



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

ENV Services, Inc./Pro-Lab – San Antonio
4758 Research Drive
San Antonio, TX 78240

Fulfills the requirements of

ISO/IEC 17025:2017

In the field(s) of

CALIBRATION and TESTING

This certificate is valid only when accompanied by a current scope of accreditation document.
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Jason Stine, Vice President

Expiry Date: 28 February 2027

Certificate Number: ACT-3365.01



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

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CALIBRATION AND TESTING

ISO/IEC 17025 Accreditation Granted: **28 February 2025**

Certificate Number: **ACT-3365.01** Certificate Expiry Date: **28 February 2027**

CALIBRATION

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity Meters ^{1,2}	10 µS/cm 100 µS/cm 1 000 µS/cm 10 mS/cm 100 mS/cm	0.81 µS/cm 2.2 µS/cm 5.2 µS/cm 40 mS/cm 370 mS/cm	Comparison to Accredited Reference Material
Carbon Dioxide – Generate ^{1,2} (CO ₂)	3 % Concentration 5 % Concentration 10 % Concentration 15 % Concentration	0.71 % of reading 0.51 % of reading 1.3 % of reading 0.51 % of reading	Comparison to Certified Reference Gases
Oxygen – Generate ^{1,2} (O ₂)	10 % Concentration 20.8 % Concentration	0.52 % of reading 0.65 % of reading	Comparison to Certified Reference Gases
Carbon Dioxide – Measure ^{1,2} (CO ₂)	Up to 3 % Concentration (> 3 to 5) % Concentration (> 5 to 10) % Concentration (> 10 to 15) % Concentration	0.76 % of reading 0.58 % of reading 1.3 % of reading 2.4 % of reading	Comparison to Bacharach CO ₂ /O ₂ Meter, Vaisala CO ₂ Meter
Oxygen – Measure ¹ (O ₂)	Up to 100 % Concentration	0.67 % of reading	Comparison to Bacharach CO ₂ /O ₂ Meter, Vaisala CO ₂ Meter
pH Meters ^{1,2}	4 pH 7 pH 10 pH	0.027 pH 0.018 pH 0.017 pH	Comparison to Accredited Buffers

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Generate ¹	(29 to 330) μ A (10 to 20) Hz (> 20 to 45) Hz > 45 Hz to 1 kHz (>1 to 5)) kHz (> 5 to 10) kHz > 330 μ A 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 (> 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 (> 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 (> 0.33 to 2.2) A (10 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz (> 2.2 to 11) A (3 to 65) Hz (> 65 to 500) Hz > 500 Hz to 1 kHz	0.31 % of reading + 0.15 μ A 0.22 % of reading + 0.15 μ A 0.22 % of reading + 0.25 μ A 0.44 % of reading + 0.15 μ A 1.3 % of reading + 0.15 μ A 0.2 % of reading + 0.3 μ A 0.1 % of reading + 0.3 μ A 0.1 % of reading + 0.3 μ A 0.2 % of reading + 0.3 μ A 0.6 % of reading + 0.3 μ A 0.2 % of reading + 3 μ A 0.1 % of reading + 3 μ A 0.09 % of reading + 3 μ A 0.2 % of reading + 3 μ A 0.6 % of reading + 3 μ A 0.2 % of reading + 30 μ A 0.1 % of reading + 30 μ A 0.09 % of reading + 30 μ A 0.2 % of reading + 30 μ A 0.6 % of reading + 30 μ A 0.2 % of output + 0.3 mA 0.1 % of output + 0.3 mA 0.75 % of output + 0.3 mA 0.06 % of output + 2 mA 0.1 % of output + 2 mA 0.33 % of output + 2 mA	Comparison to Fluke 5550A Multiproduct Calibrator
AC Current – Measure ¹	(5 to 100) μ A (10 to 20) Hz (> 20 to 45) Hz (> 45 to 100) Hz > 100 Hz to 5 kHz	0.4 % of reading + 30 nA 0.15 % of reading + 30 nA 0.06 % of reading + 30 nA 0.06 % of reading + 30 nA	Comparison to Keysight 3458A, Opt. 002 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	(> 0.1 to 1) mA (10 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 (> 1 to 10) mA (10 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 (> 10 to 100) mA (10 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 (> 0.1 to 1) A (10 to 20) Hz (> 20 to 45) Hz (> 45 to 100) Hz > 100 Hz to 5 kHz (> 5 to 20) kHz (> 20 to 50) kHz	0.4 % of reading + 0.2 μA 0.15 % of reading + 0.2 μA 0.06 % of reading + 0.2 μA 0.03 % of reading + 0.2 μA 0.06 % of reading + 0.2 μA 0.4 % of reading + 0.4 μA 0.55 % of reading + 1.5 nA 0.4 % of reading + 2 μA 0.15 % of reading + 2 μA 0.06 % of reading + 2 μA 0.03 % of reading + 2 μA 0.06 % of reading + 2 μA 0.4 % of reading + 4 μA 0.55 % of reading + 15 μA 0.4 % of reading + 20 μA 0.15 % of reading + 20 μA 0.06 % of reading + 20 μA 0.03 % of reading + 20 μA 0.06 % of reading + 20 μA 0.4 % of reading + 40 μA 0.55 % of reading + 0.15 mA 0.4 % of reading + 0.2 mA 0.16 % of reading + 0.2 mA 0.08 % of reading + 0.2 mA 0.1 % of reading + 0.2 mA 0.3 % of reading + 0.2 mA 1 % of reading + 0.4 mA	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
AC Current Clamp Meters ¹	(45 to 65) Hz (11 to 16.5) A (> 16.5 to 550) A (> 65 to 440) Hz (11 to 16.5) A (> 16.5 to 550) A	1.2 % of reading + 0.29 A 1.2 % of reading + 1 A 1.5 % of reading + 0.29 A 1.5 % of reading + 1 A	Comparison to Fluke 5550A Multiproduct Calibrator, Fluke 5500A/COIL 50-turn Coil

