



CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board
11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

Garber Metrology Weighing Solutions & Precision Calibration
520 E. Oregon Road
Lititz, PA 17543

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of activities to which this accreditation applies

AC-1255

Certificate Number



ANAB Approval

Certificate Valid Through: 01/26/2021
Version No. 010 Issued: 11/06/2019



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)**

Garber Metrology Weighing Solutions & Precision Calibration

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CALIBRATION

Valid to: **January 26, 2021**

Certificate Number: **AC-1255**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage - Source	Up to 329.999 9 mV (0.330 to 3.299 99) V (3.3 to 32.999 99) V (30 to 329.999 9) V (100 to 1 020) V	15 μ V/V + 1 μ V 8.5 mV/V + 2 μ V 9.3 mV/V + 20 μ V 0.14 V/V + 0.15 mV 0.14 V/V + 1.5 mV	Fluke 5522A Multi Product Calibrator
DC Voltage - Measure	(0 to 100) mV 100 mV to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	14 μ V/V 9.4 μ V/V 9.1 μ V/V 12 μ V/V 12 μ V/V	HP 3458A Multimeter
DC Current - Source	(0 to 329.999 9) μ A (0 to 3.299 99) mA (0 to 32.999 9) mA (0 to 329.999) mA (0 to 1.099 99) A (1.1 to 2.999 9) A (0 to 10.999 9) A (11 to 20.5) A	0.12 μ A/A + 20 nA 80 nA/A + 50 nA 80 nA/A + 0.3 μ A 80 nA/A + 2.5 μ A 0.2 μ A/A + 40 μ A 0.3 μ A/A + 40 μ A 0.4 μ A/A + 0.5 mA 0.8 μ A/A + 0.8 mA	Fluke 5522A Multi Product Calibrator
DC Current Measure	Up to 100 nA 100 nA to 1 μ A (1 to 10) μ A (10 to 100) μ A 100 μ A to 10 mA (10 to 100) mA 100 mA to 1A	500 μ A/A 69 μ A/A 34 μ A/A 32 μ A/A 28 μ A/A 45 μ A/A 140 μ A/A	HP 3458A Multimeter



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current Measure	(1 to 200) A (200 to 1 000) A	0.3 mA/A 0.7 mA/A	Current Shunts with HP 3458A Multimeter
Resistance - Source	Up to 10.999 9 Ω (11 to 32.999 9) Ω 33 Ω to 109 kΩ 110 kΩ to 1.099 99 MΩ (1.1 to 3.299 9) MΩ (3.3 to 10.999 9) MΩ (11 to 32.999 9) MΩ (33 to 109.999 9) MΩ (110 to 329.999 9) MΩ (330 to 1 100) MΩ	30 μΩ/Ω 24 μΩ/Ω 22 μΩ/Ω 25 μΩ/Ω 47 μΩ/Ω 0.1 mΩ/Ω 0.2 mΩ/Ω 0.4 mΩ/Ω 2.3 mΩ/Ω 12 mΩ/Ω	Fluke 5522A Multi Product Calibrator
Resistance - Measure	(1 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 MΩ to 1 GΩ	23 μΩ/ Ω 19 μΩ/ Ω 12 μΩ/ Ω 12 μΩ/ Ω 12 μΩ/ Ω 20 μΩ/ Ω 70 μΩ/ Ω 5.8 mΩ/ Ω 300 mΩ/ Ω	HP 3458A Multimeter
Capacitance - Source	(220.0 to 399.9) pF (0.4 to 1.099 9) nF (1.1 to 3.299 9) nF (3.3 to 10.999 9) nF (11 to 32.999 9) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) μF (1.1 to 3.299 99) μF (3.3 to 10.999 9) μF (11 to 32.999 9) μF (33 to 109.999) μF (110 to 329.999) μF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.999 9) mF (11 to 32.999 9) mF (33 to 110) mF	1.5 pF/F + 10 pF 4 pF/F + 10 pF 13 pF/F + 10 pF 21 pF/F + 1 pF 64 pF/F + 0.1 nF 0.2 nF/F + 0.1 nF 0.7 nF/F + 0.3 nF 2 nF/F + 1 nF 6 nF/F + 3 nF 21 nF/F + 10 nF 0.1 μF/F + 30 nF 0.4 μF/F + 0.1 μF 1.1 μF/F + 300 nF 4 μF/F + 1 μF 12 μF/F + 3 μF 38 μF/F + 10 μF 0.2 mF/F + 30 μF 0.9 mF/F + 100 μF	Fluke 5522A Multi Product Calibrator



