



# CERTIFICATE OF ACCREDITATION

**The ANSI National Accreditation Board**

Hereby attests that

**Metrología y Pruebas, S. A. de C. V.**  
**Privada Tecnológico No. 25**  
**Nogales, Sonora México**  
(and satellite locations as listed on the scope)

Fulfills the requirements of

**ISO/IEC 17025:2017**

In the fields 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).

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 11 November 2023  
Certificate Number: ACT-1890



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**

**Metrología y Pruebas, S. A. de C. V.**

Privada Tecnológico No.25

Nogales, Sonora, México

Patricia Ricaud 011-52-631-314-6263/6

[pricaud@mypsa.mx](mailto:pricaud@mypsa.mx) [www.mypsa.com.mx](http://www.mypsa.com.mx)

**CALIBRATION, TESTING AND DIMENSIONAL MEASUREMENT**

Valid to: **November 11, 2023**

Certificate Number: **ACT-1890**

**CALIBRATION**

**Acoustics and Vibration**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter (reference) and Source PMP-C-036
Sound Level Source Devices	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter PMP-C-036
Acceleration <sup>3</sup>	10 m/s <sup>2</sup> (80 to 5 000) Hz	0.31 m/s <sup>2</sup>	Portable Vibration calibrator PMP-C-051 (g <sub>n</sub> = 9.80665 m/s <sup>2</sup> )
	50 m/s <sup>2</sup> (30 to 45) Hz	1.5 m/s <sup>2</sup>	

**Chemical Quantities**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Particle Counter	(0.35 to 1.77) particles/L (10 to 50) particles/ft <sup>3</sup>	15 % of reading	Particle counter PMP-C-050
	(1.77 to 105 944) particles/L (50 to 3 000 000) particles/ft <sup>3</sup>	13 % of reading	



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**Chemical Quantities**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meters <sup>5</sup>	2.00 pH 4.00 pH 6.86 pH 7.00 pH 9.18 pH 10.00 pH 12.47 pH	0.022 pH 0.022 pH 0.019 pH 0.034 pH 0.016 pH 0.025 pH 0.03 pH	pH Buffer Solutions PMP-C-040
Conductivity Meters <sup>5</sup>	100 µS/cm 1 000 µS/cm 5000 µS/cm 10 000 µS/cm 100 000 µS/cm	1 µS/cm 5.1 µS/cm 20 µS/cm 20 µS/cm 400 µS/cm	Conductivity Solutions PMP-C-037
Viscometers	Up to 10 cP (10 to 100) cP (100 to 1 000) cP (1 000 to 12 500) cP (12 500 to 100 000) cP	1.2 cP (1.1 + 0.004z) cP (0.42 + 0.01z) cP (0.68 + 0.01z) cP (14 + 0.01z) cP	Viscosity Standards PMP-C-37
Breathalyzer Ethanol weight per volume of vapor @ 34 °C	0.020 g / 210 l 0.030 g / 210 l 0.1 g / 210 l	0.000 8 g / 210 l 0.001 g / 210 l 0.003 g / 210 l	Alcohol Reference Solution PMP-C-049
Gas Measurement Equipment	CO (100 ppm) H2S (25 ppm) CH4 (2.5% vol, 50%LEL) NO2 (10ppm) SO2 (20ppm) i-C4H10 O2 CO2	2 % of reading	Gas Reference PMP-C-044

**Electrical – DC/Low Frequency**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes Leveled Sine Wave	5 mV to 5.5 V 50 kHz to 100 MHz (50 to 300) MHz (300 to 600) MHz	40 mV/V 45 mV/V 65 mV/V	Multifunction Calibrator PMP-C-010



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Electrical – DC/Low Frequency

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes Square Wave Signal 10 Hz to 10 kHz  Rise Time 5 mV to 2.5 V	(1 mV to 6.6 V) p-p (50 Ω load) (1 mV to 130 V) p-p (1 MΩ load)  1 kHz to 10 MHz	1.2 mV/V  1.3 mV/V  1 ms/s	Multifunction Calibrator PMP-C-010
DC High Voltage Source	(1 to 10) kV	0.021 V/V	High Voltage Probe Multimeter PMP-C-001
DC High Voltage Measure	(1 to 10) kV	0.021 V/V	High Voltage Probe Multimeter DC Hi-Pot PMP-C-001
DC Voltage – Source equipment	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.02 kV	12 μV/V 8.3 μV/V 8.1 μV/V 10 μV/V 10 μV/V	Agilent Multimeter PMP-C-001
DC Voltage – Measuring equipment	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.02 kV	12 μV/V 8.3 μV/V 8.1 μV/V 10 μV/V 10 μV/V	Agilent Multimeter Multifunction Calibrator PMP-C-001
AC Voltage – Source equipment	(1 to 100) mV 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz 100 mV to 1V 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.1 mV/V 0.17 mV/V 0.4 mV/V  0.1 mV/V 0.16 mV/V 0.33 mV/V 0.82 mV/V	Agilent Multimeter PMP-C-003
AC Voltage – Source equipment	(1 to 10) V 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.41 mV/V 0.16 mV/V 0.32 mV/V 0.82 mV/V	Agilent Multimeter PMP-C-003



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Electrical – DC/Low Frequency

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
AC Voltage – Source equipment	(10 to 100) V 50 Hz to 1 kHz (1 to 20) kHz	0.22 mV/V 0.22 mV/V	Agilent Multimeter Multifunction Calibrator PMP-C-003		
	(100 to 1 000) V 50 Hz to 1 kHz	0.43 mV/V			
AC Voltage – Source equipment	(1 to 15) kV 60 Hz	0.02 V/V	Tektronix High Voltage Probe PMP-C-003		
AC Voltage – Source equipment	(15 to 60) kV 60 Hz	0.032 mV/V	Hipotronix Transformer		
AC Voltage – Measuring equipment	(1 to 100) mV 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz	0.1 mV/V 0.17 mV/V 0.4 mV/V	Agilent Multimeter Multifunction Calibrator PMP-C-003		
	100 mV to 1V 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.1 mV/V 0.16 mV/V 0.33 mV/V 0.82 mV/V			
	(1 to 10) V 50 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.41 mV/V 0.16 mV/V 0.32 mV/V 0.82 mV/V			
	(10 to 100) V 50 Hz to 1 kHz (1 to 20) kHz	0.22 mV/V 0.23 mV/V			
	(100 to 1 000) V 50 Hz to 1 kHz	0.43 mV/V			
	AC Voltage – Measuring equipment	(1 to 15) kV 60 Hz		0.02 V/V	Hipotronix Transformer PMP-C-003
		(15 to 60) kV 60 Hz		0.02 V/V	High Voltage Probe PMP-C-003



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Electrical – DC/Low Frequency

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Source equipment	(10 to 100) nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	432 $\mu$ A/A 64 $\mu$ A/A 32 $\mu$ A/A 30 $\mu$ A/A 26 $\mu$ A/A 26 $\mu$ A/A 40 $\mu$ A/A 122 $\mu$ A/A	Agilent Multimeter PMP-C-002
DC Current – Source equipment	(1 to 11) A (11 to 550) A	0.54 mA/A 2.6 mA/A	Agilent Multimeter with standard shunts PMP-C-002
DC Current – Measuring equipment	(10 to 100) nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	720 $\mu$ A/A 64 $\mu$ A/A 32 $\mu$ A/A 30 $\mu$ A/A 26 $\mu$ A/A 26 $\mu$ A/A 41 $\mu$ A/A 121 $\mu$ A/A	Agilent Multimeter Multifunction Calibrator PMP-C-002
DC Current – Measuring equipment Clamp-On Ammeters	(1 to 11) A (11 to 100) A (11 to 550) A	1.1 mA/A 0.92 mA/A 2.6 mA/A	Agilent Multimeter Multifunction Calibrator Shunt Resistors 50-Turn Current coil PMP-C-002
AC Current – Source equipment	(1 to 10) mA (50 to 100) Hz 100 Hz to 1 kHz (10 to 100) mA (50 to 100) Hz 100 Hz to 1 kHz 100 mA to 1 A (50 to 100) Hz 100 Hz to 1 kHz	0.8 mA/A 0.21 mA/A 0.21 mA/A 0.21 mA/A 0.21 mA/A 0.21 mA/A	Agilent Multimeter PMP-C-004
AC Current – Source equipment	(1 to 11) A 60 Hz	1.4 mA/A	Agilent Multimeter PMP-C-004 Current Shunts PMP-C-004
AC Current – Source equipment	(11 to 50) A 60 Hz (11 to 550) A 60 Hz	6.8 mA/A 8 mA/A	Agilent Multimeter with Shunt Current Calibrator PMP-C-004

**Electrical – DC/Low Frequency**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measuring equipment	(1 to 10) mA (50 to 100) Hz 100 Hz to 1 kHz	0.8 mA/A 0.5 mA/A	Agilent Multimeter Multifunction Calibrator PMP-C-003
	(10 to 100) mA (50 to 100) Hz 100 Hz to 1 kHz 100 mA to 1 A (50 to 100) Hz 100 Hz to 1 kHz	0.8 mA/A 0.51 mA/A 1 mA/A 1.2 mA/A	
AC Current – Measuring equipment	(1 to 11) A 60 Hz	1.6 mA/A	Agilent Multimeter Current Shunts PMP-C-003
	(11 to 50) A 60 Hz	6.8 mA/A	
AC Current – Measuring equipment Clamp-On Ammeters	(11 to 550) A 60 Hz	8 mA/A	Multifunction Calibrator with 50-Turn Coil PMP-C-003
DC Power Measuring equipment	10.89 mW to 11 220 W	0.82 mW/W	Multifunction Calibrator PMP-C-005
DC Power Source equipment	10.89 mW to 11 220 W	0.41 mW/W	Agilent Multimeter Shunt resistors DC Power Supply PMP-C-005A
AC Power – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 1	2.2 mW/W	Multifunction Calibrator PMP-C-005
	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.9	3.3 mW/W	
	10.89 mW to 11 220 W @ 60 Hz, P.F. = 0.8	3.9 mW/W	
AC Power – Source equipment	0.89 mW to 11220 W @ 60 Hz, P.F. = 1	1.4 mW/W	Agilent Multimeter Shunt resistors DC Power Supply PMP-C-005
	0.89 mW to 11220 W @ 60 Hz, P.F. = 0.9	3 mW/W	
	0.89 mW to 11220 W @ 60 Hz, P.F. = 0.8	4.4 mW/W	

**Electrical – DC/Low Frequency**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measuring equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	20 μΩ/Ω 17 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 17 μΩ/Ω 60 μΩ/Ω 0.5 mΩ/Ω 5 mΩ/Ω	Agilent Multimeter Multifunction Calibrator PMP-C-006
Resistance – Source equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	20 μΩ/Ω 17 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 17 μΩ/Ω 60 μΩ/Ω 0.5 mΩ/Ω 5.1 mΩ/Ω	Agilent Multimeter PMP-C-006
Resistance Generation Equipment High value resistors and decade resistors	1 MΩ to 1 TΩ @ (50 to 1 000) V	0.023 Ω/Ω	Multifunction Calibrator Agilent Multimeter High Value R Decade (1 MΩ to 1 TΩ) PMP-C-006
Resistance Measuring Equipment Megaohmmeters	100 kΩ to 1 GΩ @ (Up to 5 000) V 1 GΩ to 1 TΩ @ (1 to 10) kV	0.08 Ω/Ω 0.023 Ω/Ω	Direct method with: High Value R Decade (1 MΩ to 1 TΩ) PMP-C-006
DC Shunt Resistance Equipment	0.5 mΩ to 1 Ω @ (Up to 300) A	0.45 mΩ/Ω	Agilent Multimeter Shunt resistor 0.01Ω Shunt resistor 0.1Ω PMP-C-006
AC electrical Resistance at 60 Hz Shunt Resistance	0.5 mΩ to 1 Ω @ (1 to 60) A	2.5. mΩ/Ω	Multifunction Calibrator Agilent Multimeter DC Power Supply Shunt resistors PMP-C-006
Capacitance Source equipment	0.01 pF to 10 μF 12 Hz to 100 kHz	0.42 mF/F	Capacitance Bridge Precision LCR Meter PMP-C-009





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Electrical – DC/Low Frequency

