CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Michelli Measurement Group, Inc.
275 Orange Avenue, Suite A
Goleta, CA 93117

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION AND DIMENSIONAL MEASUREMENT

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.

Jason Stine, Vice President

Expiry Date: 11 July 2024

Certificate Number: ACT-1201

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)

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CALIBRATION AND DIMENSIONAL MEASUREMENT

Valid to: **July 11, 2024** Certificate Number: **ACT-1201**

CALIBRATION

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Voltage – Source [1]	Up to 329.999 9 mV Up to 3.299 999 V Up to 32.999 99 V (30 to 329.999 9) V (330 to 1 020) V	13 µV/V + 0.7 µV 7 µV/V + 1.3 µV 8 µV/V + 13 µV 12 µV/V + 0.1 V 12 µV/V + 1 mV	Fluke 5522A Multiproduct Calibrator
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 kV	7.8 µV/V + 0.4 µV 6.8 µV/V + 0.35 µV 6.8 µV/V + 0.65 µV 9 µV/V + 40 µV 19 µV/V + 0.5 mV	HP 3458A Opt 002 8.5 Digit Multimeter
DC Current – Source [1]	Up to 329.999 µA Up to 3.299 99 mA Up to 32.999 9 mA Up to 329.999 mA Up to 1.099 99 A (1.1 to 2.999 99) A Up to 10.999 9 A (11 to 20.5) A	100 µA/A + 13 nA 67 µA/A + 33 nA 67 µA/A + 0.17 µA 67 µA/A + 1.7 µA 0.13 mA/A + 27 µA 0.25 mA/A + 27 µA 0.33 mA/A + 0.33 mA 0.67 mA/A + 0.5 mA	Fluke 5522A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current – Measure [1]	Up to 100 nA	39 µA/A + 46 pA	HP 3458A Opt 002 8.5 Digit Multimeter
	100 nA to 1 µA	30 µA/A + 46 pA	
	(1 to 10) µA	27 µA/A + 0.11 nA	
	(10 to 100) µA	28 µA/A + 0.86 nA	
	100 µA to 1 mA	28 µA/A + 5.6 nA	
	(1 to 10) mA	28 µA/A + 56 nA	
	(10 to 100) mA	45 µA/A + 0.56 µA	
	100 mA to 1 A	0.13 mA/A + 10 µA	
AC Voltage – Source [1]	(1 to 32.999) mV		Fluke 5522A Multiproduct Calibrator
	(10 to 45) Hz	0.53 mV/V + 4 µV	
	45 Hz to 10 kHz	0.1 mV/V + 4 µV	
	(10 to 20) kHz	0.13 mV/V + 4 µV	
	(20 to 50) kHz	0.17 mV/V + 4 µV	
	(50 to 100) kHz	2.3 mV/V + 8 µV	
	(100 to 500) kHz	5.3 mV/V + 33 µV	
	(33 to 329.999) mV		
	(10 to 45) Hz	0.2 mV/V + 5.3 µV	
	45 Hz to 10 kHz	0.1 mV/V + 5.3 µV	
	(10 to 20) kHz	0.11 µV/V + 5.3 µV	
	(20 to 50) kHz	0.23 mV/V + 5.3 µV	
	(50 to 100) kHz	0.53 mV/V + 21 µV	
	(100 to 500) kHz	1.3 mV/V + 47 µV	
	(0.33 to 3.29999) V		
	(10 to 45) Hz	0.2 mV/V + 33 µV	
	45 Hz to 10 kHz	0.1 mV/V + 40 µV	
	(10 to 20) kHz	0.13 mV/V + 40 µV	
	(20 to 50) kHz	0.2 mV/V + 33 µV	
	(50 to 100) kHz	0.43 mV/V + 83 µV	
	(100 to 500) kHz	1.1 mV/V + 0.27 mV	
	(3.3 to 32.9999) V		
	(10 to 45) Hz	0.2 mV/V + 0.43 mV	
	45 Hz to 10 kHz	0.1 mV/V + 0.4 mV	
	(10 to 20) kHz	0.16 mV/V + 0.4 mV	
	(20 to 50) kHz	0.23 mV/V + 0.4 mV	
	(50 to 100) kHz	0.6 mV/V + 1.1 mV	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Source [1]	(33 to 329.999) V		Fluke 5522A Multiproduct Calibrator
	45 Hz to 1 kHz	0.13 mV/V + 1.3 mV	
	(1 to 10) kHz	0.13 mV/V + 4 mV	
	(10 to 20) kHz	0.02 mV/V + 4 mV	
	(20 to 50) kHz	0.2 mV/V + 4 mV	
	(50 to 100) kHz	1.3 mV/V + 33 mV	
	(330 to 1020) V		
	45 Hz to 1 kHz	0.2 mV/V + 6.7 mV	
	(1 to 5) kHz	0.2 mV/V + 6.7 mV	
	(5 to 10) kHz	0.2 mV/V + 6.7 mV	
AC Voltage – Measure [1]	Up to 10 mV		HP 3458A Opt 002 8.5 Digit Multimeter
	(1 to 20) Hz	4.1 µV/V + 34 µV	
	(20 to 40) Hz	1.6 mV/V + 27 µV	
	(40 to 100) Hz	0.77 mV/V + 27 µV	
	100 Hz to 20 kHz	1.8 mV/V + 27 µV	
	(20 to 50) kHz	1.6 mV/V + 27 µV	
	(50 to 100) kHz	7.1 mV/V + 37 µV	
	(100 to 250) kHz	40 mV/V + 72 µV	
	(250 to 500) kHz	0.12 mV/V + 2.4 µV	
	500 kHz to 1 MHz	0.12 mV/V + 2.4 µV	
	(1 to 2) MHz	0.12 mV/V +2.4 µV	
	(10 to 100 mV)		
	(10 to 20) Hz	4.1 mV/V + 20 µV	
	(20 to 40) Hz	1.6 mV/V + 20 µV	
	(40 to 100) Hz	0.68 mV/V + 10 µV	
	100 Hz to 20 kHz	1.8 mV/V + 10 µV	
	(20 to 50) kHz	1.6 mV/V + 40 µV	
	(50 to 100) kHz	6.1 mV/V + 80 µV	
	(100 to 250) kHz	20 mV/V + 0.5 mV	
	(250 to 500) kHz	30 mV/V + 0.6 mV	
	500 kHz to 1 MHz	50 mV/V + 2 mV	