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	(1 to 32.999) mV		Fluke 5522A Multi Product Calibrator
	(10 to 45) Hz	0.6 mV/V + 6 μV	
	45 Hz to 10 kHz	0.1 mV/V + 6 μV	
	(10 to 20) kHz	0.2 mV/V + 6 μV	
	(20 to 50) kHz	0.8 mV/V + 6 μV	
	(50 to 100) kHz	2.7 mV/V + 12 μV	
	(100 to 500) kHz	6.2 mV/V + 50 μV	
	(33 to 329.999) mV		
	(10 to 45) Hz	0.2 mV/V + 8 μV	
	45 Hz to 10 kHz	0.1 mV/V + 8 μV	
	(10 to 20) kHz	0.1 mV/V + 8 μV	
	(20 to 50) kHz	0.3 mV/V + 8 μV	
	(50 to 100) kHz	0.6 mV/V + 32 μV	
	(100 to 500) kHz	1.5 mV/V + 70 μV	
	(0.33 to 3.299 99 V)		
	(10 to 45) Hz	0.2 mV/V + 50 μV	
	45 Hz to 10 kHz	0.1 mV/V + 60 μV	
	(10 to 20) kHz	0.1 mV/V + 60 μV	
	(20 to 50) kHz	0.2 mV/V + 50 μV	
	(50 to 100) kHz	0.5 mV/V + 0.1 mV	
	(100 to 500) kHz	1.9 mV/V + 0.6 mV	
	(3.3 V to 32.999 9) V		
	(10 Hz to 45) Hz	0.2 mV/V + 0.7 mV	
	45 Hz to 10 kHz	0.1 mV/V + 0.6 mV	
(10 to 20) kHz	0.2 mV/V + 0.6 mV		
(20 to 50) kHz	0.3 mV/V + 0.6 mV		
(50 to 100) kHz	0.7 mV/V + 1.6 mV		
(33 to 329.999) V			
(10 Hz to 45) Hz	0.2 mV/V + 2 mV		
45 Hz to 10 kHz	0.2 mV/V + 6 mV		
(10 to 20) kHz	0.2 mV/V + 6 mV		
(20 to 50) kHz	0.2 mV/V + 6 mV		
(50 to 100) kHz	1.6 mV/V + 50 mV		
(330 to 1 020) V			
45 Hz to 1 kHz	0.2 mV/V + 10 mV		
(1 to 5) kHz	0.2 mV/V + 10 mV		
(5 to 10) kHz	0.2 mV/V + 10 mV		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Measure	Up to 10 mV		HP 3458A Multimeter
	(1 to 40) Hz	0.3 mV/V + 3 μV	
	40 Hz to 1 kHz	0.2 mV/V + 2 μV	
	(1 to 20) kHz	0.3 mV/V + 2 μV	
	(20 to 50) kHz	1.2 mV/V + 2 μV	
	(50 to 100) kHz	5.8 mV/V + 2 μV	
	(100 to 300) kHz	46 mV/V + 2 μV	
	10mV to 10 V		
	(1 to 40) Hz	80 μV/V + 0.4 mV	
	40 Hz to 1 kHz	80 μV/V + 0.2 mV	
	(1 to 20) kHz	0.2 mV/V + 0.2 mV	
	(20 to 50) kHz	0.3 mV/V + 0.2 mV	
	(50 to 100) kHz	0.9 mV/V + 0.2 mV	
	(100 to 300) kHz	3.5 mV/V + 1 mV	
	300 kHz TO 1 MHz	12 mV/V + 1 mV	
	(1 to 2) MHz	17 mV/V + 1 mV	
	(10 to 100) V		
	(1 to 40) Hz	0.2 mV/V + 4 mV	
	40 Hz to 1 kHz	0.2 mV/V + 2 mV	
	(20 to 50) kHz	0.4 mV/V + 2 mV	
(50 to 100) kHz	1.4 mV/V + 2 mV		
(100 to 300) kHz	4.6 mV/V + 10 mV		
300 kHz to 1 MHz	17 mV/V + 10 mV		
100 V to 1 kV			
(1 to 40) Hz	0.5 mV/V 40 mV		
40 Hz to 1 kHz	0.5 mV/V 20 mV		
(1 to 20) kHz	0.7 mV/V 20 mV		
(20 to 50) kHz	1.4 mV/V 20 mV		
(50 to 100) kHz	3.5 mV/V 20 mV		
AC Current – Source ¹	(29 to 329.99) μA		Fluke 5522A Multi Product Calibrator
	(10 to 20) Hz	0.5 μA/A + 0.1 μA	
	(20 to 45) Hz	0.4 μA/A + 0.1 μA	
	45 Hz to 1 kHz	0.3 μA/A + 0.1 μA	
	(1 to 5) kHz	0.8 μA/A + 0.2 μA	
	(5 to 10) kHz	2. μA/A + 0.2 μA	
(10 to 30) kHz	4.1 μA/A + 0.4 μA		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	(0.33 to 3.299 9) 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 32.999) 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	5.1 μ A/A + 0.2 μ A 3.2 μ A/A + 0.2 μ A 2.6 μ A/A + 0.2 μ A 5.1 μ A/A + 0.2 μ A 12.8 μ A/A + 0.3 μ A 25.6 μ A/A + 0.6 μ A 46.1 μ A/A + 2 μ A 23 μ A/A + 2 μ A 10.2 μ A/A + 2 μ A 20.5 μ A/A + 2 μ A 51.2 μ A/A + 3 μ A 0.1 mA/A + 4 μ A	Fluke 5522A Multi Product Calibrator
AC Current - Measure	Up to 100 μ A (10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz 100 μ A to 100 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 mA 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	4.9 mA/A + 0.03 μ A 2 mA/A + 0.03 μ A 1 mA/A + 0.03 μ A 4.6 mA/A + 20 μ A 1.7 mA/A + 20 μ A 0.7 mA/A + 20 μ A 0.4 mA/A + 20 μ A 4.8 mA/A + 200 μ A 2 mA/A + 200 μ A 1.2 mA/A + 200 μ A 1.4 mA/A + 200 μ A 3.7 mA/A + 200 μ A 12 mA/A + 200 μ A	HP 3458A Multimeter
AC Current – Source ¹	(33 to 329.999) 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	0.5 mA/A + 20 μ A 0.2 mA/A + 20 μ A 0.1 mA/A + 20 μ A 0.3 mA/A + 50 μ A 0.5 mA/A + 0.1 mA 1 mA/A + 0.2 mA	Fluke 5522A Multi Product Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	(0.33 to 1.099 9) A (10 to 45) Hz	1.5 mA/A + 0.1 mA	Fluke 5522A Multi Product Calibrator
	45 Hz to 1 kHz (1 to 5) kHz	0.4 mA/A + 0.1 mA	
	(5 to 10) kHz	5.1 mA/A + 1 mA	
	(1.1 to 2.999) A (10 to 45) Hz	21.3 mA/A + 5 mA	
	45 Hz to 1 kHz (1 to 5) kHz	4.2 mA/A + 0.1 mA	
	(5 to 10) kHz	1.4 mA/A + 0.1 mA	
	(3 to 10.999) A (45 to 100) Hz	14 mA/A + 1 mA	
	100 Hz to 1 kHz (1 to 5) kHz	58 mA/A + 5 mA	
	(11 to 20.5) A (45 to 100) Hz	5 mA/A + 2 mA	
	100 Hz to 1 kHz (1 to 5) kHz	8.5 mA/A + 2 mA	
		0.3 A/A + 2 mA	
		19 mA/A + 5 mA	
	24 mA/A + 5 mA		
	0.5 A/A + 5 mA		
Oscilloscopes - Amplitude	0 VDC - 50 Ω load	12 mV	Fluke 5500A Multi Product Calibrator
	6 VDC - 50 Ω load	12 mV	
	0 VDC - 1 MΩ load	12 mV	
	66 VDC - 1 MΩ load	43 mV	
	130 VDC - 1 MΩ load	76 mV	
Oscilloscopes - Flatness	50 kHz ref to 10 mV p-p	0.3 mV	Fluke 5500A Multi Product Calibrator
	50 kHz ref to 5 V p-p	96 mV	
	100 kHz to 30 mV	0.7 mV	
	100 kHz to 5.5 V	96 mV	
	300 MHz to 30 mV	0.83 mV	
	300 MHz to 5.5 V	0.13 V	
	600 MHz to 30 mV	1.5 mV	
600 MHz to 5.5 V	0.26 V		