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Measuring equipment	(1 to 10 000) pF 0.33 pF to 0.33 mF	4 mF/F 0.9 mF/F	Capacitance decade 1 pF Capacitor 1000 pF Capacitor 10 000 pF Capacitor Fluke Multifunction Calibrator PMP-C-009
Inductance – Source equipment	Up to 10 H @ 12 Hz to 100 kHz	0.069 mH/H	LCR Bridge Precision LCR Meter PMP-C-029
Inductance – Measuring equipment	1 mH to 10 H	0.23 mH/H	Precision LCR Meter Standard Inductors PMP-C-029
Phase Angle Output	(0 to 180) °	0.15 °	Phase Meter PMP-C-005
RTD Simulation Measure/ Source	Pt 385, 100 Ω (-196 to 1 000) °C	0.03 °C	Agilent Multimeter Multifunction Calibrator PMP-C-020
Thermocouple Simulation Type B Type C Type E Type J Type K Type L Type N Type R Type T Type S Type U	(600 to 1 820) °C (0 to 2 316) °C (-250 to 1 000) °C (-250 to 1 200) °C (-200 to 1 372) °C (-200 to 900) °C (-200 to 1 300) °C (0 to 1 767) °C (-250 to 400) °C (0 to 1 767) °C (-200 to 600) °C	0.07 °C 0.11 °C 0.08 °C 0.05 °C 0.07 °C 0.06 °C 0.07 °C 0.08 °C 0.06 °C 0.07 °C 0.08 °C	Multifunction Calibrator Agilent Multimeter PMP-C-020
Magnetic Field <sup>3</sup>	(0.3 to 3) mT 3 mT to 3 T	0.36 % of reading + 0.004 3 mT 0.56 % of reading	Magnetic Field Meter PMP-C-051



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Electrical – RF/Microwave

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Power - Source 50 Ω load	(-60 to 10) dBm (10 MHz to 18 GHz) 10 dBm -60 dBm	0.19 dB 0.4 dB	Power Meter w/ Power Sensors PMP-C-008
	(-80 to -10) dBm (10 MHz to 13.2 GHz) -10 dBm -80 dBm	0.22 dB 0.21 dB	Spectrum Analyzer Signal Generator (ref) PMP-C-008
Power - Measure 50 Ω load	(-60 to 10) dBm (10 MHz to 18 GHz) 10 dBm -60 dBm	0.18 dB 0.4 dB	Power Meter w/ Power Sensors Signal Generator (ref) PMP-C-008
Power - Measure 50 Ω load	(-80 to -10) dBm (10 MHz to 13.2 GHz) -10 dBm -80 dBm	0.22 dB 0.22 dB	Spectrum Analyzer Signal Generator (ref) PMP-C-008
RF/Microwave Phase Modulation – Measure / Generate	Carrier Frequency: 100 kHz to 13.2 MHz (0.1 to 45) rad	0.84 % of reading	Agilent PSA Spectrum Analyzer Frequency Synthesizer Frequency Generator PMP-C-008
Amplitude Modulation - Source and Measure Rate: Depths: 5% to 99%	20 Hz to 10 kHz 50 Hz to 100 kHz		Agilent PSA Spectrum Analyzer Frequency Synthesizer Frequency Generator PMP-C-008
	Flatness – Measure Rate: 90 Hz to 10 kHz  100 kHz to 10 MHz 10 MHz to 13.2 GHz	0.7 % of reading  0.7 % of reading 1.2 % of reading	
RF/Microwave Frequency Modulation- Source and Measure	20 Hz to 10 kHz 50 Hz to 200 kHz FM Dev 50 Hz to 50 kHz 250 kHz to 10 MHz 10 MHz to 13.2 GHz	1 % of reading	Agilent PSA Spectrum Analyzer Frequency Synthesizer Frequency Generator PMP-C-008

**Length – Dimensional Metrology**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Depth Micrometers <sup>3</sup>	Up to 1016 mm Up to 40 in	$(1.5 + 0.008L) \mu\text{m}$ $(61 + 8L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014
Outside Micrometers <sup>3</sup>	Up to 1 016 mm Up to 40 in	$(0.78 + 0.008 7L) \mu\text{m}$ $(31 + 8.7L) \mu\text{in}$	Gage Blocks (Grade 2, Grade 3) PMP-C-014 Reference Standard NMX- CH-099-IMNC-2005
Inside Micrometers <sup>3</sup>	(5.08 to 1 016) mm (0.2 to 40) in	$(0.7+ 0.008 8L) \mu\text{m}$ $(27 + 8.8L) \mu\text{in}$	Gage Blocks Grade 2 Gage blocks Grade 3 PMP-C-014 NMX-CH- 099-IMNC-2005
Dial and Digital Indicators <sup>3</sup>	Up to 101.6 mm Up to 4 in	$(0.91+ 0.004 3L) \mu\text{m}$ $(36 + 4.3L) \mu\text{in}$	Gage Blocks Grade 2 PMP-C-014 NMX-CH-36-1994
Optical Comparator <sup>2,3</sup> X, Y Axis – Linear Error of Indication	Up to 508 mm Up to 20 in	$(0.33 + 0.014L) \mu\text{m}$ $(13 + 14L) \mu\text{in}$	Glass Scales Gage Blocks Grade 2 Gage Block Grade 3 PMP-C-014
Optical Comparators <sup>2</sup> Angular	(0 to 360) °	0.019 °	Angle block PMP-C-014
Optical Comparators <sup>2</sup> Magnification	5x 10x 20x 50x 100x	0.1 % of reading 0.051 % of reading 0.076 % of reading 0.051 % of reading 0.051 % of reading	Glass Ruler PMP-C-014
Height Measuring Equipment <sup>3</sup>	Up to 609.6 mm (Up to 24 in)	$(7.4 + 0.003 2L) \mu\text{m}$ $(290 + 3.2L) \mu\text{in}$	Granite Surface Gage Blocks PMP-C-014
Graduated Rules and Tape Measures <sup>3</sup>	Up to 25 m (Up to 984 in)	$(0.000 5L+0.000 84) \mu\text{m}$ $(0.51L+0.033) \mu\text{in}$ ,	MPC490 Interferometer PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999
Graduated Rules and Tape Measures <sup>3</sup>	Up to 508 mm (Up to 20 in)	$(20 + 0.041L) \mu\text{m}$ $(791 + 41L) \mu\text{in}$	Digital Indicator Stainless Ruler 5X Amplification Lens PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999

**Length – Dimensional Metrology**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers <sup>3</sup>	Up to 1 016 mm	$(20 + 0.002\ 2L)\ \mu\text{m}$	Gage Blocks Grade 2 PMP-C-014 NMX-CH-2:1993-SCFI
Calipers <sup>3</sup>	(Up to 40 in)	$(780 + 2.2L)\ \mu\text{in}$	Gage Blocks Grade 3 PMP-C-014 NMX-CH-2:1993-SCFI
Coordinate Measuring Machines <sup>2,3,6</sup> X, Y, Z Axis - Linear Errors	Up to 4 in (4 to 25) in (25 to 80) in (80 to 315) in	17 $\mu\text{in}$ 3.7 $\mu\text{in/in} + 2.2\ \mu\text{in}$ 3.9 $\mu\text{in/in} - 2.7\ \mu\text{in}$ 3.8 $\mu\text{in/in} + 7.1\ \mu\text{in}$	PMP-C-014 (Axis Linear Errors and Volumetric Performance): API Laser Interferometer
Coating Thickness <sup>3</sup>	Up to 1.52 mm Up to 60 000 $\mu\text{in}$	$(2 + 16L)\ \mu\text{m}$ $(77 + 0.016L)\ \mu\text{in}$	Digital Indicator Gage Blocks Grade 2 PMP-C-014
Surface Roughness Measuring Devices	Ra = 3.024 $\mu\text{m}$ (119 $\mu\text{in}$ ) Ry = 9.3 $\mu\text{m}$ (366 $\mu\text{in}$ ) Ra = 0.401 $\mu\text{m}$ (15.8 $\mu\text{in}$ ) Ry = 1.58 $\mu\text{m}$ (62.2 $\mu\text{in}$ )	0.066 $\mu\text{m}$ 2.6 $\mu\text{in}$ 0.21 $\mu\text{m}$ 8.1 $\mu\text{in}$ 0.066 $\mu\text{m}$ 2.6 $\mu\text{in}$ 0.21 $\mu\text{m}$ 8.1 $\mu\text{in}$	Mitutoyo Roughness Standard (Ra, Ry) Mitutoyo PMP-C-038
Surface Roughness Standards	(0.4 to 3) $\mu\text{m}$ (16 to 120) $\mu\text{in}$	0.066 $\mu\text{m}$	Roughness Tester PMP-C-038
Levels	(0 to 1.15) °	0.000 12 °	Level Table PMP-C-014
Surface Plates <sup>1</sup> Local Area Flatness only (Repeat Reading)	Up to 1 727 mm (0 to 0.000 2) in	0.99 $\mu\text{m}$ 39 $\mu\text{in}$	Datum Gauge PMP-C-014
Surface Plates <sup>1</sup> Overall Flatness	Up to (609.6 x 914.4) mm Diagonal (24 x 36) in	0.43 $\mu\text{m}$ 17 $\mu\text{in}$	Interferometer PMP-C-014
Gages Blocks <sup>3</sup> Grade 1, 2 and 3 (FS)	(0.254 to 152.9) mm (0.01 to 6) in	$(0.1 + 0.000\ 8L)\ \mu\text{m}$ $(4 + 0.75L)\ \mu\text{in}$	Gage Blocks Grade 1 (GGG-G-15C) Gage Blocks Comparator PMP-C-014
Gages Blocks <sup>3</sup>	(152.4 to 1 016) mm (6 to 40) in	$(-0.033 + 0.000\ 8L)\ \mu\text{m}$ $(-1.3 + 0.8L)\ \mu\text{in}$	Laser Interferometer PMP-C-014

**Length – Dimensional Metrology**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pin/Plug Gauges	(0.254 to 101.6) mm (0.01 to 4) in	0.36 $\mu$ m 14 $\mu$ in	Gage Blocks Grade 2 Universal measuring machine PMP-C-014
Ring Gages	(12.7 to 101.6) mm (0.5 to 4) in	0.36 $\mu$ m 14 $\mu$ in	Universal measuring machine PMP-C-014
Thickness gauges & Measuring Equipment	(0.006 to 11.46) mm 236 $\mu$ in to 0.45 in	2 $\mu$ m 79 $\mu$ in	ASTM E797 Thickness Gauge Gage Blocks grade 2 PMP-C-014
Angle Blocks	(0 to 90) $^{\circ}$	0.014 $^{\circ}$	Vision Microscope PMP-C-014
Thread Plug Gage Pitch Diameter	M 1.6 x 0.35 to M 100 x 6 (0-80 to 4-12)	5.1 $\mu$ m 200 $\mu$ in	Supermicrometer Gage block set grade 2 PMP-C-014
Thread Plug Gage Major Diameter	M 1.6 x 0.35 to M 100 x 6 (0-80 to 4-12)	1.8 $\mu$ m 71 $\mu$ in	Supermicrometer Gage block set grade 2 PMP-C-014
Protractors	(0 to 360) $^{\circ}$	0.059 $^{\circ}$	Angle Block Gage Blocks grade 2 Sine Bar PMP-C-014
Bore Gage	(0.762 to 304.8) mm (0.03 to 12) in	3.1 $\mu$ m 120 $\mu$ in	Ring gages Vision Microscope PMP-C-014
Radius Gage	(0.254 to 25.4) mm (0.01 to 1) in	4.1 $\mu$ m 160 $\mu$ in	Microscope "Vision Engineering Hawk" PMP-C-014



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Mass and Mass Related

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dead Weights <sup>3</sup>	0.01 g 1 g 50 g 100 g 200 g 1000 g 10 kg 20 kg 50 kg	0.0084 mg 0.0088 mg 0.07 mg 0.16 mg 0.49 mg 8.3 mg 86 mg 92 mg 250 mg	ASTM Class 1 Stainless Weights Digital Scale (comparator) PMP-C-021 NIST Handbook 44 OIML R111 ABBA Method
Scales and Balances <sup>1,3,4</sup>	(0.001 to 1) g (1 to 60) g (60 to 200) g (200 to 1 000) g (1 to 10) kg (10 to 60) kg (60 to 100) kg (100 to 1 000) kg (1 000 to 2 500) kg	0.000 2 % reading + 0.011 mg 0.000 3 % reading + 0.01 mg 0.000 15 % reading + 0.11 mg 0.001 % reading – 1.6 mg 0.000 31 % reading + 5.3 mg 0.006 % reading – 0.56 mg 0.023 % reading – 11 g 0.015 % reading 0.015 % reading	ASTM Class 1, OIML M2, NIST Class F weights PMP-C-012
Volumetric Recipients <sup>3</sup> (Pipettes, Burettes) (Test Tubes, Syringes) (Flask, Beakers, Hasty Glasses) (Graduated volumetric containers) (Graduated volumetric containers)	(10 to 100) µL (100 to 500) µL (500 to 1 000) µL 1 mL to 5 L (5 to 30) L	0.04 % of reading + 0.11 µL 0.032 % of reading + 0.16 µL -0.018 % of reading + 0.38 µL 0.02 % of reading 0.012 % of reading + 0.000 35 µL	Digital Balance PMP-C-033
Water Flow <sup>1,3</sup>	Up to 1 500 l/min	(0.6 + 0.01f) l/min	Digital Flow Meter PMP-C-034
Torque <sup>1</sup>	(0.005 to 1) N·m (0.044 to 8.9) lbf·in	0.007 2 N·m 0.064 lbf·in	Dead Weights and Torque Disk PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque <sup>1</sup>	(0.9 to 20) N·m 8.0 lbf·in to 15 lbf·ft	0.056 N·m 0.5 lbf·in	Torque Transducer PMP-C-015 CNM-MMF-PT-002 & EA-10/14



