



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Upstate Metrology, Inc.

6388 Niver Rd

Conesus, NY 14435

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 calibrations to which this accreditation applies.

AC-1215

Certificate Number


ANAB Approval

Certificate Valid: 06/28/2018-02/09/2020
Version No. 007 Issued: 06/28/2018



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)**

Upstate Metrology, Inc.
6388 Niver Rd
Conesus, NY 14435
Chris Maggiulli 585-292-6430

CALIBRATION

Valid to: **February 9, 2020**

Certificate Number: **AC-1215**

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Voltage – Measure ¹	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.1 kV	0.38 μ V + 0.008 1 μ V/mV 2.3 μ V + 3.9 μ V/V 0.36 μ V + 5.8 μ V/V 0.009 4 mV/V 0.017 4 mV/V	HP 3458A Opt 002 Multimeter
	(1.1 to 10) kV	610 mV + 0.005 1 mV/V	Fluke 80E High Voltage Probe, HP 3458A Multimeter
	(10 to 120) kV	130 V	HP 3458A Opt 002 Multimeter, Ross Hi-Z Probe
DC Voltage – Source ¹	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	0.6 μ V + 0.008 μ V/mV 0.53 μ V + 8.3 μ V/V 0.000 39 mV + 0.007 3 mV/V 0.000 52 mV + 0.007 3 mV/V 0.008 5 mV/V 0.009 7 mV/V	Fluke 5700A Series II Multiproduct Calibrator
DC Current – Measure ¹	(1 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	2 nA + 0.019 nA/ μ A 0.54 nA + 33 nA/mA 0.55 nA + 33 nA/mA 0.53 μ A + 0.047 μ A/mA 0.16 mA/A	HP 3458A Opt 002 Multimeter, Current Shunts

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current – Source ¹	Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2) A	8 nA + 0.05 nA/ μ A 8 nA + 50 nA/mA 0.054 μ A/mA 0.065 μ A/mA 0.094 mA/A	Fluke 5700A Series II Multiproduct Calibrator
	(1 to 10) A (10 to 20) A	0.38 mA/A 1.1 mA + 0.25 mA/A	Fluke 5700A Multiproduct Calibrator with Fluke 5220A Amplifier
	(20 to 100) A	0.001 1 mA/A	Valhalla 2555A Transconductance Amplifier, Current Shunt
AC Voltage – Measure ¹	(1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	4.4 μ V + 0.31 μ V/mV 3 μ V + 0.15 μ V/mV 3.1 μ V + 0.25 μ V/mV 8.6 μ V + 0.7 μ V/mV 6.1 μ V + 5.4 μ V/mV 39 μ V + 43 μ V/mV 32 μ V + 79 μ V/mV	HP 3458A Opt 002 Multimeter
	(10 to 100) mV (1 to 40) Hz 40 Hz to 1kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	6.8 μ V + 0.7 μ V/mV 3.7 μ V + 0.081 μ V/mV 3.9 μ V + 0.16 μ V/mV 12 μ V + 0.41 μ V/mV 55 μ V + 0.47 μ V/mV 33 μ V + 3.31 μ V/mV 0.025 mV/mV	
	(1 to 4) MHz (4 to 8) MHz	0.39 mV + 0.044 mV/mV 2.1 mV + 0.027 mV/mV	
	100 mV to 1 V (1 to 40) Hz 40 Hz to 1kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.3 μ V + 136 μ V/V 0.36 μ V + 115 μ V/V 0.37 μ V + 197 μ V/V 15 μ V + 38 μ V/V 5.2 μ V + 97 μ V/V 0.32 mV + 0.44 mV/V 0.001 6 mV + 12 mV/V 0.001 6 mV + 12 mV/V	
	(1 to 4) MHz (4 to 8) MHz	48 mV/V 48 mV/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) V		HP 3458A Opt 002 Multimeter
	(1 to 40) Hz	0.14 mV/V	
	40 Hz to 1kHz	0.48 μV + 115 μV/V	
	(1 to 20) kHz	0.39 μV + 197 μV/V	
	(20 to 50) kHz	0.39 mV/V	
	(50 to 100) kHz	0.011 mV + 0.96 mV/V	
	(100 to 300) kHz	0.015 mV + 3.6 mV/V	
	300 to 1 MHz	12 mV/V	
	(1 to 2) MHz	0.54 mV + 47 mV/V	
	(2 to 4) MHz	0.54 mV + 47 mV/V	
	(4 to 8) MHz	0.57 mV + 47 mV/V	
	(10 to 100) V		
	(1 to 40) Hz	0.000 31 V/V	
	40 Hz to 1 kHz	0.000 29 V/V	
	(1 to 20) kHz	0.000 29 V/V	
	(20 to 50) kHz	0.000 46 V/V	
	(50 to 100) kHz	0.001 5 V/V	
AC Voltage – Source ¹	100 V to 750 V		Fluke 5700A Series II Multiproduct Calibrator
	(1 to 40) Hz	0.00054 V/V	
	40 Hz to 1 kHz	0.00054 V/V	
	(2.2 to 22) mV		
	(10 to 20) Hz	4.4 μV + 0.58 μV/mV	
	(20 to 40) Hz	4.4 μV + 0.24 μV/mV	
	40 Hz to 20 kHz	4.4 μV + 0.13 μV/mV	
	(20 to 50) kHz	4.4 μV + 0.4 μV/mV	
	(50 to 100) kHz	7 μV + 0.85 μV/mV	
	(100 to 300) kHz	13 μV + 1.1 μV/mV	
	(300 to 500) kHz	25 μV + 1.7 μV/mV	
	500 kHz to 1 MHz	25 μV + 3.4 μV/mV	
	(22 to 220) mV		
	(10 to 20) Hz	4.1 μV + 0.59 μV/mV	
	(20 to 40) Hz	4.7 μV + 0.23 μV/mV	
	40 Hz to 20 kHz	4.7 μV + 0.12 μV/mV	
	(20 to 50) kHz	5.9 μV + 0.33 μV/mV	
(50 to 100) kHz	5 μV + 0.94 μV/mV		
(100 to 300) kHz	11 μV + 1.12 μV/mV		
(300 to 500) kHz	24 μV + 1.8 μV/mV		
500 kHz to 1 MHz	19 μV + 3.7 μV/mV		