	(1 to 2) MHz	0.1 V/V + 5 mV	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Measure [1]	100 mV to 1 V		HP 3458A Opt 002 8.5 Digit Multimeter
	(10 to 20) Hz	4.1 mV/V + 0.2 mV	
	(20 to 40) Hz	1.6 mV/V + 0.2 mV	
	(40 to 100) Hz	0.68 mV/V + 0.1 mV	
	100 Hz to 20 kHz	1.8 mV/V + 0.1 mV	
	(20 to 50) kHz	1.6 mV/V + 0.4 mV	
	(50 to 100) kHz	6.1 mV/V + 0.8 mV	
	(100 to 250) kHz	20 mV/V + 5 mV	
	(250 to 500) kHz	30 mV/V + 6 mV	
	500 kHz to 1 MHz	50 mV/V + 20 mV	
	(1 to 2) MHz	0.1 V/V + 50 mV	
	(1 to 10) V		
	(10 to 20) Hz	4.1 mV/V + 2 mV	
	(20 to 40) Hz	1.6 mV/V + 2 mV	
	(40 to 100) Hz	0.68 mV/V + 1 mV	
	100 Hz to 20 kHz	1.8 mV/V + 1 mV	
	(20 to 50) kHz	1.6 mV/V + 4 mV	
	(50 to 100) kHz	6.1 mV/V + 8 mV	
	(100 to 250) kHz	20 mV/V + 50 mV	
	(250 to 500) kHz	30 mV/V + 60 mV	
	500 kHz to 1 MHz	50 mV/V + 0.2 V	
	(1 to 2) MHz	0.1 V/V + 0.5 V	
	(10 to 100) V		
	(10 to 20) Hz	4.1 mV/V + 20 mV	
	(20 to 40) Hz	1.6 mV/V + 20 mV	
	(40 to 100) Hz	0.68 mV/V + 10 mV	
	100 Hz to 20 kHz	1.8 mV/V + 10 mV	
	(20 to 50) kHz	1.6 mV/V + 40 mV	
	(50 to 100) kHz	6.1 mV/V + 80 mV	
	(100 to 250) kHz	20 mV/V + 0.5 V	
	(250 to 500) kHz	30 mV/V + 0.6 V	
	500 kHz to 1 MHz	50 mV/V + 2 V	
	(100 to 1 000) V		
	(10 to 20) Hz	4.3 mV/V + 0.3 V	
	(20 to 40) Hz	1.8 mV/V + 0.3 V	
	(40 to 100) Hz	0.88 mV/V + 0.2 V	
	100 Hz to 20 kHz	2.2 mV/V + 0.2 V	
	(20 to 50) kHz	1.6 mV/V + 0.4 V	
	(50 to 100) kHz	6.1 mV/V + 2 V	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current – Source [1]	(29 to 329.99) uA		Fluke 5522A Multiproduct Calibrator
	(10 to 20) Hz	0.13 µA/A + 67 nA	
	(20 to 45) Hz	0.1 µA/A + 67 nA	
	45 Hz to 1 kHz	80 nA/A + 67 nA	
	(1 to 5) kHz	0.2 µA/A + 0.1 µA	
	(5 to 10) kHz	0.53 µA/A + 0.13 µA	
	(10 to 30) kHz	1.1 µA/A + 0.27 µA	
	(0.33 to 3.299 99) mA		
	(10 to 20) Hz	0.13 µA/A + 0.1 µA	
	(20 to 45) Hz	80 nA/A + 0.1 µA	
	45 Hz to 1 kHz	0.67 µA/A + 0.1 µA	
	(1 to 5) kHz	0.13 µA/A + 0.13 µA	
	(5 to 10) kHz	0.33 µA/A + 0.2 µA	
	(10 to 30) kHz	70 nA/A + 0.4 µA	
	(3.3 to 32.999 9) mA		
	(10 to 20) Hz	0.12 µA/A + 0.13 µA	
	(20 to 45) Hz	60 nA/A + 0.13 µA	
	45 Hz to 1 kHz	57 nA/A + 0.13 µA	
	(1 to 5) kHz	53 nA/A + 0.13 µA	
	(5 to 10) kHz	0.13 µA/A + 2 µA	
	(10 to 30) kHz	0.27 µA/A + 2.7 µA	
	(33 to 329.999) mA		
	(10 to 20) Hz	0.12 µA/A + 13 µA	
	(20 to 45) Hz	60 nA/A + 13 µA	
	45 Hz to 1 kHz	27 nA/A + 13 µA	
	(1 to 5) kHz	67 nA/A + 33 µA	
	(5 to 10) kHz	0.13 µA/A + 67 µA	
	(10 to 30) kHz	0.27 µA/A + 0.13 mA	
	(0.33 to 1.099 99) A		
	(10 to 45) Hz	0.12 µA/A + 33 µA	
	45 Hz to 1 kHz	33 nA/A + 67 µA	
	(1 to 5) kHz	0.4 µA/A + 0.67 mA	
	(5 to 10) kHz	1.7 µA/A + 3.3 mA	
	(1.1 to 2.999 99) A		
	(10 to 45) Hz	1.7 µA/A + 67 µA	
	45 Hz to 1 kHz	1.7 µA/A + 37 µA	
	(1 to 5) kHz	1.7 µA/A + 0.67 mA	
	(5 to 10) kHz	1.7 µA/A + 3.3 mA	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current – Source [1]	(3 to 10.999 9) A		Fluke 5522A Multiproduct Calibrator
	(10 to 45) Hz	70 nA/A + 1.3 mA	
	45 Hz to 1 kHz	67 nA/A + 1.3 mA	
	(1 to 5) kHz	2 µA/A + 1.3 mA	
	(11 to 20.5) A		
	(10 to 45) Hz	80 nA/A + 3.3 mA	
	45 Hz to 1 kHz	0.1 µA/A + 3.3 mA	
	(1 to 5) kHz	2 µA/A + 3.3 mA	
AC Current – Measure [1]	(5 to 100) µA		HP 3458A Opt 002 8.5 Digit Multimeter
	(10 to 20) Hz	4.5 mA/A + 34 nA	
	(20 to 45) Hz	1.6 mA/A + 30 nA	
	(45 to 100) Hz	0.68 mA/A + 34 nA	
	100 Hz to 1 kHz	0.68 mA/A + 35 nA	
	100 µA to 1 mA		
	(10 to 20) Hz	4.5 mA/A + 0.23 µA	
	(20 to 45) Hz	1.7 mA/A + 0.23 µA	
	(45 to 100) Hz	0.68 mA/A + 0.23 µA	
	100 Hz to 5 kHz	0.38 mA/A + 0.22 µA	
	(5 to 20) kHz	0.68 mA/A + 0.23 µA	
	(20 to 50) kHz	4.5 mA/A + 0.45 mA	
	(50 to 100) kHz	6.3 mA/A + 2 µA	
	(1 to 10) mA		
	(10 to 20) Hz	4.5 mA/A + 2.3 µA	
	(20 to 45) Hz	1.7 mA/A + 2.3 µA	
	(45 to 100) Hz	0.68 mA /A + 2.3 µA	
	100 Hz to 5 kHz	0.38 mA /A + 2.1 µA	
	(5 to 20) kHz	0.68 mA /A + 2.3 µA	
	(20 to 50) kHz	4.5 mA/A + 4.5 µA	
	(50 to 100) kHz	6.3 mA/A + 20 µA	
	(10 to 100) mA		
	(10 to 20) Hz	4.5 mA/A + 23 µA	
	(20 to 45) Hz	1.7 mA/A + 23 µA	
	(45 to 100) Hz	0.69 mA/A + 23 µA	
