

**SiteCal, Inc.**  
9975 Flanders Ct. NE  
Blaine, Minnesota 55449  
Jerry Flor  
763-213-1284

**CALIBRATION**

Valid to: **May 4, 2022**

Certificate Number: **AC-1452**

**Chemical Quantities**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
CO <sub>2</sub> Measurement <sup>1</sup>	1 % 5 % 10 %	0.4 % 0.4 % 0.5 %	GD444 CO2 Analyzer
CO <sub>2</sub> Analyzer	1 % 5 % 10 %	0.3 % 0.3 % 0.4 %	Certified gases

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers <sup>1</sup>	Up to 1 in	74 μin	Gage Blocks
Calipers <sup>1</sup>	Up to 12 in (12.1 to 24) in	770 μin 740 μin	Gage Blocks

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Gages <sup>1</sup>	Up to 15 psiv (-0.27 to -0.04) psia (-0.04 to 0.04) psia (0.04 to 0.27) psia Up to 60 psia Up to 5 psig (5 to 60) psig (60 to 200) psig (200 to 500) psig (500 to 3 000) psig (3 000 to 7 500) psig	0.005 5 psiv 0.000 4 psia 0.000 5 psia 0.000 4 psia 0.022 psia 0.003 1 psig 0.027 psi 0.072 psi 0.19 psi 1.1 psi 5.5 psi	Pressure Indicator and Modules
Laboratory Balance / Scale <sup>1</sup> (0.001 mg resolution)	0 to 5 g	0.044 mg	Class 1 Weights
(0.01 mg resolution)	0 to 62 g 0 to 300 g	0.25 mg 0.89 mg	
(0.1 mg resolution)	0 to 1 000 g	2.9 mg	
(0.01 g resolution)	0 to 6 000 g 0 to 15 000 g 0 to 35 000 g	120 mg 0.24 g 2.4 g	
Industrial Scale <sup>1</sup> (0.01 kg resolution)	0 to 100 kg	0.012 kg	Class F Weights
(0.1 kg resolution)	0 to 250 kg	0.12 kg	
Pipettes	(0.2 to 100) µL (100 to 1 000) µL 1000 µL to 20 mL	0.052 µL 0.37 µL 1.8 µL	Laboratory Balance

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure <sup>1</sup>	(-196 to 0) °C (0 to 50) °C (50.1 to 100) °C (100.1 to 200) °C (200.1 to 300) °C	0.039 °C 0.036 °C 0.042 °C 0.044 °C 0.055 °C	Hart 1502A

### Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature-measure Thermocouples <sup>1</sup> Type J Type K Type T	(-196 to 400) °C (-196 to 400) °C (-196 to 400) °C	0.29 °C 0.29 °C 0.17 °C	HP 3457A
Humidity Device Calibration	(5 to 95) % RH	0.7% RH	Dew Point Hygrometer
Humidity Measurement <sup>1</sup>	(0 to 90) % (90 to 100) %	1.8% RH 2.7% RH	Vaisala RH Meter

### Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	Up to 330 mV 330 mV to 3.29 V (3.3 to 32.9) V (33 to 329) V (330 to 1000) V	0.009 mV 0.045 mV 0.49 mV 6.5 mV 23 mV	Fluke 5522A
DC Voltage – Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.009 3 mV 0.005 7 mV 0.054 mV 0.78 mV 9.9 mV	HP 3458A Option 2
DC Current – Source	Up to 330 µA 330 µA to 3.3 mA (3.2 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3.0) A (3.0 to 11) A (11 to 20.5) A	0.081 µA 0.45 µA 0.004 2 mA 0.042 mA 0.000 26 A 0.001 4 A 0.006 5 A 0.024 A	Fluke 5522A

