CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Techmaster de Mexico SA de CV
Calle Seminario #8610 Int. 11,
Col. Niños Heroes, deleg. La Presa. C.P. 22120
Parque Industrial Arboledas, 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, DIMENSIONAL MEASUREMENT and **TESTING**

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.

Jason Stine, Vice President

Expiry Date: 29 October 2024

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

Calle Seminario #8610 Int. 11
Col. Niños Heroes, deleg. La Presa. C.P. 22120, Parque Industrial Arboledas
Tijuana, B.C., Mexico
J. Ernesto Matamoros Phone: (52) 664-624-4444
quality.mx@techmaster.us www.techmasterdemexico.com

Services performed at satellite locations as indicated
Blvd Lázaro Cárdenas 543 F03, Ex Ej. Coahuila, Mexicali, B.C. C.P. 21360.
Contact: Mauricio Garayzar. Tels: 01(686) 555-1660, 557-6117 mexicali@techmaster.us
Ave Antonio J Bermúdez No. 2151-5, Fraccionamiento Parque Industrial Antonio J Bermúdez
Código Postal 32470, Ciudad Juárez Chih
Phone 01(656) 687-2471,648-1181 cdjuarez@techmaster.us
Ave. Ignacio Morones Prieto No. 914 Ote. Int. 112 Col. La Huerta C.P. 67144 Guadalupe, N.L.
Phone: 01(81)1334-0701 monterrey@techmaster.us
Carretera Federal 57, Mexico-Queretaro Lateral Norte Km 201+100 Interior 26, El Marques
(Business Park Conin) Queretaro, Queretaro
Phone :01(442)241-5104 queretaro@techmaster.us

CALIBRATION, DIMENSIONAL MEASUREMENT AND TESTING

Valid to: **October 29, 2024** 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, 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) g (7 to 10) Hz (10 to 30) Hz 30 Hz to 2 kHz (2 to 10) kHz	 7 % of reading 5 % of reading 4.2 % of reading 6.1 % of reading	Portable Vibration Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Vibration - Measure	Up to 20 g (7 to 10) Hz (10 to 99) Hz 100 Hz (101 to 920) Hz 921 Hz to 5 kHz (5 to 10) kHz (8 to 10) kHz	 2.2 % of reading 1.7 % of reading 0.76 % of reading 1.2 % of reading 2.3 % of reading 3.6 % of reading 6.6 % of reading	Portable Vibration Meter Tijuana Mexicali Juárez Monterrey Queretaro

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH measuring equipment	1.68 pH 4.0 pH 7.0 pH 10 pH 11 pH	0.02 pH 0.02 pH 0.02 pH 0.04 pH 0.02 pH	pH Solutions Tijuana Mexicali Juarez Monterrey Queretaro
Viscosity Dynamic measuring equipment [4]	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

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity measuring equipment [4]	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 High Voltage - Measure	Up to 10 kV (10 to 100) kV	0.35 mV/V + 0.09 V 0.63 mV/V + 4.1 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) µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	50 µA/A + 7.2 nA 43 µA/A + 8.4 nA 43 µA/A + 48 nA 55 µA/A + 0.84 µA 97 µA/A + 21 µA	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 Clamp On Meters	(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) µA (200 µA to 2) mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	15 µA/A + 0.49 nA 15 µA/A + 4.8 nA 17 µA/A + 48 nA 59 µA/A + 0.96 µA 0.23 mA/A + 25 µA 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

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	5.1% of reading + 5 MΩ 20 % of reading + 20 MΩ 20 % of reading + 22 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

Electrical – DC/Low Frequency

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

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 (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 (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 220 V to 1.1 kV (15 to 50) Hz 50 Hz to 1 kHz	 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 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 0.29 mV/V + 48 mV 0.11 mV/V + 18 mV	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
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

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	Up to 10 kV		High Voltage Meter Tijuana Mexicali Juarez Monterrey Queretaro
	(30 to 200) Hz	1.4 mV/V + 0.14 V	
	(200 to 450) Hz	4.6 mV/V + 0.14V	
	(450 to 600) Hz	8.7 mV/V + 0.14V	
	(10 to 100) kV		
	(30 + 70) Hz	1.4 mV/V + 0.7 V	
	(70 to 200) Hz	17 % + 0.7 V	

