SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

ALDINGER COMPANY DBA PRECISION CALIBRATION SYSTEMS
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CALIBRATION

Valid To: May 31, 2025 Certificate Number: 1509.03

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 5]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meter[3]	4 pH 7 pH 10 pH	0.026 pH 0.026 pH 0.026 pH	Std buffer solution
Conductivity Meter[3]	10 µS/cm 100 µS/cm 1000 µS/cm	0.55 µS/cm 2.5 µS/cm 5.5 µS/cm	Std conductivity solution

II. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Micrometers[3]	Up to 60 in	(65 + 5.2*L*) µin	Gauge blocks, length standard
Caliper[3]	Up to 60 in	(290 + 5.2*L*) µin	Gauge blocks length standard

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Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Standard Length[3]	Up to 11.5 in	65 µin	Universal supermic P&W Labmaster™
Standard Diameter[3]	Up to 4 in	590 µin	Universal supermic P&W Labmaster™
Pin & Plug Gauges[3]	Up to 6 in	74 µin	Universal supermic P&W Labmaster™
Feeler Gauges[3]	Up to 0.2 in	28 µin	Universal supermic P&W Labmaster™
External Threads Major Diameter[3]	Up to 6 in	69 µin	Universal supermic P&W Labmaster™
External Threads Pitch Diameter[3]	Up to 6 in	111 µin	Universal supermic P&W Labmaster
Snap Gauges[3]	Up to 11.5 in	380 µin	Universal supermic P&W Labmaster™
Ring Gauges[3]	Up to 1 in (1 to 6) in (6 to 11) in	9.5 µin 14 µin 29 µin	Universal supermic P&W Labmaster™
Dimensional Measurement Inspection	X Axis: Up to 12 in Y Axis: Up to 8 in Z Axis: Up to 40 in	(60 + 11*L*) µin (130 + 5*L*) µin (69 + 0.5*L*) µin	Keyence vision system, Starrett vision system, 2D height gauge
Surface Finish – Measurement	(4 to 320) µin Ra	2.3 µin Ra	Profilometer
Surface Finish Equipment[3]	(4 to 320) µin Ra	2.1 µin Ra	Master finish standards

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Height Gages[3]	Up to 40 in	(69 + 0.51*L*) µin	Length standard, gage blocks
Dial/Digital Indicators[3]	Up to 4 in	11 µin	Universal supermic, P&W Labmaster™
Vision Machine[3] X/Y Axis[3] Z Axis[3]	 Up to 12 in Up to 8 in	 (110 + 10*L*) µin (80 + 35*L*) µin	 Gage blocks / glass masters
Gage Block	Up to 4 in (4 to 8) in	4.2 µin 6.8 µin	P&W Labmaster™
Thread Ring – Pitch Diameter Minor Diameter	 Up to 6 in Up to 6 in	 260 µin 120 µin	 Bore gage/pin gage/ universal supermic
NPT Thread Plug	Up to 6 in	490 µin	Master ring/height gage
Glass Scale	Up to 12 in	230 µin	Vision system
ULM[3]	Up to 4 in (4 to 12) in (12 to 24) in	9.5 µin 150 µin 500 µin	Gage blocks/length standards
Steel Rules[3]	Up to 72 in	0.0055 in	Master steel rule, reticle
Diameter of Sphere[3]	Up to 3 in	580 µin	Universal supermic P&W Labmaster™

Parameter/Equipment	Range	CMC[2] (±)	Comments
Optical Comparators[3] –			
X & Y Linearity[3]	Up to 20 in	0.0006 in	Glass master, gage blocks
Magnification[3]	5X to 100X	0.0006 in	Glass master, magnification glass scale, gage blocks
Stage Squareness[3]	Up to 12 in	0.000 14 in	Glass master, dial indicator
Angle Blocks & Angle Measurements	(1 to 90)°	0.002°	Standard angle blocks surface plate
Protractors[3]	(1 to 90)°	0.002°	Angle blocks, surface plate
Precision Levels	Up to 0.050 in Deviation	61 µin	Granite plate, precision level, gage blocks
Crimpers[3] –			
Crimp Height[3]	Up to 1 in	100 µin	Crimp micrometer
Crimp Die Diameter[3]	Up to 1 in	200 µin	Pin/plug sets
Coating Thickness Testers[3]	Up to 1560 µm	3.3 µm	Coating thickness standards
Tape Measures[3]	Up to 50 ft	0.0015 in	Tape measure, reticle, push-pull block

III. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC[2, 8] (±)	Comments
AC Current – Generate[3]			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.03 % rdg + 6.0 µA 0.15 % rdg + 1.0 µA 0.13 % rdg + 0.1 µA 0.3 % rdg + 0.20 µA 0.8 % rdg + 0.10 µA 1.6 % rdg + 0.50 µA	Fluke 5522A
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 30) kHz	0.20 % rdg + 17 µA 0.14 % rdg + 16 µA 0.11 % rdg + 15 µA 0.20 % rdg + 0.30 µA 0.90 % rdg + 0.60 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.20 % rdg + 5.0 µA 0.20 % rdg + 15 µA 0.12 % rdg + 15 µA 0.08 % rdg + 2.0 µA 0.19 % rdg + 3.0 µA 1.0 % rdg + 6.0 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.18 % rdg + 20 µA 0.50 % rdg + 50 µA 0.050 % rdg + 5.0 µA 0.10 % rdg + 50 µA 0.15 % rdg + 75 µA 0.40 % rdg + 500 µA	
330 mA to 1.1 A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.19 % rdg + 300 µA 0.050 % rdg + 200 µA 0.10 % rdg + 500 µA 3.0 % rdg + 2.0 mA	
(1.1 to 3) A	(10 to 45) Hz (0.45 to 1) kHz (1 to 10) kHz	0.18 % rdg + 100 µA 0.80 % rdg + 600 µA 0.80 % rdg + 1.0 mA	
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	1.8 % rdg + 5.0 mA 2.5 % rdg + 5.0 mA 3.0 % rdg + 5.0 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 5) kHz	1.0 % rdg + 500 mA 2.5 % rdg + 500 mA	

Parameter/Equipment	Frequency	CMC[2, 6, 8] (±)	Comments
AC Current – Generate[3] (cont)			
Clamp-on Only (20.5 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.80 % 0.99 %	Fluke 5522A with Fluke 50-turn coil
AC Voltage – Generate[3]			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.080 % + 6.0 µV 0.015 % + 6.0 µV 0.02 % + 6.0 µV 0.10 % + 6.0 µV 0.36 % + 12 µV 0.80 % + 50 µV	Fluke 5522A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.030 % + 8.0 µV 0.015 % + 8.0 µV 0.016 % + 8.0 µV 0.035 % + 8.0 µV 0.080 % + 32 µV 0.20 % + 70 µV	
(0.33 to 3.3) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.030 % + 50 µV 0.015 % + 60 µV 0.019 % + 60 µV 0.030 % + 50 µV 0.070 % + 130 µV 0.24 % + 600 µV	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.030 % + 650 µV 0.015 % + 600 µV 0.024 % + 600 µV 0.035 % + 600 µV 0.090 % + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.019 % + 2.0 mV 0.020 % + 6.0 mV 0.025 % + 6.0 mV 0.030 % + 6.0 mV 0.20 % + 6.0 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.030 % + 10 mV	

