0.2 µV 4.3 µV/V + 0.5 µV 4.3 µV/V + 4.8 µV 6.7 µV/V + 98 µV 6.7 µV + 0.63 mV	Reference Multimeter Tijuana Mexicali Juarez Monterrey Queretaro
DC Voltage - Measure	Up to 2 kV (1 to 20) kV (20 to 70) kV	0.5 mV/V + 11 V 0.5 mV/V + 6.9 V 0.56 mV/V + 51 V	High Voltage Meter Tijuana Mexicali Juarez Monterrey Queretaro
Charge Analyzer	Up to 1 kV (1 to 5) kV	24 mV/V + 0.5 V 24 mV/V + 12 V	Charge Plate Analyzer Tijuana Mexicali Juarez Monterrey Queretaro

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current - Source	(2 to 220) $\mu$ A 220 $\mu$ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	50 $\mu$ A/A + 7.2 nA 43 $\mu$ A/A + 8.4 nA 43 $\mu$ A/A + 48 nA 55 $\mu$ A/A + 0.84 $\mu$ A 97 $\mu$ A/A + 21 $\mu$ A	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
DC Current - Source	(2.2 to 10) A (10 to 10.9) A (10.9 to 20.5) A	0.6 mA/A + 0.77 mA 0.6 mA/A + 1 mA 1.2 mA/A + 1.4 mA	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
DC Current - Source	(10 to 550) A (550 to 1 025) A	2.5 mA/A + 0.55 A 2.6 mA/A + 0.55 A	Multiproduct Calibrator with 50 Turn Coil Tijuana Mexicali Juarez Monterrey Queretaro
DC Current - Measure	(2 to 200) $\mu$ A (200 $\mu$ A to 2) mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	15 $\mu$ A/A + 0.49 nA 15 $\mu$ A/A + 4.8 nA 17 $\mu$ A/A + 48 nA 59 $\mu$ A/A + 0.96 $\mu$ A 0.23 mA/A + 25 $\mu$ A 0.49 mA/A + 0.36 mA	Reference Multimeter Tijuana Mexicali Juarez Monterrey Queretaro
DC Current – Measure	(20 to 100) A (100 to 300) A	0.5 mA/A + 0.004 A 1 mA/A + 0.004 A	Current Shunt Tijuana Mexicali Juarez Monterrey Queretaro
DC Current - Measure	Up to 1 000 A	2.6 mA/A + 20 mA	Current Shunt Tijuana Mexicali Juarez Monterrey Queretaro



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**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance - Source (Fixed Values)	0.001 Ω 0.01 Ω 0.1 Ω 0.333 Ω	0.23 mΩ 0.22 mΩ 0.2 mΩ 0.9 mΩ	Reference Resistor Tijuana Mexicali Juarez Monterrey Queretaro
Resistance - Source (Fixed Values)	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω	0.12 mΩ 0.22 mΩ 0.28 mΩ 0.53 mΩ 1.3 mΩ 2.3 mΩ	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Resistance - Source (Fixed Values)	1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	11 mΩ 20 mΩ 0.11 Ω 0.2 Ω 1.4 Ω 2.6 Ω 25 Ω 51 Ω 0.5 kΩ 1.2 kΩ 14 kΩ	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Resistance - Source	100 MΩ to 1 GΩ (1 to 10) GΩ 10 GΩ to 1 TΩ	10 mV/V + 1 kΩ 11 mV/V + 0.19 MΩ 21 mV/V + 2.1 MΩ	Decade Resistor Tijuana Mexicali Juarez Monterrey Queretaro
Resistance - Measure	Up to 2Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ	23 μΩ/Ω + 5.9 μΩ 12 μΩ/Ω + 18 μΩ 9.8 μΩ/Ω + 80 μΩ 12 μΩ/Ω + 0.94 mΩ 11 μΩ/Ω + 47 mΩ 11 μΩ/Ω + 60 mΩ 13 μΩ/Ω + 1.2 Ω 28 μΩ/Ω + 0.12 kΩ 0.15 mΩ/Ω + 1.2 kΩ 1.9 mΩ/Ω + 12 kΩ	Reference Multimeter Tijuana Mexicali Juarez Monterrey Queretaro



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**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measure at 500 V at 500 V at 1 kV at 1 kV at 2.5 kV at 5 kV at 5 kV at 10 kV at 10 kV	200 kΩ to 10 GΩ (10 to 100) GΩ 200 kΩ to 20 GΩ (20 to 200) GΩ 200 kΩ to 50 GΩ 200 kΩ to 100 GΩ 100 GΩ to 1 TΩ 200 kΩ to 200 GΩ 200 GΩ to 2 TΩ	61 mΩ/Ω + 0.6 MΩ 0.24 Ω/Ω + 0.6 MΩ 60 mΩ/Ω + 0.6 MΩ 0.24 Ω/Ω + 0.6 MΩ 60 mΩ/Ω + 0.6 MΩ 60 mΩ/Ω + 0.6 MΩ 0.24 Ω/Ω + 0.6 MΩ 62 mΩ/Ω + 0.6 MΩ 0.24 Ω/Ω + 0.6 MΩ	Insulation Resistance Tester Tijuana Mexicali Juarez Monterrey Queretaro
AC Voltage - Source	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.29 mV/V + 4.8 μV 0.11 mV/V + 4.8 μV 96 μV/V + 9.6 μV 0.24 mV/V + 4.8 μV 0.6 mV/V + 6 μV 1.3 mV/V + 12 μV 1.7 mV/V + 24 μV 3.3 mV/V + 24 μV 0.3 mV/V + 4.8 μV 0.13 mV/V + 4.8 μV 0.12 mV/V + 4.8 μV 0.24 mV/V + 4.8 μV 0.62 mV/V + 6 μV 1.3 mV/V + 12 μV 1.7 mV/V + 24 μV 3.3 mV/V + 24 μV 0.29 mV/V + 20 μV 0.11 mV/V + 8.9 μV 98 μV/V + 8.5 μV 0.24 mV/V + 8.5 μV 0.55 mV/V + 21 μV 1.1 mV/V + 24 μV 1.7 mV/V + 32 μV 3.3 mV/V + 54 μV	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	220 mV to 2.2 V (10 to 20) Hz (20 to 40) Hz 40Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) V	0.29 mV/V + 48 μV 0.11 mV/V + 18 μV 57 μV/V + 9.6 μV 91 μV/V + 12 μV 0.13 mV/V + 36 μV 0.5 mV/V + 96 μV 1.2 mV/V + 0.24 mV 2.1 mV/V + 0.36 mV	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
	(22 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) V	0.29 mV/V + 0.14 mV 0.11 mV/V + 41 μV 57 μV/V + 23 μV 91 μV/V + 21 μV 0.13 mV/V + 43 μV 1.2 mV/V + 0.25 mV 2.1 mV/V + 0.4 mV 0.29 mV/V + 0.12 V 0.12 mV/V + 1.9 mV 75 μV/V + 0.72 mV 0.10 mV/V + 1.2 mV 0.19 mV/V + 3 mV 1.1 mV/V + 19 mV 5.3 mV/V + 48 mV 9.7 mV/V + 96 mV	
AC Voltage - Measure	Up to 200 mV (1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.2 mV/V + 29 μV 0.17 mV/V + 5 μV 0.14 mV/V + 5 μV 0.17 mV/V + 2 μV 0.17 mV/V + 5 μV 0.42 mV/V + 10 μV 0.93 mV/V + 24 μV	Reference Multimeter  Tijuana Mexicali Juarez Monterrey Queretaro