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Mass and Mass Related

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque <sup>1</sup>	(7.4 to 500) N·m (5.5 to 369) lbf·ft	0.62 N·m 0.46 lbf·ft	Torque Transducer PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque <sup>1</sup>	(400 to 678) N·m (295 to 500) lbf·ft	1.6 N·m 1.2 lbf·ft	Torque Transducer PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque Measuring Devices	(20.34 to 135.58) N·m (15 to 100) lbf·ft	0.047 % of reading + 0.14 N·m 0.047 % of reading + 0.11 lbf·ft	Dead Weights and Torque Arm PMP-C-015
Torque Measuring Devices	(135.58 to 1355.8) N·m (100 to 1 000) lbf·ft	0.083 % of reading + 0.092 N·m 0.083 % of reading + 0.068 lbf·ft	Dead Weights and Torque Arm PMP-C-015
Air Flow <sup>1,3</sup>	Up to 1 L/min (1 to 20) L/min (20 to 300) L/min	(0.000 39 + 0.011 <i>f</i> ) l/min (0.000 76 + 0.003 5 <i>f</i> ) l/min (0.45 + 0.0082 <i>f</i> ) l/min	Flow Meter PMP-C-030
Air Velocity <sup>1,3</sup>	(0.4 to 25) m/s	(0.16 + 0.01 <i>y</i> ) m/s	Digital Anemometer PMP-C-030
Hydrometer <sup>3</sup>	(0.62 to 3) SG	(0.023 – 0.004 <i>G</i> ) SG	Dead Weights, Digital Scale, Digital Thermometer PMP-C-032 NBS Circular 555
Vacuum <sup>1,3</sup>	(-100 to 0) kPa (-14.5 to 0) psi	(-1.1 x 10 <sup>-8</sup> + 0.013 <i>ρ</i> ) kPa (-1.6 x 10 <sup>-9</sup> + 0.013 <i>ρ</i> ) psi	Pressure Sensor High Vacuum Meter PMP-C-013



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Mass and Mass Related

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell and Rockwell Hardness Testers <sup>2</sup>	(20 to 40) HRA	0.33 HRA	Indirect Verification using Hardness Blocks
	(41 to 75) HRA	0.39 HRA	
	(76 to 88) HRA	0.19 HRA	
	(40 to 59) HRBW	1.41 HRBW	
	(60 to 80) HRBW	0.9 HRBW	
	(81 to 100) HRBW	0.44 HRBW	
	(20 to 39) HRC	0.4 HRC	
	(40 to 59) HRC	0.34 HRC	
	(60 to 70) HRC	0.35 HRC	
	(70 to 77) HR15N	0.43 HR15N	
	(78 to 88) HR15N	0.43 HR15N	
	(89 to 92) HR15N	0.23 HR15N	
	(42 to 54) HR30N	0.43 HR30N	
	(55 to 73) HR30N	0.3 HR30N	
	(74 to 80) HR30N	0.35 HR30N	
	(20 to 37) HR45N	0.65 HR45N	
	(38 to 62) HR45N	0.65 HR45N	
	(63 to 74) HR45N	0.65 HR45N	
	(73 to 80) HR15TW	0.41 HR15TW	
	(81 to 87) HR15TW	0.34 HR15TW	
(88 to 93) HR15TW	0.34 HR15TW		
(43 to 56) HR30TW	0.51 HR30TW		
(57 to 69) HR30TW	0.35 HR30TW		
(70 to 82) HR30TW	0.35 HR30TW		
(12 to 32) HR45TW	0.65 HR45TW		
(33 to 52) HR45TW	0.65 HR45TW		
(53 to 73) HR45TW	0.65 HR45TW		
Durometer Shore Spring Force Types A, B, E & O Types C, D & DO	(0.55 to 8.05) N (4.445 to 44.45) N	0.05 N/N 0.005 N/N	ASTM D-2240 Weight scale PMP-C-027





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Mass and Mass Related

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Durometer Shore Indenter Shape (Not all parameters apply to all of Durometer Types) Indenter Diameter Indenter Tip Diameter Indenter Tip Radius	(1 to 20) mm	5 $\mu$ m 5 $\mu$ m 5 $\mu$ m	ASTM D-2240 Vision Microscope
Durometers Shore Indenter Shape (Not all parameters apply to all of Durometer Types) Indenter Tip Angle	(5 to 90) $^{\circ}$	0.02 $^{\circ}$	ASTM D-2240 Vision Microscope
Standardized Rockwell Hardness Test Blocks	$\geq$ 80 HRA (60 to 80) HRA $\leq$ 60 HRA  $\geq$ 80 HRBW (60 to 80) HRBW $\leq$ 60 HRBW  $\geq$ 60 HRC (40 to 60) HRC $\leq$ 40 HRC  $\geq$ 90 HR15N (80 to 90) HR15N < 80 HR15N  $\geq$ 79 HR30N (60 to 79) HR30N $\leq$ 60 HR30N	0.17 HRA 0.15 HRA 0.14 HRA  0.28 HRBW 0.21 HRBW 0.17 HRBW  0.2 HRC 0.16 HRC 0.14 HRC  0.21 HR15N 0.2 HR15N 0.2 HR15N  0.22 HR30N 0.2 HR30N 0.19 HR30N	Hardness Calibration Machine PMP-C-027



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Mass and Mass Related

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Standardized Rockwell Hardness Test Blocks	≥ 65 HR45N (50 to 65) HR45N ≤ 50 HR45N	0.2 HR45N 0.25 HR45N 0.23 HR45N	Hardness Calibration Machine PMP-C-027
	≥ 100 HR15TW (80 to 100) HR15TW ≤ 80 HR15TW	0.22 HR15TW 0.22 HR15TW 0.22 HR15TW	
	≥ 70 HR30TW (50 to 70) HR30TW ≤ 55 HR30TW	0.2 HR30TW 0.21 HR30TW 0.23 HR30TW	
	≥ 50 HR45TW (25 to 50) HR45TW ≤ 25 HR45TW	0.24 HR45TW 0.23 HR45TW 0.2 HR45TW	
Force <sup>1</sup> (Tension and Compression)	Up to 0.1 N 0.1 N to 1 N 1 N to 2500 N 2.5 kN to 44.5 kN	0.086 % of reading 0.015 % of reading + 0.000 071 N 0.026 % of reading 0.06 % of reading – 0.000 77 kN	Dead weights PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Force <sup>1</sup> (Tension and Compression)	(44.5 to 222.4) kN	0.06 % of reading	Load Cells PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Pressure Measuring Equipment Relative Pressure <sup>1</sup>	Up to 500 Pa	1.8 Pa	2" water column PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC
Pressure Measuring Equipment Relative Pressure <sup>1,3</sup>	Up to 21 MPa	(0.027 + 0.73ρ) kPa	Pressure Calibrator (3000 psi) PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC
Pressure Measuring Equipment Relative Pressure <sup>1</sup>	(21 to 137) MPa	37 kPa	Pressure transducer PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC

**Mass and Mass Related**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Measuring Equipment Absolute Pressure <sup>3</sup>	Up to 106 kPa	$(0.16 + 0.000\ 58\rho)$ kPa	Absolute Pressure (0 to 31.5) inHg PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC

**Photometry and Radiometry**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Light Intensity Meters <sup>3</sup>	(100 to 250) lx (250 to 5 000) lx (5 000 to 7500) lx (7500 to 10 000) lx	3.2 % of reading 3 % of reading 5.6 % of reading – 140 lx 7.8 % of reading - 300 lx	Illuminance Meter PMP-C-035
UV Meters <sup>3</sup> Medidores de UV	Up to 19 W/cm <sup>2</sup>	$(3.4 \times 10^{-6} + 0.001\ 7v)$ W/cm <sup>2</sup>	UV Meter PMP-C-035

**Thermodynamic**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity	(10 to 75) %RH (75 to 97) %RH	2.2 %RH 2.5 %RH	Digital Humidity Meter PMP-C-028
Temperature <sup>1</sup> – Temperature Sources, Installations, Ovens, Chambers, Dry Wells	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.0038 % of reading + 0.028 °C 0.0091 % of reading + 0.028 °C 0.0082 % of reading + 0.03 °C	PMP-C-007 RTD and Multimeter
	(660 to 1 000) °C	0.088 % of reading + 1.3 °C	PMP-C-007 Thermocouple and Indicator
Temperature – RTD with Multimeter	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.0038 % of reading + 0.034 °C (0.0065 % of reading + 0.034 °C 0.0063 % of reading + 0.035 °C	PMP-C-007 RTD, Multimeter and Temperature Dry Well and Bath Source
Temperature <sup>1</sup> – Digital/Analog Temperature Measuring Devices with Thermocouple, RTD, Thermistors, Mechanical/ Analog Thermometers	(-20 to 0) °C (0 to 400) °C (400 to 600) °C	-0.09 % of reading + 0.031 °C 0.009 % of reading + 0.031 °C 0.035 % of reading - 0.071 °C	PMP-C-007 using RTD and Multimeter with Dry Well or Temperature Bath/Source.
	(600 to 1 000) °C	0.053 % of reading + 1.8 °C	PMP-C-007 using Thermocouple with Temperature reader. And High Temp.Oven

**Thermodynamic**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature <sup>1</sup> – Environment Thermometers	(-20 to 0) °C (0 to 100) °C	0.5 % of reading + 0.14 °C 0.27 % of reading + 0.14 °C	PMP-C-007 using RTD and Multimeter

**Time and Frequency**

Nogales, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Timers and Stopwatches	0.01 ms to 604 800 s	$(2.5 \times 10^{-8} + 2.5 \times 10^{-9} t)$	Frequency Counter PMP-C-008
Frequency Counting Equipment	0.1 Hz to 18 GHz	$1 \times 10^{-9}$ Hz/Hz	GPS Receiver, Spectrum Analyzer, Frequency Counter, Signal Generator, Frequency Synthesizer, PMP-C-008
Frequency Generating Equipment	Up to 18 GHz	$1 \times 10^{-9}$ Hz/Hz	GPS Receiver, Spectrum Analyzer, Frequency Counter, Power Meter, Power Sensors PMP-C-008

## DIMENSIONAL MEASUREMENT

**3 Dimensional**

Nogales, Sonora

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
3D Dimensional Measurement	Up to 1 in 1 in to 10 in 10 in to 20 in 20 in to 25 in	49 $\mu$ in 5.5 $\mu$ in/in + 44 $\mu$ in 7.2 $\mu$ in/in + 26 $\mu$ in 8 $\mu$ in/in + 10 $\mu$ in	Coordinate Measuring Machine used as Reference Customer Drawings CMM Software
3D Dimensional Measurement	Up to 1 in 1 in to 2 in 2 in to 6 in	95 $\mu$ in 5 $\mu$ in/in + 90 $\mu$ in 10 $\mu$ in/in + 80 $\mu$ in	Vision System used as Reference Customer Drawings Vision Software

## TESTING

**Mechanical**

Nogales, Sonora

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Force Testing/ Tension and Compression Up to 445 kN	PMP-C-011	Cables and Materials	Universal Testing Machine and Load Cell System used as Reference



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### Services performed at satellite location

Boulevard Vildosola No. 229  
Hermosillo, Sonora, México  
Edgar Ricaud, Gerente General  
Patricia Ricaud, Gerente de Calidad  
011-52-66-2250-5582  
ericaud@mypsa.com.mx      www.mypsa.com.mx

## CALIBRATION

### Acoustics and Vibration

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound Level Meters <sup>1</sup>	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter (reference) and Source PMP-C-036
Sound Level Source Devices	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter PMP-C-036

### Chemical Quantities

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity Meters <sup>5</sup>	10 µS/cm 100 µS/cm 1 000 µS/cm 10 000 µS/cm 100 000 µS/cm	0.35 µS/cm 2.2 µS/cm 4.9 µS/cm 20 µS/cm 300 µS/cm	Conductivity Solutions PMP-C-043
pH Meters <sup>5</sup>	4.00 pH 6.86 pH 10.1 pH	0.013 pH 0.011 pH 0.013 pH	pH Solutions PMP-C-040

### Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes <sup>1,3</sup> Leveled Sine Wave (Relative to 50 kHz)	5 mV to 5.5 V 50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz	1.5 mV 2.7 mV 3.9 mV	Multifunction calibrator PMP-C-010

