CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Cornerstone Metrology Service Inc.
7625 Hayvenhurst Avenue, #20
Van Nuys, CA 91406

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.

Jason Stine, Vice President

Expiry Date: 13 February 2027
Certificate Number: AC-1376

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)

Cornerstone Metrology Service Inc.

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Van Nuys, CA 91406
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CALIBRATION

Valid to: **February 13, 2027** Certificate Number: **AC-1376**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source [1]	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1 020) V	5 µV/V + 1 µV 4 µV/V + 3 µV 4 µV/V + 30 µV 4.5 µV/V + 0.3 mV 4.5 µV/V + 0.9 mV	Comparison to Fluke 5500A Multiproduct Calibrator
DC Current – Source [1]	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	0.13 mA/A + 50 nA 0.1 mA/A + 0.25 µA 0.1 mA/A + 3.3 µA 0.3 mA/A + 44 µA 0.6 mA/A + 0.33 mA	Comparison to Fluke 5500A Multiproduct Calibrator
AC Voltage – Source [1]	(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	 3.5 mV/V + 20 µV 1.5 mV/V + 20 µV 2 mV/V + 20 µV 2.5 mV/V + 20 µV 3.5 mV/V + 33 µV 10 mV/V + 60 µV	Comparison to Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source [1]	(33 to 330) mV		Comparison to Fluke 5500A Multiproduct Calibrator
	(10 to 45) Hz	2.5 mV/ V + 50 µV	
	45 Hz to 10 kHz	0.5 mV/V + 20 µV	
	(10 to 20) kHz	1 mV/V + 20 µV	
	(20 to 50) kHz	1.6 mV/V + 40 µV	
	(50 to 100) kHz	2.4 mV/V + 0.17 mV	
	(100 to 500) kHz	7 mV/V + 0.33 mV	
	(0.33 to 3.3) V		
	(10 to 45) Hz	1.5 mV/V + 0.25 mV	
	45 Hz to 10 kHz	0.3 mV/V + 60 µV	
	(10 to 20) kHz	0.8 mV/V + 60 µV	
	(20 to 50) kHz	1.4 mV/V + 0.3 mV	
	(50 to 100) kHz	2.4 mV/V + 1.7 mV	
	(100 to 500) kHz	5 mV/V + 3.3 mV	
	(3.3 to 33) V		
	(10 to 45) Hz	1.5 mV/V + 2.5 mV	
	45 Hz to 10 kHz	0.4 mV/V + 0.6 mV	
	(10 to 20) kHz	0.8 mV/V + 2.6 mV	
	(20 to 50) kHz	1.9 mV/V + 5 mV	
	(50 to 100) kHz	2.4 mV/V + 17 mV	
	(33 to 330) V		
	45 Hz to 1 kHz	0.5 mV/V + 6.6 mV	
	(1 to 10) kHz	0.8 mV/V + 15 mV	
	(10 to 20) kHz	0.9 mV/V + 33 mV	
	(330 to 1 020) V		
	45 Hz to 1 kHz	0.5 mV/V + 80 mV	
	(1 to 5) kHz	2 mV/V + 0.1 V	
	(5 to 10) kHz	2 mV/V + 0.5 V	
AC Current – Source [1]	(30 to 330) µA		Comparison to Fluke 5500A Multiproduct Calibrator
	(10 to 20) Hz	2.5 mA/A + 0.15 µA	
	(20 to 45) Hz	1.3 mA/A + 0.15 µA	
	45 Hz to 1 kHz	1.3 mA/A + 0.25 µA	
	(1 to 5) kHz	4 mA/A + 0.15 µA	
	(5 to 10) kHz	12.5 mA/A + 0.15 µA	
	(0.33 to 3.3) mA		
	(10 to 20) Hz	2 mA/A + 0.3 µA	
	(20 to 45) Hz	1 mA/A + 0.3 µA	
	45 Hz to 1 kHz	1 mA/A + 0.3 µA	
	(1 to 5) kHz	2 mA/A + 0.3 µA	
	(5 to 10) kHz	6 mA/A + 0.3 µA	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	(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 (45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	 2 mA/A + 3 µA 1 mA/A + 3 µA 0.9 mA/A + 3 µA 2 mA/A + 3 µA 6 mA/A + 3 µA 2 mA/A + 20 µA 1 mA/A + 20 µA 900 µA/A + 20 µA 2 mA/A + 50 µA 6 mA/A + 0.1 mA 2 mA/A + 0.3 mA 1 mA/A + 0.3 mA 7.5 mA/A + 0.3 mA 0.6 mA/A + 2 mA 1 mA/A + 2 mA 3.3 mA/A + 2 mA	Comparison to Fluke 5500A Multiproduct Calibrator
DC Power – Source [1,2] 33 mV to 1 020 V	(3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 11) A	0.04 % of reading 0.03 % of reading 0.04 % of reading 0.03 % of reading 0.08 % of reading 0.06 % of reading 0.12 % of reading 0.09 % of reading	Comparison to Fluke 5500A Multiproduct Calibrator
AC Power – Source [1,2] (45 to 65) Hz PF = 1	(3.3 to 9) mA (33 to 330) mV (0.33 to 1 020) V (9 to 33) mA (33 to 330) mV (0.33 to 1 020) V (33 to 90) mA (33 to 330) mV (0.33 to 1 020) V (90 to 330) mA (33 to 330) mV (0.33 to 1 020) V	 0.4 % of reading 0.25 % of reading 0.25 % of reading 0.15 % of reading 0.35 % of reading 0.25 % of reading 0.25 % of reading 0.15 % of reading	Comparison to Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source [1,2] (45 to 65) Hz PF = 1	(330 to 900) mA (33 to 330) mV (0.33 to 1 020) V 900 mA to 1.5 A (33 to 330) mV (0.33 to 1 020) V (1.5 to 4.5) A (33 to 330) mV (0.33 to 1 020) V (4.5 to 11) A (33 to 330) mV (0.33 to 1 020) V	 0.35 % of reading 0.25 % of reading 0.25 % of reading 0.15 % of reading 0.35 % of reading 0.2 % of reading 0.25 % of reading 0.15 % of reading	Comparison to Fluke 5500A Multiproduct Calibrator
Resistance – Source [1]	Up to 11 Ω (11 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 110) kΩ (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	0.12 mΩ / Ω + 8 mΩ 0.12 mΩ / Ω + 15 mΩ 90 µΩ / Ω + 15 mΩ 90 µΩ / Ω + 60 mΩ 90 µΩ / Ω + 0.6 Ω 0.11 mΩ / Ω + 6 Ω 0.12 mΩ / Ω + 6 Ω 0.15 mΩ / Ω + 55 Ω 0.6 mΩ / Ω + 550 Ω 1 mΩ/Ω + 550 Ω 5 mΩ/Ω + 5.5 kΩ 5 mΩ/Ω + 16.5 kΩ	Comparison to Fluke 5500A Multiproduct Calibrator