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Generate ¹	(1 to 33) mV		Comparison to Fluke 5550A Multiproduct Calibrator
	(10 to 45) Hz	0.36 % of reading + 20 μV	
	> 45 Hz to 10 kHz	0.17 % of reading + 20 μV	
	> 10 to 20) kHz	0.2 % of reading + 20 μV	
	> 20 to 50) kHz	0.25 % of reading + 20 μV	
	> 50 to 100) kHz	0.35 % of reading + 33 μV	
	> 100 to 500) kHz	1 % of reading + 60 μV	
	(> 33 to 330) mV		
	(10 to 45) Hz	0.25 % of reading + 50 μV	
	> 45 Hz to 10 kHz	0.05 % of reading + 20 μV	
	> 10 to 20) kHz	0.1 % of reading + 20 μV	
	> 20 to 50) kHz	0.16 % of reading + 40 μV	
	> 50 to 100) kHz	0.24 % of reading + 0.17 mV	
	> 100 to 500) kHz	0.7 % of reading + 0.33 mV	
	(> 0.33 to 3.3) V		
	(10 to 45) Hz	0.15 % of reading + 0.25 mV	
	> 45 Hz to 10 kHz	0.03 % of reading + 60 μV	
	> 10 to 20) kHz	0.08 % of reading + 60 μV	
	> 20 to 50) kHz	0.14 % of reading + 0.3 mV	
	> 50 to 100) kHz	0.24 % of reading + 1.7 mV	
	> 100 to 500) kHz	0.5 % of reading + 3.3 mV	
	(> 3.3 to 33) V		
	(10 to 45) Hz	0.15 % of reading + 2.5 mV	
	> 45 Hz to 10 kHz	0.04 % of reading + 0.6 mV	
> 10 to 20) kHz	0.08 % of reading + 2.6 mV		
> 20 to 50) kHz	0.19 % of reading + 5 mV		
> 50 to 100) kHz	0.24 % of reading + 17 mV		
(> 33 to 330) V			
45 Hz to 1 Hz	0.05 % of reading + 6.6 mV		
> 1 to 10) kHz	0.08 % of reading + 15 mV		
> 10 to 20) kHz	0.09 % of reading + 33 mV		
(> 330 to 1 000) V			
45 Hz to 1 kHz	0.05 % of reading + 80 mV		
> 1 to 5) kHz	0.2 % of reading + 0.1 V		
> 5 to 10) kHz	0.2 % of reading + 0.5 V		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(1 to 10) mV		Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
	(1 to 40) Hz	0.03 % of reading + 3 μV	
	> 40 Hz to 1 kHz	0.02 % of reading + 1.1 μV	
	> 1 to 20) kHz	0.03 % of reading + 1.1 μV	
	> 20 to 50) kHz	0.1 % of reading + 1.1 μV	
	> 50 to 100) kHz	0.5 % of reading + 1.1 μV	
	> 100 to 300) kHz	4 % of reading + 2 μV	
	(> 10 to 100) mV		
	(1 to 40) Hz	0.01 % of reading + 4 μV	
	> 40 Hz to 1 kHz	0.007 % of reading + 2 μV	
	> 1 to 20) kHz	0.014 % of reading + 2 μV	
	> 20 to 50) kHz	0.03 % of reading + 2 μV	
	> 50 to 100) kHz	0.08 % of reading + 2 μV	
	> 100 to 300) kHz	0.3 % of reading + 10 μV	
	> 300 kHz to 1 MHz	1 % of reading + 10 μV	
	> 1 to 2) MHz	1.5 % of reading + 10 μV	
	(> 0.1 to 1) V		
	(1 to 40) Hz	0.007 % of reading + 40 μV	
	> 40 Hz to 1 kHz	0.007 % of reading + 20 μV	
	> 1 to 20) kHz	0.014 % of reading + 20 μV	
	> 20 to 50) kHz	0.03 % of reading + 20 μV	
	> 50 to 100) kHz	0.08 % of reading + 20 μV	
	> 100 to 300) kHz	0.3 % of reading + 0.1 mV	
	> 300 kHz to 1 MHz	1 % of reading + 0.1 mV	
> 1 to 2) MHz	1.5 % of reading + 0.1 mV		
(> 1 to 10) V			
(1 to 40) Hz	0.007 % of reading + 0.4 mV		
> 40 Hz to 1 kHz	0.007 % of reading + 0.2 mV		
> 1 to 20) kHz	0.014 % of reading + 0.2 mV		
> 20 to 50) kHz	0.03 % of reading + 0.2 mV		
> 50 to 100) kHz	0.08 % of reading + 0.2 mV		
(> 10 to 100) V			
(1 to 40) Hz	0.02 % of reading + 4 mV		
> 40 Hz to 1 kHz	0.02 % of reading + 2 mV		
> 1 to 20) kHz	0.02 % of reading + 2 mV		
> 20 to 50) kHz	0.035 % of reading + 2 mV		
> 50 to 100) kHz	0.12 % of reading + 10 mV		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(> 100 to 1 000) V (1 to 40) Hz > 40 Hz to 1 kHz (> 1 to 20) kHz (> 20 to 50) kHz (> 50 to 100) kHz	0.04 % of reading + 40 mV 0.04 % of reading + 20 mV 0.06 % of reading + 20 mV 0.12 % of reading + 20 mV 0.3 % of reading + 20 mV	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
Capacitance – Source ¹ (Simulation-Variable)	(0.33 to 0.499 9) nF (0.5 to 1.099) nF (1.1 to 3.299) nF (3.3 to 10.999) nF (11 to 32.999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 9) μF (1.1 to 3.299 9) μF (3.3 to 10.999 9) μF (11 to 32.999) μF (33 to 109.999) μF (110 to 329.999) μF 0.33 μF to 1.099 9 mF	0.5 % of reading + 10 pF 0.5 % of reading + 10 fF 0.5 % of reading + 10 fF 0.5 % of reading + 10 fF 0.25 % of reading + 0.1 pF 0.25 % of reading + 0.1 nF 0.25 % of reading + 0.3 nF 0.25 % of reading + 1 nF 0.35 % of reading + 3 nF 0.35 % of reading + 10 nF 0.4 % of reading + 30 nF 0.5 % of reading + 0.1 μF 0.7 % of reading + 0.3 μF 1 % of reading + 0.3 mF	Comparison to Fluke 5550A Multiproduct Calibrator
DC Current – Generate ¹	(> 0.33 to 3.3) mA (> 3.3 to 33) mA (> 33 to 330) mA > 330 mA to 2.2 A (> 2.2 to 11) A	0.12 % reading + 50 nA 0.01 % reading + 0.25 μA 0.01 % reading + 3.3 μA 0.03 % reading + 44 μA 0.06 % reading + 0.33 mA	Comparison to Fluke 5550A Multiproduct Calibrator
DC Current – Measure ¹	Up to 100 nA (> 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	0.003 4 % of reading + 40 aA 0.002 5 % of reading + 40 aA 0.002 5 % of reading + 0.1 fA 0.002 5 % of reading + 0.8 fA 0.002 5 % of reading + 5 fA 0.002 6 % of reading + 50 fA 0.004 1 % of reading + 0.5 μA 0.012 % of reading + 10 μA	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
DC Current Clamp Meters ¹	(> 20 to 110) A (> 110 to 550) A	0.62 % of reading + 1 A 0.61 % of reading + 1.2 A	Comparison to Fluke 5550A Multiproduct Calibrator, Fluke 5500A/COIL 50-turn Coil