**Electrical – DC/Low Frequency**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes <sup>1,3</sup> Square Wave Signal 10 Hz to 10 kHz  Rise Time 5 mV to 2.5 V	$\pm (1 \text{ mV to } 6.6 \text{ V}) \text{ p-p}$ (50 $\Omega$ load) $\pm (1 \text{ mV to } 130 \text{ V}) \text{ p-p}$ (1 M $\Omega$ load)  1 kHz to 10 MHz	(0.000 2 + 0.000 5E) mV  (0.000 08 + 0.001 2E) mV  0.1 ns	Multifunction calibrator PMP-C-010
DC High Voltage <sup>1,3</sup> - Source and Measure	(1 to 5) kV	(-0.005 6 + 0.028E) kV	Tektronix P6015A Multimeter Keysight 34461A PMP-C-001
AC High Voltage <sup>3</sup> - Source and Measure	700 V to 1.02 kV 40 Hz to 10 kHz (1.02 to 35) kV 60 Hz	(-56 + 0.082E) V  (-5.5 + 0.032E) V	Standard: Multimeter Keysight 34461A High Voltage Probe P6015A Multifunction calibrator PMP-C-003
DC Voltage – Source equipment	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.02 kV	12 $\mu\text{V/V}$ 8 $\mu\text{V/V}$ 8 $\mu\text{V/V}$ 10 $\mu\text{V/V}$ 10 $\mu\text{V/V}$	Multimeter Agilent 3458A PMP-C-001
DC Voltage – Measuring equipment <sup>1</sup>	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.02 kV	12 $\mu\text{V/V}$ 8 $\mu\text{V/V}$ 8 $\mu\text{V/V}$ 10 $\mu\text{V/V}$ 10 $\mu\text{V/V}$	Standard: Multimeter Agilent 3458A Multifunction calibrator PMP-C-001
AC Voltage – Source equipment	(1 to 100) mV 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz	0.073 mV/V 0.072 mV/V 0.073 mV/V	Multimeter Agilent 3458A PMP-C-003
AC Voltage – Source equipment <sup>3</sup>	100 mV to 1V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.78 mV/V 0.78 mV/V 0.78 mV/V 1.1 mV/V	Multimeter Agilent 3458A PMP-C-003



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Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source equipment <sup>3</sup>	(1 to 10) V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (10 to 100) V 40 Hz to 1 kHz (1 to 20) kHz (100 to 1 020) V 40 Hz to 1 kHz	9.5 mV/V 12 mV/V 9.5 mV/V 9.5 mV/V 95 mV/V 120 mV/V (1 300 + 0.21E) mV/V	Multimeter Agilent 3458A PMP-C-003
AC Voltage – Source equipment <sup>3</sup>	(1 to 5) kV 60 Hz	(-43 + 0.044E) mV/V	Multimeter Keysight 34461A High Voltage Probe P6015A PMP-C-003
AC Voltage – Measuring equipment <sup>1,3</sup>	(1 to 100) mV 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz 100 mV to 1V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (1 to 10) V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.073 mV/V 0.072 mV/V 0.073 mV/V 0.78 mV/V 0.78 mV/V 0.78 mV/V 1.1 mV/V 9.5 mV/V 12 mV/V 9.5 mV/V 9.5 mV/V	Standard: Multimeter Agilent 3458A Multifunction Calibrator PMP-C-003
AC Voltage – Measuring equipment <sup>1,3</sup>	(10 to 100) V 40 Hz to 1 kHz (1 to 20) kHz (100 to 1 020) V 40 Hz to 1 kHz	95 mV/V 120 mV/V (1 300 + 0.21E) mV/V	Standard: Multimeter Agilent 3458A Multifunction Calibrator PMP-C-003
AC Voltage – Measuring equipment <sup>1,3</sup>	(1 to 5) kV 60 Hz	(-43 + 0.049E) mV/V	Standard: Multimeter Keysight 34461A High Voltage Probe P6015A Generator: High Voltage Test Hipotronics PMP-C-003



**Electrical – DC/Low Frequency**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure equipment <sup>1,3</sup>	(1 to 100) mV		Standard: Multimeter Agilent 3458A Multifunction Calibrator PMP-C-003
	40 Hz to 1 kHz	0.073 mV/V	
	(1 to 20) kHz	0.072 mV/V	
	(20 to 50) kHz	0.073 mV/V	
	100 mV to 1V		
	40 Hz to 1 kHz	0.78 mV/V	
	(1 to 20) kHz	0.78 mV/V	
	(20 to 50) kHz	0.78 mV/V	
	(50 to 100) kHz	1.1 mV/V	
	(1 to 10) V		
	40 Hz to 1 kHz	9.5 mV/V	
	(1 to 20) kHz	12 mV/V	
(20 to 50) kHz	9.5 mV/V		
(50 to 100) kHz	9.5 mV/V		
(10 to 100) V			
40 Hz to 1 kHz	95 mV/V		
(1 to 20) kHz	120 mV/V		
(100 to 1 020) V			
40 Hz to 1 kHz	(1 300 + 0.21E) mV/V		
AC Voltage – Measuring equipment <sup>1,3</sup>	(1 to 5) kV 60 Hz	(-43 + 0.044E) mV/V	Standard: Multimeter Keysight 34461A High Voltage Probe P6015A Generator: High Voltage Test Hipotronics PMP-C-003
DC Current – Source equipment	(10 to 100) nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.076 nA 64 μA/A 35 μA/A 36 μA/A 0.028 μA 0.1 μA 0.12 μA 0.000 12 A	Multimeter Agilent 3458A PMP-C-002
DC Current <sup>1</sup> – Source equipment	(1 to 50) A	(-0.002 1 + 0.002 2I) A	Multimeter Agilent 3458A with Shunt Resistor Leeds & Northrup 4361 PMP-C-002



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Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current <sup>1</sup> – Measuring equipment	(10 to 100) nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.076 nA 64 μA/A 35 μA/A 36 μA/A 0.028μA 0.1 μA 0.12 μA 0.000 12 A	Standard: Multimeter Agilent 3458A Multifunction Calibrator PMP-C-002
DC Current <sup>1</sup> – Measuring equipment	(1 to 11) A (11 to 50) A	(-0.011 + 0.011 <i>I</i> ) A (0.14 - 0.000 54 <i>I</i> ) A	Multifunction Calibrator with Shunt Resistor PMP-C-002
DC Current <sup>1</sup> – Measuring equipment Clamp- On Ammeters	(50 to 550) A	(0.09 + 0.002 2 <i>I</i> ) A	Multifunction Calibrator And Coil PMP-C-002
AC Current – Source equipment	(1 to 10) mA (40 to 100) Hz 100 Hz to 1 kHz (10 to 100) mA (40 to 100) Hz 100 Hz to 1 kHz 100mA to 1 A (40 to 100) Hz 100 Hz to 1 kHz	(0.002 + 0.000 6 <i>I</i> ) mA (0.002 + 0.000 3 <i>I</i> ) mA  (0.02 + 0.000 6 <i>I</i> ) mA (0.02 + 0.000 3 <i>I</i> ) mA  (0.2 + 0.000 8 <i>I</i> ) mA (0.2 + 0.001 <i>I</i> ) mA	Multimeter Agilent 3458A PMP-C-004
AC Current – Source equipment	(1 to 50) A 60 Hz	0.000 7 A	Multimeter Agilent 3458A with Shunt Resistor PMP-C-004
AC Current <sup>1</sup> – Measuring equipment	(1 to 10) mA (40 to 100) Hz 100 Hz to 1 kHz (10 to 100) mA (40 to 100) Hz 100 Hz to 1 kHz 100mA to 1 A (40 to 100) Hz 100 Hz to 1 kHz	(0.002 + 0.000 6 <i>I</i> ) mA (0.002 + 0.000 3 <i>I</i> ) mA  (0.02 + 0.000 6 <i>I</i> ) mA (0.02 + 0.000 3 <i>I</i> ) mA  (0.2 + 0.000 8 <i>I</i> ) mA (0.2 + 0.001 <i>I</i> ) mA	Standard: Multimeter Agilent 3458A Multifunction Calibrator PMP-C-004
AC Current <sup>1</sup> – Measuring equipment	(1 to 11) A 60 Hz (11 to 50) A 60 Hz	(-0.000 9 + 0.001 5 <i>I</i> ) A  (0.14 - 0.000 5 <i>I</i> ) A	Multifunction Calibrator with Shunt Resistor PMP-C-004



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Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current <sup>1</sup> – Measuring equipment Clamp-On Ammeters	(50 to 550) A 60 Hz	(0.07 + 0.002 <i>I</i> ) A	Multifunction Calibrator And Coil PMP-C-004
DC Power Source equipment <sup>3</sup>	10.89 mW to 11 220 W	(-0.002 + 0.000 4 <i>J</i> ) mW	Multimeter Agilent 3458A with Shunt Resistor PMP-C-005
AC Power – Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 1	(0.01 + 0.001 2 <i>J</i> ) mW	Multimeter Agilent 3458A with Shunt Resistor PMP-C-005
AC Power – Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.9	(0.012 + 0.002 1 <i>J</i> ) mW	Multimeter Agilent 3458A with Shunt Resistor PMP-C-005
AC Power - Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.8	(0.009 2 + 0.003 <i>J</i> ) mW	Multimeter Agilent 3458A with Shunt Resistor PMP-C-005
DC Power Measuring equipment <sup>1,3</sup>	10.89 mW to 11 220 W	(-0.002 + 0.004 <i>J</i> ) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 1	(0.01 + 0.001 2 <i>J</i> ) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.9	(0.012 + 0.002 1 <i>J</i> ) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.8	(0.009 2 + 0.003 <i>J</i> ) mW	Multifunction Calibrator PMP-C-005
Resistance <sup>1</sup> – Measuring equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	20 μΩ/Ω 19 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 18 μΩ/Ω 61 μΩ/Ω 520 μΩ/Ω 290 μΩ/Ω	Multimeter Agilent 3458A Multifunction Calibrator PMP-C-006



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	20 μΩ/Ω 19 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 18 μΩ/Ω 61 μΩ/Ω 520 μΩ/Ω 290 μΩ/Ω	Agilent 3458A Multimeter PMP-C-006
Generation and Measuring Resistance Equipment <sup>1</sup> High value resistors and decade	100 kΩ to 1 TΩ up to 5 000 V Max	23 mΩ/Ω	Multifunction Calibrator Multimeter Agilent 3458A High Voltage Probe Tektronix P6015A PMP-C-006
DC Shunt Resistance Equipment <sup>1,3</sup>	0.5 mΩ to 1 Ω @ (1 to 50) A	(0.011 + 0.000 05R) mΩ	Multimeter Agilent 3458A Shunt resistor PMP-C-006
AC electrical Resistance at 60 Hz Shunt Resistance <sup>1,3</sup>	1 mΩ to 1 Ω (1 to 50) A	(0.011 + 0.000 05R) mΩ	Multimeter Agilent 3458A Shunt Resistor PMP-C-006
Capacitance <sup>1,3</sup> Source equipment	100 pF to 10 μF 50 Hz to 1 kHz 75 kHz to 30 MHz	0.042 mF/mF	LCR Meter PMP-C-009
Capacitance <sup>1,3</sup> – Measuring equipment	100pF to 1 μF 50 Hz to 1 kHz 75kHz to 30MHz	(0.07 + 0.000 001C) pF	Capacitance Decade PMP-C-009
D Factor <sup>1</sup> – Measuring equipment	(0.000 1 to 9 999) DF 50 Hz to 100 kHz (0.000 001 to 9.999 99) DF 75 kHz to 30 MHz	0.000 1 DF 0.000 5 DF	LCR Meter PMP-C-009
Inductance <sup>1</sup> – Source equipment	0.01 pH to 99 999 H @ 50 Hz to 100 kHz 0.001 nH to 99 999 H 75 kHz to 30 MHz	0.02 % of reading 0.05 % of reading	LCR Meter PMP-C-029
Inductance <sup>1,3</sup> – Measuring equipment	100 mH to 2 H	0.23 mH/H	Inductance Decade PMP-C-029
Q Factor – Measuring equipment <sup>1</sup>	(0.000 1 to 9 999) Q 50 Hz to 100 kHz (0.01 to 99 999.9) Q 75 kHz to 30 MHz	0.000 1 Q 0.000 5 Q	LCR Meter PMP-C-029