	100 Hz to 5 kHz	0.38 mA/A + 21 µA	
	(5 to 20) kHz	0.69 mA/A + 20 µA	
	(20 to 50) kHz	4.5 mA/A + 45 µA	
	(50 to 100) kHz	6.2 mA/A + 0.17 mA	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current – Measure [1]	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	 4.5 mA/A + 0.23 mA 1.8 mA/A + 0.23 mA 0.91 mA/A + 0.23 mA 1.1 mA/A + 0.25 mA 3.4 mA/A + 0.22 mA 11 mA/A + 0.45 mA	HP 3458A Opt 002 8.5 Digit Multimeter
Resistance – Source [1,3] (Simulated)	Up to 10.999 9 Ω (11 to 32.999 9) Ω (33 to 109.999 9) Ω (110 to 329.999 9) Ω (0.33 to 1.099 999) kΩ (1.1 to 3.299 999) kΩ (3.3 to 10.999 99) kΩ (11 to 32.999 99) kΩ (33 to 109.999 9) kΩ (110 to 329.999 99) kΩ (0.33 to 1.099 999) MΩ (1.1 to 3.299 999) MΩ (3.3 to 10.999 99) MΩ (11 to 32.999 99) MΩ (33 to 109.999 9) MΩ (110 to 329.999 9) MΩ (330 to 1 100) MΩ	27 µΩ/Ω + 6.7 mΩ 20 µΩ/Ω + 10 mΩ 19 uΩ/Ω + 10 mΩ 19 µΩ/Ω + 13 mΩ 19 µΩ/Ω + 13 mΩ 19 µΩ/Ω + 0.13 Ω 19 µΩ/Ω + 67 mΩ 19 µΩ/Ω + 0.67 Ω 19 µΩ/Ω + 0.67 Ω 21 µΩ/Ω + 6.7 Ω 21 µΩ/Ω + 6.7 Ω 40 µΩ/Ω + 0.1 kΩ 87 µΩ/Ω + 0.17 kΩ 0.17 mΩ/Ω + 1.7 Ω 0.33 mΩ/Ω + 2 Ω 2 mΩ/Ω + 17 kΩ 17 mΩ/Ω + 0.33 MΩ	Fluke 5522A Multiproduct Calibrator
Resistance – Source [1] (Fixed)	0.1 Ω 2 mΩ 5 mΩ 10 mΩ	3.3 µΩ 0.5 µΩ 0.5 µΩ 1.2 µΩ	Simpson Current Shunts
Resistance – Measure [1]	Up to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 k Ω to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 M Ω to 1 GΩ	18 µΩ/Ω + 79 µΩ 17 µΩ/Ω + 0.58 mΩ 15 µΩ/Ω + 0.68 mΩ 15 µΩ/Ω + 2.1 mΩ 15 µΩ/Ω + 30 mΩ 20 µΩ/Ω + 2.4 Ω 59 µΩ/Ω + 0.13 kΩ 0.6 mΩ/Ω + 1.6 kΩ 5.6 mΩ/Ω + 54 kΩ	HP 3458A Opt 002 8.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Capacitance – Source [1] (Simulated)			Fluke 5522A Multiproduct Calibrator
10 Hz to 10 kHz	(220 to 399.9) pF	0.33 % of reading + 6.7 pF	
10 Hz to 10 kHz	(0.4 to 1.099 9) nF	0.33 % of reading + 6.7 pF	
10 Hz to 3 kHz	(1.1 to 3.299 9) nF	0.33 % of reading + 6.7 pF	
10 Hz to 1 kHz	(3.3 to 10.999 9) nF	0.17 % of reading + 6.7 pF	
10 Hz to 1 kHz	(11 to 32.999 9) nF	0.17 % of reading + 67 pF	
10 Hz to 1 kHz	(33 to 109.999) nF	0.17 % of reading + 67 pF	
10 Hz to 1 kHz	(110 to 329.999) nF	0.17 % of reading + 0.2 nF	
(10 to 600) Hz	(0.33 to 1.099 99) µF	0.17 % of reading + 1 nF	
(10 to 300) Hz	(1.1 to 3.299 99) µF	0.17 % of reading + 2 nF	
(10 to 150) Hz	(3.3 to 10.999 9) µF	0.17 % of reading + 6.7 nF	
(10 to 120) Hz	(11 to 32.999 9) µF	0.27 % of reading + 20 nF	
(10 to 80) Hz	(33 to 109.999) µF	0.3 % of reading + 67 nF	
DC to 50 Hz	(110 to 329.999) µF	0.3 % of reading + 0.2 µF	
DC to 20 Hz	(0.33 to 1.099 99) mF	0.3 % of reading + 0.7 µF	
DC to 6 Hz	(1.1 to 3.299 99) mF	0.3 % of reading + 2 µF	
DC to 2 Hz	(3.3 to 10.999 9) mF	0.3 % of reading + 6.7 µF	
DC to 0.6 Hz	(11 to 32.999 9) mF	0.5 % of reading + 20 µF	
DC to 0.2 Hz	(33 to 110) mF	0.7 % of reading + 67 µF	
Inductance – Source [1]	0 to 999.999 mH	23 mH/H + 90 nH	IET LC-400L-SC Decade Inductor
Electrical Simulation of Thermocouple Indicators – Source/Measure [1]	Type B		Fluke 5522A Multiproduct Calibrator
	(600 to 800) °C	0.28 °C	
	(800 to 1 000) °C	0.22 °C	
	(1 000 to 1 550) °C	0.2 °C	
	(1 550 to 1 820) °C	0.17 °C	
	Type C		
	(0 to 15) °C	0.15 °C	
	(150 to 650) °C	0.13 °C	
	(650 to 1 000) °C	0.15 °C	
	(1 000 to 1 800) °C	0.25 °C	
	(1 800 to 2 316) °C	0.42 °C	
	Type E		
	(-250 to -100) °C	0.25 °C	
	(-100 to -25) °C	0.08 °C	
	(-25 to 350) °C	0.07 °C	
	(350 to 650) °C	0.08 °C	
	(650 to 1 000) °C	0.11 °C	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of Thermocouple Indicators – Source/Measure [1]	Type J		Fluke 5522A Multiproduct Calibrator
	(-210 to -100) °C	0.18 °C	
	(-100 to -30) °C	0.11 °C	
	(-30 to 150) °C	0.09 °C	
	(150 to 760) °C	0.11 °C	
	(760 to 1 200) °C	0.15 °C	
	Type K		
	(200 to -100) °C	0.22 °C	
	(-100 to -25) °C	0.12 °C	
	(-25 to 120) °C	0.11 °C	
	(120 to 1 000 °C	0.17 °C	
	(1 000 to 1 372) °C	0.27°C	
	Type L		
	(200 to -100) °C	0.25 °C	
	(-100 to 800) °C	0.17 °C	