Capacitance – Source [1] 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz 50 Hz to 1 kHz (50 to 400) Hz (50 to 400) Hz (50 to 200) Hz (50 to 100) Hz (50 to 100) Hz	 (0.33 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF (0.33 to 1.1) mF	 5 mF/F + 10 pF 2.5 mF/F + 0.1 nF 2.5 mF/F + 0.3 nF 2.5 mF/F + 1 nF 3.5 mF/F + 3 nF 3.5 mF/F + 10 nF 4 mF/F + 30 nF 5 mF/F + 0.1 µF 7 mF/F + 0.3 µF 10 mF/F + 0.3 µF	Comparison to Fluke 5500A 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	 0.44 °C 0.34 °C 0.3 °C 0.33 °C	Comparison to Fluke 5500A 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 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 Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C Type N (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C Type R (0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	 0.3 °C 0.26 °C 0.31 °C 0.5 °C 0.84 °C 0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C 0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C 0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C 0.37 °C 0.26 °C 0.17 °C 0.4 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C 0.57 °C 0.36 °C 0.34 °C 0.4 °C	Comparison to Fluke 5500A 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 S 0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C Type U (0 to 600) °C	 0.47 °C 0.36 °C 0.37 °C 0.46 °C 0.63 °C 0.25 °C 0.17 °C 0.15 °C 0.27 °C	Comparison to Fluke 5500A Multiproduct Calibrator
Electrical Simulation of RTD Indicating Devices – Source [1]	Pt 385, 100 Ω (-200 to -80) °C (-80 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 100) °C (100-to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C Pt 3926, 100 Ω (-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	 0.05 °C 0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.23 °C 0.25 °C 0.4 °C 0.5 °C 0.6 °C 0.7 °C 0.8 °C 0.9 °C 0.1 °C 0.23 °C 0.04 °C 0.04 °C 0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C	Comparison to Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source [1]	Pt 385, 200 Ω		Comparison to Fluke 5500A Multiproduct Calibrator
	(-200 to -80) °C	0.04 °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	0.12 °C	
	(300 to 400) °C	0.13 °C	
	(400 to 600) °C	0.14 °C	
	(600 to 630) °C	0.16 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.04 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.06 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.08 °C	
	(400 to 600) °C	0.09 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 1 kΩ		
	(-200 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	0.06 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 600) °C	0.07 °C	
	(600 to 630) °C	0.23 °C	
	Ni 385, 120 Ω		
	(-80 to 0) °C	0.08 °C	
	(0 to 100) °C	0.08 °C	
	(100 to 260) °C	0.14 °C	
	Cu 427, 10 Ω		
	(-100 to 260) °C	0.3 °C	
Oscilloscopes			Comparison to Fluke 5500A - SC300 Multiproduct Calibrator
Amplitude – DC			
into 50 Ω load	(0 to ± 2.2) V	0.25 % of reading + 0.1 mV	
into 1 MΩ load	(0 to ± 33) V	0.25 % of reading + 0.1 mV	
Amplitude – Square Wave			
into 50 Ω load	1.8 mVp-p to 2.2 Vp-p	0.25 % of reading + 0.1 mV	
into 1 MΩ load	1.8 mVp-p to 55 Vp-p	0.25 % of reading + 0.1 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes [3] Leveled Sine Wave - Amplitude	5 mVp-p to 5.5 Vp-p 50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz	 2 % of reading + 0.2 mV 3.5 % of reading + 0.3 mV 4 % of reading + 0.3 mV	Comparison to Fluke 5500A - SC300 Multiproduct Calibrator
Flatness	50 kHz to 100 MHz (100 to 300) MHz	1.5 % of reading + 0.1 mV 2 % of reading + 0.1 mV	
Time Marker	2 ns to 1 µs (2 to 50) µs 100 µs to 5 s	25 µs/s (25 + 15 000*t*) µs/s (25 + 1 000*t*) µs/s	
Edge-Rise Time	1 kHz to 1 MHz ≤ 2 ns (50 Ω, 1Vp-p)	 +0/-30 ps	
Sine Wave Flatness – Source	(-143 to 13) dBm 100 kHz to 1.04 GHz	 1 dB	Comparison to HP 8657A Signal Generator
Phase – Source [1]	(10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.4° 1.5° 5° 6° 10°	Comparison to Fluke 5500A Multiproduct Calibrator
Power Supplies, Welders [1] (DC and AC @ 60 Hz) Voltage	Up to 40 kV	1 % of reading	Comparison to Digital Multimeter with High Voltage Probe
Current	Up to 1 kA	1 % of reading	Current Shunts
ESD Mats and Tables [1,2]	10 V 100 kΩ to 100 MΩ/sq 100 V 10 MΩ to 1 TΩ/sq	 25 % of reading 25 % of reading	Comparison to OHM-STAT RT 1000

