CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Instrument Calibration and Technical Services, Inc.
5312 Peters Creek Road, Suite E
Roanoke, VA 24019

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

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.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 11 November 2024
Certificate Number: AC-1195

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AND

ANSI/NCSL Z540-1-1994 (R2002)

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CALIBRATION

Valid to: **November 11, 2024** Certificate Number: **AC-1195**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source [1]	Up to 220 mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1 100) V	2.9 µV 16 µV 55 µV 0.11 mV 1.6 mV 11 mV	Fluke 5730A Multifunction Calibrator
DC Voltage – Measure [1]	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	0.1 µV 13 µV 0.12 mV 1.4 mV 14 mV	HP 3458A 8.5 Digit Multimeter
DC High Voltage – Measure [1]	Up to 100 V (100 to 200) V (0.2 to 1) kV (1 to 4) kV (4 to 9) kV	71 mV 0.11 V 0.39 V 1.5 V 3.6 V	Vitrek 4700 High Voltage Meter
	(9 to 10) kV (10 to 30) kV	4.2 V 28 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-35 High Voltage Probe

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
	(30 to 50) kV (50 to 70) kV (70 to 90) kV	41 V 0.2 kV 0.44 kV	Vitrek 4700 High Voltage Meter, Vitrek HVL-100 High Voltage Probe
AC Voltage – Source [1]	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (0.22 to 2.2) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	 6.6 µV 6.1 µV 2.6 µV 6.5 µV 8.5 µV 17 µV 33 µV 39 µV 14 µV 8.8 µV 8.4 µV 12 µV 22 µV 47 µV 73 µV 0.12 mV 94 µV 39 µV 27 µV 48 µV 0.13 mV 0.23 mV 0.47 mV 0.92 mV 0.82 mV 0.31 mV 0.14 mV 0.23 mV 0.31 mV 1.1 mV 3.4 mV 5.7 mV	Fluke 5730A Multifunction Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source [1]	(2.2 to 22) V		Fluke 5730A Multifunction Calibrator
	(10 to 20) Hz	8.2 mV	
	(20 to 40) Hz	3.1 mV	
	40 Hz to 20 kHz	1.4 mV	
	(20 to 50) kHz	2.3 mV	
	(50 to 100) kHz	3 mV	
	(100 to 300) kHz	8.8 mV	
	(300 to 500) kHz	34 mV	
	500 kHz to 1 MHz	52 mV	
	(22 to 220) V		
	(10 to 20) Hz	76 mV	
	(20 to 40) Hz	28 mV	
	40 Hz to 20 kHz	17 mV	
	(20 to 50) kHz	27 mV	
	(50 to 100) kHz	48 mV	
	(100 to 300) kHz	0.28 V	
	(300 to 500) kHz	1.4 V	
	500 kHz to 1 MHz	2.5 V	
	(220 to 1 100) V		
	(15 to 50) Hz	0.46 V	
	50 Hz to 1 kHz	0.11 V	
AC Voltage – Measure [1]	Up to 10 mV		HP 3458A 8.5 Digit Multimeter
	40 Hz to 1 kHz	1.2 µV	
	(1 to 20) kHz	1.2 µV	
	(20 to 50) kHz	2.1 µV	
	(10 to 100) mV		
	40 Hz to 1 kHz	21 µV	
	(1 to 20) kHz	4 µV	
	(20 to 50) kHz	7 µV	
	100 mV to 1 V		
	40 Hz to 1 kHz	0.21 mV	
	(1 to 20) kHz	30 µV	
	(20 to 50) kHz	50 µV	
	(1 to 10) V		
	40 Hz to 1 kHz	2 mV	
	(1 to 20) kHz	0.2 mV	
	(20 to 50) kHz	0.5 mV	
	(10 to 100) V		
	40 Hz to 1 kHz	20 mV	
	(1 to 20) kHz	3 mV	
	(20 to 50) kHz	5 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure [1]	(100 V to 1 000) V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz	40 mV 13 mV 13 mV	HP 3458A 8.5 Digit Multimeter
AC High Voltage – Measure [1]	Up to 1 kV 10 mHz to 600 Hz (1 to 9) kV 10 mHz to 600 Hz	1.5 V 13 V	Vitrek 4700 High Voltage Meter
	(9 to 10) kV 10 mHz to 600 Hz (10 to 30) kV 10 mHz to 600 Hz	12 V 35 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-35 High Voltage Probe
	(30 to 70) kV 10 mHz to 600 Hz	81 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-100 High Voltage Probe
DC Current – Source [1]	Up to 220 µA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A	12 nA 0.11 µA 1.1 µA 14 µA 0.25 mA	Fluke 5730A Multifunction Calibrator
	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	1.4 mA 7 mA 24 mA	Fluke 5520A Multifunction Calibrator
DC Current – Source Clamp-On Meters [1]	(10 to 50) A (50 to 100) A (100 to 250) A (250 to 500) A (500 to 1 000) A	0.29 mA 0.96 mA 3.6 mA 6.4 mA 24 mA	Fluke 5520A Multifunction Calibrator, Fluke 5500A/COIL 50-turn Coil
DC Current – Measure [1]	(0.1 to 1) µA (1 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	0.82 nA 0.9 nA 3.3 nA 24 nA 0.24 µA 4.1 µA 0.13 µA	HP 3458A 8.5 Digit Multimeter
	(1 to 10) A (10 to 100) A	0.041 % of reading 0.041% of reading	HP 3458A 8.5 Digit Multimeter, Rubicon 1166 Current Shunt