	(800 to 900) °C	0.11 °C	
	Type N		
	(-200 to -100) °C	0.27 °C	
	(-100 to -25) °C	0.15 °C	
	(-25 to 120) °C	0.13 °C	
	(120 to 410) °C	0.12 °C	
	(410 to 1 300) °C	0.18 °C	
	Type R		
	(0 to 250) °C	0.38 °C	
	(250 to 400) °C	0.23 °C	
	(400 to 1 000) °C	0.22 °C	
	(1 000 to 1 767) °C	0.27 °C	
	Type S		
	(0 to 250) °C	0.31 °C	
	(250 to 1 000) °C	0.24 °C	
	(1 000 to 1 400) °C	0.25 °C	
	(1 400 to 1 767) °C	0.31 °C	
	Type T		
	(-250 to -150) °C	0.42 °C	
	(-150 to 0) °C	0.16 °C	
	(0 to 120) °C	0.11 °C	
	(120 to 400) °C	0.09 °C	
	Type U		
	(-200 to 0) °C	0.37 °C	
	(0 to 600) °C	0.18 °C	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD Indicators – Source [1]	Pt 385, 100 Ω		Fluke 5522A Multiproduct Calibrator
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 630) °C	0.08 °C	
	(630 to 800) °C	0.15 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 630) °C	0.08 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.17 °C	
	(-190 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.05 °C	
	(300 to 400) °C	0.06 °C	
	(400 to 600) °C	0.07 °C	
	(600 to 630) °C	0.15 °C	
	Pt 385, 200 Ω		
	(-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	0.03 °C	
	(260 to 300) °C	0.18 °C	
	(300 to 400) °C	0.09 °C	
	(400 to 600) °C	0.1 °C	
	(600 to 630) °C	0.11 °C	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD Indicators – Source [1]	Pt 385, 500 Ω		Fluke 5522A Multiproduct 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	0.05 °C	
	(300 to 400) °C	0.05 °C	
	(400 to 600) °C	0.06 °C	
	(600 to 630) °C	0.07 °C	
	Pt 385, 1 000 Ω		
	(-200 to 0) °C	0.02 °C	
	(0 to 100) °C	0.02 °C	
	(100 to 260) °C	0.03 °C	
	(260 to 300) °C	0.04 °C	
	(300 to 600) °C	0.05 °C	
	(600 to 630) °C	0.05 °C	
	Ni 120, 120 Ω		
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.09 °C	
	Cu 427, 10 Ω		
	(-100 to 260) °C	0.2 °C	
Oscilloscopes [1]			Fluke 5522A Multiproduct Calibrator with 1.1 GHz Scope Option
Amplitude – DC Signal			
into 50 Ω load	(-6.6 to 6.6) V	0.25 % of reading + 40 µV	
into 1 MΩ load	(-130 to 130) V	0.05 % of reading + 40 µV	
Amplitude – Square Wave			
50 Ω load	± 1 mVp-p to ± 6.6 Vp-p		
	10 Hz to 10 kHz	0.25 % of reading + 40 µV	
1 MΩ load	± 1 mVp-p to ± 130 Vp-p		
	10 Hz to 1 kHz	0.1 % of reading + 40 µV	
	(1 to 10) kHz	0.25 % of reading + 40 µV	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Oscilloscopes [1,2]			Fluke 5522A Multiproduct Calibrator with 1.1 GHz Scope Option
Rise Time	< 300 ps	+ 0 ps/- 100 ps	
Leveled Sine Wave (Relative to 50 kHz)	5 mVp-p to 5.5 Vp-p		
	50 kHz to 100 MHz	11 mV/V + 0.8 mV	
	(100 to 300) MHz	15 mV/V + 0.7 mV	
	(300 to 600) MHz	30 mV/V + 0.7 mV	
Time Marker			
into 50 Ω Load	50 ms to 5 s	(25 + 1 0007) µs/s	
	1 ns to 20 ms	2.5 µs	
Leveled Sine Wave – Flatness			
into 50 Ω load	5 mVp-p to 5.5 Vp-p		
	50 kHz Reference	2 % of reading + 0.3 mV	
	50 kHz to 100 MHz	3.5 % of reading + 0.3 mV	
	(100 to 300) MHz	4 % of reading + 0.3 mV	
	(300 to 600) MHz	6 % of reading + 0.3 mV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	7 % of reading + 0.3 mV	
Leveled Sine Wave – Frequency			
into 50 Ω load	50 kHz to 1.1 GHz	0.25 µHz/Hz	
Edge Characteristics into 50 Ω load			
Rise Time	≤ 300 ps	+ 0 ps/-100 ps	
Amplitude	5 mVp-p to 2.5 Vp-p	2 % of reading + 0.2 mV	
Frequency	900 Hz to 11 MHz	2.5 µHz/Hz	
Wave Generator – Amplitude (square, sine, & triangle)			
into 50 Ω	10 Hz to 10 kHz		
	1.8 mVp-p to 2.5 Vp-p	30 mV/V + 0.1 mV	
into 1 MΩ	10 Hz to 10 kHz		
	1.8 mVp-p to 55 Vp-p	30 mV/V + 0.1 mV	
Wave Generator – Frequency (square, sine, & triangle)	10 Hz to 10 kHz	25 µHz/Hz + 15 mHz	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Oscilloscopes [1,2]			
Input Impedance – Measure Resistance			
into 50 Ω load	(40 to 60) Ω	0.1 % of reading	Fluke 5522A Multiproduct Calibrator with 1.1 GHz Scope Option
into 1 MΩ load	500 kΩ to 1.5 MΩ	0.1 % of reading	
Capacitance			
into 1 MΩ load	(5 to 50) pF	5 % of reading + 0.5 pF	