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Source ¹	220 mV to 2.2 V		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	0.018 mV+0.53 mV/V	
	(20 to 40) Hz	0.018 mV+0.16 mV/V	
	40 Hz to 20 kHz	0.016 mV+0.071 mV/V	
	(20 to 50) kHz	0.056 mV+0.1 mV/V	
	(50 to 100) kHz	0.17 mV+0.19 mV/V	
	(100 to 300) kHz	0.18 mV+0.41 mV/V	
	(300 to 500) kHz	0.16 mV+1.1 mV/V	
	500 kHz to 1 MHz	0.29 mV+2.5 mV/V	
	(2.2 to 22) V		
	(10 to 20) Hz	0.000 016 mV+0.54 mV/V	
	(20 to 40) Hz	0.000 049 mV+0.17 mV/V	
	40 Hz to 20 kHz	0.000 11 mV+0.078 mV/V	
	(20 to 50) kHz	0.000 065 mV+0.13 mV/V	
	(50 to 100) kHz	0.039 mV+0.26 mV/V	
	(100 to 300) kHz	0.58 mV/V	
(300 to 500) kHz	0.001 5 V/V		
500 kHz to 1 MHz	0.003 1 V/V		
(22 to 220) V			
(10 to 20) Hz	0.54 mV/V		
(20 to 40) Hz	0.173 mV/V		
40 Hz to 20 kHz	0.085 mV/V		
(20 to 50) kHz	0.000 25 V/V		
(50 to 100) kHz	0.000 57 V/V		
AC Current – Source ¹	220 μA to 2.2 mA		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	0.024 μA+0.71 μA/mA	
	(20 to 40) Hz	0.02 μA + 0.36 μA/mA	
	40 Hz to 1 kHz	0.017 μA + 0.15 μA/mA	
	(1 to 5) kHz	0.000 83 μA+0.78 μA/mA	
	(5 to 10) kHz	0.000 33 μA+2 μA/mA	
	(2.2 to 22) mA		
	(10 to 20) Hz	0.000 13 μA + 0.72 μA/mA	
	(20 to 40) Hz	0.000 26 μA + 0.37 μA/mA	
	40 Hz to 1 kHz	0.000 62 μA + 0.16 μA/mA	
(1 to 5) kHz	0.000 12 μA + 0.79 μA/mA		
(5 to 10) kHz	0.000 049 μA + 2 μA/mA		