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC 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 (> 0.1 to 1) GΩ	20 μΩ/Ω + 50 pΩ 15 μΩ/Ω + 0.5 nΩ 13 μΩ/Ω + 0.5 nΩ 13 μΩ/Ω + 5 μΩ 13 μΩ/Ω + 50 μΩ 18 μΩ/Ω + 2 Ω 53 μΩ/Ω + 0.1 kΩ 0.15 mΩ/Ω + 1 kΩ 5.1 mΩ/Ω + 10 kΩ	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
Electrical Simulation of PRT/RTD Indicators – Source ¹	Pt 385, 100 Ω (-200 to 0) °C (> 0 to 100) °C (> 100 to 300) °C (>300 to 400) °C (> 400 to 630) °C (> 630 to 800) °C Pt 3916, 100 Ω (-200 to -190) °C (> -190 to -80) °C (> -80 to 0) °C (> 0 to 260) °C (> 260 to 300) °C (> 300 to 400) °C (> 400 to 600) °C (> 400 to 630) °C Pt 3926, 100 Ω (-200 to 0) °C (> 0 to 100) °C (> 100 to 300) °C (> 300 to 400) °C (> 400 to 630) °C	0.04 °C 0.05 °C 0.07 °C 0.08 °C 0.09 °C 0.18 °C 0.19 °C 0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.18 °C 0.04 °C 0.05 °C 0.07 °C 0.08 °C 0.09 °C	Comparison to Fluke 5550A Multiproduct Calibrator
DC Resistance – Generate ¹ (Simulation)	Up to 11 Ω (> 11 to 33) Ω (> 33 to 110) Ω (110 to 330) Ω 330 Ω to 3.3 kΩ (> 3.3 to 13) kΩ (> 33 to 110) kΩ	0.013 % reading + 10 mΩ 0.012 % reading + 15 mΩ 0.009 % reading + 15 mΩ 0.009 % reading + 20 mΩ 0.009 % reading + 60 mΩ 0.009 % reading + 0.6 Ω 0.011 % reading + 6 Ω	Comparison to Fluke 5550A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Resistance – Generate ¹ (Simulation)	(> 110 to 330) kΩ > 330 kΩ to 3.3 MΩ (> 3.3 to 11) MΩ (> 11 to 33) MΩ (> 33 to 110) MΩ (> 110 to 330) MΩ	0.012 % reading + 6 Ω 0.015 % reading + 55 Ω 0.06 % reading + 0.55 kΩ 0.1 % reading + 0.55 kΩ 0.5 % reading + 5.5 kΩ 0.5 % reading + 16.5 kΩ	Comparison to Fluke 5550A Multiproduct Calibrator
DC Voltage – Measure ¹	(10 to 100) mV (> 0.1 to 1) V (> 1 to 10) V (> 10 to 100) V (> 100 to 1 000) V	0.000 7 % of reading + 0.3 μV 0.000 8 % of reading + 0.3 μV 0.000 8 % of reading + 0.5 μV 0.000 9 % of reading + 30 μV 0.000 9 % of reading + 0.1 mV	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
DC Voltage – Generate ¹	Up to 330 mV (> 0.33 to 3.3) V (> 3.3 to 33) V (> 33 to 330) V (> 330 to 1 000) V	0.006 % of reading + 3 μV 0.005 % of reading + 5 μV 0.005 % of reading + 50 μV 0.005 5 % of reading + 0.5 mV 0.005 5 % of reading + 1.5 mV	Comparison to Fluke 5550A Multiproduct Calibrator
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	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 (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.34 °C 0.26 °C 0.23 °C 0.26 °C 0.23 °C 0.20 °C 0.24 °C 0.39 °C 0.65 °C 0.39 °C 0.12 °C 0.11 °C 0.12 °C 0.16 °C 0.21 °C 0.12 °C 0.11 °C 0.13 °C 0.18 °C	Comparison to Fluke 5550A Multiproduct Calibrator