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Angle Plates	Up to 6 in	63 µin	Cylindrical Square, Granite Cube, Mu-Checker, Surface Plate
Angle Blocks	(0 to 90)º	5”	Rotary Table, Autocollimator, Reflecting Cube
Caliper Checker [2]	Up to 8 in	(57 + 2*L*) µin	Mu-Checker, Height Master, Surface Plate
Calipers [1]			
Length	Up to 8 in	294 µin	Caliper Checker, Gage Blocks
	(8 to 12) in	288 µin	
	(12 to 20) in	296 µin	
	(20 to 40) in	592 µin	
	(40 to 72) in	645 µin	
Depth	1 in	284 µin	
Inside Diameter	1.617 67 in	290 µin	
Chamfer Gauges[1]	Up to 2 in	639 µin	Ring Gauges
Depth Micrometers [1,2]	Up to 12 in	(42 + 2*L*) µin	Gage Blocks, Surface Plate
Dial Caliper Gages [2]	Up to 6 in	(280 + 15*L*) µin	P&W Supermicrometer, Ring Gages
Feeler Gages [1]	Up to 0.01 in	35 µin	P&W Supermicrometer, Gage Blocks, Micrometer

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Gage Blocks [2]	Up to 0.11 in (0.11 to 1) in (1 to 4) in	4.5 µin (4 + 0.8*L*) µin (3 + 1.5*L*) µin	Gage Block Comparator, Grade 1 Gage Blocks
	Up to 25 mm (25 to 50) mm (50 to 100) mm	0.11 µm (0.1 + 0.02*L*) µm (0.1 + 0.01*L*) µm	
Height Gages [1,2]	Up to 8 in (8 to 24) in	(290 + 0.4*L*) µin (280 + 1.3*L*) µin	Gage Blocks, Surface Plate
Height Master [2]	Up to 18 in	(38 + 1.2*L*) µin	Mu-checker, Surface Plate, Gage Blocks
Indicators [1,2] (Drop and Test)	Up to 4 in (4 to 10) in	(24 + 19*L*) µin (250 + 9*L*) µin	Micrometer Head, Gage Blocks, Surface Plate, P&W Supermicrometer
Inside Micrometers [2]	Up to 4 in (4 to 24) in	233 µin (69 + 3*L*) µin	P&W Lab Master, Gage Blocks, Riser Block, Sine Plate, Height Master
Levels	± 1 div	1.2”	Autocollimator, Reflective Cube, Rotary Table
Outside Micrometers [1,2]	Up to 3 in (3 to 20) in	33 µin (52 + 1.8*L*) µin	Gage Blocks
Micrometer Heads [1]	Up to 2 in	18 µin	Mu-Checker, Gage Blocks
Mu Checkers [1]	Up to 150 µin	3.2 µin	Gage Blocks
Optical Comparator [1,2] Linear Measurement X-axis and Y-axis Angular Measurement Magnification	 Up to 6 in (6 to 30) in Up to 360 ° 10X, 20X, 31.25X, 100X	 (60 + 0.6*L*) µin (13 + 8.3L) µin 44″ (0.011 + 0.000 02*L*) in	 Microrule, Gage Blocks, Glass Scale Angle Blocks Magnification Checker
Plugs Cylindrical [2] Pin Gage	Up to 6 in	(2.5 + 4*L*) µin	P&W Lab Master, Gage Blocks
Protractors, Digital	(0 to 90)°	0.058°	Rotary Table, Level