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	Up to 220 µA		Fluke 5730A Multifunction Calibrator
	(10 to 20) Hz	0.1 µA
	(20 to 40) Hz	65 nA
	40 Hz to 1 kHz	43 nA
	(1 to 5) kHz	0.11 µA
	(5 to 10) kHz	0.42 µA
	(0.22 to 2.2) mA	
	(10 to 20) Hz	0.82 µA
	(20 to 40) Hz	0.56 µA
	40 Hz to 1 kHz	0.36 µA
	(1 to 5) kHz	0.77 µA
	(5 to 10) kHz	4.2 µA
	(2.2 to 22) mA	
	(10 to 20) Hz	8.3 µA
	(20 to 40) Hz	5.6 µA
	40 Hz to 1 kHz	3.6 µA
	(1 to 5) kHz	7.1 µA
	(5 to 10) kHz	40 µA
	(22 to 220) mA	
	(10 to 20) Hz	83 µA
	(20 to 40) Hz	56 µA
	40 Hz to 1 kHz	35 µA
	(1 to 5) kHz	68 µA
	(5 to 10) kHz	0.35 mA
	(0.22 to 2.2) A	
	45 Hz to 1 kHz	0.82 mA
	(1 to 5) kHz	1.4 mA
	(5 to 10) kHz	21 mA
AC Current – Source [1]	Up to 220 µA		Fluke 5520A Multifunction Calibrator
	(10 to 30) kHz	4.1 µA
	220 µA to 2.2 mA	
	(10 to 30) kHz	26 µA
	(2.2 to 22) mA	
	(10 to 30) kHz	0.11mA
	(22 to 220) mA	
	(10 to 30) kHz	1.3 mA
	(2.2 to 3) A	
	(10 to 45) Hz	6.4 mA
	45 Hz to 1kHz	2.2 mA
	(1 to 5) kHz	22 mA
	(5 to 10) kHz	88 mA