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 K		Comparison to Fluke 5550A Multiproduct Calibrator
	(-200 to -100) °C	0.26 °C	
	(-100 to -25) °C	0.14 °C	
	(-25 to 120) °C	0.12 °C	
	(120 to 1 000) °C	0.2 °C	
	(1 000 to 1 372) °C	0.31 °C	
	Type L		
	(-200 to -100) °C	0.29 °C	
	(-100 to 800) °C	0.2 °C	
	(800 to 900) °C	0.13 °C	
	Type N		
	(-200 to -100) °C	0.31 °C	
	(-100 to -25) °C	0.17 °C	
	(-25 to 120) °C	0.15 °C	
	(120 to 410) °C	0.14 °C	
	(410 to 1 300) °C	0.21 °C	
	Type R		
	(0 to 250) °C	0.44 °C	
	(250 to 400) °C	0.27 °C	
	(400 to 1 000) °C	0.26 °C	
	(1 000 to 1 767) °C	0.31 °C	
Type S			
(0 to 250) °C	0.36 °C		
(250 to 1 000) °C	0.28 °C		
(1 000 to 1 400) °C	0.29 °C		
(1 400 to 1 767) °C	0.36 °C		
Type T			
(-250 to -150) °C	0.49 °C		
(-150 to 0) °C	0.19 °C		
(0 to 120) °C	0.12 °C		
(120 to 400) °C	0.11 °C		
Type U			
(-200 to 0) °C	0.43 °C		
(0 to 600) °C	0.21 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes ^{1,2} Amplitude DC into 50 Ω load into 1 MΩ load	(> 0 to 2.2) V (> 0 to 33) V	0.25 % of reading + 0.1 mV 0.25 % of reading + 0.1 mV	Comparison to Fluke 5500A/300 Multiproduct Calibrator with 300 MHz Scope Option
Amplitude Square Wave into 50 Ω load	10 Hz to 10 kHz 4.5 mVp-p to 2.75 Vp-p	2 % of reading + 0.2 mV	
Leveled Sine Wave into 50 Ω load	50 kHz 5 mVp-p to 5.5 Vp-p	2 % of reading + 0.2 mV	
Leveled Sine Wave Flatness (50 kHz Reference) into 50 Ω load	5 mVp-p to 5.5 Vp-p 50 kHz to 100 MHz (100 to 300) MHz	3.5 % of reading + 0.3 mV 4 % of reading + 0.3 mV	
Time Marker into 50 Ω load	(2 to 10) ns 20 ns to 1 μs (2 to 50) μs 100 μs to 5 s	25 μs/s 25 μs/s (25 to 15 000t) μs/s (25 + 1 000t) μs/s	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers ^{1,3}	Up to 20 in	(220 + 22L) μin	Comparison to Gage Blocks; ENV WI 4372
Micrometers ^{1,3}	(0.01 to 20) in	(81 + 5L) μin	Comparison to Gage Blocks; ENV WI 36585

