



# CERTIFICATE OF ACCREDITATION

**The ANSI National Accreditation Board**

Hereby attests that

**Thermo-Temp, Inc.**  
**813-A Woodcrest**  
**Houston, TX 77018**

Fulfills the requirements of

**ISO/IEC 17025:2017**

and national standards

**ANSI/NCSL Z540-1-1994 (R2002) and**  
**ANSI/NCSL Z540.3-2006 (R2013)**

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](http://www.anab.org).

A handwritten signature in black ink, appearing to be 'J. Stine', is positioned above a horizontal line.

Jason Stine, Vice President

Expiry Date: 12 December 2025  
Certificate Number: AC-2535



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)**

**ANSI/NCSL Z540.3-2006 (R2013)**

**Thermo-Temp, Inc.**

813-A Woodcrest

Houston, Texas 77018

Chuck Osterhaus 713-695-1939

**CALIBRATION**

ISO/IEC 17025 Accreditation Granted: **05 December 2023**

Certificate Number: **AC-2535**

Certificate Expiry Date: **12 December 2025**

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Generate <sup>1</sup>	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (100 to 1 000) V	16 $\mu$ V/V + 1 $\mu$ V 9 $\mu$ V/V + 2 $\mu$ V 9 $\mu$ V/V + 20 $\mu$ V 14 $\mu$ V/V + 0.15 mV 14 $\mu$ V/V + 1.5 mV	Comparison to Fluke 5522A Multiproduct Calibrator
DC Voltage – Measure <sup>1</sup>	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (10 to 1 000) V	8 $\mu$ V/V + 0.3 $\mu$ V 7 $\mu$ V/V + 0.3 $\mu$ V 7 $\mu$ V/V + 0.5 $\mu$ V 9 $\mu$ V/V + 30 $\mu$ V 10 $\mu$ V/V + 0.1 mV	Comparison to HP 3458A 8.5 Digit Multimeter
AC Voltage – Generate <sup>1</sup>	(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	0.64 mV/V + 6 $\mu$ V 0.19 mV/V + 6 $\mu$ V 0.21 mV/V + 6 $\mu$ V 0.79 mV/V + 6 $\mu$ V 2.7 mV/V + 12 $\mu$ V 6.2 mV/V + 50 $\mu$ V	Comparison to Fluke 5522A Multiproduct Calibrator



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Generate <sup>1</sup>	(33 to 330) mV		Comparison to Fluke 5522A Multiproduct Calibrator
	(10 to 45) Hz	0.29 mV/V + 8 μV	
	45 Hz to 10 kHz	0.21 mV/V + 8 μV	
	(10 to 20) kHz	0.21 mV/V + 8 μV	
	(20 to 50) kHz	0.32 mV/V + 8 μV	
	(50 to 100) kHz	0.64 mV/V + 32 μV	
	(100 to 500) kHz	1.6 mV/V + 70 μV	
	(0.33 to 3.3) V		
	(10 to 45) Hz	0.23 mV/V + 50 μV	
	45 Hz to 10 kHz	0.12 mV/V + 60 μV	
	(10 to 20) kHz	0.15 mV/V + 60 μV	
	(20 to 50) kHz	0.24 mV/V + 50 μV	
	(50 to 100) kHz	0.54 mV/V + 0.13 mV	
	(100 to 500) kHz	1.8 mV/V + 0.6 mV	
	(3.3 to 33) V		
	(10 to 45) Hz	0.23 mV/V + 0.65 mV	
	45 Hz to 10 kHz	0.12 mV/V + 0.6 mV	
	(10 to 20) kHz	0.19 mV/V + 0.6 mV	
	(20 to 50) kHz	0.27 mV/V + 0.6 mV	
	(50 to 100) kHz	0.7 mV/V + 1.6 mV	
	(33 to 330) V		
	10 Hz to 45 Hz	0.15 mV/V + 2 mV	
	45 Hz to 10 kHz	0.16 mV/V + 6 mV	
	10 kHz to 20 kHz	0.19 mV/V + 6 mV	
20 kHz to 50 kHz	0.23 mV/V + 6 mV		
50 kHz to 100 kHz	1.6 mV/V + 50 mV		
(330 to 1 000) V			
45 Hz to 1 kHz	0.23 mV/V + 10 mV		
1 kHz to 5 kHz	0.2 mV/V + 10 mV		
5 kHz to 10 kHz	0.23 mV/V + 10 mV		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure <sup>1</sup>	Up to 10 mV		Comparison to HP 3458A 8.5 Digit Multimeter
	(1 to 40) Hz	0.03 % of reading + 3 μV	
	40 Hz to 1 kHz	0.03 % of reading + 1.1 μV	
	(1 to 20) kHz	0.04 % of reading + 1.1 μV	
	(20 to 50) kHz	0.09 % of reading + 1.1 μV	
	(50 to 100) kHz	0.09 % of reading + 1.1 μV	
	(100 to 300) kHz	4.1 % of reading + 2 μV	
	(10 to 100) mV		
	(1 to 40) Hz	0.017 % of reading + 4 μV	
	40 Hz to 1 kHz	0.017 % of reading + 2 μV	
	(1 to 20) kHz	0.022 % of reading + 2 μV	
	(20 to 50) kHz	0.05 % of reading + 2 μV	
	(50 to 100) kHz	0.09 % of reading + 2 μV	
	(100 to 300) kHz	0.31 % 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	0.019 % of reading + 0.4 mV	
	40 Hz to 1 kHz	0.019 % of reading + 0.2 mV	
	(1 to 20) kHz	0.023 % of reading + 0.2 mV	
	(20 to 50) kHz	0.04 % of reading + 0.2 mV	
	(50 to 100) kHz	0.08 % of reading + 0.2 mV	
	(100 to 300) kHz	0.3 % of reading + 1 mV	
	300 kHz to 1 MHz	1 % of reading + 1 mV	
(1 to 2) MHz	1.5 % of reading + 1 mV		
(1 to 10) V			
(1 to 40) Hz	0.008 % of reading + 0.4 mV		
40 Hz to 1 kHz	0.008 % of reading + 0.2 mV		
(1 to 20) kHz	0.016 % 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		
(100 to 300) kHz	0.3 % of reading + 1 mV		
300 kHz to 1 MHz	1 % of reading + 1 mV		
(1 to 2) MHz	1.5 % of reading + 1 mV		