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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Measure	200 mV to 2 V		Reference Multimeter  Tijuana Mexicali Juarez Monterrey Queretaro
	(1 to 10) Hz	0.19 mV/V + 0.33 mV	
	(10 to 40) Hz	0.15 mV/V + 3 μV	
	(40 to 100) Hz	0.12 mV/V + 24 μV	
	100 Hz to 2 kHz	0.17 mV/V + 24 μV	
	(2 to 10) kHz	0.14 mV/V + 24 μV	
	(10 to 30) kHz	0.27 mV/V + 48 μV	
	(30 to 100) kHz	0.7 mV/V + 0.24 mV	
	(2 to 20) V		
	(1 to 10) Hz	0.18 mV/V + 3.3 mV	
	(10 to 40) Hz	0.14 mV/V + 0.3 mV	
	(40 to 100) Hz	0.11 mV/V + 0.24 mV	
	100 Hz to 2 kHz	0.15 mV/V + 0.24 mV	
	(2 to 10) kHz	0.14 mV/V + 0.24 mV	
	(10 to 30) kHz	0.27 mV/V + 0.48 mV	
	(30 to 100) kHz	0.69 mV/V + 2.4 mV	
	(100 to 300) kHz	3.6 mV/V + 24 mV	
	300 kHz to 1 MHz	12 mV/V + 0.24 mV	
	(20 to 200) V		
	1 to 10 Hz	0.19 mV/V + 58 mV	
(10 to 40) Hz	0.15 mV/V + 2.7 mV		
(40 to 100) Hz	0.12 mV/V + 2.4 mV		
100 Hz to 2 kHz	0.15 mV/V + 2.4 mV		
(2 to 10) kHz	0.14 mV/V + 2.4 mV		
(10 to 30) kHz	0.27 mV/V + 4.8 mV		
(30 to 100) kHz	0.69 mV/V + 24 mV		
(100 to 300) kHz	3.6 mV/V + 0.24 mV		
300 kHz to 1 MHz	12 mV/V + 2.4 V		
200 V to 1 kV			
(1 to 10) Hz	0.19 mV/V + 84 mV		
(10 to 40) Hz	0.16 mV/V + 24 mV		
40 Hz to 10 kHz	0.29 mV/V + 24 mV		
(10 to 30) kHz	0.28 mV/V + 48 mV		
(30 to 100) kHz	0.72 mV/V + 0.24 V		
AC Voltage - Measure	(1 to 2) kV		High Voltage Meter Tijuana Mexicali Juarez Monterrey Queretaro
	(20 to 400) Hz	0.86 mV/V + 11 V	
	(2 to 20) kV		
	(20 to 100) Hz	0.52 mV/V + 49 V	
AC Voltage - Measure	(20 to 70) kV		High Voltage Meter Tijuana Mexicali Juarez Monterrey Queretaro
	(50 to 60) Hz	0.49 mV/V + 0.21 kV	