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Protractors, Bevel			
Angle	(0 to 35)º	0.025°	Angle Blocks, Mu-Checker, Surface Plate
Blade Parallelism	Up to 0.001 in	34 µin	
Threaded Plugs [2]			
Pitch Diameter	Up to 6 in	(133 + 0.2*L*) µin	Gage Blocks, Thread Wires, P&W Supermic, Gage Blocks, Optical Comparator
Major Diameter	Up to 6 in	(10 + 1.7*L*) µin	
Angle	(0 to 60)º	1.5′	
Adjustable Threaded Ring Gages [2]			Setting Plug Gages, P&W Supermic In accordance with ASME B1.2, para 5.1.1: the ring is sized to a plug, with the plug's uncertainty given.
Pitch Diameter	Up to 4 in	79 µin	
Minor Diameter	Up to 6 in	(11 + 1.5*L*) µin	
Radius Gauge	Up to 1 in	300 µin	Optical Comparator, Radius Screen
Ring Gauge – Plain [2]	Up to 1 in (1 to 11) in	5.6 µin (0.8 + 4.8*L*) µin	Gage Blocks, Ring Comparator, P&W Lab Master
Rotary Tables [1]			
Angle	360º	1.4”	Autocollimator, Reflecting Cube, Mu Checker, Surface Plate, Angle Blocks
Flatness/Parallelism	Up to 0.1 in	36 µin	
Compound Angle	(15, 30, 45)°	2.5”	
Sine Plates			
Angle	Up to 45° (5 in and 10 in Roller Spacing only)	4.7”	Angle Blocks, Gauge Blocks, Mu Checker, Surface Plate
Flatness & Parallelism	Up to 0.001 in	36 µin	Mu Checker, Surface Plate

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Steel Rules [2]	Up to 72 in	(131 + 37*L*) µin	Optical Comparator
Surface Plates [1,2] Overall Flatness	Up to 161 in*DL*	(15 + 3.2*DL*) µin	In accordance with Fed Spec GGG-P-463 using Autocollimator
Local Area Flatness	Up to 0.001 in	21 µin	Mu Checker w/ Probe
Thread Wires	(4 to 120) TPI	29 µin	Plug Gages, P&W Lab Master, Gage Blocks
Tri-Micrometers [1]	Up to 4 in	250 µin	Ring Gages
V-Anvil Micrometers [1]	Up to 1 in	86 µin	Plain Plug Gages
Vee Block Parallelism to Adjacent Side	Up to 0.001 in	68 µin	Plug Gauge, Mu Checker, Surface Plate
Parallelism to Opposite Side	Up to 0.001 in	36 µin	Angle Block, Mu Checker, Surface Plate
Side Squareness	Up to 0.001 in	64 µin	Granite Cube, Mu Checker, Surface Plate
Surface Flatness & Parallelism	Up to 0.001 in	34 µin	Mu Checker, Surface Plate

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Velometers and Anemometers	(50 to 200) fpm (200 to 1 200) fpm	1.7 % of reading + 5.8 fpm 2.2 % of reading + 1.5 fpm	Standard Anemometer
Balances and Scales [1] SI (0.000 01 g resolution)	Up to 210 g	0.18 mg	ASTM Class 1 Weights and internal procedure BP042 utilized for the calibration of the weighing system.

