



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Accredited Calibration Services, Inc.

2-1016C Sutton Drive

Burlington, Ontario L7L 6B8 Canada

has been assessed by ANAB

and meets the requirements of international standard

ISO/IEC 17025:2005

and national standard

ANSI/NCSL Z540-1-1994

while demonstrating technical competence in the field(s) of

CALIBRATION

in the following areas:

Dimensional, Electromagnetic-DC/Low Frequency, Electromagnetic-RF/Microwave,

Time and Frequency, Thermodynamic, Mechanical, Chemical Quantities

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of calibrations and/or tests to which this accreditation applies.

AC-1172

Certificate Number

ANAB Approval

Certificate Valid To: 05/27/2016

Version No. 002 Issued: 04/28/2015



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).



ANSI-ASQ National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994

Accredited Calibration Services, Inc. (Marsh Metrology)

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CALIBRATION

Valid to: May 27, 2016

Certificate Number: AC-1172

I. Dimensional

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Micrometers - Outside	Up to 4 in (4 to 20) in (20 to 36) in	(44 + 16L) μ in (32 + 22L) μ in (32 + 22L) μ in	Gage Blocks, Optical Flats	Proprietary On File with ANAB
Calipers - Outside Jaws	Up to 6 in (6 to 40) in	(420 + 3.9L) μ in (350 + 17L) μ in	Gage Blocks	
Calipers - Inside Jaws	Up to 24 in (24 to 40) in	(480 + 3.9L) μ in (340 + 19L) μ in	Reference Bar, Gage Blocks	
Calipers - Depth	Up to 24 in	(530 + 1.7L) μ in	Gage Blocks, Surface Plate	
Height Gages	Up to 24 in (24 to 40) in	(490 + 10L) μ in (260 + 19.2L) μ in	Reference Bar, Surface Plate, Test Indicator	
Micrometers - Inside (Head Movement Only)	Up to 1 in	(81 + 24L) μ in	Gage Blocks, Gage Holder	
Micrometers - Inside (Resolution 0.0001 in)	Up to 6 in (6 to 24) in	(100 + 12L) μ in (38 + 22L) μ in	Reference Bar, Gage Blocks	
Micrometers - Inside (Resolution 0.001 in)	Up to 6 in (6 to 24) in (24 to 40) in	(460 + 16.7L) μ in	Reference Bar, Gage Blocks	



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Micrometers - Depth	Up to 12 in	(630 + 4.5L) μin	Gage Blocks, Surface Plate	Proprietary On File with ANAB
Bore Gages (Resolution 0.0001 in)	(0.1 to 0.5) in (0.5 to 3) in	(80 + 2L) μin (150 + 19L) μin	Master Ring Gages	
Indicators Test, Dial, Digital (Resolution 0.0001 in)	Up to 2 in	(68 + 25L) μin	Gage Blocks, Calibration Tester, Surface Plate	
Flatness	Up to 4 in	5.5 μin	Master Flat	
Optical Comparator Horizontal Readout Vertical Readout	Up to 8 in Up to 8 in	(740 + 8.6L) μin (760 + 8.7L) μin	Reading Scale	
Thickness (Feeler) Gages	(0 to 0.05) in	125 μin	Digital Micrometer	
Rulers	Up to 40 in	(3 200 + 112L) μin/in	Caliper	