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermocouple Simulation <sup>1</sup>	Type B (600 to 800) °C	0.44 °C	Multifunction Calibrator PMP-C-020
	(800 to 1 000) °C	0.34 °C	
	(1 000 to 1 550) °C	0.3 °C	
	(1 550 to 1 820) °C	0.33 °C	
	Type C (0 to 150) °C	0.3 °C	
	(150 to 650) °C	0.26 °C	
	(650 to 1 000) °C	0.31 °C	
	(1 000 to 1 800) °C	0.5 °C	
	(1 800 to 2 316) °C	0.84 °C	
	Type E (-250 to -100) °C	0.5 °C	
	(-100 to -25) °C	0.16 °C	
	(-25 to 350) °C	0.14 °C	
	(350 to 650) °C	0.16 °C	
	(650 to 1 000) °C	0.21 °C	
	Type J (-250 to -100) °C	0.27 °C	
	(-100 to -30) °C	0.16 °C	
	(-30 to 150) °C	0.14 °C	
	(150 to 760) °C	0.17 °C	
	(760 to 1 200) °C	0.23 °C	
	Type K (-200 to -100) °C	0.33 °C	
	(-100 to -25) °C	0.18 °C	
	(-25 to 120) °C	0.16 °C	
	(120 to 1 000) °C	0.26 °C	
	(1 000 to 1 372) °C	0.4 °C	
Type L (-200 to -100) °C	0.37 °C		
(-100 to 800) °C	0.26 °C		
(800 to 900) °C	0.17 °C		
Type N (-200 to -100) °C	0.4 °C		
(-100 to -25) °C	0.22 °C		
(-25 to 120) °C	0.19 °C		
(120 to 410) °C	0.18 °C		
(410 to 1 300) °C	0.27 °C		



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermocouple Simulation <sup>1</sup>	Type R (0 to 250) °C	0.57 °C	Multifunction Calibrator PMP-C-020
	(250 to 400) °C	0.35 °C	
	(400 to 1000) °C	0.33 °C	
	(1000 to 1767) °C	0.4 °C	
	Type S (0 to 250) °C	0.47 °C	
	(250 to 1 000) °C	0.36 °C	
	(1 000 to 1 400) °C	0.37 °C	
	(1 400 to 1 767) °C	0.46 °C	
	Type T (-250 to -150) °C	0.63 °C	
	(-150 to 0) °C	0.24 °C	
	(0 to 120) °C	0.16 °C	
	(120 to 400) °C	0.14 °C	
	Type U (-200 to 0) °C	0.56 °C	
	(0 to 600) °C	0.27 °C	
RTD Simulation <sup>1</sup>	Cu 427 10 Ω (-100 to 260) °C	0.3 °C	Multifunction Calibrator PMP-C-020
	Pt 385, 100 Ω (-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	(630 to 800) °C	0.23 °C	
	Pt 3916, 100 Ω (-200 to -190) °C	0.25 °C	
	(-190 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.09 °C	
	(400 to 600) °C	0.1 °C	
	(600 to 630) °C	0.23 °C	



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RTD Simulation <sup>1</sup>	Pt 3926, 100 Ω		Multifunction Calibrator PMP-C-020
	(-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	Pt 385, 200 Ω		
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.04 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.12 °C	
	(300 to 400) °C	0.13 °C	
	(400 to 600) °C	0.14 °C	
	(600 to 630) °C	0.16 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.06 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.08 °C	
	(400 to 600) °C	0.09 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 1000 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
(260 to 300) °C	0.06 °C		
(300 to 400) °C	0.07 °C		
(400 to 600) °C	0.07 °C		
(600 to 630) °C	0.23 °C		
PtNi 385, 120 Ω (Ni120)			
(-80 to 0) °C	0.08 °C		
(0 to 100) °C	0.08 °C		
(100 to 260) °C	0.14 °C		



ANSI National Accreditation Board

Electrical – RF/Microwave

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Power – Measure <sup>1</sup> 50 Ω load	(-136 to +30) dBm (10 kHz to 13.2 GHz)	0.2 dB	Power Sensors, Power Meters PMP-C-008
	(-60 to +20) dBm (10 MHz to 6 GHz)	0.2 dB	
	(-35 to +20) dBm (10 MHz to 18 GHz)	0.2 dB	
	(-70 to -20) dBm (10 MHz to 18 GHz)	0.2 dB	
RF Power – Source <sup>1</sup> 50 Ohm load	(-127 to +13) dBm (100 kHz to 999 MHz)	0.2 dB	Power Sensors, Power Meters PMP-C-008
	(-120 to +8) dBm (2 to 18) GHz	0.2 dB	
	(-136 to +17) dBm (250 kHz to 4 GHz)	0.2 dB	
Phase Modulation <sup>1</sup> – Measure Carrier Frequency: 100 kHz to 13.2 MHz	200 Hz to 20 kHz	1 % of reading	Performance Spectrum Analyzer PMP-C-008
Amplitude Modulation <sup>1</sup> - Source and Measure Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz  Flatness – Measure	Depths: 5% to 99% 100 kHz to 10 MHz 10 MHz to 13.2 GHz	0.75 % of reading 1.5 % of reading	Performance Spectrum Analyzer Power Sensor Power Meters PMP-C-008
	10 MHz to 13.2 GHz Rate: 90 Hz to 10 kHz Depth (5 to 99) %	0.4 % of reading	
Frequency Modulation <sup>1</sup> - Source and Measure Modulation Rate: 20 Hz to 10 kHz 50 Hz to 200 kHz Modulation Distortion	250 kHz to 10 MHz 10 MHz to 13.2 GHz	1.5 % of reading	Performance Spectrum Analyzer PMP-C-008
	200 Hz to 300 kHz (-80 to -0.1) dB	1 % of reading	





ANSI National Accreditation Board

Length – Dimensional Metrology

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Outside Micrometers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(1 + 0.22L) \mu\text{m}$ $(39 + 8.6L) \mu\text{in}$	Gage Blocks Grade 2 Gage blocks Grade 3 PMP-C-014 Reference Standard NMX-CH-099-IMNC-2005
Depth Micrometers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(1 + 0.22L) \mu\text{m}$ $(39 + 8.6L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014
Dial and Digital Indicators <sup>1,3</sup>	Up to 101.6 mm Up to 4 in	$(0.88 + 0.083L) \mu\text{m}$ $(35 + 3.3L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014 NMX-CH-36-1994
Calipers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(9.6 + 0.089L) \mu\text{m}$ $(380 + 3.5L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014 NMX-CH-2:1993-SCFI
Height Measuring Equipment <sup>3</sup>	Up to 1 016 mm Up to 40 in	$(0.95 + 0.22L) \mu\text{m}$ $(38 + 8.6L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014
Optical Comparator <sup>2,3</sup> X, Y Axis – Linear Error of Indication	Up to 508 mm Up to 20 in	$(0.33 + 0.014L) \mu\text{m}$ $(13 + 14L) \mu\text{in}$	Glass Scales Gage Blocks Grade 2 Gage Block Grade 3 PMP-C-014
Optical Comparators <sup>2</sup> Angular	(0 to 360)°	0.019°	Angle block PMP-C-014
Optical Comparators <sup>2</sup> Magnification	5x 10x 20x 50x 100x	0.1 % of reading 0.051 % of reading 0.076 % of reading 0.051 % of reading 0.051 % of reading	Glass Ruler PMP-C-014
Graduated Rules and Tape Measures <sup>3</sup>	Up to 25 m Up to 985 in	0.076 $\mu\text{m}$ 3 $\mu\text{in}$	Interferometer PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999
Graduated Rules and Tape Measures <sup>3</sup>	Up to 25 m Up to 985 in	$(20 + 0.008L) \mu\text{m}$ $(790 + 0.33L) \mu\text{in}$	Digital Indicator Stainless Ruler 5X Amplification Lens PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999

**Length – Dimensional Metrology**

Hermsillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Coordinate Measuring Machines <sup>2,3,6</sup> X, Y, Z Axis - Linear Errors	Up to 4 in (4 to 25) in (25 to 80) in (80 to 315) in	17 µin 3.7 µin/in + 2.2 µin 3.9 µin/in – 2.7 µin 3.8 µin/in + 7.1 µin	PMP-C-014 (Linear Errors and Volumetric Performance): API Laser Interferometer
Coating Thickness <sup>1,3</sup>	Up to 6.35 mm Up to 0.25 in	(0.72 + 0.043L) µm (28 + 1.7L) µin	Digital Indicator Gage Blocks Grade 2 PMP-C-014
Roughness Measuring Devices <sup>1</sup>	Ra = 2.94 µm (116 µin) Ry = 366 µm (9.3 µin)	0.061 µm  0.2 µm	Roughness Standard (Ra, Ry) PMP-C-038
Levels <sup>1</sup>	(-4 125 to +4 125) ”	0.42 ”	Sine Bar PMP-C-014
Digital Levels <sup>1</sup>	(15, 30, 45, 90) °	0.42 ”	Angle Blocks PMP-C-014
Surface Plates <sup>1</sup> Local Area Flatness (Repeat Reading)	Up to (192 x 192) in	21 µin	Repeat-o-meter PMP-C-014
Surface Plates <sup>1</sup> Overall Flatness	Up to (192 x 192) in	11 µin	Interferometer PMP-C-014
Gages Blocks <sup>3</sup> Grade 1, 2 and 3 (FS)	(0.254 to 152.9) mm (0.01 to 6) in	(0.1 + 0.047L) µm (3.9 + 1.9L) µin	Gage Blocks Grade 1 FS Gage Blocks Comparator

**Mass and Mass Related**

Hermsillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dead Weights <sup>3</sup>	0.01 g 1 g 50 g 100 g 200 g 1000 g 10 kg 20 kg 50 kg	0.0084 mg 0.0088 mg 0.07 mg 0.16 mg 0.49 mg 8.3 mg 86 mg 92 mg 250 mg	ASTM Class 1 Stainless Weights and Digital Scale (comparator), (ABBA Method) PMP-C-021



ANSI National Accreditation Board

Mass and Mass Related

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances <sup>3,4</sup>	(0.001 to 1) g (1 to 60) g (60 to 200) g (200 to 1 000) g (1 to 10) kg (10 to 60) kg (60 to 100) kg (100 to 1 000) kg (1 000 to 2 500) kg	0.000 2 % reading + 0.011 mg 0.000 3 % reading + 0.01 mg 0.000 15 % reading + 0.11 mg 0.001 % reading – 1.6 mg 0.000 31 % reading + 5.3 mg 0.006 % reading – 0.56 mg 0.023 % reading – 11 g 0.015 % reading 0.015 % reading	ASTM class 1, OIML M2, NIST Class F weights PMP-C-012
Volumetric Recipients <sup>3</sup> (measuring cylinder, flask, beaker precipitate, special containers, containers volumetric of graduates collar, plastic, glass and metallic)	(10 to 100) µL (100 to 500) µL (500 to 1 000) µL 1 mL to 5 L (5 to 30) L	0.04 % of reading + 0.11 µL 0.032 % of reading + 0.16 µL -0.018 % of reading + 0.38 µL 0.02 % of reading 0.012 % of reading + 0.000 35 µL	Digital Balance PMP-C-033
Water Flow <sup>2,3</sup>	Up to 3 000 l/min	(0.9 + 0.005F) l/min	Water Flow Meter PMP-C-034
Torque Transducers, Tools, and Measuring Equipment <sup>1,3</sup>	(0.005 to 1) N·m (1 to 20) N·m (20 to 500) N·m	(0.000 001 + 0.004T) N·m (-0.004 + 0.007T) N·m (-0.02 + 0.008T) N·m	Dead Weights with Torque Arm PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque Transducers, Tools, and Measuring Equipment <sup>1,3</sup>	(67.8 to 678) N·m	(-0.11 + 0.004 8T) N·m	Torque Transducer Torque Meter PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque Transducers, Tools, and Measuring Equipment <sup>3</sup>	(678 to 1 355) N·m	(2.9 + 0.000 7T) N·m	Torque Transducer Torque Meter ETA Mk. V PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque Measuring Devices	(20.34 to 135.58) N·m (15 to 100) lbf·ft	0.036 % of reading + 0.17 N·m 0.036 % of reading + 0.13 lbf·ft	Dead Weights and Torque Arm PMP-C-015
Torque Measuring Devices	(135.58 to 1355.8) N·m (100 to 1 000) lbf·ft	0.08 % of reading + 0.11 N·m 0.08 % of reading + 0.08 lbf·ft	Dead Weights and Torque Arm PMP-C-015