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Balances and Scales [1] SI (0.01 g resolution)	(210 to 3 200) g	7.6 mg	ASTM Class 4 Weights and internal procedure BP042 utilized for the calibration of the weighing system.
Balances and Scales [1] SI (0.1 g resolution)	(3.2 to 31) kg	59 mg	ASTM Class 6 Weights and internal procedure BP042 utilized for the calibration of the weighing system.
Balances and Scales [1,3]	Up to 300 lb	0.003 % of reading + 0.003 lb	ASTM Class 6 Weights and internal procedure BP042 utilized for the calibration of the weighing system.
Balances and Scales [1,3]	(300 to 650) lb	0.006 % of reading + 0.055 lb	ASTM Class 6 Weights and internal procedure BP042 utilized for the calibration of the weighing system.
Barometers	(28 to 32) inHg	0.09 inHg	Manometer w/ Master Barometer
Durometer Force Type A, B, E, & O Types C, D, & DO Type OO & OOO	 Up to 821 gf Up to 4 532 gf Up to 114 gf	 0.14 gf 0.14 gf 0.14 gf	Class 4 Weights, Analytical Balance
Durometer Indenter Length	(0.09 to 0.11) in	133 µin	Optical Comparator
Dynamometer, Load Cells [1,4]	Up to 5 000 g	4.2 mg	ASTM Class 1 & S Weights
	(2 to 1 000) lbf (1 000 to 5 000) lbf (5 000 to 10 000) lbf	0.06 % of reading + 0.06 lbf 0.08 % of reading + 0.11 lbf 0.004 % of reading + 3.7 lbf	ASTM Class 6 Weights Load Cell, Multimeter
Flow Meters [1]	Up to 2 slpm (2 to 20) slpm	0.9 % of reading + 0.003 slpm 0.7 % of reading + 0.044 slpm	Alicat Flow Controller

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Rockwell Hardness Testers [1]	HRA HRBW HRC HRD HRE HRF	1.2 HRA 1.2 HRBW 0.7 HRC 1.2 HRD 1.3 HRE 1.3 HRF	Indirect verification per ASTM E18 using Test Blocks
Brinell Hardness Testers [1]	230 HBW 309 HBW	3.3 HBW 5.5 HBW	Indirect verification per ASTM E10 using Test Blocks
Force Indicating Devices [1]	Up to 210 g	0.64 mg	Class 1 Weights, Hanger
	(2 to 400) lbf (400 to 1 000) lbf (1 000 to 5 000) lbf (5 000 to 10 000) lbf	0.03 % of reading 0.03 % of reading + 0.3 lbf 0.03 % of reading + 0.9 lbf 0.03 % of reading + 2.7 lbf	ASTM Class 6 Weights, Load Cell, Multimeter
Mass Determination	Up to 2 g	0.002 % of reading + 13 µg	Sartorius MC 210 S Balance, ASTM Class 1 & 4 Weights
	(2 to 210) g	0.000 07 % of reading + 30 µg	Sartorius MC 210-03S Balance, ASTM Class 1 & 4 Weights
	(210 to 3 200) g	0.000 4 % of reading + 1 mg	Sartorius MSA31 Scale, ASTM Class 1 & 4 Weights
	(3 200 to 31 000) g	0.000 27 % of reading + 80 mg	GP-30K Scale, Class 1 & 4 Weights
Pipettes	(0.5 to 10 000) µL	0.04 % of reading + 0.03 µL	Precision Balances, Distilled Water
Volumetric Ware	Up to 2 000 mL	0.04 % of reading	Precision Balances, Distilled Water
Barometers	(28 to 32) in Hg	0.09 inHg	Manometer w/ Master Barometer
Pressure Gages, Pressure Transducers [1]	(0.000 01 to 0.5) in H_2O	0.03 % of reading	Comparison to Manometer
	(0.072 to 7.5) psig	0.12 % of reading	Comparison to Mensor 2400 Digital Pressure Gage

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Pressure Gages, Pressure Transducers [1]	(7.5 to 60) psig	0.000 1 % of reading + 0.001 2 psi	Dead Weight Tester
	(60 to 1 000) psig	0.000 04 % of reading + 0.038 psi	Dead Weight Tester
	(1 000 to 10 000) psig	0.000 06% of reading + 0.011 psi	Dead Weight Tester
Vacuum Gages [1]	(-30 to 0) inHg	0.09 inHg	Comparison to Master Manometer
Torque Transducers	Up to 27.6 lbf·in (27.6 to 150) lbf·in 150 lbf·in to 60 lbf·ft (60 to 2 000) lbf·ft	0.007 % of reading + 0.004 lbf·in 0.06 % of reading + 0.000 1 lbf·in 0.3 % of reading + 0.009 lbf·ft 0.08 % of reading + 0.000 5 lbf·ft	Torque Wheels, Torque Arms, Class 6 Weights
Torque Tools [1,2]	(4 to 50) lbf·in (30 to 400) lbf·in (80 to 1 000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft (200 to 2 000) lbf·ft	0.17 % of reading + 0.11 lbf·in 0.41 % of reading + 0.05 lbf-in 0.42 % of reading + 0.02 lbf·in 0.39 % of reading + 0.07 lbf·ft 0.3 % of reading + 0.01 lbf·ft 0.3 % of reading + 0.004 lbf·ft	CDI Torque Machine

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Humidity – Source/Measure [1]	(10 to 90) %RH (90 to 95) %RH	1.4 %RH 2.1 %RH	Vaisala HMI70 Temperature/Humidity Indicator, Accredited Salts
Temperature – Measure [1]	(-20 to 60) °C	0.25 °C	Vaisala HMI41 Temperature/Humidity Indicator
	(-270 to -210) °C (-210 to 400) °C (400 to 1 370) °C	0.7 °C 0.6 °C 1.3 °C	Comparison to Datalogger w/ Type T Thermocouple Probe
	(-270 to 400) °C (400 to 1 370) °C	0.6 °C 1.3 °C	Comparison to Fluke 5500A Multiproduct Calibrator, w/ Type T Thermocouple Probe