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Surface Plates [1,3] Overall Flatness Local Area Flatness (Repeat Readings)	Up to 204 in*DL* Up to 0.05 in	(11.3 + 0.3√DL) µin 12 µin	GGG-P-463c using Autocollimator Repeat-o-Meter
Bench Micrometers [1,3]	Up to 72 in	(9.4 + 5.2*L*) µin	Comparison to Grade 1 Gage Blocks, Optical Parallels, TESA Electronic Length Measuring Equipment
Linear Measuring Machines [1,3]	Up to 72 in	(9.4 + 5.2*L*) µin	Comparison to Grade 1 Gage Blocks, Optical Parallels, TESA Electronic Length Measuring Equipment
Optical Comparators Profile Projectors [1,3]	(5 to 60) in Screen X & Y Travel to 12 in	(76 + 2.2*L*) µin	Comparison to Glass Scales, Magnification Scales, Magnification Pins, Precision Balls
Indicators [1,3]	Up to 6 in	(12 + 1*L*) µin	Comparison to Calibration Tester, MAC-10 Calibrator, Grade 2 Gage Blocks, Surface Plate
Calipers [1,3]	Up to 80 in	(130 + 24*L*) µin	Comparison to Grade 2 Gage Blocks, Ring Gages, Surface Plate
Micrometers [1,3] O.D.& I.D Includes Depth, Point, Ball, Blade, V, Pitch Anvils Bore (Intramic) Mic Heads	Up to 60 in Up to 6 in Up to 2 in	(33 + 9.5*L*) µin 68 µin 61 µin	Comparisons to Grade 2 Gage Blocks, Ring Gages, Surface Plate, Optical Parallels, Ball Gages, Ring Gages, Heidenhain MT25 Linear Probe