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Mass and Mass Related

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Air Flow <sup>1,3</sup>	Up to 20 sl/min Up to 300 sl/min	(0.000 4 + 0.002 5A) sl/min (0.24 + 0.003 3A) sl/min	Air Flow Transducers PMP-C-030
Air Velocity <sup>3</sup> (Air Speed)	Up to 25 m/s	(0.18 + 0.008 7Y) m/s	Wind Tunnel with Anemometer Master PMP-C-030
Specific Gravity <sup>3</sup>	(0.62 to 3) SG	(0.023 - 0.004 2G) SG	Digital Scale Digital Thermometer PMP-C-032 NBS Circular 555
Vacuum meters <sup>1,3</sup> Generate / Measure	1 bar to 4 x 10 <sup>-3</sup> mbar (1 x 10 <sup>-3</sup> to 1 x 10 <sup>-9</sup> ) mbar	(0.000 05 + 0.013U) mbar 0.016U mbar	Pressure Sensor High Vacuum PMP-C-013
Rockwell Hardness Testers <sup>1</sup>	21.31 HRC 25.29 HRC 28.33 HRC 46.12 HRC 52.97 HRC 64.06 HRC 64.20 HRC  42.13 HRBW 42.66 HRBW 48.59 HRBW 71.42 HRBW 73.27 HRBW 73.43 HRBW 90.73 HRBW 91.51 HRBW 98.22 HRBW 98.40 HRBW	0.65 HRC 0.65 HRC 0.62 HRC 0.55 HRC 0.55 HRC 0.54 HRC 0.54 HRC  0.46 HRBW 0.37 HRBW 0.40 HRBW 0.29 HRBW 0.27 HRBW 0.31 HRBW 0.48 HRBW 0.41 HRBW 0.42 HRBW 0.42 HRBW	Indirect Verification using Test Blocks PMP-C-027
Superficial Rockwell Hardness Testers <sup>1</sup>	76.88 HR15TW 84.07 HR15TW 91.21 HR15TW	0.26 HR15TW 0.25 HR15TW 0.44 HR15TW	Indirect Verification using Test Blocks PMP-C-027
Shore Hardness Testers Spring Force Only Types A, B Types C, D	(0 to 100) Duro	0.58 Duro	Digital Scale PMP-C-027

**Mass and Mass Related**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force <sup>1</sup> (Tension and Compression)	Up to 0.1 N (0.1 to 1) N (1 to 2 500) N (2.5 to 44.5) kN	0.086 % of reading 0.015 % of reading + 0.000 071 N 0.026 % of reading 0.06 % of reading – 0.000 77 kN	Dead weights PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Force Transducers, Tools, and Measuring Equipment <sup>1,3</sup>	5.6 N to 6.67 kN (6.67 to 66.7) kN (45 to 222) kN	(0.008 + 0.002 <i>N</i> ) N (-0.005 + 0.002 <i>N</i> ) kN (0.000 08 + 0.001 <i>N</i> ) kN	Multifunction Calibrator and Multimeter PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Force Transducers, Tools, and Measuring Equipment <sup>1,3</sup> (compression)	(222 to 1 760) kN	(-0.003 7 + 0.01 <i>N</i> ) kN	Load Cell 250 Ton PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Relative Pressure <sup>3</sup>	Up to 500 Pa Up to 2 inH <sub>2</sub> O	(-0.000 034 + 0.003 7 <i>P</i> ) inH <sub>2</sub> O	Water Column PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC
Relative Pressure <sup>3</sup>	Up to 0.2 MPa Up to 30 psi  (Up to 20.7) MPa (Up to 3 000) psi	(-0.000 004 + 0.001 <i>P</i> ) psi  (-0.000 001 + 0.000 7 <i>P</i> ) psi	Pressure Calibrator PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC
Relative Pressure	(20.7 to 138) MPa (3 000 to 20 000) psi	5.3 psi	Pressure Sensor PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC

**Photometry and Radiometry**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Power Wavelength (nm)	(-38 to 20) dB (850 to 1 550) nm	1 dB 4 % of reading	Power Meter PMP-C-039
Light Intensity Meters <sup>3</sup>	(0.1 to 10 000) lux (10 k to 100 k) lux	(0.006 + 0.004 <i>x</i> ) lux (0.043 <i>x</i> ) lux	Minolta T-1 Illuminance Meter PMP-C-035



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**Photometry and Radiometry**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
UV Meters <sup>3</sup>	Up to 19.99 mW/cm <sup>2</sup> 20 mW to 19W/cm <sup>2</sup>	0.008 2 mW/cm <sup>2</sup> (-0.000 003 + 0.002z) W/cm <sup>2</sup>	Meter UV Dymax RCH-108-4 PMP-C-035

**Thermodynamic**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity <sup>1,3</sup>	(10 to 75) %RH (75 to 97) %RH	2.2 %RH 2.5 %RH	Reference Materials Humidity Meter Thermometer PMP-C-028
Temperature <sup>1</sup> – Furnace System Accuracy Test (SAT), Furnace Temperature Uniformity Test (TUS)	50 °C to 150 °C	0.15 % of reading + 0.16 °C	Temperature measurement system PMP-C-053 per AMS2750F
	150 °C to 300 °C	0.25 % of reading + 0.052 °C	Temperature measurement system PMP-C-053 per AMS2750F
	300 °C to 400 °C	1.6 % of reading - 3.8 °C	Temperature measurement system PMP-C-053 per AMS2750F
Temperature- Liquid in glass thermometers partial and full immersion	(-30 to 300) °C	0.000 33 % of reading + 0.045 °C	PMP-C-007 RTD and Multimeter
Temperature <sup>1</sup> – Temperature Sources, Installations, Ovens, Chambers, Dry Wells	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.003 8 % of reading + 0.028 °C 0.009 1 % of reading + 0.028 °C 0.008 2 % of reading + 0.030 °C	PMP-C-007 RTD and Multimeter
Temperature <sup>1</sup> – Temperature Sources and Chambers	(660 to 1 000) °C	0.088 % of reading + 1.3 °C	PMP-C-007 Thermocouple and Indicator
Temperature – RTD with Multimeter	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.003 8 % of reading + 0.034 °C 0.006 5 % of reading + 0.034 °C 0.006 3 % of reading + 0.035 °C	PMP-C-007 RTD, Multimeter and Temperature Dry Well and Bath Source

**Thermodynamic**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature <sup>1</sup> – Digital/Analog Temperature Measuring Devices with Thermocouple, RTD, Thermistors; Mechanical/ Analog Thermometers	(-20 to 0) °C (0 to 400) °C (400 to 600) °C	-0.09 % of reading + 0.031 °C 0.009 % of reading + 0.031 °C 0.035 % of reading - 0.071 °C	PMP-C-007 using RTD and Multimeter with Dry Well or Temperature Bath/Source.
Temperature <sup>1</sup> – Temperature Measuring Devices (digital, mechanical)	(600 to 1 000) °C	0.053 % of reading + 1.8 °C	PMP-C-007 using Thermocouple with Temperature reader. And High Temp.Oven
Temperature <sup>1</sup> – Environment Thermometers	(-20 to 0) °C (0 to 100) °C	0.5 % of reading + 0.14 °C 0.27 % of reading + 0.14 °C	PMP-C-007 using RTD and Multimeter
Temperature <sup>1</sup> – Temperature Sources, Installations, Ovens, Chambers, Dry Wells	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.003 8 % of reading + 0.028 °C 0.009 1 % of reading + 0.028 °C 0.008 2 % of reading + 0.030 °C	PMP-C-007 RTD and Multimeter

**Time and Frequency**

Hermosillo, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency _ Source and Measure	0.1 Hz to 18 GHz	1 x 10 <sup>-9</sup> Hz/Hz	GPS Receiver PMP-C-008
Timers and Stopwatches <sup>1</sup>	0.01 ms to 604 800 s	(2.5 x 10 <sup>-8</sup> +2.5 x 10 <sup>-9</sup> t)	Frequency Counter PMP-C-008

**DIMENSIONAL MEASUREMENT**

**3 Dimensional**

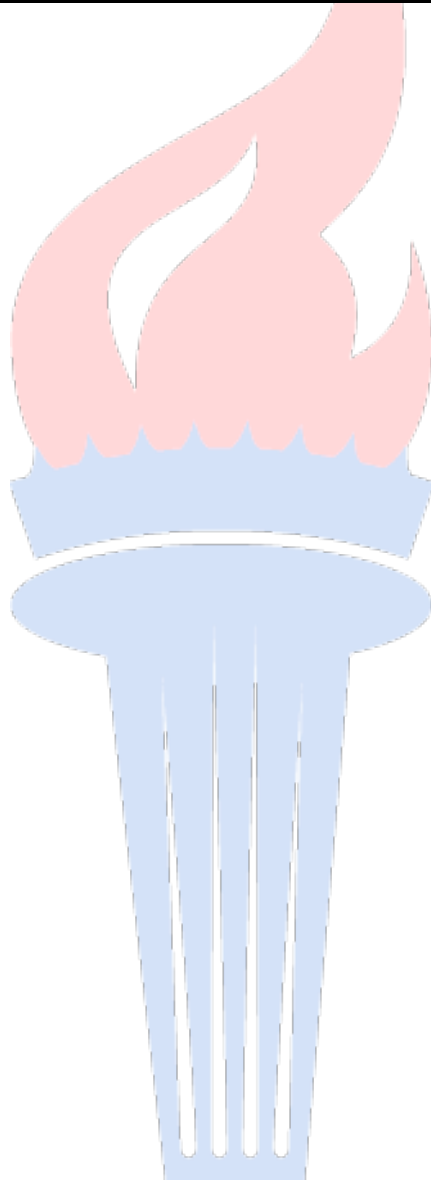
Hermosillo, Sonora

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
3D Dimensional Measurement	Up to 1 in (1 to 10) in (10 to 20) in (20 to 25) in	49 µin 5.5 µin/in + 44 µin 7.3 µin/in + 26 µin 8 µin/in + 10 µin	Coordinate Measuring Machine used as Reference Customer Drawings CMM Software

**3 Dimensional**

Hermosillo, Sonora

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
3D Dimensional Measurement	Up to 1 in (1 to 2) in (2 to 6) in	95 $\mu$ m 5 $\mu$ m/in + 90 $\mu$ m 11 $\mu$ m/in + 80 $\mu$ m	Vision System used as Reference Customer Drawings Vision Software







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### Services performed at satellite location

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### CALIBRATION

#### Acoustics and Vibration

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound Level Meters <sup>1</sup>	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter PMP-C-036
Sound Level Source Devices	(70 to 109) dB 100 Hz to 10 kHz	0.93 dB	Sound Level Meter PMP-C-036

#### Chemical Quantities

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity Meters <sup>5</sup>	1.77 µS/cm 9.8 µS/cm 84.6 µS/cm 501 µS/cm 1002 µS/cm 1413 µS/cm 10 070 µS/cm 99 880 µS/cm	0.13 µS/cm 0.10 µS/cm 0.82 µS/cm 2.4 µS/cm 3.3 µS/cm 5.2 µS/cm 31.2 µS/cm 310 µS/cm	Conductivity Solutions PMP-C-043
pH Meters <sup>5</sup>	4.00 pH 7.01 pH 10.00 pH	0.017 pH 0.013 pH 0.025 pH	pH Buffer Solutions PMP-C-040



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Electrical – DC/Low Frequency

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes <sup>1,3</sup> Leveled Sine Wave (Relative to 50 kHz)  Square Wave Signal 10 Hz to 10 kHz  Rise Time 5 mV to 2.5 V	5 mV to 5.5 V 50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz  $\pm (1 \text{ mV to } 6.6 \text{ V}) \text{ p-p}$ (50 $\Omega$ load)  $\pm (1 \text{ mV to } 130 \text{ V}) \text{ p-p}$ (1 M $\Omega$ load)  1 kHz to 10 MHz	1.5 mV 2.7 mV 3.9 mV  (0.000 08 + 0.001E) mV  (0.007 8 + 0.001 4E) mV  0.1 ns	Multifunction Calibrator PMP-C-010
DC High Voltage <sup>1,3</sup> - Source and Measure	(1000 to 5000) V	(-0.49 + 0.024E) V	Tektronix P6015A Multimeter PMP-C-001
AC High Voltage <sup>3</sup> - Source and Measure	700 V to 1000 V 60 Hz (1 to 35) kV 60 Hz	(-43 + 0.07E) V  (-18 + 0.032E) V	High Voltage Probe P6015A Multimeter PMP-C-003
DC Voltage – Source equipment	(1 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V 100 V to 1000 V	(0.035 + 0.000 11E) $\mu$ V (0.043 - 0.03E) $\mu$ V (0.033 + 0.027E) $\mu$ V (0.38 + 0.013E) $\mu$ V (9.7 + 0.007 8E) $\mu$ V	Multimeter Agilent 3458A Multifunction Calibrator PMP-C-001
DC Voltage – Measuring equipment <sup>1</sup>	(1 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V 100 V to 1000 V	(0.035 + 0.000 11E) $\mu$ V (0.043 - 0.03E) $\mu$ V (0.033 + 0.027E) $\mu$ V (0.38 + 0.013E) $\mu$ V (9.7 + 0.007 8E) $\mu$ V	Multimeter Agilent 3458A Multifunction Calibrator PMP-C-001
AC Voltage – Source and Measure	(1 to 100) mV (50 Hz to 100kHz) 100 mV to 1V 50 Hz to 100kHz	(0.012+0.000 2E) $\mu$ V  (0.052+0.094E) $\mu$ V	Multimeter Agilent 3458A Multifunction Calibrator PMP-C-003
AC Voltage – Source and Measuring Equipment	(1 to 10) V 50 Hz to 100kHz (10 to 100) V 50 Hz to 50kHz (100 to 700) V 50 Hz to 1 kHz	(0.12 + 0.094E) $\mu$ V  (6.6 + 1E) $\mu$ V  (-50 + 2.4E) $\mu$ V	Multimeter Agilent 3458A Multifunction Calibrator PMP-C-003