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Air Flow Meters/Sensors ^{1,3,4}	(0.007 6 to 0.055 8) SCFM (> 0.156 to 1.72) SCFM	1.3 % of reading 0.99 % of reading	Comparison to Laminar Flow Elements and Pressure Module; Manufacturer's Procedure; Values are referenced to standard atmospheric conditions.
Particle Counters – Flow ^{1,2}	Up to 200 lpm	2.4 % of reading + 0.04 lpm	Mass Flow Meter; ISO 21501
Particle Counters – Particle Size	(0.3 to 10) µm	2 % of reading	Spheres, Digital Voltmeter; ISO 21501
Particle Counters – Counting Efficiency	(0.24 to 0.9) µm 50 % Counting Efficiency 100 % Counting Efficiency	3.5 % reading 4.8 % reading	Reference Particle Counter using ISO 21501.
Pneumatic Pressure Gages/Transducers ^{1,4} (Absolute)	Up to 10 Torr (> 10 to 100) Torr (> 100 to 1 000) Torr	0.13 % of reading 0.14 % of reading 0.093 % of reading	Comparison to MKS System; ASME B40.100
Pneumatic Pressure Gages/Transducers ¹ (Absolute)	(> 0 to 0.5) inH ₂ O (> 0.5 to 1) inH ₂ O (> 1 to 5) inH ₂ O (> 5 to 10) inH ₂ O (> 10 to 860) inH ₂ O	0.000 42 inH ₂ O 0.001 6 inH ₂ O 0.003 6 inH ₂ O 0.002 3 inH ₂ O 0.017 % of reading	HQS Pressure Modules Ametek Deadweight Tester ASME B40.100
Pneumatic Pressure Gages/Transducers ¹ (Absolute)	Up to 25 psia (> 25 to 500) psia	0.004 psi 0.015 % of reading	Comparison to Mensor System; ASME B40.100
Hydraulic Pressure Gages/Transducers ¹ (Gauge)	(> 500 to 2 000) psig (> 2 000 to 5 000) psig	1.5 psi 3.3 psi	HQS-2 Pressure Modules; ASME B40.100
Scales and Balances ^{1,5}	24 µg to 500 mg 500 mg to 2 g (> 2 to 20) g (> 20 to 30) g (> 30 to 150) g (> 150 to 600) g	8 µg 24 µg 53 µg 94 µg 0.29 mg 1.3 mg	ASTM E617 Class 1 weights and ASTM E898 utilized for the calibration of the weighing system.