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current – Source ¹	(22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0012 μ A + 0.72 μ A/mA 0.002 3 μ A + 0.37 μ A/mA 0.005 4 μ A + 0.16 μ A/mA 0.001 1 μ A + 0.78 μ A/mA 0.000 43 μ A + 2 μ A/mA 0.72 mA/A 0.79 mA/A 0.000 93 A/A	Fluke 5700A Series II Multiproduct Calibrator
	(2.2 to 10) A 30 Hz to 5 kHz	0.001 3 A + 0.000 8 A/A	Fluke 5700A Series II Multiproduct Calibrator with Fluke 5220A Amplifier
AC Current – Measure ¹	(Up to 100) μ A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 μ A 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 (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	35 nA + 4.6 nA/ μ A 35 nA + 1.8 nA/ μ A 35 nA + 0.74 nA/ μ A 35 nA + 0.74 nA/ μ A 0.014 μ A + 4.8 μ A/mA 0.016 μ A + 25 μ A/mA 20 nA + 914 nA/mA 57 nA + 536 nA/mA 0.23 μ A + 0.7 μ A/mA 4.6 μ A + 4.6 μ A/mA 0.003 3 μ A + 4.9 μ A/mA 0.008 2 μ A + 2 μ A/mA 0.017 μ A + 0.95 μ A/mA 0.026 μ A + 0.61 μ A/mA 0.017 μ A + 0.95 μ A/mA 0.003 2 μ A + 5.1 μ A/mA 0.002 μ A + 8.1 μ A/mA	HP 3458A Opt 002 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 (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	0.003 3 μA + 4.9 μA/mA 0.008 2 μA + 2 μA/mA 0.017 μA + 0.95 μA/mA 0.026 μA + 0.61 μA/mA 0.017 μA + 0.95 μA/mA 0.003 2 μA + 5.1 μA/mA 0.002 μA + 8.1 μA/mA 4.9 mA/A 2.1 mA/A 1.2 mA/A 1.5 mA/A 4 mA/A 0.013 A/A	HP 3458A Opt 002 Multimeter
Resistance – Source ¹	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	0.21 mΩ 0.24 mΩ 0.37 mΩ 0.51 mΩ 1.8 mΩ 3.2 mΩ 18 mΩ 32 mΩ 0.16 Ω 0.31 Ω 1.6 Ω 3 Ω 0.13 kΩ 0.25 kΩ 1.3 kΩ 2.5 kΩ 13 kΩ	Fluke 5700A Series II Multiproduct Calibrator
Resistance – Source ¹	(1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	580 kΩ + 0.012 kΩ/ MΩ 580 kΩ + 0.012 kΩ/ MΩ 5.9 MΩ/ MΩ	Biddle 72-6345-1 Mega Deck Resistor
Resistance – Measure ¹	(0.001 to 100) mΩ	0.000 19 m Ω + 0.000 003 m Ω/ Ω	HP 3458A Opt 002 Multimeter, Fluke 5700A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Resistance – Measure ¹	0.25 mΩ to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1GΩ	0.056 mΩ+0.086 mΩ/Ω 0.0055 m Ω + 0.022 mΩ/ Ω 0.0013 Ω + 0.012 Ω/ kΩ 0.002 Ω + 0.014 5 Ω/k Ω 0.002 Ω + 0.014 5 Ω/k Ω 0.019 6 kΩ/MΩ 0.076 7 k Ω/M Ω 0.000 62 MΩ/ MΩ 0.006 36 GΩ/GΩ	HP 3458A Opt 002 Multimeter
Capacitance – Source ¹ @ 1kHz	100 pF to 1.111 μF	0.000 045 μF + 0.000 57 μF/μF	GenRad 1423A Decade Capacitor
Capacitance – Source ¹	DC and 50 Hz to 1kHz Up to 0.33 nF 0.33 nF to 32.99 nF 33 uF to 329.99 nF 0.33 uF to 3.299 uF DC and 50 Hz to 400Hz 3.3 μF to 32.99 μF DC and 50 Hz to 200 Hz 33 μF to 109.99 μF DC and 50 Hz to 100 Hz 110 μF to 1.1 mF	0.0099 nF + 0.00523 nF/nF 0.0099 nF + 0.00523 nF/nF 0.00345 nF/nF 0.42 F + 4.28 nF/ μF 6 nF + 4.73 nF/ μF 0.1 μF + 0.005 μF/ μF 10.3 μF/mF	Fluke 5500A Multiproduct Calibrator
Inductance – Source ¹ @ 1kHz	100 μH, 1 kHz 100 mH, 1 kHz 1 H, 100 Hz	0.3 μH 0.13 mH 1.3 mH	GenRad 1482-B Inductor GenRad 1482-L Inductor GenRad 1482-P Inductor
Electrical Calibration of Thermocouple Indicating Devices	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	0.37 °C 0.29 °C 0.29 °C 0.31 °C 0.27 °C 0.27 °C 0.3 °C 0.43 °C 0.67 °C	Fluke 5500A Multiproduct Calibrator