Electrical – DC/Low Frequency

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

Electrical – DC/Low Frequency

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

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

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 (400 to 1 000) °C (1 000 to 1 767) °C Type S (0 to 250) °C (250 to 400) °C (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 0.69 °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

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	

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 50 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 µW/W + 0.39 W 60 µW/W + 2.8 W 90 µW/W + 2.8 W 50 µW/W + 2.8 W	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Phase	Up to 90 ° (10 to 500) Hz 500 Hz to 1 kHz (1to 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[1]	(-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: ≤ 40 kHz peak 250 kHz to 10 MHz Rate: 20 Hz to 10 kHz Deviation: ≤ 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

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 Rate: 200 Hz to 20 kHz 10 MHz to 1.3 GHz	4.8 % of reading + 0.32 rad 3.6 % of reading + 0.32 rad	Measuring Receiver w/ Power Sensor Tijuana Mexicali Juarez Monterrey Queretaro
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

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 [1,2]	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 + 2.6*L*) µin (7.8 + 2.3*L*) µin (11 + 4.6*L*) µin (18 + 3*L*) µin (13 + 7.7*L*) µin	LabMaster System and Gage Blocks Tijuana Juarez Monterrey
Ring Gages [1,2]	Up to 1 in (1 to 4) in (4 to 10) in (10 to 40) in	(9 + 20*L*) µin (8.1 + 8.4*L*) µin (11 + 11*L*) µin [26 + 13 (*L*-10)] µin	LabMaster System and Gage Blocks Tijuana Juarez Monterrey
Gage Blocks [1,2]	Up to 1 in (1 to 4) in (4 to 10) in	(4 + 0.8*L*) µin (3.1 + 1.7*L*) µin (1.2 + 2.2*L*) µin	LabMaster System and Gage Blocks Tijuana Juarez
Gage Blocks [1,2]	Up to 1 in (1 to 4) in (4 to 10) in (10 to 40) in	(4 + 0.8*L*) µin (3.1 + 1.7*L*) µin (1.2 + 2.2*L*) µin [9.7 + 13 (*L*-10)] µin	LabMaster System and Gage Blocks Monterrey
Gage Blocks [1,2]	Up to 4 in Up to 101.6 mm	(3.9 + 0.42 L) µin (0.12 + 0.011 L) µm	Electromechanical Comparator & Gage Blocks Mexicali
Thread Plug Gages [1,2] Major Diameter and Pitch Diameter	(0.05 to 1) in (1 to 2) in (2 to 12) in	100 µin 100 µin 130 µin	LabMaster System Gage Blocks and Thread Wires Tijuana Juarez Monterrey

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thread Plug Gages [1,2] Major Diameter Pitch Diameter Flank Angle	 Up to 5.9 in Up to 5.9 in (27 to 80)º	 (76 + 5.8*L*) µin (76 + 5.8*L*) µin 0.11º	Master Scanner and Master Plugs Mexicali
Thread Ring Gages [1,2] Minor Diameter and Pitch Diameter	(0.19 to 1) in (1 to 2) in (2 to 10) in	38 µin 40 µin 77 µin	LabMaster System, Gages Blocks and Sphere Probes Tijuana Juarez Monterrey
Thread Ring Gages [1,2] Minor Diameter Pitch Diameter Flank Angle	 Up to 6.3 in Up to 6.3 in (27 to 80)º	 (90 + 4.8*L*) µin (90 + 4.8*L*) µin 0.11º	Master Scanner & Master Rings Mexicali
OD Micrometers [2]	Up to 1 in (1 to 10) in	(5.6 + 0.6*L*) µin (32 + 12*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
ID Micrometers [2]	Up to 12 in	(32 + 12*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Calipers [2]	Up to 12 in (12 to 40) in (40 to 80) in (80 to 120) in	(610 + 1.1*L*) µin (630 + 4.3*L*) µin (940 + 0.25*L*) µin (1 000 + 7.5*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Digital and Dial Indicators [2]	Up to 4 in	(62 + 5.6*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Test Indicators [2]	Up to 0.06 in	(6.2 + 4.4*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Pin Gages	Up to 60 mm	3 µm	Laser Micrometer Tijuana Mexicali Juarez Monterrey Queretaro
Laser Micrometer	Up to 60 mm	0.64 um	Master Plug Gages Tijuana Mexicali Juarez Monterrey Queretaro
Height Gages [2]	Up to 12 in (12 to 40) in	(130 + 7*L*) µin (130 + 13*L*) µin	Gage Blocks Tijuana Mexicali Juarez Monterrey Queretaro
Vision Equipment Optical Length [2]	(0 to 50) mm (50 to 100) mm	(2.1 + 0.005*L*) µm (2.6 + 0.005*L*) µm	Reference Glass Scale Tijuana Mexicali Juarez Monterrey Queretaro
Square/Block Flatness	Up to 4 in	9.6 µin	Linear High Gage Tijuana Mexicali Juarez Monterrey Queretaro