Parameter/Range	Frequency	CMC[2, 8] (±)	Comments
AC Current – Measure[3]			
(1 to 100) µA	29 Hz to 10 kHz	0.36 µA	Fluke 8846A
100 µA to 1 mA		0.0024 mA	
(1 to 10 mA)		0.024 mA	
(10 to 100) mA		0.24 mA	
(100 to 400) mA		0.84 mA	
400 mA to 1 A		0.0024 A	
(1 to 3) A		0.011 A	
(3 to 10) A		0.036 A	
(10 to 400) A	(50 to 400) Hz	7.0 A	Amprobe AMP-330
AC Voltage – Measure[3]			
Up to 100 mV	10 Hz to 300 kHz	0.16 mV	Fluke 8846A
100 mV to 1 V	10 Hz to 300 kHz	0.0015 V	
(1 to 10) V	10 Hz to 300 kHz	0.0017 V	
(10 to 100) V	10 Hz to 300 kHz	0.0015 V	
(100 to 1000) V	45 Hz to 100 kHz	1.5 V	
(10 to 20) kV	60 Hz	0.23 kV	Fluke 27 & high voltage probe
(1 to 10) kV	60 Hz	0.1 V + 0.34 %	Vitrek 4700

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
DC Current – Generate[3]	Up to 329.999 µA 329.999 µA to 3.299 99 mA (3.299 999 9 to 32.999 99) mA (32.999 99 to 329.9999) mA 329.999 mA to 1.099 99 A (1.1 to 2.999 99) A (2.999 99 to 10.9999) A (10.9999 to 20) A (20 to 1010) A	0.05 µA 0.33 µA 3.3 µA 36 µA 0.22 mA 1.7 mA 5.6 mA 36 mA 2.2 A	Fluke 5522A w/ 50 turn coil
DC Voltage – Generate[3]	Up to 330 mV 330 mV to 3.299 999 V (3.299 999 to 32.999 99) V (32.999 99 to 329.9999) V (329.9999 to 1020) V	22 µV 39 µV 0.4 mV 6.1 mV 20 mV	Fluke 5522A
Capacitance – Generate[3]	Up to 399.999 pF (0.4 to 10.999) nF 11 nF to 1.0999 µF (1.1 to 32.999) µF 33 µF to 1.0999 mF (1.1 to 32.999) mF (33 to 110) mF	0.02 nF 0.07 nF 0.01 µF 0.29 µF 0.02 mF 0.53 mF 2.6 mF	Fluke 5522A
Resistance – Generate[3]	Up to 10.999 Ω (11 to 32.999) Ω (32.999 to 109.999) Ω (109.999 to 329.999) Ω 330 Ω to 1.099 99 kΩ (1.1 to 3.299 99) kΩ (3.3 to 10.999) kΩ (11 to 32.999) kΩ (33 to 109.999) kΩ (110 to 329.999) kΩ 330 kΩ to 1.0999 MΩ (1.1 to 3.2999) MΩ (3.3 to 10.9999) MΩ (11 to 32.999) MΩ (33 to 109.999) MΩ (110 to 329.999) MΩ (330 to 1100) MΩ	1.1 mΩ 1.9 mΩ 2 mΩ 9.5 mΩ 0.04 Ω 0.1 Ω 0.3 Ω 1 Ω 3.4 Ω 11 Ω 0.1 kΩ 0.2 kΩ 1.4 kΩ 8.7 kΩ 56 kΩ 1 MΩ 17 MΩ	Fluke 5522A