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source	Up to 220 $\mu$ A (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 $\mu$ A to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.38 mA/A + 21 nA 0.3 mA/A + 12 nA 0.27 mA/A + 9.9 nA 0.41 mA/A + 15 nA 1.4 mA/A + 78 nA 0.3 mA/A + 68 nA 0.19 mA/A + 48 nA 0.15 mA/A + 48 nA 0.27 mA/A + 0.13 $\mu$ A 1.3 mA/A + 0.78 $\mu$ A 0.3 mA/A + 0.49 $\mu$ A 0.2 mA/A + 0.43 $\mu$ A 0.15 mA/A + 0.43 $\mu$ A 0.39 mA/A + 0.66 $\mu$ A 1.4 mA/A + 6 $\mu$ A 0.43 mA/A + 7.9 $\mu$ A 0.37 mA/A + 4.7 $\mu$ A 0.36 mA/A + 3.9 $\mu$ A 0.41 mA/A + 4.3 $\mu$ A 3.3 mA/A + 12 $\mu$ A 0.5 mA/A + 55 $\mu$ A 4 $\mu$ A/A + 96 $\mu$ A 9.3 mA/A + 0.19 mA	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
AC Current – Source	(3 to 20) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.5 mA/A + 1.4 mA 0.7 mA/A + 1.4 mA 20 mA/A + 1.4 mA 0.8 mA/A + 3.4 mA 1 mA/A + 3.4 mA 20 mA/A + 3.4 mA	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(16.5 to 55) A		Multiproduct Calibrator with 50 Turn Coil Tijuana Mexicali Juarez Monterrey Queretaro
	65 Hz	2.8 mA/A + 0.17 A	
	440 Hz	7.9 mA/A + 0.19 A	
	(55 to 150) A		
	65 Hz	2.8 mA/A + 0.31 A	
	440 Hz	7.9 mA/A + 0.16 A	
AC Current – Source	(150 to 550) A		Multiproduct Calibrator with 50 Turn Coil Tijuana Mexicali Juarez Monterrey Queretaro
	65 Hz	2.8 mA/A + 1.3 A	
	440 Hz	7.9 mA/A + 0.41 A	
AC Current – Source	(550 to 1 025) A		Multiproduct Calibrator with 50 Turn Coil Tijuana Mexicali Juarez Monterrey Queretaro
	65 Hz	2.9 mA/A + 0.71 A	
AC Current - Measure	440 Hz	8 mA/A + 1.2 A	Reference Multimeter  Tijuana Mexicali Juarez Monterrey Queretaro
	Up to 200 $\mu$ A		
	10 Hz to 10 kHz	0.42 mA/A + 24 nA	
	(10 to 30) kHz	0.88 mA/A + 24 nA	
	(30 to 100) kHz	4.8 mA/A + 24 nA	
	200 $\mu$ A to 2 mA		
	10 Hz to 10 kHz	0.36 mA/A + 0.24 $\mu$ A	
	(10 to 30) kHz	0.86 mA/A + 0.24 $\mu$ A	
	(30 to 100) kHz	4.8 mA/A + 0.24 $\mu$ A	
	2 to 20 mA		
	10 Hz to 10 kHz	0.37 mA/A + 2.4 $\mu$ A	
	(10 to 30) kHz	0.86 mA/A + 2.4 $\mu$ A	
	(30 to 100) kHz	4.8 mA/A + 2.4 $\mu$ A	
	20 to 200 mA		
	10 Hz to 10 kHz	0.35 mA/A + 24 $\mu$ A	
	(10 to 30) kHz	0.75 mA/A + 24 $\mu$ A	
	200 mA to 2 A		
	10 Hz to 2 kHz	0.75 mA/A + 0.25 mA	
(2 to 10) kHz	0.87 mA/A + 0.27 mA		
(10 to 30) kHz	3.6 mA/A + 0.26 mA		
2 to 20 A			
10 Hz to 2 kHz	0.99 mA/A + 2.4 mA		
(2 to 10) kHz	3.1 mA/A + 2.4 mA		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Measure	(20 to 1 000) A (60 to 100) Hz	2.6 mA/A + 0.28 A	Current Shunt Tijuana Mexicali Juarez Monterrey Queretaro
Electrical Simulation of Thermocouple Indicators	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C Type J (-200 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.53 °C 0.43 °C 0.37 °C 0.41 °C 0.36 °C 0.30 °C 0.37 °C 0.61 °C 1 °C 0.6 °C 0.19 °C 0.17 °C 0.19 °C 0.26 °C 0.32 °C 0.19 °C 0.17 °C 0.21 °C 0.28 °C 0.57 °C 0.22 °C 0.19 °C 0.31 °C 0.48 °C 0.45 °C 0.32 °C 0.21 °C	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro



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**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicators	Type N (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C Type R (0 to 250) °C (250 to 400) °C Type S (400 to 1 000) °C (1 000 to 1 767) °C Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C Type U (0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.48 °C 0.26 °C 0.23 °C 0.22 °C 0.33 °C 0.69 °C 0.42 °C 0.48 °C 0.6 °C 0.76 °C 0.29 °C 0.19 °C 0.48 °C 0.57 °C 0.43 °C 0.44 °C 0.57 °C	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
Electrical Simulation of RTD Indicators	Pt 385, 100 Ω (-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C Pt 385, 200 Ω (-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.06 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C 0.28 °C 0.05 °C 0.06 °C 0.14 °C 0.16 °C 0.17 °C 0.19 °C	Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro



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**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators	Pt 385, 500 Ω		Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
	(-200 to -80) °C	0.07 °C	
	(-80 to 100) °C	0.07 °C	
	(100 to 260) °C	0.08 °C	
	(260 to 400) °C	0.11 °C	
	(400 to 600) °C	0.12 °C	
	(600 to 630) °C	0.14 °C	
	Pt 385, 1 000Ω		
	(-200 to 0) °C	0.06 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 600) °C	0.1 °C	
	(600 to 630) °C	0.28 °C	
	Pt 3926, 100 Ω		
(-200 to 0) °C	0.06 °C		
(0 to 100) °C	0.08 °C		
(100 to 300) °C	0.11 °C		
(300 to 400) °C	0.12 °C		
(400 to 630) °C	0.14 °C		
Capacitance - Source			Multiproduct Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
10 Hz to 10 kHz	(200 to 400) pF	6 mF/F + 12 pF	
10 Hz to 10 kHz	400 pF to 1.1 nF	6 mF/F + 12 pF	
10 Hz to 3 kHz	(1.1 to 3.3) nF	6 mF/F + 12 pF	
10 Hz to 1 kHz	(3.3 to 11) nF	3 mF/F + 13 pF	
10 Hz to 1 kHz	(11 to 33) nF	3 mF/F + 0.12 nF	
10 Hz to 1 kHz	(33 to 110) nF	3 mF/F + 0.14 nF	
10 Hz to 1 kHz	(110 to 330) nF	3 mF/F + 0.43 nF	
(10 to 600) Hz	330 nF to 1.1 μF	3 mF/F + 1.5 nF	
(10 to 300) Hz	(1.1 to 3.3) μF	3 mF/F + 4.1 nF	
(10 to 150) Hz	(3.3 to 11) μF	3 mF/F + 14 nF	
(10 to 120) Hz	(11 to 33) μF	4.8 mF/F + 41 nF	
(10 to 80) Hz	(33 to 110) μF	5.4 mF/F + 0.16 μF	
Capacitance - Measure			Impedance Meter Tijuana Mexicali Juarez Monterrey Queretaro
(1 to 100) kHz	100 pF to 1 nF	1.3 mF/F + 0.013 pF	
300 Hz to 100 kHz	(1 to 10) nF	1.3 mF/F + 0.17 pF	
(50 to 100) kHz	(10 to 100) nF	1.2 mF/F + 2.7 pF	
(50 to 200) kHz	(0.1 to 1) μF	1.2 mF/F + 0.14 nF	
50 Hz to 10 kHz	(1 to 10) μF	1.2 mF/F + 1.1 nF	
50 Hz to 1 kHz	(10 to 100) μF	1.2 mF/F + 1.7 nF	