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Calibration of Thermocouple Indicating Devices	Type E		Fluke 5500A Multiproduct Calibrator
	(-250 to -100) °C	0.41 °C	
	(-100 to -25) °C	0.18 °C	
	(-25 to 350) °C	0.17 °C	
	(350 to 650) °C	0.21 °C	
	(650 to 1 000) °C	0.24 °C	
	Type J		
	(-210 to -100) °C	0.25 °C	
	(-100 to -30) °C	0.18 °C	
	(-30 to 150) °C	0.17 °C	
	(150 to 760) °C	0.22 °C	
	(760 to 1 200) °C	0.25 °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	0.27 °C	
	(1 000 to 1 372) °C	0.36 °C	
	Type L		
	(-200 to -100) °C	0.34 °C	
	(-100 to 800) °C	0.27 °C	
	(800 to 900) °C	0.22 °C	
	Type N		
	(-200 to -100) °C	0.34 °C	
	(-100 to -25) °C	0.21 °C	
	(-25 to 120) °C	0.2 °C	
	(120 to 410) °C	0.22 °C	
	(410 to 1 300) °C	0.27 °C	
Type R			
(0 to 250) °C	0.47 °C		
(250 to 400) °C	0.3 °C		
(400 to 1 000) °C	0.31 °C		
(1 000 to 1 767) °C	0.36 °C		
Type S			
(0 to 250) °C	0.39 °C		
(250 to 1 000) °C	0.31 °C		
(1 000 to 1 400) °C	0.34 °C		
(1 400 to 1 767) °C	0.4 °C		



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Calibration of Thermocouple Indicating Devices	Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.51 °C 0.23 °C 0.18 °C 0.2 °C	Fluke 5500A Multiproduct Calibrator

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
RF Power - Power Meter Reference ¹	1 mW, 50 MHz	0.014mW	HP 8902A Measuring Receiver with HP 11792A Power Sensor, Range Calibrator, Agilent 3458A
RF Absolute Power – Measure ¹	(-30 to 20) dBm 100 kHz to 4.2 GHz	0.042 dB	HP 8482A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 10 MHz to 18 GHz	0.042 dB	HP 8481A Power Sensor, HP 438A Power Meter
RF Absolute Power – Measure ¹	(-30 to 20) dBm 50 MHz to 50 GHz	0.042 dB	Agilent 8487A Power Sensor, HP 438A Power Meter
RF Power – Source ¹	(-30 to 20) dBm 100 kHz to 20 MHz	1.1 dB	HP 3325B Signal Generator, Agilent 8487A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 250 kHz to 3 GHz	1.1 dB	HP E4432B Signal Generator, Agilent 8487A, HP 438A Power Meter
	(-30 to 20) dBm 50 MHz to 18.6 GHz	1.1 dB	HP 8673C Signal Generator, Agilent 8487A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 10 MHz to 40 GHz	1.1 dB	HP 83640B, Agilent 8487A Power Sensor, HP 438A Power Meter



Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Tuned RF Level ¹	2.5 MHz to 26.5 GHz (-22 to +10) dB (-42 to -22) dB (-50 to -42) dB (-60 to -50) dB (-72 to -60) dB (-80 to -72) dB (-92 to -80) dB (-102 to -92) dB (-110 to -102) dB (-120 to -110) dB (-127 to -120) dB	0.51 dB	HP 8902A Measuring Receiver with 11792A, 11973A, and 11722A Power Sensors
Distortion - Measure ^{1,5} Fundamental Frequency	(-110 to 20) dB 20 Hz to 20 kHz (20 to 100) kHz	1.3 dB 2.6 dB	HP 8902A Measuring Receiver
RF Harmonic Distortion ¹	Up to 26 GHz (-60 to 10) dB	1.2 dB	HP 8590L, HP 8562A Spectrum Analyzers
Spurious Signals ¹	Up to 26 GHz (-60 to 10) dB	1.2 dB	
Amplitude Modulation ¹	Depth to 99 % Rates 50 Hz to 50 kHz Freq 150 kHz to 1.3 GHz	3.6 % Depth	HP 8902A Measuring Receiver
Frequency Modulation ¹	Freq 250 kHz to 1.3 GHz Rates 20 Hz to 100 kHz	0.14 kHz + 0.219 kHz/kHz	HP 8902A Measuring Receiver