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes - Rise Time (V p-p)	400 ps 1 MHz, 1 V 400 ps 10 MHz, 0.5 V 400 ps 10 MHz, 1 V	8.1 ps 8.2 ps 8.2 ps	Fluke 5500A Multi Product Calibrator
Oscilloscopes - Square Wave 1 MΩ Load	100 mV to 10 kHz 1 V to 10 kHz 10 V to 10 kHz	2.2 mV 35 mV 0.35 V	Fluke 5500A Multi Product Calibrator
Square Wave 50 Ω Load	100 mV to 10 kHz 1 V to 10 kHz 5 V to 10 kHz	3.6 mV 35 mV 0.17 V	
Oscilloscopes - Time Markers	2 ns 20 ms 50 ms 5 s	0.01 ns/s 0.01 ms/s 0.01 ms/s 0.03 s/s	Fluke 5500A Multi Product Calibrator
<i>Electrical Simulation of RTD Indicating Devices¹</i>	Pt 385, 200 Ω		Fluke 5522A Multi Product Calibrator
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.03 °C	
	(100 to 260) °C	0.04 °C	
	(260 to 300) °C	0.09 °C	
	(300 to 400) °C	0.10 °C	
	(400 to 600) °C	0.11 °C	
	(600 to 630) °C	0.12 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.04 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
(260 to 300) °C	0.06 °C		
(300 to 400) °C	0.06 °C		
(400 to 600) °C	0.07 °C		
(600 to 630) °C	0.09 °C		