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure	Up to 100 $\mu$ A	0.003 7 $\mu$ A	HP 3458A Option 2  (Values over 1A shunted) Agilent 34330A Shunt
	100 $\mu$ A to 1 mA	0.000 031 mA	
	(1 to 10) mA	0.000 31 mA	
	(10 to 100) mA	0.005 2 mA	
	100 mA to 1 A	0.000 15 A	
	(1 to 5) A	0.16 A	
	(5 to 10) A	0.002 3 A	
AC Voltage – Source	(10 to 20) A	0.002 3 A	Fluke 5522A
	Up to 33 mV		
	Up to 10 Hz	0.038 mV	
	(10 to 45) Hz	0.038 mV	
	45 Hz to 1 kHz	0.013 mV	
	(1 to 10) kHz	0.013 mV	
	(10 to 20) kHz	0.015 mV	
	(20 to 50) kHz	0.046 mV	
	(50 to 100) kHz	0.15 mV	
	(100 to 450) kHz	0.37 mV	
	33 to 330 mV		
	Up to 10 Hz	0.048 mV	
	(10 to 45) Hz	0.06 mV	
	45 Hz to 1 kHz	0.028 mV	
	(1 to 10) kHz	0.029 mV	
	(10 to 20) kHz	0.031 mV	
	(20 to 50) kHz	0.053 mV	
	(50 to 100) kHz	0.14 mV	
	(100 to 500) kHz	0.33 mV	
	0.33 to 3.3 V		
	Up to 10 Hz	1.3 mV	
(10 to 45) Hz	1.2 mV		
45 Hz to 1 kHz	0.65 mV		
(1 to 10) kHz	0.65 mV		
(10 to 20) kHz	0.8 mV		
(20 to 50) kHz	1.3 mV		
(50 to 100) kHz	2.9 mV		
(100 to 450) kHz	9.9 mV		

**Electrical – DC/Low Frequency**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
AC Voltage – Source	3.3 to 33 V Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 90) kHz	9.9 mV 13 mV 6.5 mV 6.5 mV 9.9 mV 15 mV 37 mV	Fluke 5522A
	33 to 330 V Up to 45 Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	76 mV 76 mV 84 mV 110 mV 24 mV 110 mV	
	330 to 1000 V Up to 45 Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	360 mV 360 mV 310 mV 360 mV	
AC Voltage - Measure	Up to 10 mV Up to 20 Hz (20 to 40) Hz (40 to 100) Hz 100 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 250) kHz	0.084 mV 0.047 mV 0.036 mV 0.032 mV 0.047 mV 0.13 mV 0.55 mV	HP 3458A Option 2
	(10 to 100) mV Up to 20 Hz (20 to 40) Hz (40 to 100) Hz 100 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.49 mV 0.2 mV 0.081 mV 0.036 mV 0.23 mV 0.79 mV 2.9 mV 8.1 mV 18 mV	

**Electrical – DC/Low Frequency**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
AC Voltage - Measure	100 mV to 1 V		HP 3458A Option 2
	Up to 20 Hz	4.9 mV	
	(20 to 40) Hz	2 mV	
	(40 to 100) Hz	0.81 mV	
	100 Hz to 20 kHz	0.36 mV	
	(20 to 50) kHz	2.2 mV	
	(50 to 100) kHz	7.9 mV	
	(100 to 300) kHz	29 mV	
	(300 to 500) kHz	42 mV	
500 kHz to 1 MHz	81 mV		
	(1 to 2) MHz	180 mV	
AC Current - Source	(1 to 10) V		Fluke 5522A
	Up to 20 Hz	49 mV	
	(20 to 40) Hz	20 mV	
	(40 to 100) Hz	81 mV	
	100 Hz to 20 kHz	3.6 mV	
	(20 to 50) kHz	22 mV	
	(50 to 100) kHz	79 mV	
	(100 to 300) kHz	290 mV	
	300 kHz to 1 MHz	810 mV	
	(10 to 100) V		
	Up to 20 Hz	0.49 V	
	(20 to 40) Hz	0.2 V	
	(40 to 100) Hz	0.082 V	
	100 Hz to 20 kHz	0.047 V	
	(20 to 50) kHz	0.22 V	
(50 to 100) kHz	0.79 V		
(100 to 300) kHz	2.9 V		
300 kHz to 1 MHz	8.1 V		
(100 to 1 000) V			
Up to 40 Hz	2.3 V		
(40 to 100) Hz	1.2 V		
100 Hz to 20 kHz	0.93 V		
(20 to 50) kHz	2.2 V		
(50 to 100) kHz	9.3 V		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
	Up to 330 $\mu$ A Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.89 $\mu$ A 0.7 $\mu$ A 0.6 $\mu$ A 1.4 $\mu$ A 3.3 $\mu$ A 6.6 $\mu$ A	
AC Current - Source	330 $\mu$ A to 3.3 mA Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.008 2 mA 0.005 3 mA 0.004 1 mA 0.007 9 mA 0.02 mA 0.039 mA	Fluke 5522A
	(3.3 to 33) mA Up to 10 Hz 10 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.071 mA 0.16 mA 0.31 mA 0.08 mA 0.16 mA	
	(33 to 330) mA Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.6 mA 0.6 mA 0.26 mA 0.18 mA 0.35 mA 1.8 mA	
	(0.33 to 1.1) A Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	7.1 mA 5.2 mA 2.2 mA 2.2 mA 7.1 mA	