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure <sup>1</sup>	(10 to 100) V		Comparison to HP 3458A 8.5 Digit Multimeter
	1 Hz 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	0.036 % of reading + 2 mV	
	(50 to 100) kHz	0.12 % of reading + 10 mV	
	(100 to 300) kHz	0.4 % of reading + 10 mV	
	300 kHz to 1 MHz	1.5 % of reading + 10 mV	
	(100 to 1 000) V		
	1 Hz to 40 Hz	0.04 % of reading + 40 mV	
	40 Hz to 1 kHz	0.04 % of reading + 20 mV	
	(1 to 20) kHz	0.06 % of reading + 20 mV	
	(20 to 50) kHz	0.12 % of reading + 20 mV	
	(50 to 100) kHz	0.3 % of reading + 20 mV	
Resistance – Generate <sup>1</sup>	(0 to 11) Ω	0.2 mΩ/Ω + 10 mΩ	Comparison to Fluke 5522A Multiproduct Calibrator
	(11 to 33) Ω	27 μΩ/Ω + 15 mΩ	
	(33 to 110) Ω	25 μΩ/Ω + 15 mΩ	
	(110 to 330) Ω	22 μΩ/Ω + 20 mΩ	
	(0.33 to 1.1) Ω	22 μΩ/Ω + 20 mΩ	
	(1.1 to 3.3) kΩ	22 μΩ/Ω + 0.2 Ω	
	(3.3 to 11) kΩ	22 μΩ/Ω + 0.1 Ω	
	(11 to 33) kΩ	22 μΩ/Ω + 1 Ω	
	(33 to 110) kΩ	22 μΩ/Ω + 1 Ω	
	(110 to 330) kΩ	25 μΩ/Ω + 10 Ω	
	(0.33 to 1.1) kΩ	25 μΩ/Ω + 10 Ω	
	(1.1 to 3.3) MΩ	47 μΩ/Ω + 0.15 kΩ	
	(3.3 to 11) MΩ	0.1 mΩ/Ω + 0.25 kΩ	
	(11 to 33) MΩ	0.19 mΩ/Ω + 2.5 kΩ	
	(33 to 110) MΩ	0.39 mΩ/Ω + 3 kΩ	
	(110 to 330) MΩ	2.3 mΩ/Ω + 0.1 MΩ	
(0.33 to 1.1) GΩ	12 mΩ/Ω + 0.5 MΩ		
Resistance – Measure <sup>1,2</sup>	(0 to 10) Ω	24 μΩ/Ω + 50 μΩ	Comparison to HP 3458A 8.5 Digit Multimeter
	(10 to 100) Ω	22 μΩ/Ω + 0.5 mΩ	
	(0.1 to 1) kΩ	20 μΩ/Ω + 0.5 mΩ	
	(1 to 10) kΩ	15 μΩ/Ω + 5 mΩ	
	(10 to 100) kΩ	15 μΩ/Ω + 50 mΩ	
	(0.1 to 1) MΩ	20 μΩ/Ω + 2 Ω	
	(1 to 10) MΩ	57 μΩ/Ω + 0.1 kΩ	
	(10 to 100) MΩ	0.53 mΩ/Ω + 1 kΩ	
	(0.1 to 1) GΩ	5 mΩ/Ω + 10 kΩ	