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Temperature – Measure [1]	(-200 to 100) °C (100 to 300) °C (300 to 500) °C (500 to 660) °C	0.046 °C 0.065 °C 0.085 °C 0.12 °C	Fluke/Hart 5628 PRT w/ HP 3458A Opt 002 8.5 Digit Multimeter
Temperature – Source [1]	(-25 to 400) °C	0.6 °C	Dry Well, Fluke 5500A Multiproduct Calibrator w/ Type K Thermocouple Probe
	(-25 to 100) °C (100 to 300) °C (300 to 400) °C	0.046 °C 0.065 °C 0.085 °C	Dry Well, Burns Engineering PRT w/ HP 3458A Opt 002 8.5 Digit Multimeter
Thermocouple Wires, Thermocouple Probes [1]	(-25 to 400) °C	0.07 °C	Ice Bath, Dry-well, Burns Engineering PRT w/ HP 3458A Opt 002 8.5 Digit Multimeter, Fluke 5500A Multiproduct Calibrator
Infrared Thermometers [1]	(-20 to 660) °C	0.3 °C	Comparison to Burns Engineering PRT w/ HP 3458A Opt 002 8.5 Digit Multimeter, Blackbody Source $\varepsilon = 0.96$, $\lambda = (8 \text{ to } 14)$ µm
	50 °C 100 °C 200 °C 300 °C 400 °C	1.4 °C 1.4 °C 1.8 °C 1.5 °C 1.6 °C	Ametek ETC-400R Blackbody Source (cavity) $\varepsilon = 0.96$, $\lambda = (8 \text{ to } 14)$ µm

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Source [1]	1 µHz to 50 kHz	5 µHz/Hz	HP 3325B Function Generator
	50 kHz to 600 MHz	2.5 µHz/Hz	Fluke 5500A SC 600 Multiproduct Calibrator

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Measure [1]	(1 to 40) Hz 40 Hz to 10 kHz 10 kHz to 1 MHz (1 to 20) MHz (20 to 100) MHz	500 µHz/Hz 100 µHz/Hz 3.6 µHz/Hz + 1 Hz 0.4 Hz 2.4 Hz	HP 3458A Opt 002 8.5 Digit Multimeter, HP 5334A Counter
Stopwatches and Timers [1]	Up to 24 hr	0.12 s	Time Signal Receiver
Rate of Pull [1] (Tensile Testers)	Up to 24 in/min	0.14 % of reading + 0.013 in/min	Steel Rule, Stopwatch
Rotational Indicating Devices [1,2]	Up to 30 000 rpm	0.011 % of reading + 1.3 rpm	Comparison to Ametek 1726 Digital Tachometer
Handheld Tachometers [1,2]	(20 to 300) rpm (300 to 3 000) rpm (3 000 to 30 000) rpm	0.009 % of reading + 0.03 rpm 0.01 % of reading + 0.14 rpm 0.01 % of reading + 1.3 rpm	Comparison to Ametek 1965 Digistrobe

DIMENSIONAL MEASUREMENT

1 Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dimensional Measurement – 1D [2]	Up to 13 in	$(2 + 4.2L)$ µin	Universal Length Measuring Machine utilized as Reference Standard for Length Dimensional Inspection.
	Up to 4 in	78 µin	Micrometer Set utilized as Reference Standard for Length Dimensional Inspection.
	Up to 4 in	$(133 + 1L)$ µin	Optical Comparator utilized as Reference Standard for Length Dimensional Inspection. (X-Axis Only)

1 Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dimensional Measurement – 1D [2]	Up to 24 in	(32 + 2.3*L*) µin	Gage Blocks, Mu Checker, and Surface Plate utilized as Reference Standards for Length Dimensional Inspection.
	Up to 1 200 in	(0.007 + 0.000 2*L*) in	Steel Rule utilized as Reference Standard for Length Dimensional Inspection.
	Up to 18 in	(60 + 2.6*L*) µin	Height Master, Mu Checker, and Surface Plate utilized as Reference Standards for Height Dimensional Inspection.
	Up to 1 in	150 µin	Drop Indicator utilized as Reference Standard for Depth Dimensional Inspection.
	Up to 0.001 in	36 µin	Mu Checker and Surface Plate utilized as Reference Standards for Flatness/Parallelism Dimensional Inspection.
	Up to 1 in	(118 + 8*L*) µin	Pin Gages utilized as Reference Standards for Go-No/Go Dimensional Inspection.
	Up to 11.31 in*DL*	56 µin	Granite Cube, Mu Checker, and Surface Plate utilized as Reference Standards for Squareness Dimensional Inspection.

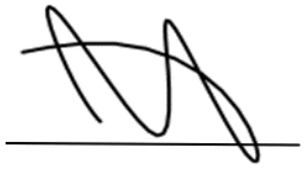
2 Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dimensional Measurement – 2D [2]	Up to 360°	74″	Optical Comparator utilized as Reference Standard for Angle Dimensional Inspection.
	Up to 1 in	260 µin	Optical Comparator utilized as Reference Standard for Radius Dimensional Inspection.

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. L = length in inches; DL = diagonal length in inches; T = time in seconds; ″ = arc-second; ′ = arc-minute; rpm = revolutions per minute.
3. 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.
4. The Scope Uncertainty presented here does not include the Resolution of the device under calibration. It will be included in the Measurement Uncertainty on the calibration certificate.
5. This scope is formatted as part of a single document including Certificate of Accreditation No. ACT-1201.



Jason Stine, Vice President