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
	(1.1 to 3) A Up to 10 Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	11 mA 35 mA 0.9 mA 2 mA 6.6 mA	
	(3 to 11) A Up to 45 Hz (45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz	10 mA 10 mA 16 mA 16 mA 300 mA	
AC Current - Source	(11 to 20.5) A Up to 45 Hz (45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz	35 mA 35 mA 42 mA 42 mA 720 mA	Fluke 5522A
AC Current - Measure	Up to 100 $\mu$ A Up to 20 Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.5 $\mu$ A 0.21 $\mu$ A 0.11 $\mu$ A 0.11 $\mu$ A	HP 3458A Opt 2 w/ Agilent 34330A Current Shunt for values over 1 A
	100 $\mu$ A to 100 mA Up to 20 Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.49 mA 0.2 mA 0.093 mA 0.059 mA 0.51 mA 0.81 mA 0.81 mA	
	100 mA to 1 A Up to 20 Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz	0.016 A 0.006 6 A 0.017 A 0.018 A 0.0073 A	





ANSI National Accreditation Board

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
	(1 to 5) A Up to 1 kHz (1 to 5) kHz	0.17 A 0.17 A	
	(5 to 10) A Up to 1 kHz (1 to 5) kHz	0.029 A 0.15 A	
	(10 to 20) A Up to 1 kHz (1 to 5) kHz	0.013 A 0.15 A	
Resistance - Source	Up to 10 Ω (10 to 100) Ω 100 Ω to 1.0 kΩ (1.0 to 10.0) kΩ (10.0 to 100.0) kΩ 100.0 kΩ to 1.0 MΩ (1.0 to 10.0) MΩ (10.0 to 100.0) MΩ 100.0 to 1.0 GΩ	0.012 Ω 0.005 Ω 0.000 095 kΩ 0.003 5 kΩ 0.003 6 kΩ 0.000 041 MΩ 0.001 MΩ 0.022 MΩ 0.004 1 GΩ	Fluke 5522A
Resistance - Sense	Up to 10.0 Ω (10.0 to 100.0) Ω 100.0 Ω to 1.0 kΩ (1.0 to 10.0) kΩ (10.0 to 100.0) kΩ 100.0 kΩ to 1.0 MΩ (1.0 to 10.0) MΩ (10.0 to 100.0) MΩ	0.000 26 Ω 0.002 3 Ω 0.007 4 Ω 0.000 15 kΩ 0.001 5 kΩ 0.000 021 MΩ 0.000 73 MΩ 0.06 MΩ	HP 3458A Option 2
Electrical Temperature Simulation Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.38 °C 0.31 °C 0.27 °C 0.30 °C	Fluke 5522A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.41 °C 0.18 °C 0.17 °C 0.18 °C 0.21 °C	

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Type J	(-210 to -100) °C	0.25 °C	Fluke 5522A
	(-100 to -30) °C	0.18 °C	
	(-30 to 150) °C	0.17 °C	
	(150 to 760) °C	0.18 °C	
	(760 to 1 200) °C	0.22 °C	
Type K	(-200 to -100) °C	0.29 °C	
	(-100 to -25) °C	0.19 °C	
	(-25 to 120) °C	0.18 °C	
	(120 to 1 000) °C	0.24 °C	
	(1 000 to 1 372) °C	0.34 °C	
Electrical Temperature Simulation Type N	(-200 to -100) °C	0.34 °C	
	(-100 to -25) °C	0.21 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 410) °C	0.19 °C	
	(410 to 1 300) °C	0.25 °C	
Type R	(0 to 250) °C	0.47 °C	
	(250 to 400) °C	0.31 °C	
	(400 to 1000) °C	0.30 °C	
	(1000 to 1767) °C	0.34 °C	
Type S	(0 to 250) °C	0.40 °C	
	(250 to 1000) °C	0.32 °C	
	(1000 to 1400) °C	0.32 °C	
	(1400 to 1767) °C	0.39 °C	
Type T	(-250 to -150) °C	0.51 °C	
	(-150 to 0) °C	0.22 °C	
	(0 to 120) °C	0.18 °C	
	(120 to 400) °C	0.17 °C	

**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RPM Measurement <sup>1</sup>	(6 to 8 300) RPM (8 300 to 19 000) RPM	2.2 RPM 2.9 RPM	Shimpo Tachometer

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. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1452.



R. Douglas Leonard Jr., VP, PILR SBU