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	(3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1kHz (1 to 5) kHz	 10 mA 15 mA 0.38 A 34 mA 41 mA 0.79 A	Fluke 5520A Multifunction Calibrator
AC Current – Source Clamp-on Meters [1]	(10 to 50) A (45 to 60) Hz (60 to 400) Hz (50 to 100) A (45 to 60) Hz (60 to 400) Hz (100 to 250) A (45 to 60) Hz (60 to 400) Hz (250 to 500) A (45 to 60) Hz (60 to 400) Hz (500 to 1 000) A (45 to 60) Hz (60 to 400) Hz	 0.27 A 0.64 A 0.49 A 1.2 A 1.5 A 3.3 A 2.8 A 6.5 A 5.6 A 13 A	Fluke 5520A Multifunction Calibrator, Fluke 5500A/COIL 50-turn Coil
AC Current – Measure [1]	Up to 100 µA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (0.1 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	 4.1 µA 4.1 µA 4.1 µA 3.4 µA 3 µA 2.8 µA 22 µA 9.7 µA 9.4 µA	HP 3458A 8.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure [1]	(10 to 100) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (0.1 to 1) A (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	 0.2 mA 93 µA 58 µA 4 mA 3.6 mA 3.7 mA	HP 3458A 8.5 Digit Multimeter
Resistance – Source [1] Simulated (Fixed)	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	64 µΩ 0.13 mΩ 0.24 mΩ 0.32 mΩ 0.6 mΩ 1.4 mΩ 2.7 mΩ 9.4 mΩ 18 mΩ 95 mΩ 0.18 Ω 1.2 Ω 2.7 Ω 18 Ω 57 Ω 0.54 kΩ 1.3 kΩ 16 kΩ	Fluke 5730A Multifunction Calibrator
Resistance – Source [1] Simulated (Variable)	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 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 (0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ	1.8 mΩ 3 mΩ 5.1 mΩ 13 mΩ 31 mΩ 0.11 Ω 0.31 Ω 1.1 Ω 3.1 Ω 13 Ω 46 Ω 0.26 kΩ 1.6 kΩ 16 kΩ	Fluke 5520A Multifunction Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source [1] Simulated (Variable)	(33 to 110) MΩ (110 to 330) MΩ (330 to 1 100) MΩ	72 kΩ 1.6 MΩ 16 MΩ	Fluke 5520A Multifunction Calibrator
Resistance – Measure [1]	Up to 10 Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 300) MΩ	6.4 mΩ 2.2 mΩ 12 mΩ 0.12 Ω 1.3 Ω 20 Ω 0.7 kΩ 59 kΩ 0.59 MΩ	HP 3458A 8.5 Digit Multimeter
Capacitance – Source [1] Simulated (Variable)	(0.19 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF (0.33 to 1.1) mF	18 pF 31 pF 44 pF 0.21 nF 0.44 nF 1.3 nF 4.4 nF 15 nF 44 nF 0.19 µF 0.71 µF 2.1 µF 6.9 µF	Fluke 5520A Multifunction Calibrator
DC Power – Source [1] (Derived)	33 mV to 1 000 V (0.33 to 330) mA (0.33 to 3) A (3 to 20) A	 42 mW 1.4 W 24W	Fluke 5520A Multifunction Calibrator
AC Power – Source [1] (Derived) (45 to 65) Hz Power Factor = 1	(33 to 330) mV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20) A	 4.7 µW 16 µW 0.11 mW 0.18 mW 0.62 mW 1.2 mW 4.4 mW 12 mW	Fluke 5520A Multifunction Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source [1] (Derived) (45 to 65) Hz Power Factor = 1	330 mV to 1 020 V (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 11) A	15 mW 49 mW 0.17 W 0.49 W 1.9 W 3.4 W 14 W 31 W	Fluke 5520A Multifunction Calibrator
Oscilloscopes [1]			Fluke 5520A/SC1100 Multifunction Calibrator
Amplitude – DC			
into 50 Ω load	(0 to 6.6) V	19 mV	
into 1 MΩ load	(0 to 130) V	38 mV	
Amplitude – Square Wave			
into 50 Ω load	1 mV to 6.6 Vp-p	3.3 mV	
into 50 Ω load	1 mV to 130 Vp-p	15 mV	
Leveled Sine Wave			
Amplitude			
into 50 Ω load	5 mV to 5.5 V		
(Reference 50 kHz)	50 kHz to 100 MHz	3.8 mV	
	(100 to 300) MHz	37 mV	
	(300 to 600) MHz	56 mV	
	(600 to 1 100) MHz	0.52 V	
Flatness			
into 50 Ω load	5 mV to 5.5 V		
(Relative to 50 kHz)	50 kHz to 100 MHz	13 mV	
	(100 to 300) MHz	3.2 mV	
	(300 to 600) MHz	3.4 mV	
	(600 to 1 100) MHz	4.1 mV	
Time Marker			
into to 50 Ω load	50 ms to 5 s	0.7 µs	
	1 ns to 20 ms	20 ps	
Rise Time			
into 50 Ω load	≤ 300 ps	8.3 ps	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type E		Ectron 1140A Thermocouple Simulator
	(-175 to -155) °C	0.13 °C	
	(-155 to -90) °C	0.1 °C	
	(-90 to 15) °C	0.09 °C	
	(15 to 890) °C	0.07 °C	
	(890 to 950) °C	0.08 °C	
	Type J		
	(-210 to -105) °C	0.32 °C	
	(-105 to -50) °C	0.1 °C	
	(-50 to 990) °C	0.08 °C	
	(990 to 1 100) °C	0.08 °C	
	Type K		
	(-200 to -195) °C	0.81 °C	
	(-195 to -115) °C	0.15 °C	
	(-115 to -55) °C	0.11 °C	
	(-55 to 1 000) °C	0.08 °C	
	(1 000 to 1 200) °C	0.1 °C	
	Type R		
	(0 to 45) °C	0.66 °C	
	(45 to 160) °C	0.48 °C	
	(160 to 380) °C	0.36 °C	
	(380 to 775) °C	0.32 °C	
	(775 to 1 600) °C	0.28 °C	
	Type S		
	(0 to 45) °C	0.57 °C	
	(45 to 105) °C	0.47 °C	
	(105 to 310) °C	0.4 °C	
	(310 to 615) °C	0.35 °C	
	(615 to 1 700) °C	0.31 °C	
	Type T		
	(-250 to -150) °C	0.73 °C	
	(-150 to -135) °C	0.29 °C	
	(-135 to -40) °C	0.15 °C	
	(-40 to 100) °C	0.14 °C	
	(100 to 300) °C	0.08 °C	
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type E		Fluke 5520A Multifunction Calibrator
	(-250 to -175) °C	0.58 °C	
	(950 to 1 000) °C	0.25 °C	
	Type J		
	(1 100 to 1 200) °C	0.27 °C	
	Type K		
	(1 200 to 1 372) °C	0.47 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type R (1 600 to 1 767) °C Type S (1 700 to 1 767) °C Type T (300 to 400) °C	0.48 °C 0.58 °C 0.17 °C	Fluke 5520A Multifunction Calibrator