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Cylindrical Squares, Steel Blade Magnetic Combination	(2 to 12) in	110 µin	Comparison to Surface Plate, Test Indicator, Angle Plate, Cylindrical Square
Levels, Digital Protractors, Inclinometers [3]	Up to 360°	0.33″	Comparison to Grade 2 Gage Blocks, Surface Plate, Sine Bar, Autocollimator, Angle Blocks
Optical Flats/Parallels Flatness Parallelism	 (1 to 6) in Up to 1 in	 2.2 µin 3.6 µin	 Comparison to 6 in Master Flat, Optical Vernier, Gage Block Comparator
Height Gages [3] Analog Digital	 Up to 60 in Up to 60 in	 290 µin (10 + 7*L*) µin	 Comparison to Grade 2 Gage Blocks, Surface Plate
Height Master [1] Riser Blocks Block Stacks	Up to 60 in 6 in and 12 in Up to 48 in	(10 + 7*L*) µin 21 µin (28 + 4.3*L*) µin	Comparison to Grade 2 Gage Blocks Surface Plate, Electronic Amplifier with Probe
Electronic Gage Dimensional Comparator [1]	Up to 6 in	7.8 µin	Comparison to Grade 2 Gage Blocks, Surface Plate
Toolmaker's Microscope, Video Scope [1]	X, Y, Z: Up to 12 in	(19 + 4.3*L*) µin	Comparison to Glass Scales, TESA Electronic Length Measuring Equipment
Glass Scales, Stage Micrometers, Steel Rules	(0.001 to 12) in	(16 + 2.7*L*) µin	Comparison to Mahr Measurement Machine, CCT Microscope
Autocollimator [3]	Up to 60′	0.21″	Comparison to Autocollimator Calibrator Optical Wedge

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rotary Table Dividing Heads Ultradex [1,3] Rotary Tilt	 (0 to 360)° (0 to 90)°	 0.5″ 1″	Comparison to Autocollimator, 12-Sided Polygon (30 °)
Coordinate Measuring Machines [1,3]	1D: Up to 72 in	(33 + 8.4*L*) µin	Comparison to Granite Square, Grade 2 Gage Blocks, Ball Bar
Thread Wires	Up to 1 in	7.6 µin	Mahr Measurement Machine, Master Wires, Gage Blocks
Ring Gages [3] Inside Diameter	(0.125 to 12) in	(16 + 2.9*L*) µin	Comparison to I.D. Comparator, Gage Blocks
Plug Gages [3] Outside Diameter	(0.005 to 8) in	(8.9 + 1.8*L*) µin	Comparison to Mahr Measurement Machine, Gage Blocks
Gear Wires	(0.005 to 1) in	7.6 µin	Bench Micrometer, Mahr Measurement Machine, Grade 2 Gage Blocks
Thread Ring Gages	Up to 1 in	51 µin	Tactile Fit using Master Thread Setting Plugs
Polygons [3]	Up to 360°	0.30″	Comparison to Autocollimator, Ultradex
Thread Plug Gages	Up to 10 in	12 µin	Comparison to Bench Micrometer, Mahr Measurement Machine, Grade 2 Gage Blocks, Grade A Thread Wire Set

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thread Ring Setting Master	Up to 10 in	12 µin	Comparison to Bench Micrometer, Mahr Measurement Machine, Wires, Grade 2 Gage Blocks
Calibration Testers	Up to 0.2 in	14 µin	Comparison to TESA Electronic Length Measuring Equipment, Grade 2 Gage Blocks, Heidenhain MT25 Linear Probe
Indicator Calibrators	Up to 2 in	14 µin	Comparison to TESA Electronic Length Measuring Equipment, Grade 2 Gage Blocks, Heidenhain MT50 Linear Probe
Gage Blocks [3]	(0.01 to 0.1) in (0.1001 to 4) in (5 to 20) in	(2.7 + 3.8L) µin (2.0 + 3.1L) µin (1.8 + 1.7L) µin	Comparison to TESA Electronic Length Measuring Equipment, Grades 1 and Grade 2 Gage Blocks
Crimp Tools	Up to 0.25 in	43 µin	Comparison to Pin Gages, Outside Micrometer
Repeat Reading Gages	Up to 0.025 in	15 µin	Comparison to Calibration Tester
Sunnen Gage Setting Fixtures [1]	Up to 4 in	58 µin	Comparison to Grade 2 Gage Blocks, Optical Parallels
Sunnen Gages [1]	(0.375 to 4) in	45 µin	Comparison to Ring Gages
Squares [3] (Granite and Ceramic)	(2 to 24) in	(18 + 1.9L) µin	Comparison to Autocollimator, Parallel Mirror, Surface Plate, Optical Square