ANSI National Accreditation Board

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances ^{1,4}	(> 600 to 800) g > 800 g to 2 kg (> 2 to 10) kg (> 10 to 60) kg	11 mg 10 mg 0.18 g 1.8 g	ASTM E617 Class 1 weights and ASTM E898 utilized for the calibration of the electronic weighing system.
Torque Wrenches/Sensors ¹	(1 to 10) lbf·in (> 1 to 100) lbf·in (> 100 to 250) lbf·in (> 20.8 to 250) lbf·ft	0.12 lbf·in 1.2 lbf·in 2.9 lbf·in 2.9 lbf·ft	Comparison to Torque Transducers
Digital Aerosol Photometer ¹	Up to 20 % leakage (> 20 to 100) % leakage	0.16 % leakage 0.1 % leakage	Comparison to Keithley Current Source
Piston Operated Volumetric Apparatus ¹ (Pipettes, Burettes, Titrators, Dispensers, Diluters)	(0.2 to 1) µL (> 1 to 2) µL (> 2 to 20) µL (> 20 to 100) µL (> 100 to 200) µL	13 nL 0.12 µL 0.13 µL 0.18 µL 0.3 µL	Precision Balances, ASTM E617 Ultra-Class weights; Gravimetric Method
Piston Operated Volumetric Apparatus ¹ (Pipettes, Burettes, Titrators, Dispensers, Diluters)	> 200 µL to 1 mL (> 1 to 5) mL (> 5 to 10) mL (> 10 to 50) mL	0.23 µL 0.23 µL 5.7 µL 17 µL	Precision Balances, ASTM E617 Ultra-Class weights; Gravimetric Method

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Light Meters	(330 to 8 260) lux	3.6 % of reading	Master Light Meter; INS DX-200 Handbook of Photometry Method

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity – Generate ⁴ (Meters, Sensors, etc.)	Up to 30 %RH (> 30 to 80) %RH	0.39 %RH 0.57 %RH	Comparison to Thunder Scientific Humidity Generation System

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Generate ¹ (Temperature Probes, Sensors, etc.)	(-90 to -30) °C (> -30 to 125) °C (> 125 to 419) °C (> 419 to 660) °C	0.015 °C 0.063 °C 0.084 °C 0.19 °C	Comparison to PRT, Super-thermometer Readout, Baths, Dry Well
Temperature – Measure ¹ (Room, Chambers, Dry Wells, etc.)	(-196 to -38.8) °C (> -38.8 to 0) °C (> 0 to 156) °C (> 156 to 231) °C (> 231 to 419) °C (> 419 to 660) °C	0.017 °C 0.016 °C 0.014 °C 0.015 °C 0.02 °C 0.14 °C	Comparison to Burns Engineering PRT, Super-thermometer Readout
Infrared Thermometers, Thermal Video Devices ¹	(-30 to 150) °C (> 150 to 300) °C (> 300 to 500) °C	0.49 °C 0.78 °C 0.96 °C	Comparison to Blackbody Source (flat body) $\epsilon = 0.95, \lambda = (8 \text{ to } 14) \mu\text{m}$
Temperature Uniformity Survey (TUS) ¹ (Ovens, Furnaces, Freezers, Environmental Chambers) Temperature	(-196 to -80) °C (> -80 to 140) °C (> 140 to 220) °C (> 220 to 537) °C (> 537 to 760) °C (> 760 to 982) °C (> 982 to 1 204) °C	0.93 °C 0.15 °C 0.93 °C 3.4 °C 4.1 °C 5 °C 6 °C	Per AMS-2750 using Fluke 1586A Precision Temperature Scanner, Type T Thermocouple Type K Thermocouple
Humidity	(20 to 90) %RH	2.5 %RH	Temp/Humidity Dataloggers