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**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance - Source (Fixed Values @ 1 kHz)	1 nF 10 nF 100 nF 1 μF	0.8 pF 14 pF 0.14 nF 0.65 nF	Reference Capacitors Tijuana Mexicali Juarez Monterrey Queretaro
Inductance - Source 100 Hz to 10 kHz	100 μH 1 mH 20 mH 100 mH @ (0.1 to 1) kHz 101.88 mH @ 10 kHz	0.85 μH 18 μH 27 μH 0.13 mH 0.15 mH	Reference Inductor Tijuana Mexicali Juarez Monterrey Queretaro
Inductance - Measure (2 to 100) kHz 300 Hz to 100k Hz 100 Hz to 100 kHz (50 to 100) kHz 50 Hz to 10 kHz 50 Hz to 2 kHz	100 μH to 1 mH (1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H (10 to 100) H	1.2 mH/H + 23 nH 1.2 mH/H + 0.27 μH 1.2 mH/H + 3.3 μH 1.3 mH/H + 27 μH 1.3 mH/H + 1.1 μH 1.3 mH/H + 3.5 mH	Impedance Meter Tijuana Mexicali Juarez Monterrey Queretaro
Oscilloscopes Amplitude Square Wave 50 Ω Load  1 MΩ Load  Leveled Sine Wave  Time Marker into 50 Ω	1 mV to 6.6 V p-p 10 Hz to 10 kHz  1 mV to 130 V p-p 10 Hz to 10 kHz  5 mV to 5.5 V 50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz (500 to 600) MHz  1 ns to 50 ms 20 ms to 5 s	3 mV/V + 0.96 mV  3 mV/V + 1.8 mV  42 mV/V + 1.4 mV 48 mV/V + 1.4 mV 66 mV/V + 1.4 mV 72 mV/V + 1.4 mV  1 μs/s + 60 ns 3 μs/s + 9 μs	Oscilloscope Calibrator  Tijuana Mexicali Juarez Monterrey Queretaro
DC Power - Source	Up to 3.06 kW (3.06 to 20.91) kW	20 μW/W + 0.39 W 50 μW/W + 3.1W	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power - Source (45 to 65 Hz)	Up to 336.6 W 336.6 W to 2.244 kW (2.244 to 4.59) kW (4.59 to 20.91) kW	50 $\mu$ W/W + 0.39 W 60 $\mu$ W/W + 2.8 W 90 $\mu$ W/W + 2.8 W 50 $\mu$ W/W + 2.8 W	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Phase	Up to 90 ° (10 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.4 ° 1.5 ° 2.2 ° 3.7 ° 6.9 °	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro

**Electrical – RF/Microwave**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Power/Gain – Measure <sup>1</sup>	(-30 to 20) dB (10 to 20) MHz (20 to 50) MHz (50 to 100) MHz 100 MHz to 1 GHz (1 to 4) GHz (4 to 8) GHz (8 to 18) GHz	2.1 % of reading + 0.09 dB 1.8 % of reading + 0.09 dB 1.4 % of reading + 0.09 dB 1.2 % of reading + 0.09 dB 1.2 % of reading + 0.09 dB 1.4 % of reading + 0.09 dB 2.5 % of reading + 0.09 dB	Feed thru Power Standard, Control Unit Tijuana Mexicali Juarez Monterrey Queretaro
Frequency Modulation - Measure	Rate: 20 Hz to 10 kHz Deviation: $\leq$ 40 kHz peak 250 kHz to 10 MHz  Rate: 20 Hz to 10 kHz Deviation: $\leq$ 400 kHz peak 10 MHz to 1.3 GHz	2.4 % of reading + 210 Hz  1.2 % of reading + 210 Hz	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
Amplitude Modulation - Measure	Rate: 50 Hz to 10 kHz Depths;(5 to 99) % 150 kHz to 10 MHz  Rate 10 MHz to 1.3 GHz Depths (5 to 99) % 50 Hz to 50 kHz	2.4 % of reading + 0.19 % depth  1.2 % of reading + 0.19 % depth	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro





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**Electrical – RF/Microwave**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Phase Modulation - Measure	Rate: 200 Hz to 10 kHz 150 kHz to 10 MHz	4.8 % of reading + 0.32 rad	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
	Rate: 200 Hz to 20 kHz 10 MHz to 1.3 GHz	3.6 % of reading + 0.32 rad	
RF Power - Measure	(-20 to 30) dBm 100 kHz to 2.6 GHz	0.1 dB	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
RF Power - Measure	(-30 to 20) dBm 100 kHz to 4.2 GHz 50 MHz to 26.5 GHz	4.9 % of reading + 0.21 dB 3.1 % of reading + 0.13 dB	Power Sensors w/Power Meter Tijuana Mexicali Juarez Monterrey Queretaro
Tuned RF Power Relative - Measure	2.5 MHz to 1.3 GHz (0 to -10) dB (-10 to -40) dB (-40 to -50) dB (-50 to -80) dB (-80 to -90) dB (-90 to -110) dB (-110 to -127) dB	0.03 dB 0.06 dB 0.13 dB 0.18 dB 0.16 dB 0.43 dB 0.44 dB	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
RF Power - Source	10 MHz to 2 GHz (13 to 10) dBm (10 to -10) dBm (-10 to -60) dBm (-60 to -110) dBm 2 to 20 GHz (13 to 10) dBm (10 to -10) dBm (-10 to -60) dBm (-60 to -110) dBm	1.5 dB 0.73 dB 1.1 dB 1.7 dB 1.6 dB 0.84 dB 1.2 dB 1.8 dB	Signal Generator Tijuana Mexicali Juarez Monterrey Queretaro



