



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid to: July 7, 2010

Certificate Number: AC – 1338

I. Electromagnetic – DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance – Source 1 kHz	100 pF to 1.111 µF	0.08 % of Reading	Capacitance Decade	PMP-C-009
Capacitance – Measure 100 Hz to 1 kHz	1 pF to 11 µF	0.08% of Reading	Capacitance Bridge	
Inductance- Source	100 mH	0.5 % of Reading	Standard Inductor	PMP-C-029

II. Electromagnetic – RF/Microwave

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
High Frequency Power	1µW to 10 mW @ 1 MHz to 18 GHz	1 % of Reading	Power Meter HP436A Power Sensor HP478A Function Generator HP8656B	PMP-C-010

III. Time and Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Time & Frequency	10 MHz	6 parts in 10 ¹⁰	NIST Frequency Receiver	PMP-C-008



IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Relative Humidity	32.8 % RH 75.3 % RH	3.0 % of reading	Reference Materials Humidity Meter Thermometer	PMP-C-028

V. Mechanical

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Dead Weights	0.01 g to 200 g	(0.058 + 0.00011W) mg	Class 1 Stainless weights	PMP-C-021 NIST Handbook 44 OIML R111 ABBA Method
	(0.2 to 3) kg	(0.33 + 2.04W) mg	Class F Cast Iron Weights	
	(3 to 60) kg	(90.2 + 32W) mg	Digital Scale as Comparison Element	
Scales and Balances	Up to 20 kg	(0.052 + 58W) mg	Class 1 Stainless Weights	PMP-C-012 NOM-010-SCFI-1994, NMX-CH-31-1982, NMX-CH-047-1996-IMNC & NMX-CH-059-1996-IMNC
	(20 to 1 000) kg	(10.7 + 0.59W) g	Class F Cast Iron Weights	
Volume	(1 to 200) ml	(44.5 + 0.053V) μ l	Dead Weights Digital Scale Digital Thermohygrometer Digital Barometer	PMP-C-033 NOM-042-SCFI-1997 & NMX-CH-049-1998-IMNC
	(200 to 3 000) ml	(-6.8 + 0.034V) ml		
	(3 000 to 15 000) ml	(63.3 + 0.011V) ml		
Water Flow	Up to 40 l/min	0.013 l/min	Water Flow Meter	PMP-C-034

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Torque Transducers, Tools, and Measuring Equipment	(0.005 to 1) Nm (1 to 20) Nm (20 to 500) Nm (67.8 to 678) Nm	0.42 % of Reading 0.44 % of Reading 0.65 % of Reading 0.42 % of Reading	Dead Weights with Torque Arm Torque Transducer Torque Meter TM-200	PMP-C-015 CNM-MMF-PT-002 & EA-10/14
Air Flow	Up to 20 sl/min Up to 200 sl/min	0.33 % of Reading 0.42 % of Reading	Air Flow Transducers	PMP-C-030
Specific Gravity	(0.62 to 3) SG	0.3 % of Reading	Dead Weights Digital Scale Digital Thermometer	PMP-C-032 NBS Circular 555
Vacuum	Up to 207 kPa (Up to 30 psi)	0.1 % of Full Scale	Vacuum Meter Vacuum Pump	PMP-C-027
Normal Rockwell Hardness	HRA, HRB & HRC	1.1 HR	Indirect Verification using Test Blocks	PMP-C-027
Superficial Rockwell Hardness	15N, 30N, 45N, 15T, 30T & 45T	1.2 HR	Indirect Verification using Test Blocks	PMP-C-027
Micro Rockwell Hardness	Knoop & Vickers	2 % of Reading	Indirect Verification using Test Blocks	PMP-C-027
Shore Hardness	A, B, C, D	0.9 POH	Dead Weights Digital Scale	PMP-C-027
Sound	114 dBm 500 Hz, 1 kHz, 2 kHz	1.0 dB	Sound Generator Sound Level Meter	PMP-C-036
Force Transducers, Tools, and Measuring Equipment	(0.1 to 5.5) N 5.6 N to 2.5 kN (2.5 to 45) kN (45 to 445) kN	0.54 % of Reading 0.26 % of Reading 0.24 % of Reading 0.22 % of Reading	Dead weights Load Cell Fluke 5500A HP 3458A	PMP-C-011 NMX-CH-27-1994-SCFI & NMX-CH-023-1994-SCFI

VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Outside Micrometers	Up to 609.6 mm (Up to 24 in)	$(1.4 + 0.016L) \mu\text{m}$ $(54.3 + 15.9L) \mu\text{in}$	Gage Blocks Grade 2 Gage blocks Grade 3	PMP-C-014 Reference Standard NMX-CH-99:1993-SCFI
Depth Micrometers	Up to 609.6 mm (Up to 24 in)	$(1.4 + 0.016L) \mu\text{m}$ $(54.3 + 15.9L) \mu\text{in}$	Gage Blocks Grade 2 Gage Blocks Grade 3	PMP-C-014
Dial and Digital Indicators	Up to 101.6 mm (Up to 4 in)	$(0.58 + 0.0033L) \mu\text{m}$ $(28.8 + 3.3L) \mu\text{in}$	Calibration Tester Dial Gage Tester	PMP-C-014 NMX-CH-36-1994
Optical Comparators	Up to 203.2 mm (Up to 8 in)	$(7.1 + 0.0005L) \mu\text{m}$ $(281 + 0.5L) \mu\text{in}$	Glass Scales Gage Blocks Grade 2 Gage Block Grade 3	PMP-C-014
Height Measuring Equipment	Up to 609.6 mm (Up to 24 in)	$(7.3 + 0.0033L) \mu\text{m}$ $(289 + 3.3L) \mu\text{in}$	Granite Surface Gage Blocks Grade 2 Gage Blocks Grade 3	PMP-C-014
Graduated Rules and Flexometers	Up to 25 m (Up to 984 in)	$(70 + 0.07L) \mu\text{m}$ $(2761 + 70L) \mu\text{in}$	Digital Indicator Stainless Ruler 5X Amplification Lens	PMP-C-014 NOM-040-SCFI-1994 & NOM-046-SCFI-1999
Gage Blocks	Up to 25.4 mm (Up to 1 in) (25.4 to 50.8) mm (1 to 2) in (50.8 to 76.2) mm (2 to 3) in (76.2 to 101.6) mm (3 to 4) in (101.6 to 127) mm (4 to 5) in (127 to 152.9) mm (5 to 6) in	$(0.094 + 0.00032L) \mu\text{m}$ $(3.7 + 0.32L) \mu\text{in}$ $(0.071 + 0.0012L) \mu\text{m}$ $(2.8 + 1.2L) \mu\text{in}$ $(0.061 + 0.0014L) \mu\text{m}$ $(2.4 + 1.4L) \mu\text{in}$ $(0.094 + 0.00032L) \mu\text{m}$ $(3.7 + 0.32L) \mu\text{in}$ $(0.089 + 0.0012L) \mu\text{m}$ $(3.5 + 1.2L) \mu\text{in}$ $(0.025 + 0.0017L) \mu\text{m}$ $(1.0 + 1.7L) \mu\text{in}$	Gage Blocks Comparator Gage Blocks Grade 1	PMP-C-014
Calipers	Up to 609.6 mm (Up to 24 in)	$(20.2 + 0.0014L) \mu\text{m}$ $(796 + 1.4L) \mu\text{in}$	Gage blocks grade 2 Gage blocks grade 3	PMP-C-014 Reference standard NMX-CH-2:1993-SCFI
Pin gauges	Up to 25.4 mm (Up to 1 in)	$(0.25 + 0.0031L) \mu\text{m}$ $(10 + 3.1L) \mu\text{in}$	Digital indicator Gage block grade 2	PMP-C-014
Plug gauges	25,4 mm to 38.1 mm (1 in to 1.5 in)	$(0.33 + 0.002L) \mu\text{m}$ $(13 + 2L) \mu\text{in}$	Digital indicator Gage block grade 2	PMP-C-014

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Coordinate Measuring Machines	Up to 609.6 mm (Up to 24 in)	$(0.56 + 0.001L) \mu\text{m}$ $(22 + 10L) \mu\text{in}$	Gage blocks grade 2 Gage blocks grade 3	PMP-C-014
Coating Thickness	Up to 6.35 mm (Up to 0.25 in)	$(0.72 + 1.7L) \mu\text{m}$ $(28.3 + 1.7L) \mu\text{in}$	Digital Indicator Gage blocks grade 2	PMP-C-014

Notes:

1. Best Measurement Uncertainties (Expanded Uncertainty) are based on approximately a 95% confidence interval, using a coverage of $k=2$
2. The uncertainty associated when calibrating a balance/scale is dependent on local conditions, such as the resolution of the unit being calibrated and the environment in which the balance/scale is operating. The uncertainty listed in the scope here represents the best uncertainty for a balance/scale which the organization typically calibrates in its lab. Since field (on-site) conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected in the field (on-site) than what is reported on the accredited scope.
3. V is applied volume, W is applied weight, and L is length in either mm or inches.
4. Contact the laboratory for on-site capabilities.
5. This scope is part of and must be included with the Certificate of Accreditation No. AC - 1338



Vice President