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Distance Measurement Rulers & Flexometers [2]	Up to 250 mm 250 mm to 972 mm 972mm to 10 m	(3.8 + 9.2L/1 000) µm (21 + 0.7L/600) µm 7.8 mm	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	Up to 0.10 in	21 µin	Linear High Gage Tijuana Mexicali Juarez Monterrey Queretaro
Surface Plates Local Area Flatness (Repeat Reading)	Up to 1 in	41 µin/step	Repeat-o-Meter Tijuana Mexicali Juarez Monterrey Queretaro
Surface Plates Overall Flatness	Up to 161 in DL	(77 + 0.18 DL)µin	Federal Level System Tijuana Mexicali Juarez Monterrey Queretaro
Surface Finish - Source	118 µin	2.6 µin	Roughness Standard Tijuana Mexicali Juarez Monterrey Queretaro

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Surface Finish - Measure	Up to 300 µin	5.6 µin	Surface Roughness Meter Tijuana Mexicali Juarez Monterrey Queretaro
Coating Thickness Gauge[3]	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 (5.8 to 1 000) psig	0.016 % of reading + 0.000 5 psi 0.018 % of reading + 0.001 3 psi	Pneumatic Deadweight Tester Tijuana
Pressure Source	(100 to 10 000) psig	0.011 % of reading + 0.008 psi	Hydraulic Deadweight Tester Tijuana
Pressure Measuring Equipment/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	(11.6 to 15) psia	0.011 psi	Absolute pressure module Tijuana Mexicali Juarez Monterrey Queretaro

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force - Tension/Compression	Up to 50 lbf (50 to 500) lbf Up to 1 000 lbf (1 000 to 10 000) lbf (10 000 to 50 000) lbf	0.06 lbf 1.4 lbf 2.4 lbf 26 lbf 60 lbf	Reference Load Cells Tijuana Mexicali Juarez Monterrey Queretaro
Scales/Balances [2]	Up to 5 g	0.021 mg + 0.6*R*	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 + 0.6*R* 0.1 mg + 0.6*R* 88 mg + 0.6*R* 4.5 g + 0.6*R* 110 g + 0.6*R*	Class F Weights Tijuana Mexicali Juarez Monterrey Queretaro
Torque – Measure Torque Tools	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
Torque – Measure Torque Tools	(250 to 1 000) lbf·ft	0.31 % of reading + 0.88 lbf·ft	Torque Tester Tijuana Mexicali Juarez Monterrey Queretaro
Torque – Source Analyzers/Transducers	(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

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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	0.02 ml 0.074 ml 0.36 ml 0.64 ml 1.1 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	0.52 % 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	Flowmeter Calibration System Tijuana Mexicali Juarez Monterrey Queretaro
Liquid Flow Meters	(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
Air Velocity Meters	Up to 3 000 fpm	2.6 % of reading + 0.581 fpm	Anemometer Tijuana Mexicali Juarez Monterrey Queretaro

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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
Rockwell Hardness Testers	(<60) HRBW (≥60 to <88) HRBW (≥88) HRBW (<35) HRC (≥35 to <60) HRC (≥60) HRC (<84) HREW (≥80 to <93) HREW (≥ 93) HREW	2.1 HRBW 1.5 HRBW 1.3 HRBW 1.2 HRC 1.2 HRC 0.68 HRC 1.3 HREW 1.4 HREW 1.3 HREW	ASTM E18 Indirect Verification Tijuana Mexicali Juarez Monterrey Queretaro