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Straight Edges [3] (Granite and Ceramic)	(6 to 60) in	(15 + 2.3*L*) µin	Comparison to Autocollimator, Parallel Mirror, Surface Plate
Parallels [3] (Granite and Ceramic)	(6 to 60) in	(15 + 2.3*L*) µin	Comparison to Surface Plate, Electronic Amplifier with Probe
Penta Prism Optical Square [3]	90°	0.37″	Comparison to Autocollimator, Parallel Mirror, Surface Plate
Surface Roughness Gages [1]	Up to 120 µin	5.9 µin	Comparison to Roughness Specimens
Surface Roughness Specimens	Ra Up to 120 µin	3.1 µin	Comparison to Shef Surface Tester
Torque Ratio Arms/Wheels	(1 to 60) in	(23 + 9.8*L*) µin	Comparison to Surface Plate, Gage Blocks, Amp w/ Probe

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers [1]	HRA Low Middle High HRBW Low Middle High HRC Low Middle High	 1.2 HRA 1.1 HRA 1.1 HRA 1.5 HRBW 1.3 HRBW 1.2 HRBW 1.2 HRC 1.3 HRC 1.2 HRC	Indirect verification per ASTM E18 using Hardness Blocks.

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers [1]	HRE Low Middle High HRHW Low High HR15N Low Middle High HR30N Low Middle High HR45N Low Middle High HR15TW Low Middle High HR30TW Low Middle High HR45TW Low Middle High	 1.3 HRE 1.2 HRE 1.2 HRE 1.2 HRHW 1.2 HRHW 1.2 HR15N 1.1 HR15N 1.1 HR15N 1.2 HR30N 1.2 HR30N 1.3 HR30N 1.2 HR45N 1.3 HR45N 1.1 HR45N 1.2 HR15TW 1.2 HR15TW 1.2 HR15TW 1.3 HR30TW 1.2 HR30TW 1.2 HR30TW 1.3 HR45TW 1.3 HR45TW 1.2 HR45TW	Indirect verification per ASTM E18 using Hardness Blocks.
Vickers Hardness Testers [1]	HV Up to 1 000 HV	6.7 HV	Indirect verification per ASTM E92 using Hardness Blocks.
Knoop Hardness Testers [1]	HK Up to 1 000 HV	10 HK	Indirect verification per ASTM E92 using Hardness Blocks.
Durometer/Shore Hardness Tester – Force Only [1] Type A, D, M	Up to 100 duro	0.72 duro	Partial Verification per ASTM D2240 using Gage Blocks and Digital Force Gage/Fixture.

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Gages [1]	Up to 100 g 100 to 500 g 500 g to 5 kg (5 to 25) kg	0.3 mg 1.8 mg 12.2 mg 0.19 g	Comparison to Class F Weights, Master Load Cells
Load Cells	Up to 500 lb (500 to 2 000) lb (2 000 to 10 000) lb	0.07 % of reading 0.06 % of reading + 0.5 lb 0.07 % of reading + 0.5 lb	Comparison to Class F Weights, Master Load Cells
Scales and Balances [1] (0.000 1 g resolution)	Up to 100 g	0.3 mg	OIML Class M1 weights and NIST HB 44 are utilized in the calibration of the weighing system.
Scales and Balances [1] (0.001 g resolution)	(100 to 500) g	1.8 mg	OIML Class M1 weights and NIST HB 44 are utilized in the calibration of the weighing system.
Scales and Balances [1] (0.01 g resolution)	500 g to 5 kg	13 mg	OIML Class M1 weights and NIST HB 44 are utilized in the calibration of the weighing system.
Scales and Balances [1] (0.1 g resolution)	(5 to 25) kg	0.19 g	OIML Class M1 weights and NIST HB 44 are utilized in the calibration of the weighing system.
Scales and Balances [1] (0.1 lb resolution)	Up to 500 lb	1.7 g	NIST Class F Weights and NIST HB 44 utilized in the calibration of the weighing system.
Mass Artifacts	Up to 100 g	0.22 mg	Comparison to OIML Class M1 Weights using HR-202 Balance
	(100 to 500) g	1.7 mg	Comparison to OIML Class M1 Weights using SETRA 500C Balance
	500 g to 5 kg	12 mg	Comparison to OIML Class M1 Weights using SETRA 5000C Balance