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Generate <sup>1</sup>	(0 to 330) $\mu$ A (0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 1.1) A (1.1 to 3) A (0 to 11) A (11 to 20.5) A	0.12 mA/A + 20 nA 78 $\mu$ A/A + 50 nA 78 $\mu$ A/A + 0.25 $\mu$ A 78 $\mu$ A/A + 2.5 $\mu$ A 0.37 mA/A + 40 $\mu$ A 0.3 mA/A + 40 $\mu$ A 0.39 mA/A + 0.5 mA 0.78 mA/A + 0.75 mA	Comparison to Fluke 5522A Multiproduct Calibrator (Locked Ranges)
DC Current – Measure	(0 to 100) nA (0.1 to 1) $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	36 $\mu$ A/A + 40 pA 26 $\mu$ A/A + 40 pA 26 $\mu$ A/A + 0.1 nA 30 $\mu$ A/A + 0.8 nA 28 $\mu$ A/A + 5 nA 28 $\mu$ A/A + 50 nA 46 $\mu$ A/A + 0.5 $\mu$ A 0.12 mA/A + 10 $\mu$ A	Comparison to HP 3458A 8.5 Digit Multimeter
AC Current – Generate <sup>1</sup>	(29 to 330) $\mu$ A (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 (0.33 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	0.17 % of reading + 0.1 $\mu$ A 0.14 % of reading + 0.1 $\mu$ A 0.12 % of reading + 0.1 $\mu$ A 0.23 % of reading + 0.2 $\mu$ A 0.62 % of reading + 0.2 $\mu$ A 1.2 % of reading + 0.4 $\mu$ A 0.17 % of reading + 0.15 $\mu$ A 0.12 % of reading + 0.2 $\mu$ A 0.1 % of reading + 0.2 $\mu$ A 0.53 % of reading + 0.2 $\mu$ A 0.39 % of reading + 0.3 $\mu$ A 0.78 % of reading + 0.6 $\mu$ A 0.16 % of reading + 2 $\mu$ A 0.1 % of reading + 2 $\mu$ A 0.078 % of reading + 2 $\mu$ A 0.062 % of reading + 2 $\mu$ A 0.16 % of reading + 3 $\mu$ A 0.31 % of reading + 4 $\mu$ A	Comparison to Fluke 5522A Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Generate <sup>1</sup>	(33 to 330) mA		Comparison to Fluke 5522A Multiproduct Calibrator
	(10 to 20) Hz	0.16 % of reading + 20 µA	
	(20 to 45) Hz	0.1 % of reading + 20 µA	
	45 Hz to 1 kHz	0.031 % of reading + 20 µA	
	(1 to 5) kHz	0.078 % of reading + 50 µA	
	(5 to 10) kHz	0.16 % of reading + 0.1 mA	
	(10 to 30) kHz	0.31 % of reading + 0.2 mA	
	(0.33 to 1.1) A		
	(10 to 45) Hz	0.14 % of reading + 0.1 mA	
	45 Hz to 1 kHz	0.05 % of reading + 0.1 mA	
	(1 to 5) kHz	0.47 % of reading + 1 mA	
	(5 to 10) kHz	1.9 % of reading + 5 mA	
	(1.1 to 3) A		
	(10 to 45) Hz	0.14 % of reading + 0.1 mA	
	45 Hz to 1 kHz	0.05 % of reading + 0.1 mA	
	(1 to 5) kHz	0.47 % of reading + 1 mA	
	(5 to 10) kHz	1.9 % of reading + 5 mA	
	(3 to 11) A		
	(45 to 500) Hz	0.05 % of reading + 2 mA	
	500 Hz to 1 kHz	0.08 % of reading + 2 mA	
(1 to 5) kHz	2.3 % of reading + 2 mA		
(11 to 20.5) A			
(45 to 100) Hz	0.09 % of reading + 5 mA		
100 Hz to 1 kHz	0.12 % of reading + 5 mA		
(1 to 5) kHz	2.3 % of reading + 5 mA		
AC Current – Measure	(5 to 100) µA		Comparison to HP 3458A 8.5 Digit Multimeter
	(10 to 20) Hz	4.1 mA/A + 30 nA	
	(20 to 45) Hz	1.7 mA/A + 30 nA	
	(45 to 100) Hz	0.95 mA/A + 30 nA	
	100 to 5 kHz	0.95 mA/A + 30 nA	
	(0.1 to 1) mA		
	(10 to 20) Hz	4.1 mA/A + 0.2 µA	
	(20 to 45) Hz	1.7 mA/A + 0.2 µA	
	(45 to 100) Hz	0.94 mA/A + 0.2 µA	
	100 to 5 kHz	0.78 mA/A + 0.2 µA	
	(5 to 20) kHz	0.94 mA/A + 0.2 µA	
	(20 to 50) kHz	4.1 mA/A + 0.4 µA	
(50 to 100) kHz	5.6 mA/A + 1.5 µA		