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers [1,2]	Up to 4 in (4 to 12) in	(29 + 0.8*L*) µin (52 + 5.2*L*) µin	Gage Blocks
Calipers [1,2]	Up to 6 in (6 to 12) in (12 to 36) in	(289 + 0.29*L*) µin (324 + 20*L*) µin (558 + 5*L*) µin	
Dial Indicators [1,2]	Up to 1 in	(45 + 2.5*L*) µin	
Height Gages [1,2]	Up to 4 in (4 to 20) in (20 to 24) in	(221 + 55*L*) µin (562 + 1.4*L*) µin (582 + 2.2*L*) µin	
V Blocks [1] Parallelism Perpendicularity V-Centrality	 (-0.004 to 0.004) in (-0.004 to 0.004) in (-0.004 to 0.004) in	 120 µin 170 µin 120 µin	Indicator, Surface Plate, Cylindrical Square, Gage Pins
Pin Gages	Up to 1 in	30 µin	Pratt & Whitney Model C Supermicrometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Devices [1]	(-13 to -5) psig (-5 to 5) psig (5 to 15) psig (15 to 30) psig (30 to 100) psig (100 to 300) psig (300 to 600) psig (600 to 1 000) psig (1 000 to 2 000) psig (2 000 to 3 000) psig (3 000 to 5 000) psig (5 000 to 10 000) psig	0.011 psi 0.002 6 psi 0.018 psi 0.012 psi 0.028 psi 0.076 psi 0.15 psi 0.25 psi 0.53 psi 0.78 psi 1.3 psi 8.5 psi	Comparison to Additel Precision Pressure Gages, Druck DPI 610 Pressure Calibrator, Pressure Transducers
Torque Tools [1]	Up to 100 lbf·in	0.2 lbf·in	AKO TSD-011 Torque Transducer
	Up to 100 lbf·ft (100 to 200) lbf·ft (200 to 300) lbf·ft (300 to 400) lbf·ft (400 to 500) lbf·ft	0.36 lbf·ft 0.63 lbf·ft 0.64 lbf·ft 0.85 lbf·ft 0.48 lbf·ft	AKO TSD-511 Torque Transducer
Force [1]	Up to 5 lbf (5 to 11) lbf (11 to 50) lbf (50 to 500) lbf	0.002 9 lbf 0.003 1 lbf 0.05 lbf 0.12 lbf	Master Weights
Balances and Scales [1,3] (SI)	Up to 1 g (1 to 10) g (10 to 50) g (50 to 100) g (100 to 200) g (200 to 300) g (300 to 400) g (400 to 500) g (500 to 1 000) g (1 000 to 2 000) g (2 000 to 4 000) g (4 000 to 6 000) g	59 µg 0.12 mg 0.47 mg 0.94 mg 1.9 mg 4.2 mg 6.1 mg 8.2 mg 9.3 mg 19 mg 37 mg 56 mg	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales [1] (Avoirdupois) (0.000 1 lb resolution)	Up to 1 lb (1 to 5) lb	0.000 13 lb 0.000 59 lb	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.
(0.001 lb resolution)	(5 to 10) lb (10 to 20) lb (20 to 40) lb (40 to 50) lb	0.001 3 lb 0.002 3 lb 0.004 6 lb 0.005 9 lb	
Scales [1] (Avoirdupois) (0.005 lb resolution)	(50 to 60) lb (60 to 70) lb	0.007 4 lb 0.008 lb	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.
(0.1 lb resolution)	(70 to 100) lb (100 to 200) lb	0.06 lb 0.09 lb	
(1 lb resolution)	(200 to 400) lb (400 to 600) lb (600 to 800) lb (800 to 1 000) lb (1 000 to 1 500) lb	0.58 lb 0.58 lb 0.59 lb 0.59 lb 0.6 lb	