II. Electromagnetic – DC/Low Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	14 μV/V + 1.2 μV 6.3 μV/V + 10 μV 7.7 μV/V + 81 μV 12 μV/V + 0.78 mV 14 μV/V + 1.4 mV	Multifunction Calibrator	Proprietary On file with ANAB
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV Up to 6 kV (6 to 20) kV (20 to 35) kV Up to 150 kV	9.6 μV/V + 1.1 μV 3.8 μV/V + 10 μV 8.4 μV/V + 3.3 μV 10 μV/V + 38 μV 10 μV/V + 0.13 mV 10 mV/V + 0.60 V 20 mV/V + 2.4 V 90 mV/V + 51 V 5.06 mV/V + 6.9 V	Long Scale DMM DMM with High Voltage Probe	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Current - Source	Up to 330 µA 330 µA to 3.3 mA (3.3 to 330) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (10 to 16.5) A (16.5 to 150) A (150 to 1 000) A	59 µA/A + 61 nA 73 µA/A + 57 nA 77 µA/A + 0.21 µA 75 µA/A + 2.8 µA 0.16 mA/A + 31 µA 0.29 mA/A + 31 µA 0.42 mA/A + 31µA 4.7 mA/A + 29 mA 4.7 mA/A + 0.21 A 4.7 mA/A + 0.99 A	Multifunction Calibrator Multifunction Calibrator with Current Coil	
DC Current - Measure	Up 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	16 µA/A + 45 pA 11 µA/A + 54 pA 20 µA/A + 0.10 nA 20 µA/A + 0.81 nA 15 µA/A + 14 nA 20 µA/A + 51 nA 35 µA/A + 0.51 µA 35 µA/A + 5.5 µA/A	Long Scale DMM	
AC Voltage - Source	(1 to 33) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz 330 mV to 3.3 V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (3.3 to 33) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.62 mV/V + 4.8 µV 0.12 mV/V + 4.7 µV 0.15 mV/V + 4.8 µV 0.78 mV/V + 4.7 µV 2.7 mV/V + 9.4 µV 6.2 mV/V + 39 µV 0.39 mV/V + 6.8 µV 0.11 mV/V + 7.1 µV 0.12 mV/V + 7.4 µV 0.27 mV/V + 6.7 µV 0.62 mV/V + 25 µV 1.6 mV/V + 54 µV 0.23 mV/V + 43 µV 0.11 mV/V + 66 µV 0.14 mV/V + 58 µV 0.23 mV/V + 42 µV 0.54 mV/V + 0.10 mV 1.9 mV/V + 0.47 mV 0.23 mV/V + 0.53 mV 0.11 mV/V + 0.53 mV 0.19 mV/V + 0.49 mV 0.27 mV/V + 0.50 mV 0.70 mV/V + 1.3 mV	Multifunction Calibrator	Proprietary On file with ANAB

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Source (cont.)	(33 to 330) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 330 V to 1 kV 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.11 mV/V + 2.4 mV 0.15 mV/V + 5.5 mV 0.19 mV/V + 5.4 mV 0.23 mV/V + 5.3 mV 1.6 mV/V + 39 mV 0.23 mV/V + 8.1 mV 0.19 mV/V + 8 mV 0.23 mV/V + 8.2 mV	Multifunction Calibrator	
AC Voltage - Measure	Up to 10 mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz 100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (10 to 100) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz 100 V to 1 kV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz Up to 6 kV 60 Hz (6 to 35) kV 60 Hz Up to 150 kV 1 kHz	0.47 mV/V + 4 μV 0.14 mV/V + 3 μV 0.22 mV/V + 3 μV 0.89 mV/V + 2.7 μV 70 μV/V + 4.3 μV 70 μV/V + 2.1 μV 0.14 mV/V + 2.1 μV 0.30 mV/V + 2.1 μV 70 μV/V + 40 μV 70 μV/V + 21 μV 0.14 mV/V + 21 μV 0.30 mV/V + 23 μV 70 μV/V + 0.40 mV 70 μV/V + 0.22 mV 0.14 mV/V + 0.21 mV 0.30 mV/V + 0.21 mV 0.20 mV/V + 4 mV 0.20 mV/V + 2 mV 0.20 mV/V + 2.1 mV 0.35 mV/V + 2.1 mV 0.40 mV/V + 40 mV 0.40 mV/V + 20 mV 0.60 mV/V + 20 mV 1.1 mV/V + 79 mV 10 mV/V + 5 V 51 mV/V + 9 V 8.45 mV/V + 38 V	Long Scale Multimeter, Multifunction Calibrator	Proprietary On File with ANAB