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
<i>Electrical Simulation of RTD Indicating Devices¹</i>	Pt 385, 1 000 Ω		Fluke 5522A Multi Product Calibrator
	(-200 to -80) °C	0.02 °C	
	(-80 to 0) °C	0.02 °C	
	(0 to 100) °C	0.03 °C	
	(100 to 260) °C	0.04 °C	
	(260 to 300) °C	0.05 °C	
	(300 to 400) °C	0.05 °C	
	(400 to 600) °C	0.05 °C	
	(600 to 630) °C	0.18 °C	
	PtNi 385, 120 Ω		
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.11 °C	
Cu 427, 10 Ω			
(-100 to 260) °C	0.23 °C		
<i>Electrical Simulation of Thermocouple – Measure/Source¹</i>	Type B		Fluke 5522A Multi Product Calibrator
	(600 to 800) °C	0.34 °C	
	(800 to 1 000) °C	0.26 °C	
	(1 000 to 1 550) °C	0.23 °C	
	(1 550 to 1 820) °C	0.26 °C	
	Type C		
	(0 to 150) °C	0.23 °C	
	(150 to 650) °C	0.20 °C	
	(650 to 1 000) °C	0.24 °C	
	(1 000 to 1 800) °C	0.39 °C	
	(1 800 to 2 316) °C	0.65 °C	
	Type E		
	(-250 to -100) °C	0.39 °C	
	(-100 to -25) °C	0.12 °C	
	(-25 to 350) °C	0.11 °C	
	(350 to 650) °C	0.12 °C	
	(650 to 1 000) °C	0.16 °C	
	Type J		
	(-210 to -100) °C	0.21 °C	
	(-100 to -30) °C	0.12 °C	
(-30 to 150) °C	0.11 °C		
(150 to 760) °C	0.13 °C		
(760 to 1 200) °C	0.18 °C		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
<i>Electrical Simulation of Thermocouple – Measure/Source¹</i>	Type K		Fluke 5522A Multi Product 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		
DC Power	Up to 10 W	0.3 mW	Fluke 5500A Multi Product Calibrator
	(20 to 50) W	2 mW	
	100 W	3 mW	
	(200 to 900) W	20 mW	