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(1 to 10) mA		Comparison to HP 3458A 8.5 Digit Multimeter
	(10 to 20) Hz	4.1 mA/A + 20 $\mu$ A	
	(20 to 45) Hz	1.7 mA/A + 20 $\mu$ A	
	(45 to 100) Hz	0.93 mA/A + 20 $\mu$ A	
	100 to 5 kHz	0.32 mA/A + 20 $\mu$ A	
	(5 to 20) kHz	0.61 mA/A + 20 $\mu$ A	
	(20 to 50) kHz	4 mA/A + 40 $\mu$ A	
	(50 to 100) kHz	5.5 mA/A + 0.15 mA	
	(10 to 100) mA		
	(10 to 20) Hz	4.1 mA/A + 20 $\mu$ A	
	(20 to 45) Hz	1.7 mA/A + 20 $\mu$ A	
	(45 to 100) Hz	0.95 mA/A + 20 $\mu$ A	
	100 to 5 kHz	0.33 mA/A + 20 $\mu$ A	
	(5 to 20) kHz	0.62 mA/A + 20 $\mu$ A	
	(20 to 50) kHz	4 mA/A + 40 $\mu$ A	
	(50 to 100) kHz	5.5 mA/A + 0.15 mA	
	(0.1 to 1) A		
	(10 to 20) Hz	4.1 mA/A + 0.2 mA	
(20 to 45) Hz	1.8 mA/A + 0.2 mA		
(45 to 100) Hz	0.83 mA/A + 0.2 mA		
100 to 5 kHz	1 mA/A + 0.2 mA		
(5 to 20) kHz	3 mA/A + 0.2 mA		
(20 to 50) kHz	10 mA/A + 0.4 mA		
Capacitance – Generate <sup>1</sup> (Simulation)	(0.19 to 0.4) nF	3.9 % of reading + 10 pF	Comparison to Fluke 5522A Multiproduct Calibrator
	(0.4 to 1.1) nF	1.4 % of reading + 10 pF	
	(1.1 to 3.3) nF	1.1 % of reading + 10 pF	
	(3.3 to 11) nF	0.28 % of reading + 10 pF	
	(11 to 33) nF	0.43% of reading + 10 pF	
	(33 to 110) nF	0.26.% of reading + 10 pF	
	(110 to 330) nF	0.19 % of reading + 30 pF	
	(0.33 to 1,1) $\mu$ F	0.19 % of reading + 1 nF	
	(1.1 to 3.3) $\mu$ F	0.19 % of reading + 3 nF	
	(3.3 to 11) $\mu$ F	0.19 % of reading + 10 nF	
	(11 to 33) $\mu$ F	0.31 % of reading + 30 nF	
	(33 to 110) $\mu$ F	0.35 % of reading + 0.1 $\mu$ F	
	(110 to 330) $\mu$ F	0.35 % of reading + 0.3 $\mu$ F	
	(0.33 to 1.1) mF	0.35 % of reading + 1 $\mu$ F	
	(1.1 to 3.3) mF	0.35 % of reading + 3 $\mu$ F	
(3.3 to 11) mF	0.35 % of reading + 10 $\mu$ F		
(11 to 33) mF	0.58 % of reading + 30 $\mu$ F		
(33 to 110) mF	0.85 % of reading + 0.1 mF		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Generate/Measure <sup>1</sup>	Type J		Comparison to Fluke 5522A Multiproduct Calibrator
	(-210 to -100) °C	0.24 °C	
	(-100 to -30) °C	0.12 °C	
	(-30 to 150) °C	0.13 °C	
	(150 to 760) °C	0.13 °C	
	(760 to 1 200) °C	0.19 °C	
	Type K		
	(-200 to -100) °C	0.35 °C	
	(-100 to -25) °C	0.14 °C	
	(-25 to 120) °C	0.18 °C	
	(120 to 1 000) °C	0.2 °C	
	(1 000 to 1 372) °C	0.33 °C	
	Type N		
	(-200 to -100) °C	0.33 °C	
	(-100 to -25) °C	0.17 °C	
	(-25 to 120) °C	0.17 °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	0.37 °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		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance Simulation of RTD Indicating Devices – Generate <sup>1</sup>	Pt 385, 100 Ω		Comparison to Fluke 5522A Multiproduct Calibrator
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 300) °C	0.07 °C	
	(300 to 400) °C	0.08 °C	
	(400 to 630) °C	0.09 °C	
	(630 to 800) °C	0.18 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.08 °C	
	(300 to 400) °C	0.16 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.19 °C	
	(-190 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.04 °C	
(0 to 100) °C	0.05 °C		
(100 to 260) °C	0.05 °C		
(260 to 300) °C	0.06 °C		
(300 to 400) °C	0.07 °C		
(400 to 600) °C	0.08 °C		
(600 to 630) °C	0.18 °C		