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Generate (Reference)	10 MHz	(3.7 x 10 ⁻⁸) Hz	Comparison to GPS, Fluke PM6681 Counter

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Generate ¹	10 mHz to 12 kHz > 12 kHz to 1.2 MHz (> 1.2 to 2) MHz	0.001 9 % of reading + 1 Hz 0.001 9 % of reading + 15 Hz 0.002 5 % of reading + 15 Hz	Comparison to Fluke 5500A Multiproduct Calibrator
Frequency – Measure (Reference)	10 MHz	(6.8 x 10 ⁻⁸) Hz	Comparison to GPS, Fluke PM6681 Counter
Frequency – Measure ¹	(1 to 40) Hz > 40 Hz to 100 MHz	0.05 % of reading 0.01 % of reading	Comparison to Keysight 3458A, Opt. 002 8.5 Digit Multimeter
Optical Tachometers ^{1,3}	(10 to 300) rpm (> 300 to 200 000) rpm	0.001 rpm 0.000 3 % of reading	Comparison to Fluke 5500A Multiproduct Calibrator, LED
Stopwatches ¹	15 s to 24 hr	50 ms	Timometer; NIST 960-2

TESTING

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Chemical Fume Hood, Ductless Fume Hood	ASHRAE 110, SEFA 1, ANSI/AIHA Z95, ENV Method WI-4380 & WI-4381	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator
Class 1 Bio-Safety Cabinet	WI-4389	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator, Particle Aerosol Generator, Photometer
Class II, Type A2 Bio-Safety Cabinet	NSF/ANSI 49 (except vibration)	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Direct Inflow Measurement (DIM), Visual Aerosol Generator, Particle Aerosol Generator, Photometer

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Class II, Type B2 Bio-Safety Cabinet	NSF/ANSI 49 (except vibration), WI-4374	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Direct Inflow Measurement (DIM), Visual Aerosol Generator, Particle Aerosol Generator, Photometer
Class III Bio-Safety Cabinet/Glove Box, Barrier Isolator	IEST-RP-CC028/.1, ISO 14644-7, WI-4382	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator, Particle Aerosol Generator, Photometer, Particle Counter
Laminar Flow Hood	IEST-RP-CC002.3, WI-4387	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator, Particle Aerosol Generator, Photometer
Terminal HEPA Filter	IEST-RP-CC002.3, IEST-RP-C034.2, WI-4387	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Particle Aerosol Generator, Photometer
Clean Room	ISO 14644 Part 1 & 2, IEST-RP-C006.3, FDA Guidance for Industry 2004, WI-1146	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator, Particle Aerosol Generator, Photometer, Balometer, Manometer, Particle Counter
Certificate of Sterile Compounding Facilities and Aseptic Isolators	USP797, CETA CAG-001, CETA CAG-002, CETA CAG-003	Fume Hoods, Bio-Safety Cabinets, Glove Boxes, Clean Room, etc.	Thermo Anemometer, Visual Aerosol Generator, Particle Aerosol Generator, Photometer, Balometer, Manometer, Particle Counter, Viable Air Sampler

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. The values shown in the Range column are “Nominal” values. The actual values will be reported on the calibration certificate at the time of calibration, along with the associated Measurement Uncertainty.
 3. t = time in seconds; L = length in inches; lpm = liters per minute; SFM = standard feet per minute; SCFM = standard cubic feet per minute; rpm = revolutions per minute.
 4. $0.6R$ will be added to Measurement Uncertainty at the time of calibration. R = resolution in the unit of measure of the measurand.
 5. The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
 6. Unless otherwise specified in the far-right column, the calibration procedure utilized was developed internally.
 7. The legal entity for this site is ENV Services, Inc./Pro-Lab.



Jason Stine, Vice President