**Electrical – DC/Low Frequency**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source and Measuring Equipment	(700 to 5 000) V 60 Hz	$(-9 + 0.02E) V$	Multimeter High Voltage Probe P6015A, PMP-C-003
DC Current – Source and Measuring equipment	(10 to 100) nA 0.1 $\mu$ A to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA  (10 to 100) mA 100 mA to 1 A	$(-0.28 + 0.012A) nA$ $(0.001 - 0.001 1A) \mu A$ $(0.000 027 + 0.000 029A) \mu A$ $(0.000 03 + 0.000 028A) \mu A$ $(0.000 000 27 + 0.000 025A) mA$ $(0.000 000 003 9 + 0.000 026A) mA$ $(-0.000 14 + 0.000 043A) mA$ $(-0.000 007 2 + 0.000 13A) A$	Multimeter Agilent 3458A PMP-C-002
DC Current <sup>1</sup> – Source and Measuring equipment	(1 to 11) A (11 to 50) A	$(-0.000 64 + 0.000 59A) A$ $(0.004 1 + 0.000 11A) A$	Multifunction Calibrator with Shunt Resistor PMP-C-002
DC Current <sup>1</sup> – Measuring equipment Clamp-On Ammeters	(50 to 550) A	$(-0.11 + 0.002 8A) A$	Multifunction Calibrator And Coil PMP-C-002
AC Current – Source and Measuring equipment	(1 to 10) mA 40 Hz to 1 kHz (10 to 100) mA 40 Hz to 1 kHz 100 mA to 1 A 40 Hz to 1 kHz	$(0.000 000 15 + 0.000 8A) mA$ $(-0.007 2 + 0.000 89I) mA$ $(-0.000 018 + 0.001I) A$	Multimeter Multifunction Calibrator PMP-C-004
AC Current – Source equipment	(1 to 50) A 60 Hz	$(0.006 - 0.000 076I) A$	Multimeter Shunt Resistor PMP-C-004
AC Current <sup>1</sup> – Measuring equipment	(1 to 11) A 60 Hz (11 to 100) A 60 Hz	$(0.000 4 + 0.001I) A$ $(0.008 - 0.000 016I) A$	Multifunction Calibrator with Shunt Resistor PMP-C-004
AC Current <sup>1</sup> – Measuring equipment Clamp-On Ammeters	(50 to 550) A 60 Hz	$(0.052+0.002 7I) A$	Multifunction Calibrator And Coil PMP-C-004
DC Power Source equipment <sup>3</sup>	10.89 mW to 11 220 W	$(-0.002 + 0.00 04J) mW$	Multimeter and Shunt Resistor PMP-C-005
AC Power – Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 1	$(0.01 + 0.001 2J) mW$	Multimeter and Shunt Resistor PMP-C-005



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Electrical – DC/Low Frequency

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.9	(0.012 + 0.002 1J) mW	Multimeter and Shunt Resistor PMP-C-005
AC Power - Source equipment <sup>3</sup>	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.8	(0.009 2 + 0.003J) mW	Multimeter and Shunt Resistor PMP-C-005
DC Power Measuring equipment <sup>1,3</sup>	10.89 mW to 11 220 W	(-0.002 + 0.000 4J) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 1	(0.01 + 0.001 2J) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.9	(0.012 + 0.002 1J) mW	Multifunction Calibrator PMP-C-005
AC Power <sup>1,3</sup> – Measuring equipment	0.89 mW to 11 220 W @ 60 Hz, P.F. = 0.8	(0.009 2 + 0.003J) mW	Multifunction Calibrator PMP-C-005
Resistance <sup>1</sup> – Measuring equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	(0.000 003+ 0.000 022R) Ω (0.000 031+ 0.000 019R) Ω (0.000 000 58+ 0.000 012R) kΩ (0.000 000 0092+ 0.000 013R) kΩ (0.000 000 05+ 0.000 013R) kΩ (-0.000 000 54+ 0.000 02R) MΩ (-0.000 039+ 0.000 067R) MΩ (-0.000 006 2+ 0.000 063R) MΩ (-0.000 008 9+ 0.0002 9R) GΩ	Multimeter Multifunction Calibrator PMP-C-006
Resistance – Source equipment	(1 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	(0.000 003+ 0.000 022R) Ω (0.000 031+ 0.000 019R) Ω (0.000 0005 8+ 0.000 012R) kΩ (0.000 0000 092+ 0.000 013R) kΩ (0.000 000 05+ 0.000 013R) kΩ (-0.000 000 54+ 0.000 02R) MΩ (-0.000 039+ 0.000 067R) MΩ (-0.000 006 2+ 0.000 063R) MΩ (-0.000 008 9+ 0.0002 9R) GΩ	Multimeter PMP-C-006
Generation and Measuring Resistance Equipment <sup>1</sup> High value resistors and decade	100 kΩ to 10 GΩ up to 5 000 V Max	(-0.012 + 0.026R) GΩ	Multifunction Calibrator Multimeter Agilent 3458A High Voltage Probe Tektronix P6015A PMP-C-006
DC Shunt Resistance Equipment <sup>1,3</sup>	0.5 mΩ to 1 Ω @ (1 to 50) A	(-0.017 + 0.000 59R) mΩ	Multimeter Agilent 3458A Shunt resistor PMP-C-006



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Electrical – DC/Low Frequency

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC electrical Resistance at 60 Hz Shunt Resistance <sup>1,3</sup>	0.5 mΩ to 1 Ω (1 to 50) A	(-0.017 + 0.000 59R) mΩ	Multimeter Agilent 3458A Shunt resistor PMP-C-006
Capacitance <sup>1,3</sup> Source equipment	100 pF to 10 μF 50 Hz to 1 kHz 75 kHz to 30 MHz	0.42 mF/F	LCR Meter PMP-C-009
Capacitance <sup>1,3</sup> – Measuring equipment	100 pF to 1 μF 50 Hz to 1 kHz 75 kHz to 30MHz	(0.07 + 0.000 001C) pF	Capacitance Decade PMP-C-009
Thermocouple Simulation <sup>1</sup>	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 (-250 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	0.44 °C 0.34 °C 0.3 °C 0.33 °C 0.3 °C 0.26 °C 0.31 °C 0.5 °C 0.84 °C 0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C 0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C 0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C	Multifunction Calibrator PMP-C-020



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Electrical – DC/Low Frequency

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermocouple Simulation <sup>1</sup>	Type L		Multifunction Calibrator PMP-C-020
	(-200 to -100) °C	0.37 °C	
	(-100 to 800) °C	0.26 °C	
	(800 to 900) °C	0.17 °C	
	Type N		
	(-200 to -100) °C	0.4 °C	
	(-100 to -25) °C	0.22 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 410) °C	0.18 °C	
	(410 to 1 300) °C	0.27 °C	
	Type R		
	(0 to 250) °C	0.57 °C	
	(250 to 400) °C	0.35 °C	
	(400 to 1000) °C	0.33 °C	
	(1000 to 1767) °C	0.4 °C	
	Type S		
(0 to 250) °C	0.47 °C		
(250 to 1 000) °C	0.36 °C		
(1 000 to 1 400) °C	0.37 °C		
(1 400 to 1 767) °C	0.46 °C		
Type T			
(-250 to -150) °C	0.63 °C		
(-150 to 0) °C	0.24 °C		
(0 to 120) °C	0.16 °C		
(120 to 400) °C	0.14 °C		
Type U			
(-200 to 0) °C	0.56 °C		
(0 to 600) °C	0.27 °C		
RTD Simulation <sup>1</sup>	PtNi 385, 120 Ω Ni120)		Multifunction Calibrator PMP-C-020
	(-80 to 0) °C	0.08 °C	
	(0 to 100) °C	0.08 °C	
	(100 to 260) °C	0.14 °C	
	Cu 427 10 Ω		
(-100 to 260) °C	0.3 °C		



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Electrical – DC/Low Frequency

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RTD Simulation <sup>1</sup>	Pt 385, 100 Ω		Multifunction Calibrator PMP-C-020
	(-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	(630 to 800) °C	0.23 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.25 °C	
	(-190 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.09 °C	
	(400 to 600) °C	0.1 °C	
(600 to 630) °C	0.23 °C		
Pt 385, 200 Ω			
(-200 to -80) °C	0.04 °C		
(-80 to 0) °C	0.04 °C		
(0 to 100) °C	0.04 °C		
(100 to 260) °C	0.05 °C		
(260 to 300) °C	0.12 °C		
(300 to 400) °C	0.13 °C		
(400 to 600) °C	0.14 °C		
(600 to 630) °C	0.16 °C		

**Electrical – DC/Low Frequency**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RTD Simulation <sup>1</sup>	Pt 385, 500 Ω		Multifunction Calibrator PMP-C-020
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.06 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.08 °C	
	(400 to 600) °C	0.09 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 1000 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
(260 to 300) °C	0.06 °C		
(300 to 400) °C	0.07 °C		
(400 to 600) °C	0.07 °C		
(600 to 630) °C	0.23 °C		

**Length – Dimensional Metrology**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Outside Micrometers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(0.26 + 0.23L) \mu\text{m}$ $(10 + 9.2L) \mu\text{in}$	Gage Blocks Grade 2 Gage blocks Grade 3 PMP-C-014 Reference Standard NMX-CH-099-IMNC-2005
Depth Micrometers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(0.3 + 0.23L) \mu\text{m}$ $(12 + 9.2L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014
Dial and Digital Indicators <sup>1,3</sup>	Up to 101.6 mm Up to 4 in	$(0.25 + 0.14L) \mu\text{m}$ $(9.7 + 5.3L) \mu\text{in}$	Calibration Tester Dial Gage Tester PMP-C-014 NMX-CH-36-1994
Calipers <sup>1,3</sup>	Up to 1 016 mm Up to 40 in	$(2.3 + 0.2L) \mu\text{m}$ $(89 + 7.8L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014 NMX-CH-2:1993-SCFI



**Length – Dimensional Metrology**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Height Measuring Equipment <sup>3</sup>	Up to 1 016 mm Up to 40 in	$(0.81 + 0.22L) \mu\text{m}$ $(32 + 8.5L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3 PMP-C-014
Optical Comparator <sup>2,3</sup> X, Y Axis – Linear Error of Indication	Up to 508 mm Up to 20 in	$(0.33 + 0.014L) \mu\text{m}$ $(13 + 14L) \mu\text{in}$	Glass Scales Gage Blocks Grade 2 Gage Block Grade 3 PMP-C-014
Optical Comparators <sup>2</sup> Angular	$(0 \text{ to } 360)^\circ$	0.019°	Angle block PMP-C-014
Optical Comparators <sup>2</sup> Magnification	5x 10x 20x 50x 100x	0.1 % of reading 0.051 % of reading 0.076 % of reading 0.051 % of reading 0.051 % of reading	Glass Ruler PMP-C-014
Graduated Rules and Tape Measures <sup>3</sup>	Up to 25 m Up to 985 in	$(0.019 + 0.000\ 005L) \mu\text{m}$ $(0.73 + 0.000\ 2L) \mu\text{in}$	Laser Interferometer PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999
Graduated Rules and Tape Measures <sup>3</sup>	Up to 2 032 mm Up to 80 in	0.24 mm 0.009 4 in	Digital Indicator Stainless Ruler 5X Amplification Lens PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999
Coating Thickness <sup>1,3</sup>	Up to 1.5 mm Up to 0.06 in	$(0.001\ 9 - 0.000\ 7L) \text{ mm}$ $(0.000\ 075 + 0.000\ 028L) \text{ in}$	Digital Indicator Gage Blocks Grade 2 (GGG-G-15C) PMP-C-014
Surface Roughness Measuring Devices <sup>1</sup>	2.99 $\mu\text{m}$ Ra 118 $\mu\text{in}$ Ra 0.4 $\mu\text{m}$ Ry 16 $\mu\text{in}$ Ry	0.061 $\mu\text{m}$ 2.4 $\mu\text{in}$ 0.061 $\mu\text{m}$ 2.4 $\mu\text{m}$	Mitutoyo Roughness Standards (Ra, Ry) Mitutoyo PMP-C-038
Levels <sup>1</sup>	$(0 \text{ to } 60)^\circ$	0.000 7°	Surface Plate Sine Bar, Gage Blocks PMP-C-014
Surface Plates <sup>1</sup> Local Area Flatness (Repeat Reading)	Up to (192 x 192) in	$(37+0.02L) \mu\text{in}$	Repeat-o-meter PMP-C-014