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Source [1]	(-38 to 0.1) °C (0.1 to 400) °C	0.02 °C 0.05 °C	Temperature Bath, Hart 5614 Platinum Resistance Thermometer
	(400 to 600) °C	0.24 °C	Dry-well, Isotech 935-14-95H Semi-standard Platinum Resistance Thermometer
Temperature – Measure [1]	(-196 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C	0.07 °C 0.05 °C 0.04 °C 0.08 °C	Hart 5614 Platinum Resistance Thermometer

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure [1]	(400 to 600) °C	0.11 °C	Isotech 935-14-95H Semi-standard Platinum Resistance Thermometer
Infrared Thermometers [1]	35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.16 °C 0.21 °C 0.27 °C 0.45 °C 0.78 °C	Fluke 4181 Infrared Calibrator ε = (0.9 to 1), λ = (8 to 14) µm
Humidity – Source [1]	(11 to 80) %RH (80 to 94) %RH 33 %RH 75 %RH	1.4 %RH 2.5 %RH 1.6 %RH 1.7 %RH	Vaisala MI70/HMP77 Thermohygrometer, Saturated Salt Solutions

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source [1]	10 MHz (Reference)	1.2 mHz	Spectracom 8194B GPS Master Oscillator, HP 3225B Function Generator
	Up to 100 Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 20) MHz (20 to 80) MHz	0.94 mHz 0.37 mHz 3.7 mHz 2.5 mHz 0.14 Hz 0.35 Hz 1.3 Hz 0.19 kHz	
Frequency – Measure [1]	Up to 100 Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 100) MHz	0.89 mHz 0.45 mHz 0.3 mHz 1.5 mHz 3.1 mHz 27 mHz 0.17 Hz	HP 53131A Universal Counter
Stopwatch/Timers [1]	Up to 59 min 59 min to 24 h	5.9 ms 1.1 s	Spectracom 8194B GPS Master Oscillator, HP 3225B Function Generator

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

Notes:

1. 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.
2. L = length in inches.
3. CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1195.

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