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Source	(10 to 16.5) A (45 to 65) Hz (65 to 440) Hz (16.5 to 150) A (45 to 65) Hz (65 to 440) Hz (150 to 1 000) A (45 to 65) Hz (65 to 440) Hz	5.5 mA/A + 33 mA 10 mA/A + 35 mA 5.6 mA/A + 0.27 A 10 mA/A + 0.27 A 5.1 mA/A + 1.7 A 12 mA/A + 1.1 A	Multifunction Calibrator with Current Coil	Proprietary On file with ANAB
AC Current - Source	(29 to 330) μA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz 330 μA to 3.3 mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (33 to 330) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz 330 mA to 3 A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (5 to 10) kHz	1.6 mA/A + 78 nA 1.2 mA/A + 78 nA 0.97 mA/A + 78 nA 2.3 mA/A + 0.12 μ A 6.2 mA/A + 0.16 μ A 12 mA/A + 0.31 μ A 1.6 mA/A + 0.13 μ A 0.97 mA/A + 0.12 μ A 0.78 mA/A + 0.12 μ A 1.6 mA/A + 0.16 μ A 3.9 mA/A + 0.23 μ A 7.8 mA/A + 0.47 μ A 1.4 mA/A + 1.6 μ A 0.70 mA/A + 1.6 μ A 0.31 mA/A + 1.6 μ A 0.62 mA/A + 1.6 μ A 1.6 mA/A + 2.3 μ A 3.1 mA/A + 3.1 μ A 1.4 mA/A + 16 μ A 0.70 mA/A + 16 μ A 0.31 mA/A + 16 μ A 0.78 mA/A + 39 μ A 1.6 mA/A + 78 μ A 3.1 mA/A + 0.16 mA 1.4 mA/A + 78 μ A 0.47 mA/A + 78 μ A 4.7 mA/A + 0.78 mA 19 mA/A + 3.9 mA 0.45 A/A + 1.9 mA 0.77 A/A + 1.6 mA 23 mA/A + 1.6 mA	Multifunction Calibrator	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure	100 μA to 1 mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (1 to 10) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (10 to 100) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz 100 mA to 1 A (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz	1.5 mA/A + 0.20 μA 0.60 mA/A + 0.20 μA 0.30 mA/A + 0.20 μA 4 mA/A + 2 μA 1.5 mA/A + 2 μA 0.60 mA/A + 2 μA 0.30 mA/A + 2 μA 4 mA/A + 20 μA 1.5 mA/A + 20 μA 0.60 mA/A + 20 μA 0.30 mA/A + 20 μA 4 mA/A + 0.20 mA 1.6 mA/A + 0.20 mA 0.60 mA/A + 0.20 mA 1 mA/A + 0.20 mA	Long Scale Multimeter	Proprietary On File with ANAB
Resistance - Source	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	27 μΩ/Ω + 1.2 mΩ 19 μΩ/Ω + 1.7 mΩ 20 μΩ/Ω + 1.4 mΩ 21 μΩ/Ω + 2 mΩ 22 μΩ/Ω + 1.8 mΩ 20 μΩ/Ω + 22 mΩ 22 μΩ/Ω + 17 mΩ 19 μΩ/Ω + 0.30 Ω 19 μΩ/Ω + 0.52 Ω 24 μΩ/Ω + 2.7 Ω 24 μΩ/Ω + 3.8 Ω 24 μΩ/Ω + 0.10 kΩ 95 μΩ/Ω + 0.12 kΩ 0.17 mΩ/Ω + 3.1 kΩ 0.38 mΩ/Ω + 3.7 kΩ 2.3 mΩ/Ω + 81 kΩ 12 mΩ/Ω + 0.40 MΩ	Multifunction Calibrator	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance - Measure	Up 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	14 μΩ/Ω + 75 μΩ 12 μΩ/Ω + 0.52 mΩ 10 μΩ/Ω + 0.57 mΩ 9.7 μΩ/Ω + 13 mΩ 10 μΩ/Ω + 57 mΩ 15 μΩ/Ω + 2.1 Ω 49 μΩ/Ω + 0.12 kΩ 0.16 mΩ/Ω + 79 kΩ 4.5 mΩ/Ω + 0.56 MΩ	Long Scale Multimeter	
Capacitance - Source	10 Hz to 1 kHz Charge/Discharge Rate (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF 10 Hz to 600 Hz Charge/Discharge rate (0.33 to 1.1) μF 10 Hz to 300 Hz Charge/Discharge rate (1.1 to 3.3) μF 10 Hz to 150 Hz Charge/Discharge rate (3.3 to 11) μF 10 Hz to 120 Hz Charge/Discharge rate (11 to 33) μF 10 Hz to 80 Hz Charge/Discharge rate (33 to 110) μF Up to 50 Hz Charge/Discharge rate (110 to 330) μF Up to 50 Hz Charge/Discharge rate 330 μF to 1 mF	1.8 mF/F + 11 pF 1.7 mF/F + 95 pF 1.7 mF/F + 0.13 nF 1.4 mF/F + 0.57 nF 1.9 mF/F + 0.91 mF 1.4 mF/F + 5.7 nF 1.8 mF/F + 10 nF 2.6 mF/F + 52 nF 3.4 mF/F + 88 nF 3 mF/F + 0.51 μF 3.4 mF/F + 0.99 μF	Multifunction Calibrator	Proprietary On File with ANAB



PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)		
Capacitance - Source Fixed Values	1 nF 1 kHz	0.28 nF	Standard Capacitors	Proprietary On File with ANAB		
	1 μF 100 Hz 120 Hz 1 kHz	1.5 nF 1.5 nF 1.5 nF				
	10 μF 100 Hz 120 Hz 1 kHz	15 nF 15 nF 15 nF				
	100 μF 100 Hz 120 Hz 1 kHz	0.15 μF 0.15 μF 0.15 μF				
	1 mF 100 Hz 120 Hz 1 kHz	1.9 μF 2.1 μF 2.1 μF				
	10 mF 100 Hz 120 Hz 1 kHz	0.11 mF 0.11 mF 0.15 mF				
	Inductance - Source Fixed Values	10 mH 100 Hz 1 kHz			6.5 μH 6.5 μH	Standard Inductors
		Resistors - Source Fixed Values (at 1 kΩ)			24.9 Ω 375.6 Ω 5.97 kΩ 95.3 kΩ	
	Frequency - Source Using Calibrator's Normal Output	(0.01 to 120) Hz 120 Hz to 1.2 kHz (1.2 to 12) kHz (12 to 120) kHz 120 kHz to 1.2 MHz (1.2 to 2) MHz			1.2 μHz/Hz + 0.11 mHz 1.6 μHz/Hz + 0.48 mHz 1.9 μHz/Hz + 0.40 mHz 1.9 μHz/Hz + 1.2 mHz 1.9 μHz/Hz + 1.2 mHz 1.9 μHz/Hz + 14 mHz	Multifunction Calibrator
		Using Calibrator's Oscilloscope Output			50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Measure	1 Hz to 10 MHz	0.50 mHz/Hz + 0.10 µHz	Long Scale Multimeter	Proprietary On File with ANAB
Oscilloscopes Bandwidth (Leveled Sine Wave)	50 kHz to 600 MHz	(4.8 + 0.0068 X ¹) %	Multifunction Calibrator	
DC Voltage 50 Ω load	0 V to 6.6 V	1.9 mV/V + 0.37 mV		
1 M Ω load	0 V to 130 V	0.46 mV/V + 0.50 mV		
Square Wave - Amplitude 50 Ω load	0 V to 6.6 V	0.19 mV/V + 0.46 mV		
1 M Ω load	0 V to 130 V	0.77 mV/V + 0.64 mV		
Rise Time	3.5 ns Pulse Edge	41 ps		
Time Marker	(2 to 10) ns (20 to 100) ns (100 to 500) ns (1 to 20) ms (50 to 500) ms (1 to 5) s	2.9 ns/s + 7.8 ps 27 ns/s + 7.7 ps 0.15 µs/s + 7.7 ps 4.6 ns/s + 8.6 ns 1.4 ns/s + 44 ns 2.8 ms/s + 9 ms		
Thermocouple Simulation and Measure				
J-type thermocouple	(63 to 1 473) K (-210 to 1 200) °C	0.24 K (0.24 °C)		
K-type thermocouple	(73 to 1 645) K (-200 to 1 372) °C	0.25 K (0.25 °C)		
S-type thermocouple	(273 to 1 673) K (0 to 1 400) °C	0.52 K (0.52 °C)		
T-type thermocouple	(23 to 673) K (-250 to 400) °C	0.25 K (0.25 °C)		
E-type thermocouple	(23 to 1 273) K (-250 to 1 000) °C	0.43 K (0.43 °C)		
N-type thermocouple	(73 to 1 573) K (-200 to 1 300) °C	0.37 K (0.37 °C)		