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature Calibration, Indication, & Control Equipment Used With RTD – (Electrical Simulation)[3]			
Cu 42 710 Ω[3]	(-100 to 260) °C	0.32 °C	Fluke 5502A
PT 385 100 Ω[3]	(-200 to 300) °C (300 to 630) °C (630 to 800) °C	0.15 °C 0.18 °C 0.26 °C	
PT 385 200 Ω[3]	(-200 to 100) °C (100 to 630) °C	0.12 °C 0.20 °C	
PT 385 500 Ω[3]	(-200 to 100) °C (100 to 630) °C	0.13 °C 0.16 °C	
PT 3 851 000 Ω[3]	(-200 to 100) °C (100 to 630) °C	0.12 °C 0.26 °C	
PT 3 916 100 Ω	(-200 to 100) °C (100 to 630) °C	0.28 °C 0.27 °C	
PT 3 926 100 Ω	(-200 to 100) °C (100 to 630) °C	0.14 °C 0.18 °C	
PtNi 385 120 Ω	(-80 to 100) °C (100 to 260) °C	0.14 °C 0.18 °C	
Temperature – Instruments (Electrical Simulation) – Thermocouple Devices[3]			
Type B	(600 to 1000) °C (1000 to 1820) °C	0.45 °C 0.35 °C	Fluke 5502A
Type E	(-250 to -25) °C (-25 to 1000) °C	0.51 °C 0.24 °C	
Type J	(-210 to -30) °C (-30 to 1200) °C	0.34 °C 0.29 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature – Instruments (Electrical Simulation) – Thermocouple Devices[3] (cont)			
Type K	(-200 to 120) °C (120 to 1372) °C	0.35 °C 0.42 °C	Fluke 5502A
Type N	(-200 to 120) °C (120 to 1300) °C	0.42 °C 0.29 °C	
Type R	(0 to 400) °C (400 to 1767) °C	0.58 °C 0.42 °C	
Type S	(0 to 1000) °C (1000 to 1767) °C	0.62 °C 0.48 °C	
Type T	(-250 to 0) °C Up to 400 °C	0.64 °C 0.18 °C	
Type U	(-250 to 0) °C Up to 600 °C	0.29 °C 0.31 °C	
DC Current – Measure[3]	(1 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA (100 to 400) mA 400 mA to 1 A (1 to 3) A (3 to 10) A	0.12 µA 0.001 mA 0.013 mA 0.11 mA 0.42 mA 0.0012 A 0.0066 A 0.031 A	Fluke 8846A
	(10 to 400) A	8.4 A	Amprobe AMP-330
DC Voltage – Measure[3]	(0.01 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.011 mV 0.58 mV 0.000 48 V 0.0082 V 0.092 V	Fluke 8846A
	(1 to 6) kV (10 to 20) kV	0.095 kV 0.24 kV	Fluke 27 & high voltage probe
	(1 to 10) kV	0.03 V + 0.23 % of rdg	Vitrek 4700 & high voltage probe

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Capacitance – Measure[3]	1 nF 10 nF 100 nF 1 µF 10 µF 100 µF 1 mF 10 mF 100 mF	0.065 nF 0.028 nF 2.5 nF 0.025 µF 0.25 µF 2.5 µF 0.025 mF 0.25 mF 8.2 mF	Fluke 8846A
Resistance – Measure[3] Equipment to Source	Up 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 to 1000) MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ Up to 1000 Ω	4 mΩ 14 mΩ 0.11 Ω 1.1 Ω 11 Ω 110 Ω 4.2 kΩ 9.1 kΩ 20 MΩ 0.02 MΩ 0.16 MΩ 0.001 GΩ 0.08 GΩ 16 µΩ/Ω + 0.000 18 Ω	Fluke 8846A Megger insulation resistance standard Transfer standard, fixed resistors, Fluke multimeter

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Liquid Flow Meter (Field Only)[3]	Up to 200 GPM (200 to 400) GPM (400 to 500) GPM	0.45 % 0.68 % 0.87 %	Fuji portaflow FSC3 Fuji portaflow
Liquid Flow Meter[3]	Up to 30 GPM (31 to 200) GPM Up to 6 kg/sec	0.12 % 0.15 % 0.09 %	Coriolis flow meter Balance

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
POVA (Piston/Plunger Operated Volumetric Apparatus)[3] –	(0.1 to 20) µL (20 to 200) µL (200 to 1000) µL (1000 to 10 000) µL (10 000 to 20 000) µL	0.16 µL 0.22 µL 0.53 µL 5 µL 11 µL	Micro balance
Including But Not Limited To: Pipettes, Syringes, Dispensers, & Burettes	(10 to 100) mL	(0.58 % + 0.3) mL	Balance
Graduated Cylinder/Flask/Beaker3	Up to 50 mL (50 to 6000) mL	12 µL 64 µL	Micro balance Balance
Viscometers[3]	Up to 10 000 cP	2.5 %	Viscosity reference standards
Anemometers	(445 to 2680) fpm	1.5 %	Kanomax reference anemometer / wind tunnel
	(452 to 2800) fpm	3.6 %	Differential pressure transducer, wind tunnel, pitot tube