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power	50 W @ 60 Hz 100 W @ 60 Hz 200 W @ 60 Hz 390 W @ 60Hz 550 W @ 60 Hz 900 W @ 60 Hz 100 W @ 400 Hz 100 W @ 1 kHz 100 W @ 5 kHz	5 mW 19 mW 20 mW 26 mW 20 mW 21 mW 3 mW 3 mW 16 mW	Fluke 5500A Multi Product Calibrator

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gage Blocks	Up to 1 in (1 to 4) in (4 to 10) in (10 to 13) in	3.7 μin 5.1 μin 7.8 μin 7.8 μin	Pratt & Whitney LMU-2130 Grade 1 Gage Blocks
Thread Measuring Wires (4 to 120) tpi	(0.004 81 to 0.144 352) in	8.8 μin (0.000 2 mm)	
Plain Plugs	(0.004 to 1) in (1 to 4) in (4 to 12) in	6.8 μin 9.7 μin 19 μin	
Pins	Up to 1 in	30 μin	Z-Mike Laser Micrometer
Thread Plugs	Up to 1 in (1 to 3) in (3 to 7.5) in	14 μin 35 μin 60 μin	Pratt & Whitney LMU-2130, Grade 1 Gage Blocks, Thread Measuring Wires
NPT Thread Plugs	Up to 1 in (1 to 3) in (3 to 6) in	30 μin 34 μin 55 μin	
Thread Rings	Up to 1 in (1 to 4) in (4 to 8) in	20 μin 35 μin 59 μin	Pratt & Whitney LMU-2130, Class XXX Plain Rings
Plain Rings	(0.04 to 1) in (1 to 4) in (4 to 12) in	18 μin 21 μin 30 μin	

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers – OD, ID, Bore, Depth	Up to 1 in (1 to 10) in (10 to 48) in	84 µin 140 µin 170 µin	Grade 2 Gage Blocks, Optical Flat
Calipers – Dial, Vernier, & Digital	Up to 6 in (6 to 12) in (12 to 48) in (48 to 120) in	580 µin 580 µin 585 µin 610 µin	
Indicator Calibrators	Up to 1 in	59 µin	
Height Gages	Up to 12 in (12 to 48) in	600 µin 615 µin	
Indicators - Dial and Digital (0.001 in resolution) (0.000 1 in resolution) (0.000 05 in resolution) (0.000 02 in resolution) (0.000 01 in resolution)	Up to 6 in Up to 0.5 in Up to 0.05 in Up to 0.02 in Up to 0.01 in	290 µin 140 µin 58 µin 34 µin 14 µin	Grade 2 Gage Blocks, Indicator Calibrator
Surface Plates - Overall Flatness	To (36 x 48) in To (72 x 144) in	240 µin 240 µin	Planeators, Straight Indicators
Local Area Flatness (Repeat Reading)	(36 x 48) in (72 x 144) in	55 µin 55 µin	
Length Standards	Up to 1 in (1 to 4) in (4 to 10) in	7 µin 11 µin 19 µin	Pratt & Whitney LMU- 2130 Comparator, Grade 1 Gage Blocks, Electronic Height Gage
Parallels	Up to 4 in	10 µin	Pratt & Whitney LMU- 2130 Comparator, Grade 1 Gage Blocks
Optical Comparators X, Y Axis Length	Up to 6 in	900 µin	Glass Scale Standard, Check Balls



Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure and Vacuum	(0 to 300) psi	0.1 psi	Druck DPI610 Precision Pressure Calibrator
	Up to 30 inHg Up to 100 psi (100 to 150) psi (150 to 1 000) psi (1 000 to 10 000) psi	0.1 inHg 0.1 psi 1 psi 2.2 psi 3.1 psi	Precision Pressure Calibrator, Dead Weight Tester, Ametek R-110-1
Torque	(4 to 100) ozf·in (5 to 250) lbf·ft (250 to 600) lbf·ft	0.32 % of reading + 0.01 ozf·in 0.32 % of reading + 0.01 lbf·ft 1.3 % of reading + 0.01 lbf·ft	Torque Calibrator CDI Sure-test 5000-ST
Torque Calibrator	(4 to 50) lbf·in (30 to 400) lbf·in (100 to 1 000) lbf·in (20 to 250) lbf·ft	0.01 lbf·in 0.03 lbf·in 0.13 lbf·in 0.04 lbf·ft	Torque Arms & Class F Weights
Durometers Spring Force Types A, B, E, O Types C, D, DO	Up to 100 units or (0 to 8.05) N [lbf, kgf] (0 to 44.45) N [lbf, gf]	0.02 lbf, 0.009 9 kgf 0.12 lbf, 54 gf	Triple Beam Balance
Pipettes	(2 to 20) µL (20 to 100) µL (100 to 1 250) µL (2 000 to 9 000) µL (9 000 to 10 000) µL	0.2 µL 0.2 µL 1.3 µL 5 µL 7 µL	Balance, Class 1 Weights
Class F Masses	(1 to 2) g (5 to 100) g 200 g 500 g 1 000 g (2 000 to 5 000) g (0.001 to 0.002) lb (0.005 to 0.2) lb (0.5 to 10) lb (10 to 50) lb	0.3 mg 0.4 mg 13 mg 22 mg 33 mg 56 mg 0.000 000 5 lb 0.000 014 lb 0.000 3 lb 0.001 6 lb	Class 3 Weights Per NIST HB 105-1
Balances and Scales 0.1 mg resolution	Up to 10 g Up to 200 g	0.2 mg 0.3 mg	Class 0 Weights NIST Handbook 44
	(200 to 600) g (600 to 6 000) g	15 mg 22 mg	Class 1 Weights NIST Handbook 44

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Balances and Scales 0.1 g resolution	Up to 1.2 kg (1.2 to 2) kg (2 to 6) kg (5 to 30) kg	0.1 g 0.1 g 0.2 g 0.2 g	Class F Weights NIST Handbook 44
Balances and Scales 0.000 2 lb resolution 0.000 5 lb resolution 0.001 lb resolution 0.005 lb resolution 0.002 lb resolution 0.005 lb resolution 0.01 lb resolution 0.05 lb resolution 0.05 lb resolution 0.2 lb resolution 0.5 lb resolution 1 lb resolution 2 lb resolution 20 lb resolution	Up to 2 lb Up to 5 lb Up to 10 lb Up to 20 lb Up to 25 lb Up to 50 lb Up to 100 lb Up to 150 lb Up to 500 lb Up to 1 000 lb Up to 3 000 lb Up to 5 000 lb Up to 20 000 lb Up to 200 000 lb	0.000 4 lb 0.001 lb 0.002 lb 0.01 lb 0.004 lb 0.01 lb 0.03 lb 0.1 lb 0.1 lb 0.3 lb 0.6 lb 1.3 lb 2.6 lb 27 lb	Class F Weights NIST Handbook 44

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature	(0 to 600) °C (-20 to 0) °C	0.3 °C 0.5 °C	Hart Microbath 9173 Hart Scientific 9103 Drywell
Microbath and Drywell Calibrators	(-200 to 660) °C	0.35 °C	HP 3458A Multimeter and RTD Probe
RTD and Thermocouple Probes (4 wires measure)	-180 °C 100 °C 780 °C	0.05 °C 0.05 °C 0.05 °C	Fluke 5500A, Fluke 8846A w/PRT Probe
RTD and Thermocouple Probes (3 wires measure)	-180 °C 100 °C 780 °C	0.07 °C 0.06 °C 0.15 °C	



Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RTD and Thermocouple Probes (Source)	-180 °C 100 °C 780 °C	0.12 °C 0.12 °C 0.12 °C	RTD Probe, 9105 Drywell Calibrator, 9173 Drywell Calibrator, 6102 Microbath, HP 3458A Multimeter w/PRT Probe

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency Source/Measure	Up to 100 Hz (1 to 10) kHz 100 kHz (1 to 10) MHz 20 MHz to 1 GHz	19 nHz 16 nHz 24 nHz 17 nHz 30 Hz	Rubidium Oscillator MS-1009B & Marconi 2022A Signal 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. D = diagonal length in inches.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1255.

Vice President