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RTD Simulation				
Pt 385 (100 Ω)	(73 to 1 073) K (-200 to 800) °C	0.09 K (0.09 °C)	Long Scale Multimeter	Proprietary On File with ANAB
Pt 385 (1 000 Ω)	(73 to 903) K (-200 to 630) °C	0.10 K (0.1 °C)		
Pt 3916 (100 Ω)	(73 to 903) K (-200 to 630) °C	0.09 K (0.09 °C)		
Pt 3926 (100 Ω)	(73 to 903) K (-200 to 903) °C	0.09 K (0.09 °C)		
Ni 120 (120 Ω)	(193 to 533) K (-80 to 260) °C	0.13 K (0.13 °C)		
Pt 385 (200 Ω)	(73 to 903) K (-200 to 630) °C	0.10 K (0.1 °C)		
Pt 385 (500 Ω)	(73 to 903) K (-200 to 630) °C	0.1 K (0.1 °C)		

III. Electromagnetic – RF/Microwave

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Absolute Power Measure				
(0 to 35) dBm	10 MHz to 18 GHz	0.12 dB	RF Power Meter and Power Sensor	Proprietary On File with ANAB
(35 to 44) dBm	10 MHz to 18 GHz	0.23 dB		
(-30 to 10) dBm	0.1 MHz to 4.2 GHz	0.08 dB		
(10 to 20) dBm	0.1 MHz to 4.2 GHz	0.09 dB		
(-70 to -30) dBm	10 MHz to 18 GHz	0.10 dB		
(-30 to -20) dBm	10 MHz to 18 GHz	0.11 dB		
(-30 to 10) dBm	10 MHz to 18 GHz	0.08 dB		
(10 to 20) dBm	10 MHz to 18 GHz	0.17 dB		
-20 to -10 dBm	30 MHz to 26.5 GHz	0.15 dB		
-10 to 30 dBm	30 MHz to 26.5 GHz	0.15 dB		

IV. Time and Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Stopwatches	Up to 24 hours	0.19 s	NIST UTC Phone Time Signal	Proprietary On File with ANAB
Frequency – Source and Measure	0.1 μHz to 3 GHz 10 Hz to 26.5 GHz	0.012 Hz + 0.385 Hz/MHz 0.17 Hz	Frequency Counter	

V. Thermodynamic

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature at Ice Point	273.15 K (0 °C)	0.033 K 0.033 °C	Standard Multimeter and Platinum Resistance Thermometer	Proprietary On File with ANAB
Temperature - Measure	(73 to 933) K (-200 to 660) °C	0.000004 K/K + 0.032 K 0.000004 °C/°C + 0.032 °C	Standard Multimeter and Platinum Resistance Thermometer	
	(0 to 1 750) °C	0.00434 °C/°C + 0.57 °C	Type R Thermocouple and Multifunction Calibrator	
Humidity - Source	(10 to 95) %RH	0.81 %RH + 0.014 %RH/%RH	Humidity Chamber and Humidity Meter	
Humidity - Measure	(10 to 95) %RH	0.7 %RH + 0.015 %RH/%RH		