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Gage Blocks	(0.01 to 4) in	(3.9 + 2.3L) μin	Grade 1 Gage Blocks, Gage Block Comparator
	(4 to 10) in	(4.5 + 2.7L) μin	Grade 0 & 1 Gage Blocks, Long Gage Block Comparator
Height Gages ¹	Up to 35 in	(840 + 13L) μin	Gage Blocks, End Measuring Rods
Calipers ¹	Up to 35 in	(850 + 11L) μin	Gage Blocks, End Measuring Rods



Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Micrometers ¹	Up to 1 in (1 to 6) in	58 μin (58 + 0.02L) μin	Gage Blocks, End Measuring Rods
Dial/Digital Indicators ¹	Up to 3 in	20 μin	Gage Blocks
Surface Plates ¹	Up to 34 inD	110 μin	Planekator
Local Area Flatness	(34 to 170) inD	220 μin	Electronic Levels
	(0 to 0.001) in	20 μin	Repeat-O-Meter
Cylindrical OD	(0.01 to 1) in	15 μin	Supermicrometer, Gage Blocks
	(1 to 4) in	34 μin	
	(4 to 8) in	74 μin	
Cylindrical ID	0.04 to 8 in	(7.3 + 2.3L) μin	Internal Comparator, Gage Blocks
Thread Plug Gages Major Diameter Pitch Diameter 4 to 80 TPI, M.24 to 4	(0.06 to 8) in (0.05 to 7.96) in	16 μin + 0.44 μin/in 100 μin	Supermicrometer, Gage Blocks, Thread Wires

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Mass	(1 to 1000) mg	42 μg	Voland Double Pan Balance Class 1 Weights
	1 g	40 μg	
	(2 to 3) g	78 μg	
	4 g	0.1 mg	
	(5 to 6) g	42 μg	
	10 g	78 μg	
	(20 to 50) g	50 μg	
	100 g	58 μg	
	200 g	65 μg	
	300 g	0.11 mg	
500 g	4.6 mg		

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Mass	1 kg 2 kg (4 to 5) kg 10 kg	28 mg 30 mg 34 mg 1.6 mg	Voland Double Pan Balance Class 1 Weights
Pressure ¹	(10 to 18 000) psi	0.005 3 psi	DHI Deadweight Pressure System
Torque Transducers	(up to 40) ozf-in (75 to 750) lbf-in (50 to 500) lbf-ft (100 to 1 000) lbf-ft	0.12 ozf-in 0.19 lbf-in 0.26 lbf-ft 0.43 lbf-ft	Weights, Butterfly Wheels, 40 in Torque Arm
Torque Wrenches, Screwdrivers and Watches ¹	(0.5 to 215) ozf-in (75 to 750) lbf-in (50 to 500) lbf-ft (100 to 1 000) lbf-ft	0.59 ozf-in + 0.003 6 ozf-in/ozf-in 0.059 lbf-in + 0.005 7 lbf-in/lbf-in 0.16 lbf-ft + 0.005 5 lbf-ft/lbf-ft 0.61 lbf-ft + 0.005 3 lbf-ft/lbf-ft	Torque Transducers
Force ¹ Compression / Tension Source and Measure	(200 to 2 000) lbf (230 to 2 000) lbf (2 000 to 10 000) lbf	1.3 lbf 1.4 lbf 24 lbf	Morehouse Proving Rings

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Humidity Source and Measure	(15 to 80) %RH	0.95 %RH + 0.19 % of reading	Rotronic, HygroPalm Luneaire Environmental Chamber
Temperature Source and Measure	-77 °C (-40 to 150) °C (-150 to 300) °C	0.094 °C 0.058 °C 0.067 °C + 0.006 9 % of reading	Dry Ice/ Alcohol Bath Ice Bath, Thermotron Chamber, Hart Scientific 5309 Bath

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Source ¹	Fixed 10 MHz	0.006 5 μHz	HP 58503A GPS Receiver

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Source and Measure ¹	50 μ Hz to 500 MHz 500 MHz to 40 GHz	0.58 μ Hz + 0.002 6 μ Hz/Hz 6.6 Hz + 0.047 Hz/GHz	HP 58503A GPS Receiver, HP3325B, HP E4432A, HP 8673A Signal Generators, HP 83640B, HP 5345A, HP 5352A Counters

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. Electromagnetic uncertainties do not include possible contributions to uncertainty caused by a “best available” unit under test.
3. RF/Microwave uncertainties do not include mismatch.
4. The term (L) represents Length and (D) represents Diagonal Length, both in inches.
5. The term (I) refers to Applied Current.
6. The expression (Vin) signifies Applied Voltage.
7. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1215.



Vice President