**Length – Dimensional Metrology**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pin/Plug Gauges	(0.254 to 101.6) mm (0.01 to 4) in	0.36 $\mu$ m 14 $\mu$ in	Gage Blocks Grade 2 Universal measuring machine PMP-C-014
Thread Plug Gage Pitch Diameter	M 1.6 x 0.35 to M 100 x 6 (0-80 to 4-12)	5.1 $\mu$ m 200 $\mu$ in	Super micrometer Gage block set grade 2 PMP-C-014
Thread Plug Gage Major Diameter	M 1.6 x 0.35 to M 100 x 6 (0-80 to 4-12)	1.8 $\mu$ m 71 $\mu$ in	Super micrometer Gage block set grade 2 PMP-C-014
Protractors	(0 to 360) °	0.059 °	Angle Block PMP-C-014
Bore Gage	(0.762 to 304.8) mm (0.03 to 12) in	3.1 $\mu$ m 120 $\mu$ in	Ring gages Vision Microscope PMP-C-014
Radius Gage	(0.254 to 25.4) mm (0.01 to 1) in	4.1 $\mu$ m 160 $\mu$ in	Vision Microscope PMP-C-014
Angle Blocks	(0 to 90) °	0.014 °	Vision Microscope PMP-C-014
Ring Gages	(12.7 to 101.6) mm (0.5 to 4) in	0.36 $\mu$ m 14 $\mu$ in	Universal measuring machine PMP-C-014

**Mass and Mass Related**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances <sup>3,4</sup>	(0.001 to 1) g (1 to 60) g (60 to 200) g (200 to 1 000) g (1 to 10) kg (10 to 60) kg (60 to 100) kg (100 to 1 000) kg (1 000 to 2 500) kg	0.000 2 % reading + 0.011 mg 0.000 3 % reading + 0.01 mg 0.000 15 % reading + 0.11 mg 0.001 % reading – 1.6 mg 0.000 31 % reading + 5.3 mg 0.006 % reading – 0.56 mg 0.023 % reading – 11 g 0.015 % reading 0.015 % reading	ASTM class 1, OIML M2, NIST Class F weights PMP-C-012



ANSI National Accreditation Board

Mass and Mass Related

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Volumetric Recipients <sup>3</sup> (measuring cylinder, flask, beaker precipitate, special containers, containers volumetric of graduates collar, plastic, glass and metallic)	(10 to 100) µL (100 to 500) µL (500 to 1 000) µL 1 mL to 5 L (5 to 30) L	0.04 % of reading + 0.11 µL 0.032 % of reading + 0.16 µL -0.018 % of reading + 0.38 µL 0.02 % of reading 0.012 % of reading + 0.000 35 µL	Digital Balance PMP-C-033
Torque Transducers, Tools, and Measuring Equipment <sup>1,3</sup>	(0.005 to 1) N·m (1 to 20) N·m (20 to 500) N·m (500 to 1 000) N·m	(0.0008 4 + 0.003 7T) N·m (0.003 1 + 0.007 6T) N·m (-0.13 + 0.008 4T) N·m (3.3+0.001 9T) N·m	Dead Weights with Torque Arm & Torque Transducer PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Torque Measuring Devices	(20.34 to 135.58) N·m 15 lbf·ft to 100 lbf·ft	0.036 % of reading + 0.17 N·m 0.036 % of reading + 0.13 lbf·ft	Dead Weights and Torque Arm PMP-C-015
	(135.58 to 677.9) N·m 100 lbf·ft to 500 lbf·ft	(0.011 % of reading + 0.075 N·m 0.11 % of reading + 0.055 lbf·ft	Dead Weights and Torque Arm PMP-C-015
	(677.9 to 1 355.8) N·m 500 lbf·ft to 500 lbf·ft	(0.06 % of reading + 0.38 N·m (0.06 % of reading + 0.28 lbf·ft	Dead Weights and Torque Arm PMP-C-015
Specific Gravity <sup>3</sup>	(0.62 to 3) SG	(0.005 6 + 0.000 2G) SG	Digital Scale Digital Thermometer PMP-C-032 NBS Circular 555
Rockwell Hardness Testers <sup>1</sup>	21.31 HRC 25.29 HRC 28.33 HRC 46.12 HRC 52.97 HRC 64.06 HRC 64.20 HRC	0.64 HRC 0.64 HRC 0.62 HRC 0.55 HRC 0.54 HRC 0.53 HRC 0.53 HRC	Indirect Verification using Test Blocks PMP-C-027

**Mass and Mass Related**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers <sup>1</sup>	42.13 HRBW 42.66 HRBW 48.59 HRBW 71.42 HRBW 73.27 HRBW 73.43 HRBW 90.73 HRBW 91.51 HRBW 98.22 HRBW 98.40 HRBW	0.46 HRBW 0.37 HRBW 0.4 HRBW 0.29 HRBW 0.27 HRBW 0.31 HRBW 0.48 HRBW 0.41 HRBW 0.42 HRBW 0.42 HRBW	Indirect Verification using Test Blocks PMP-C-027
Shore Hardness Testers Spring Force Only Types A, B Types C, D	(0 to 100) Duro	0.058 Duro	Digital Scale PMP-C-027
Force <sup>1</sup> (Tension and Compression)	Up to 0.1 N (0.1 to 1) N (1 to 2 500) N (2.5 to 44.5) kN	0.086 % of reading 0.015 % of reading + 0.000 071 N 0.026 % of reading 0.06 % of reading – 0.000 77 kN	Dead Weights PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Force Transducers, Tools, and Measuring Equipment <sup>1,3</sup>	5.5 N to 6.67 kN (6.67 to 66.7) kN (45 to 222) kN	(0.66 + 0.002 2N) N (-1.7 + 0.002 5N) N (120 + 0.002 3N) N	Load Cell, Fluke 5500A Calibrator HP 3458A Multimeter, PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI
Relative Pressure <sup>3</sup>	Up to 0.2 MPa Up to 30 psi  (0.2 to 20.7) MPa (30 to 3 000) psi	(0.002 3 + 0.000 11P) psi  (0.037 + 0.000 1P) psi	Pressure Calibrator PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC
Relative Pressure	(20.7 to 138) MPa (3 000 to 20 000) psi	9.1 psi	Pressure Sensor PMP-C-013 NMX-CH-058-1994 & NMX-CH-060-2006-IMNC



ANSI National Accreditation Board

**Photometry and Radiometry**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Light Intensity Meters <sup>3</sup>	(0.1 to 10 000) lux (10 000 to 100 000) lux	(-75 + 0.07x) lux (-890 + 0.11x) lux	Illuminance Meter PMP-C-035
UV Meters <sup>3</sup>	Up to 19.99 mW/cm <sup>2</sup> 19.99 mW to 30 W/cm <sup>2</sup>	(0.000 2 + 0.05z) mW/cm <sup>2</sup> (0.002 5 + 0.04z) W/cm <sup>2</sup>	UV Meter PMP-C-035

**Thermodynamic**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity <sup>1,3</sup>	(10 to 75) %RH (75 to 97) %RH	2.2 %RH 2.5 %RH	Reference Materials, Humidity Meter Thermometer PMP-C-028
Temperature <sup>1</sup> – Furnace System Accuracy Test (SAT), Furnace Temperature Uniformity Test (TUS)	(50 to 150) °C	0.15 % of reading + 0.16 °C	Temperature measurement system PMP-C-053 per AMS2750F
	(150 to 300) °C	0.25 % of reading + 0.052 °C	Temperature measurement system PMP-C-053 per AMS2750F
	(300 to 400) °C	1.6 % of reading - 3.8 °C	Temperature measurement system PMP-C-053 per AMS2750F
Temperature <sup>1</sup> – Temperature Sources, Installations, Ovens, Chambers, Dry Wells Temperature <sup>1</sup> – Temperature Sources and Chambers	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.003 8 % of reading + 0.028 °C 0.009 1 % of reading + 0.028 °C 0.008 2 % of reading + 0.03 °C	PMP-C-007 RTD and Multimeter
	(660 to 1 000) °C	0.088 % of reading + 1.3 °C	PMP-C-007 Thermocouple and Indicator
Temperature – RTD with Multimeter	(-80 to 0) °C (0 to 232) °C (232 to 660) °C	0.003 8 % of reading + 0.034 °C 0.006 5 % of reading + 0.034 °C 0.006 3 % of reading + 0.035 °C	PMP-C-007 RTD, Multimeter and Temperature Dry Well and Bath Source

**Thermodynamic**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature <sup>1</sup> – Digital/Analog Temperature Measuring Devices with Thermocouple, RTD, Thermistors; Mechanical/ Analog Thermometers	(-20 to 0) °C (0 to 400) °C (400 to 600) °C	-0.09 % of reading + 0.031 °C 0.009 % of reading + 0.031 °C 0.035 % of reading - 0.071 °C	PMP-C-007 using RTD and Multimeter with Dry Well or Temperature Bath/Source.
Temperature <sup>1</sup> – Temperature Measuring Devices (digital, mechanical)	(600 to 1 000) °C	0.053 % of reading + 1.8 °C	PMP-C-007 using Thermocouple with Temperature reader. And High Temp Oven
Temperature <sup>1</sup> – Environment Thermometers	(-20 to 0) °C (0 to 100) °C	0.5 % of reading + 0.14 °C 0.27 % of reading + 0.14 °C	PMP-C-007 using RTD and Multimeter

**Time and Frequency**

Guaymas, Sonora

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency _ Source and Measure	0.1 Hz to 18 GHz	1 x 10 <sup>-9</sup> Hz/Hz	GPS Receiver PMP-C-008
Timers and Stopwatches	0.01 ms to 604 800 s	(2.5 x 10 <sup>-8</sup> +2.5 x 10 <sup>-9</sup> t)	Frequency Counter PMP-C-008

## DIMENSIONAL MEASUREMENT

### 3 Dimensional

Guaymas, Sonora

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
3D Dimensional Measurement	Up to 1 in (1 to 10) in (10 to 20) in (20 to 25) in	9 $\mu$ m 5.5 $\mu$ m/in + 44 $\mu$ m 7.2 $\mu$ m/in + 26 $\mu$ m 8 $\mu$ m/in + 10 $\mu$ m	Coordinate Measuring Machine used as Reference Customer Drawings and CMM Software
3D Dimensional Measurement	Up to 1 in (1 to 2) in (2 to 6) in	95 $\mu$ m 5 $\mu$ m/in + 90 $\mu$ m 10 $\mu$ m/in + 80 $\mu$ m	Vision System used as Reference Customer Drawings and Vision Software

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:

- On-site calibration service is available for this parameter, 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.
- This parameter is only available on-site and not in the laboratory's facilities.
- Symbols of applied units in the above scope of capabilities:  $a$  = applied to acceleration in g-force;  $A$  = applied air flow in standard liters/minute,  $c$  = applied temperature in degrees C,  $C$  = applied electromagnetic capacitance in Farads,  $E$  = applied electromagnetic voltage in Volts,  $f$  = applied flow in liters/minute;  $F$  = applied water flow in liters/minute,  $G$  = applied in terms of specific gravity;  $h$  = applied Relative Humidity in percent RH;  $H$  = applied inductance in Henrys;  $I$  = applied current in amperes,  $L$  = length in either mm or inches as applicable,  $N$  = applied to force in Newtons,  $M$  = magnetic flux density in teslas,  $P$  = applied pressure in Pascal or psi as appropriate;  $t$  = applied time in seconds;  $U$  = applied vacuum in millibars;  $V$  = applied volume in liters;  $W$  = applied weight in grams;  $x$  = applied light intensity in lux;  $Y$  = applied air velocity or air speed in meters/second;  $v$  = applied volume in milli-liters or  $cm^3$ ;  $V$  = applied volume in liters,  $w$  = applied ultra-violet light in Watts/ $cm^2$ ,  $W$  = applied weight in grams or milli-grams;  $\chi$  = applied light intensity in lux;  $T$  = applied torque in Newton-meters,  $y$  = applied Air Velocity in m/s;  $z$  = applied viscosity in centi-poise-cP and ( $\Delta$ ) is applied particle counters in particle size/ $ft^3$ ,  $Y$  = applied air velocity or air speed in meters/second; and  $z$  = applied Ultraviolet light in Watts per centimeter squared.
- The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The uncertainties presented here do not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
- Nominal values are approximate.
- Volumetric performance test (reproducibility) is done using a non-calibrated ball length bar per ASME B89.4.1-1997
- This scope is formatted as part of a single document including Certificate of Accreditation No. ACT-1890.



R. Douglas Leonard Jr., VP, PILR SBU