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**Electrical – RF/Microwave**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Power - Source	20 GHz to 26.5 GHz (13 to -10) dBm (-10 to -60) dBm (-60 to -1) dBm	1.1 dB 1.5 dB 1.8 dB	Signal Generator Tijuana Mexicali Juarez Monterrey Queretaro

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Plug Gages <sup>1,2</sup>	Up to 0.5 in (0.5 to 1) in (1 to 2.5) in (2.5 to 4) in (4 to 12) in	(6.5 + 2.6L) μin (7.8 + 2.3L) μin (11 + 4.6L) μin (18 + 3L) μin (13 + 7.7L) μin	LabMaster System Tijuana Juarez Monterrey
Ring Gages <sup>1,2</sup>	Up to 1 in (1 to 4) in (4 to 10) in (10 to 40) in	(9 + 20L) μin (8.1 + 8.4L) μin (11 + 11L) μin [26 + 13 (L-10)] μin	LabMaster System Tijuana Juarez Monterrey
Gage Blocks <sup>1,2</sup>	Up to 1 in (1 to 4) in 6 in 10 in (10 to 40) in	(4 + 0.8L) μin (3.1 + 1.7L) μin 14 μin 23 μin [9.7 + 13 (L-10)] μin	LabMaster System Tijuana Juarez Monterrey
Thread Plug Gages <sup>1,2</sup>	(0.05 to 1) in (1 to 2) in (2 to 12) in	100 μin 100 μin 130 μin	LabMaster System Tijuana Juarez Monterrey
Thread Ring Gages <sup>1,2</sup>	(0.19 to 1) in (1 to 2) in (2 to 10) in	38 μin 40 μin 77 μin	LabMaster System Tijuana Juarez Monterrey
OD Micrometers <sup>2</sup>	Up to 1 in (1 to 10) in	(5.6 + 0.6L) μin (32 + 12L) μin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
ID Micrometers <sup>2</sup>	Up to 12 in	$(32 + 12L) \mu\text{in}$	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Calipers <sup>2</sup>	Up to 12 in (12 to 40) in (40 to 80) in (80 to 120) in	$(610 + 1.1L) \mu\text{in}$ $(630 + 4.3L) \mu\text{in}$ $(940 + 0.25L) \mu\text{in}$ $(1\ 000 + 7.5L) \mu\text{in}$	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Dial Indicators <sup>2</sup>	Up to 4 in	$(62 + 5.6L) \mu\text{in}$	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Test Indicators <sup>2</sup>	Up to 0.06 in	$(6.2 + 4.4L) \mu\text{in}$	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Pin Gages	Up to 60 mm	3 $\mu\text{m}$	Laser Micrometer Tijuana Mexicali Juarez Monterrey Queretaro
Laser Micrometer	Up to 60 mm	0.64 $\mu\text{m}$	Master Plug Gages Tijuana Mexicali Juarez Monterrey Queretaro

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Height Gages <sup>2</sup>	Up to 12 in (12 to 40) in	$(130 + 7L) \mu\text{in}$ $(130 + 13L) \mu\text{in}$	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Optical Length <sup>2</sup>	(0 to 50) mm (50 to 100) mm	$(2.1 + 0.005L) \mu\text{m}$ $(2.6 + 0.005L) \mu\text{m}$	Reference Glass Scale Tijuana Mexicali Juarez Monterrey Queretaro
Optical Flat - Flatness	Up to 4 in	9.6 $\mu\text{in}$	Optical Parallels Tijuana Mexicali Juarez Monterrey Queretaro
Distance Measurement <sup>2</sup>	Up to 972 mm Up to 1 200 in	$(2.4+0.7L / 600) \mu\text{m}$ 0.06 in	Height Gage, Distance Meter Tijuana Mexicali Juarez Monterrey Queretaro
Protractor/Angle	(Up to 90) °	2 arc min	Angle Block Set Tijuana Mexicali Juarez Monterrey Queretaro
Square/Block Parallelism	(-0.1 to 0.10) in	21 $\mu\text{in}$	Federal Head/Amplifier Tijuana Mexicali Juarez Monterrey Queretaro

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Surface Plates Local Area Flatness (Repeat Reading)	Up to 1 in	34 $\mu$ in/step	Repeat-o-Meter Tijuana Mexicali Juarez Monterrey Queretaro
Surface Plates Overall Flatness	Up to 1 000 arc sec	12 arc sec	Federal Level System Tijuana Mexicali Juarez Monterrey Queretaro
Surface Finish - Source	118 $\mu$ in	2.6 $\mu$ in	Roughness Standard Tijuana Mexicali Juarez Monterrey Queretaro
Surface Finish - Measure	(0 to 300) $\mu$ in	5.6 $\mu$ in	Surface Roughness Meter Tijuana Mexicali Juarez Monterrey Queretaro
Coating Thickness Gauge <sup>3</sup>	Up to 19.84 mils (19.84 to 58.35) mils (58.35 to 202.70) mils	0.02 mils 0.09 mils 0.2 mils	Coating Thickness Standard Tijuana Mexicali Juarez Monterrey Queretaro

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Source	(-14 to -0.43) psig (0 to 1 000) psig	0.016 % of reading + 0.000 5 psi 0.016 % of reading + 0.001 2 psi	Pneumatic Deadweight Tester Tijuana