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers <sup>1</sup>	HRA		Indirect Verification per ASTM E 18 using Test Blocks
	Low	0.89 HRA	
	Middle	0.89 HRA	
	High	0.53 HRA	
	HRBW		
	Low	1.43 HRBW	
Middle	1.37 HRBW		
High	1.17 HRBW		

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers <sup>1</sup>	HRC Low Middle High	0.81 HRC 0.79 HRC 0.71 HRC	Indirect Verification per ASTM E 18 using Test Blocks
Brinell Hardness Testers <sup>1,4</sup>	HBW 106 HBW 223 HBW 451 HBW	7.2 HBW 7.2 HBW 18 HBW	Indirect Verification per ASTM E 10 using Test Blocks
Pressure Gauges, Differential Pressure Gauges <sup>1,3</sup>	(-14 to 15) psig (0 to 150) psig	0.002 9 psi 0.021 psi	Comparison to Druck DPI150 Pressure/Vacuum Calibrator
Pressure Gauges, Differential Pressure Gauges <sup>1,3</sup>	(0 to 1 000) psig (200 to 20 000) psig	0.14 psi 4.6 psi	Comparison to Budenberg CPB5800 Deadweight Tester
Pressure Gauges, Differential Pressure Gauges <sup>1,3</sup>	(10 000 to 72 500) psig	4.8 psi	Comparison to Fluke PG7302 Hydraulic Piston Gauge

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure <sup>1</sup>	(-197 to -80) °C (-80 to -38.84) °C (-38.84 to 0) °C (0 to 231.9) °C (231.9 to 419.5) °C (419.5 to 660) °C	0.016 °C 0.023 °C 0.028 °C 0.082 °C 0.11 °C 0.16 °C	Comparison to Fluke 1502A Thermometer Readout, Fluke 562xA Secondary PRT
Temperature – Measuring Equipment <sup>1</sup>	(-197 to -80) °C (-80 to -38.84) °C (-38.84 to 0) °C (0 to 231.9) °C (231.9 to 419.5) °C (419.5 to 660) °C	0.02 °C 0.026 °C 0.034 °C 0.1 °C 0.16 °C 0.2 °C	Comparison to Fluke 1502A Thermometer Readout, Fluke 562xA Secondary PRT, Liquid Bath, Dry Well

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
System Accuracy Test (SAT)	(200 to 2 000) °F (2 000 to 2 200) °F	2.6 °F 3.9 °F	Process Calibrator, Type K MGO Thermocouple Probe per AMS 2750.
Temperature Uniformity Survey (TUS)	(200 to 1 600) °F (1 600 to 2 000) °F (2 000 to 2 200) °F	4.8 °F 2.7 °F 4 °F	Data Acquisition Recorder, Type K Thermocouple Wire per AMS 2750.


**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Generate <sup>1</sup>	10 mHz to 2 MHz	0.000 2 % of reading + 5 μHz	Comparison to Fluke 5522A Multiproduct Calibrator

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. For 2-wire measurement, add 0.25 Ω.
3. 0.6R will be added to the Measurement Uncertainty at the time of calibration (where R = resolution of the device under calibration).
4. The range value is a nominal value. The actual value of the standard will be used during calibration and the associated uncertainty will be utilized to calculate measurement uncertainty.
5. Unless otherwise specified in the far-right column, the calibration method/procedure utilized by the laboratory was developed and validated internally.



Jason Stine, Vice President