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

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Durometers Force Types A, B, O Types C, D, DO Types M, OO Indenter Length Indenter Angle Indenter Radius	 (56.08 to 820.87) gf Up to 4530 gf Up to 113 gf Up to 20 mm Up to 35º Up to 1 mm	 0.99 grf 6.2 grf 0.58 grf 2.4 um 0.2º 3.3 um	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, 1 550) 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 (1 300, 1 550) nm	(-60 to 0) dB	0.13 dB	Optical Attenuator Tijuana Mexicali Juarez Monterrey Queretaro

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity – Source[4]	43 %RH 75 %RH 97 %RH	1.3 %RH	Indicator/Hygrometer Saturated Salt Baths Tijuana Mexicali Juarez Monterrey Queretaro
Humidity - Measure	(>0 to 99) %RH	1.3 %RH	Indicator/Hygrometer Tijuana Mexicali Juarez Monterrey Queretaro
Radiation (Infrared) Thermometers	(50 to 100) °C (100 to 300) °C (300 to 500) °C	1.7 °C 5.3 °C 8.2 °C	Blackbody Source (flat plate) $\varepsilon = 0.95$, $\lambda = (8 \text{ to } 14)$ µm Tijuana Mexicali Juarez Monterrey Queretaro
Radiation (Infrared) Thermometers	(100 to 1 200) °C	21 °C	High Temperature Blackbody Source (cavity) $\varepsilon = 0.995$, $\lambda = (8 \text{ to } 14)$ µm Tijuana Mexicali Juarez Monterrey Queretaro
Temperature Source- Measuring Equipment	(-30 to 0) °C (0 to 150) °C (150 to 300) °C (350 to 1 200) °C	0.26 °C 0.23 °C 0.53 °C 5.7 °C	Reference Thermometer w/ PRT Tijuana Mexicali Juarez Monterrey Queretaro

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Source / Measure	(-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 Source / Measure	0 to 1 200 °C	0.6 °C	Type S Reference Thermocouple Mexicali Juarez Monterrey Queretaro
Temperature Measurement	(650 to 1 200) °C	0.1 % of reading + 1.4 °C	Type R Reference Thermocouple 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 and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Time - Source	1 ms to 100 000 s	(4.8×10^{-3}) µs	Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Measure[2]	150 kHz to 1.3 GHz	(2.4×10^{-8}) Hz + 2*R*	Measuring Receiver Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Measure[2]	DC to 3.2 GHz (3.2 to 20) GHz	(9.4×10^{-6}) Hz + 2*R* 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 µHz/Hz + 61 µHz 3 µHz/Hz + 61 µHz 3 µHz/Hz + 120 µHz 3 µHz/Hz + 10 mHz 3 µHz/Hz + 12 mHz	Multiproduct Calibrator Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Source[2]	2 MHz to 6 GHz	1.3 µHz/Hz + 0.02 Hz	Signal Generator Tijuana Mexicali Juarez Monterrey Queretaro
Frequency – Source[2]	10 MHz to 26.5 GHz	(1.2×10^{-7}) Hz + *R*	Signal Generator Frequency Counter Tijuana Mexicali Juarez Monterrey Queretaro

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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
Discharge Time	Up to 999.9 s	2 % of reading + 0.14 sec	Charge Plate Analyzer 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[1,2] (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 Costumer Print or Report Tijuana Juarez
Dimensional[1,2] (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 Costumer 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
Oil Aerosol & Vapor Content [5]	ISO 8573-1 ISO 8573-2 ISO 8573-5	Compressed Air Purity Test	Oil Content Analyzer Air Sampler Tijuana Mexicali Juarez Monterrey Queretaro
Humidity / Dew Point Measurement	ISO 8573-3	Compressed Air Purity Test	Dew Point Meter & Diffuser Tijuana Mexicali Juarez Monterrey Queretaro

Environmental

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Pressurized Air Particle Content	ISO 8573-4	Compressed Air Purity Test	Particle Counter & Diffuser Tijuana Mexicali Juarez Monterrey Queretaro
Viable Microbiological Contaminant [6]	ISO 8573-7	Compressed Air Purity Test	Microbiological Sampler Tijuana Mexicali Juarez Monterrey Queretaro

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. Portions of ISO 8573-5 requiring analysis using gas chromatography are contracted to another accredited laboratory.
6. This analysis is intended to be used in conjunction with the testing per ISO 8573-4 when there is a need to identify solid particles that are also viable, colony-forming units and is contracted to another accredited laboratory.
7. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1342.

Jason Stine, Vice President