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**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Source	(90 to 10 000) psig	0.006 % of reading + 0.008 psi	Hydraulic Deadweight Tester Tijuana
Pressure - Measure	Up to 1 inH2O (1 to 10) inH2O (-14.7 to 300) psig (15 to 1 000) psig (1 000 to 10 000) psig (0.25 to 2.5) psig	0.006 inH2O 0.05 inH2O 0.09 psi 0.32 psi 3.8 psi 0.000 8 psi	Pressure Calibrator, Tijuana Mexicali Juarez Monterrey Queretaro
Barometric Pressure Measurement	(0 to 15) psia	0.011 psi	Absolute pressure module Tijuana Mexicali Juarez Monterrey Queretaro
Force - Tension/Compression	Up to 50 lbf (50 to 500) lbf Up to 1 000 lbf (1 000 to 5 000) lbf (5 000 to 10 000) lbf (10 000 to 50 000) lbf	0.06 lbf 0.26 lbf 0.68 lbf 6.3 lbf 24 lbf 60 lbf	Reference Load Cells Tijuana Mexicali Juarez Monterrey Queretaro
Scales/Balances <sup>2,5</sup>	Up to 5 g	0.021 mg + 0.6R	Class 0 Weights Tijuana Mexicali Juarez Monterrey Queretaro
	Up to 50 g (50 to 200) g 200 g to 10 kg (10 to 500) kg (500 to 1 000) kg	0.046 mg + 0.6R 0.1 mg + 0.6R 88 mg + 0.6R 4.5 g + 0.6R 110 g + 0.6R	Class F Weights Tijuana Mexicali Juarez Monterrey Queretaro
Torque - Measure	Up to 20 ozf-in (15 to 200) ozf-in (12.5 to 50) lbf-in (50 to 250) lbf-in (250 to 1 000) lbf-in (83.3 to 250) lbf-ft	0.5 % of reading + 0.38 ozf-in 0.25 % of reading + 0.33 ozf-in 0.33 % of reading + 0.006 lbf-in 0.31 % of reading + 0.04 lbf-in 0.31 % of reading + 0.12 lbf-in 0.31 % of reading + 1.9 lbf-ft	Torque Cell/ Torque Tester Tijuana Mexicali Juarez Monterrey Queretaro



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**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque - Measure	(250 to 1 000) lbf-ft	0.31 % of reading + 0.88 lbf-ft	Torque Tester Tijuana Mexicali Juarez Monterrey Queretaro
Torque - Source	(0.07 to 0.28) Nm (0.28 to 8.47) Nm (8.47 to 16.93) Nm (16.93 to 56.44) Nm (56.44 to 67.71) Nm (67.71 to 225.7) Nm (225.7 to 1 221.05) Nm	0.054 % of reading + 0.000 18 Nm 0.053 % of reading + 0.001 5 Nm 0.015 % of reading + 0.002 1 Nm 0.007 5 % of reading + 0.022 Nm 0.002 9 % of reading + 0.021 Nm 0.007 4 % of reading + 0.025 Nm 0.002 5 % of reading + 0.02 Nm	Calibration Arms and Weights Tijuana Mexicali Juarez Monterrey Queretaro
Volumetric Calibration	Up to 5 ml (5 to 100) ml (100 ml to 250) ml 250 ml to 1.2 l (1.2 to 25) l	0.018 ml 0.071 ml 0.355 ml 0.63 ml 0.81 ml	Analytical Balance and DI Water Tijuana Mexicali Juarez Monterrey Queretaro
Air Flow	Up to 10 sccm (10 to 500) sccm (0.5 to 20) slpm (20 to 250) slpm (250 to 1 000) slpm (0 to 30) sccm (30 to 300) sccm (1 to 10) slm (10 to 100) slm (100 to 1 000) slm	0.52 % of reading + 0.03 sccm 0.52 % of reading + 1.2 sccm 0.52 % of reading + 0.05 slpm 0.87 % of reading + 0.51 slpm 0.87 % of reading + 5.4 slpm 1.4 % of reading + 0.01 sccm 1.4 % of reading + 0.1 sccm 1.4 % of reading + 0.001 slm 1.4 % of reading + 0.01 slm 1.4 % of reading + 0.91 slm	Flow meter Calibration System Tijuana Mexicali Juarez Monterrey Queretaro
	(0 to 200) sccm	1 % of reading + 2 sccm	Leak Tester Tijuana Mexicali Juarez Monterrey
Liquid Flow	(1 to 10 000 GPM DN 30 to DN 1 000	2 % of reading + 0.16 GPM	Ultrasonic Flow Meter Tijuana Mexicali Juarez Monterrey Queretaro



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**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Air Velocity	(100 to 6 800) fpm	1.3 % of reading + 41 fpm	Anemometer Tijuana Mexicali Juarez Monterrey Queretaro
Mass  DOD Midas, OEM and GIDEP Sourced Procedures  NIST 105-1 Handbook  Up to Class F only	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 25 kg	0.13 mg 0.15 mg 0.17 mg 0.21 mg 0.24 mg 0.42 mg 0.52 mg 0.65 mg 0.74 mg 1.1 mg 1.3 mg 1.8 mg 2.4 mg 4.8 mg 12 mg 24 mg 48 mg 84 mg 0.14 g 0.25 g 0.61 g 0.6 g	Class F Weights and Balances  Tijuana Mexicali Juarez Monterrey Queretaro
Leak Tester	Up to 10 sccm	0.17 sccm	Optima VT Leak Tester Tijuana Mexicali Juarez Monterrey Queretaro
Leak Tester	(10 to 200) sccm	1 % of reading. + 2 sccm	Leak Tester Tijuana Mexicali Juarez Monterrey Queretaro