VI. Mechanical

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Balances	Up to 410 g	0.016 mg/g + 1.6 mg	Class 3 Weights	Proprietary On File with ANAB
	Up to 9 kg (20 lb)	0.092 mg/g + 0.1 g 0.000092 lb/lb + 0.00022 lb	Class 6 Weights	

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Scales	Up to 400 lb	(0.24 + 0.00021) lb/lb	Class 6 Weights	Proprietary On File with ANAB
Torque Tools	(0.4 to 2) Nm	0.00056 Nm/Nm + 0.000034 Nm	Torque Tester	
	(4 to 18) lbf in	0.00056 lbf in/lbf in + 0.003 lbf in		
	(2.26 to 11.29) Nm	0.034 Nm + 0.0026 Nm/Nm		
	(20 to 100) lbf-in	0.3 lbf in + 0.0023 lbf-in/lbf-in		
	(67 to 338.9) Nm	0.22 Nm + 0.0073 Nm/Nm	Torque Transducer, Torque Display	
	(50 to 250) lbf-ft	0.16 lbf-ft + 0.00536 lbf-ft/lbf		
	(271.1 to 1 355.8) Nm	0.46 Nm + 0.0781 Nm/Nm		
	(200 to 1 000) lbf ft	0.34 lbf ft + 0.00576 lbf ft/lbf ft		
Tensiometers	(5 to 600) lb	(1.6 + 0.034 x ²) lb	Class 6 Weights	
Pressure - Pneumatic	(-10 to 30) psi (30 to 50) psi (50 to 100) psi (100 to 300) psi (300 to 600) psi (600 to 1 000) psi	0.007 psi + 0.43 µpsi/psi 0.009 psi + 0.59 µpsi/psi 0.02 psi + 0.83 µpsi/psi 0.04 psi + 2.4 µpsi/psi 0.08 psi + 2.5 µpsi/psi 0.18 psi + 1.7 µpsi/psi	Precision Pressure Controller used as Standard; Calibration Media - Nitrogen	
Pressure * - Hydraulic Cross Floating	41.4 kPa to 16.5 MPa (6 to 2 400) psi	0.22 kPa + 0.19 Pa/Pa (0.032 psi to 0.000028 psi/psi)	Comparison to Ruska 2400 Standard Dead Weight Tester	
	207 kPa to 82.7 MPa (30 to 12 000) psi	1.3 kPa + 0.19 Pa/Pa (0.18 psi + 0.000028 psi/psi)		
	41.4 kPa to 16.5 MPa (6 to 2 400) psi	0.28 kPa + 0.17 Pa/Pa (0.041 psi + 0.000025 psi/psi)		
	207 kPa to 82.7 MPa (30 to 12 000) psi	0.35 kPa + 0.25 Pa/Pa (0.05 psi + 0.000037 psi/psi)		
	34.48 to 137.92 MPa (5 000 to 20 000) psi	77 kPa + 0.00055 Pa/kPa (11.2 psi + 0.00008 psi/psi)		

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Hardness (Rockwell scale) B Scale	Low Mid High	2 HRB 1.6 HRB 1.8 HRB	Indirect Comparison to Hardness Test Blocks	Proprietary On File with ANAB
C Scale	Low Mid High	1.3 HRC 1.3 HRC 1.1 HRC		
Superficial 30T Scale	Low Mid High	1.6 HR 30T 1.3 HR 30T 1.4 HR 30T		

VII. Chemical Quantities

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
pH Meters	(4, 7 and 10) pH units	0.012 pH units	Standard Buffer Solutions	Proprietary On File with ANAB

Notes:

1. Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory offers calibration services in its laboratory and on-site at customer-designated locations. Satellite sites may also be established in the future at key customer locations. Since on-site and/or satellite 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. .
3. X^1 = measured value, X^2 = measured value in lbf, L = Length in inches.
4. Items marked with an asterisk (*) cannot be performed on-site.
5. This scope is formatted as part of a single document including the Certificate of Accreditation No. AC-1172.



Vice President