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Artifacts	(5 to 20) kg	0.13 g	Comparison to OIML Class M1 Weights using SETRA SUPER II Balance
Torque Tools [1]	0.1 ozf·in to 1 200 lbf·ft	1 % of reading	Comparison to Waters Torque Watch Calibrator, Digital Torque Calibrator, Load Cells
Torque Calibrators	0.1 ozf·in to 1 200 lbf·ft	0.5 % of reading	Comparison to Torque Arms, NIST Class F Weights
Pressure Gages [1]	Up to 500 psi Up to 5 000 psi Up to 10 000 psi	0.03 % of reading 0.1 % of reading 0.1 % of reading	Comparison to Fluke Master Pressure Gages, Omega DRO w/ Pressure Transducer
Vacuum Gages [1]	(-25 to 0) inHg	0.03 % of reading	Comparison to Fluke Master Pressure Gages, Omega DRO w/ Pressure Transducer

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Ovens, Environmental Chambers, Freezers, Temperature Baths [1]	(0 to 2 501) °F (0 to 100) °C	2.9 °F 0.22 °C	Comparison to Data Logger, Thermocouple Calibrator, Lab Thermometer
Temperature Controllers	(32 to 752) °F	0.43 °F	Comparison to Lab Oven Thermocouple Calibrator
Thermometers [1]	(0 to 400) °C	0.24 °C	Comparison to Fluke/Hart 1502, Indicator with PRT, Heat Source

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Infrared Thermometers [4]	({Ambient + 20} to 932) °F	0.83 % of reading + 5.2 °F	Comparison to Thermoworks IRK-2 & IRK-500 / Omega BB703 Black Body (flat plate) $\varepsilon = 0.99$, $\lambda = (8 \text{ to } 14)$ µm
Thermocouple Devices	Ambient to 1 000 °F Ambient to 538 °C	1.3 °F 0.73 °C	Comparison to Lab Oven, Thermocouple Calibrator, Hart Fluke 1502A Indicator with PRT, Temperature Bath, Fluke 5500 Multiproduct Calibrator
Humidity – Source [5] (Fixed Points) (relative to 25 °C)	33.07 %RH 54.38 %RH 75.47 %RH	2 % of reading 2 % of reading 3 % of reading	Comparison to Chamber with Thermohygrometer and Salt Solutions
Humidity – Measure [1]	(10 to 90) %RH	4 %RH	Comparison to Thermohygrometer

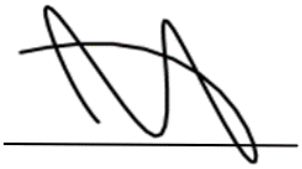
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Stopwatches & Timers [1]	Up to 48 hr	0.11 s	Comparison to Quartz Standard Stopwatch.
Photo Tachometers [3]	(60 to 99 999) rpm	0.003 6 % of reading + 1.2 rpm	Comparison to HP 34401A 6.5 Digit Multimeter, Wavetek 171 Signal Generator
Mechanical Tachometers [3]	(10 to 1 000) rpm (1000 to 6 000) rpm	0.05 % of reading + 2 rpm 0.05 % of reading + 1 rpm	Comparison to Digital Photo Tachometer.
Frequency – Source [1]	0.01 Hz to 1.2 kHz (1.2 to 10) kHz 10 kHz to 2 MHz	25 µHz/Hz + 1 mHz 25 µHz/Hz + 1 mHz 25 µHz/Hz + 15 mHz	Comparison to Fluke 5500A - SC300 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. Uncertainty is stated in % of reading in units of Watts (W).
3. t = time in seconds; L = length in inches; DL = diagonal length; $'$ = arc-minute; $''$ = arc-second; rpm = revolutions per minute.
4. Resolution of the Device Under Test will be included in the Measurement Uncertainty (MU) at the time of calibration.
5. The values present in the Range column are Nominal values. The actual setpoint value at the time of calibration will be reported with the tolerance and the associated Measurement Uncertainty (MU). The Nominal at 33.07 %RH can vary by ± 0.18 %RH; 54.38 %RH can vary by 0.23 %RH; and 75.47 %RH can vary by 0.14 %RH.
6. Unless otherwise specified in the far-right column, the calibration procedure/method was written internally.
7. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1376.



Jason Stine, Vice President