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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Leak Standards	0.317 5 sccm @ 6.22 psi	0.008 sccm	American Specialty Gold Restrictor  Tijuana Mexicali Juarez Monterrey Queretaro
	0.392 1 sccm @ 8.68 psi	0.008 sccm	
	0.554 5 sccm @ 11.12psi	0.009 sccm	
	0.660 8 sccm @ 13.08 psi	0.009 sccm	
	0.761 6 sccm @ 14.56 psi	0.01 sccm	
	0.435 sccm @ 5.38 psi	0.007 sccm	
	0.641 1 sccm @ 7.49 psi	0.009 sccm	
	0.976 9 sccm @ 10.54psi	0.012 sccm	
	1.316 1 sccm @ 13.30psi	0.015 sccm	
	1.658 4 sccm @ 15.79psi	0.019 sccm	
	1.681 3 sccm @ 4.30psi	0.018 sccm	
	3.096 9 sccm @ 7.27psi	0.032 sccm	
	4.871 6 sccm @ 10.51psi	0.05 sccm	
	6.268 7 sccm @ 12.80psi	0.063 sccm	
	8.231 5 sccm @ 15.76psi	0.083 sccm	
3.451 2 sccm @ 4.39psi	0.036 sccm		
5.986 8 sccm @ 48.81psi	0.061 sccm		
9.468 5 sccm @ 10.35psi	0.096 sccm		
12.755 3 sccm @ 13.15psi	0.13 sccm		
15.644 3 sccm @ 15.46psi	0.16 sccm		
(-6.5 to -10.35) psi (0.803 to 1.017) sccm	1.2 % of reading + 0.17 sccm		
(5.62 to 15.84) psi (31.25 to 102.06) sccm	1.2 % of reading + 0.16 sccm		
(5.73 to 16.15) psi (35.33 to 113.43) sccm	1.2 % of reading + 0.16 sccm		
Rockwell Hardness Testers	(>60) HRBW	2.1 HRBW	ASTM E18 Indirect Verification  Tijuana Mexicali Juarez Monterrey Queretaro
	(≥60 to <88) HRBW	1.5 HRBW	
	(≥88) HRBW	1.3 HRBW	
	(<35) HRC	1.2 HRC	
	(≥35 to <60) HRC	0.68 HRC	
	(≥60) HRC	1.2 HRC	
(<84) HREW	1.3 HREW		
(≥80 to <93) HREW	1.4 HREW		
(≥ 93) HREW	1.3 HREW		



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**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers	(<65) HRKW (≥65 to <85) HRKW (≥85) HRKW (<37) HR45N (≥37 to <66) HR45N (≥66) HR45N  (<57) HR30TW (≥57 to <70) HR30TW (≥70) HR30TW  (<78) HR15N (≥78 to <90) HR15N (≥90) HR15N  (<81) HR15TW (≥81 to <87) HR15TW (≥87) HR15TW	1.1 HRKW 1.1 HRKW 1 HRKW 1.3 HR45N 1.3 HR45N 0.75 HR45N  1.4 HR30TW 1.2 HR30TW 1.2 HR30TW  1.2 HR15N 1.1 HR15N 0.77 HR15N  1.1 HR15TW 1.1 HR15TW 1.2 HR15TW	ASTM E18 Indirect Verification  Tijuana Mexicali Juarez Monterrey Queretaro
Brinell Hardness Testers	100 HBW 10/500 142 HBW 10/3000 163 HBW 10/500 197 HBW 3000 239 HBW 10/500 248 HBW 10/3000	4.3 HBW 5.7 HBW 7.9 HBW 8.7 HBW 9 HBW 14 HBW	ASTM E10 Indirect Verification Tijuana Mexicali Juarez Monterrey Queretaro
Micro-Indentation Hardness Testers	(100 ≤ HV ≤ 240) (240 ≤ HV ≤ 600) HV > 600	24 HV 28 HV 35 HV	ASTM E92 Indirect Verification Tijuana Mexicali Juarez Monterrey Queretaro
Durometers Force Types A, B, O Types C, D, DO Types M, OO  Indenter Length	(20 to 90) Duro  (0.096 to 0.104) in	0.8 grf 4.9 grf 0.31 grf  0.001 in	ASTM D2240 – Section 7 Tijuana Mexicali Juarez Monterrey Queretaro

**Photometry and Radiometry**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Power Source (850, 1 300, 1 310, 1 550) nm	(-7 to 0) dBm	0.35 dB	Laser Source Tijuana Mexicali Juarez Monterrey Queretaro
Optical Power Measure-Linearity Measure –Accuracy 800 nm to 1650 nm	(-80 to 10) dBm Up to 10 mW	0.035 dB 3.5% of reading + 0.073 uW	Optical Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
Optical Attenuation Source 1 310 nm to 1 550 nm	(-60 to 0) dB	0.13 dB	Optical Attenuator Tijuana Mexicali Juarez Monterrey Queretaro
Optical Power Source (850, 1 300, 1 310, 1 550) nm	(-7 to 0) dBm	0.35 dB	Laser Power Source Tijuana Mexicali Juarez Monterrey Queretaro

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity – Source <sup>4</sup>	43 %RH 75 %RH 97 %RH	1.3 %RH	Indicator/Hygrometer Saturated Salt Baths Tijuana Mexicali Juarez Monterrey Queretaro

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity - Measure	(>0 to 99) % RH	1.3 % RH	Indicator/Hygrometer Tijuana Mexicali Juarez Monterrey Queretaro
Temperature - Source (Black Body)	(50 to 100) °C (100 to 500) °C	0.63 °C 1 °C	Infrared Calibrator $\epsilon = 0.95, \lambda = (8 \text{ to } 14) \mu\text{m}$ Tijuana Mexicali Juarez Monterrey Queretaro
Temperature - Source (Black Body)	(100 to 1 200) °C	2.5 °C	High Temperature Blackbody Source $\epsilon = 0.995, \lambda = (8 \text{ to } 14) \mu\text{m}$ Tijuana Mexicali Juarez Monterrey Queretaro
Temperature Measurement	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 420) °C (420 to 650) °C	0.03 °C 0.05 °C 0.07 °C 0.11 °C 0.14 °C	Reference Thermometer w/ PRT Tijuana Mexicali Juarez Monterrey Queretaro
Temperature Measurement	0 to 1 200 °C	0.6 °C	Type S Reference Thermocouple Tijuana Mexicali Juarez Monterrey Queretaro

### Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Measurement	(650 to 1 200) °C	0.1 % of reading + 1.4 °C	Type R Reference Thermocouple Tijuana Mexicali Juarez Monterrey Queretaro
Dew Point	(-40 to 60) °C	2.5 °C	Reference Dew Point Indicator Tijuana Mexicali Juarez Monterrey Queretaro

### Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Chronometers, Stopwatches, Timers	1 ms to 100 000 s	0.12 ms	Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro
Time - Source	1 ms to 100 000 s	$(4.8 \times 10^{-3}) \mu\text{s}$	Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Measure <sup>2</sup>	150 kHz to 1.3 GHz	$(2.4 \times 10^{-8}) \text{ Hz} + 2R$	Measuring Receiver Tijuana Mexicali Juarez Monterrey Queretaro



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**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure <sup>2</sup>	DC to 3.2 GHz (3.2 to 20) GHz	$(9.4 \times 10^{-6}) \text{ Hz} + 2R$ 2.6 Hz	Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro
Frequency - Source	(0.01 to 120) Hz 120 Hz to 1.2 kHz (1.2 to 120) kHz 120 kHz to 1.2 MHz (1.2 to 2) MHz	3 $\mu\text{Hz/Hz} + 61 \mu\text{Hz}$ 3 $\mu\text{Hz/Hz} + 61 \mu\text{Hz}$ 3 $\mu\text{Hz/Hz} + 120 \mu\text{Hz}$ 3 $\mu\text{Hz/Hz} + 10 \text{ mHz}$ 3 $\mu\text{Hz/Hz} + 12 \text{ mHz}$	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Source <sup>2</sup>	2 MHz to 6 GHz	1.3 $\mu\text{Hz/Hz} + 0.02 \text{ Hz}$	Signal Generator Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Source <sup>2</sup>	10 MHz to 26.5 GHz	$(1.2 \times 10^{-7}) \text{ Hz} + R$	Signal Generator Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro
Tachometer (Stroboscope)	Up to 100 rpm (100 to 1 000) rpm (1 000 to 99 999) rpm	0.03 % of reading + 0.014 rpm 0.03 % of reading + 0.14 rpm 0.03 % of reading + 1.4 rpm	Tachometer/Stroboscope Tijuana Mexicali Juarez Monterrey Queretaro

## DIMENSIONAL MEASUREMENT

### 3 Dimensional

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Dimensional <sup>1,2</sup> (CMM)	X axis to 705 mm Y axis to 1 005 mm Z axis to 605 mm	(7.6 + 4.6L/1 000) um	Mitutoyo CRTAS7106 with TP20 Probe per Customer Print or Report Tijuana Juarez
Dimensional <sup>1,2</sup> (Non-Contact)	X axis to 250 mm Y axis to 200 mm Z axis to 200 mm	(2.5+3.5L/1 000) um (2.5+3.5L/1 000) um (3.9+4.6L/1 000) um	Quick Vision QV-E202 per Customer Print or Report Tijuana Mexicali Juarez

## TESTING

### Environmental


Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Face Velocity Test Airflow Smoke Pattern Test Leak/Backstreaming Test	ISO 14644-4 ANSI/ASHRAE 110 IEST-RP-CC002.4	Flow hood Devices Test	Thermal Anemometer Aerosol Generator Digital Aerosol Photometer Tijuana Mexicali Juárez Monterrey Querétaro
Airborne Particle Count Survey Airflow Measurement Airflow Smoke Pattern Test HEPA/ULPA filter leak Test Biological Safety Cabinet Classification	ISO 14644-1, ISO 14644-4 IEST-RP-CC034.2 IEST-RP-CC006.3 NSF/ANSI49-2004 Annex	Biological Safety Cabinet Test	Particle Counter Balometer Aerosol Generator Digital Aerosol Photometer Thermal Anemometer Tijuana Mexicali Juárez Monterrey Querétaro

**Environmental**

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Airflow Measurement Air Pressure Difference Test Airflow Smoke Pattern Test HEPA/ULPA filter leak Test Airborne Particle Count Survey Lighting Level Sound Level Test Temperature Test Humidity Test Temperature/Humidity Uniformity Test Recovery Test	ISO 14644-1, ISO 14644-3 ISO 14644-4 IEST-RP-CC006.3 IEST-RP-CC034.2	Clean Room Test	Balometer Differential Pressure Meter Digital Aerosol Photometer, Aerosol Generator Particle Counter Light Level meter Sound meter Temperature & humidity meter Thermal anemometer. Tijuana Mexicali Juárez Monterrey Querétaro
Airborne Particle Count Survey Airflow Velocity Laminar Hood HEPA/ULPA filter leak Test Induction Leak/Backstreaming Test Airflow Smoke Pattern Test Lighting Level Sound Level Test	ISO 14644-1, ISO 14644-4 IEST-RP-CC002.4 IEST-RP-CC006.3 IEST-RP-CC034.2	Laminar Air Flow Workstation Test	Particle Counter Thermal Anemometer Aerosol Generator Digital Aerosol Photometer Light Level meter Sound meter Tijuana Mexicali Juárez Monterrey Querétaro

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ( $k=2$ ), corresponding to a confidence level of approximately 95%.

- Notes:
1. This parameter is available at the laboratory facilities only, all other parameters are available for on-site calibration service, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope
  2.  $L$  = length in inches,  $N$  = the diagonal length of the surface place divided by four,  $R$  = resolution of the unit under test.
  3. 1 mil = 0.001 inch.
  4. Nominal values are approximate.
  5. The CMC for scales and balances are highly dependent upon the resolution of the unit under test. The uncertainty presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
  6. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1342.



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