V. Mechanical

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Force Gauges[3]	(1 to 220) lbf	0.3 %	Calibrated weights
Load Cells, Load Stands & Tension/Compression Testers[3]	(1 to 220) lbf	0.23 %	Calibrated weights
	(220 to 1000) lbf	0.11 %	Futek LSB350 load cell w/ IHH500 indicator
	(1000 to 5000) lbf	0.12 %	Futek LSB453 load cell w/ IHH500 indicator
	(5000 to 20 000) lbf	0.39 %	TT-SWO-20K load cell w/ IHH500 indicator
	(20 000 to 50 000) lbf	0.26 %	Futek 50K load cell
Compression[3]	(20 000 to 300 000) lbf	0.08 %	TT CLC-300K load cell w/ IHH500 indicator

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Load Cells[3]			
Tension & Compression	(500 to 25 000) lbf	0.025 %	Morehouse load cell w/ indicator
Compression Only	(28 200 to 500 000) lbf	0.032 %	Strainsense load cell w/ indicator
Scales[3]	Up to 100 lb (100 to 10 000) lb	0.08 lb 1.0 lb	ASTM Class 6 weights Class F weights
Analytical Balance	Up to 1 g (1 to 50) g (50 to 220) g 220 g to 1 kg (1 to 10) kg	34 µg 120 µg 570 µg 2.5 mg 60 mg	ASTM class 1 mass
Crimpers –			
Pull Force[3] Jaw Force[3]	Up to 500 lbf Up to 15 Tons	3.2 % 2.4 %	Force gauge
Mass – Fixed Points	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1000 g 2000 g 5000 g 10 000 g 20 000 g 22 679.62 g	2.2 µg 2.1 µg 2.9 µg 1.4 µg 1.5 µg 2.2 µg 1.6 µg 1.6 µg 2.1 µg 11 µg 3.3 µg 5.7 µg 7.2 µg 13 µg 11 µg 39 µg 140 µg 320 µg 390 µg 1.7 mg 2.6 mg 93 mg 94 mg 140 mg	Class 1 weights, mass comparator

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Pressure Gauge[3]	Up to 1 in H2O (1 to 10) in H2O	0.0016 in H2O 0.01 in H2O	Additel ADT760-LLP-DL
	Up to 1 psi	0.0017 psi	Fluke 744/700PD2
	(1 to 15) psi	0.0031 psi	Fluke 2700G-BG100K
	(15 to 300) psi	0.044 psi	Fluke 2700G-BG2M
	(300 to 1000) psi	0.2 psi	Fluke 2700G-BG7M
	(1000 to 10 000) psi	1.8 psi	Fluke 2700G-G70M
Absolute[3]	Up to 30 psia	0.012 psia	Pressure module, Fluke calibrator
Pressure Gauge	(10 to 10 000) psi	0.015 %	Deadweight tester
Vacuum Gauge[3]	(-14 to -1) psi	0.0033 psi	Fluke 744/700PV4
	(-1 to 0) psi	0.0013 psi	Fluke 744/700PD2
	(-10 to -1) in H_2O (-1 to 0) in H_2O	0.01 H_2O 0.0016 in H_20	Additel ADT760-LLP-DL
Indirect Verification of Rockwell Hardness Testers HRC[3]	(20 to 39) HRC (40 to 59) HRC (60 to 70) HRC	0.34 HRC 0.34 HRC 0.32 HRC	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HRB[3]	(50 to 59) HRB (60 to 79) HRB (80 to 89) HRB	0.33 HRB 0.34 HRB 0.33 HRB	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HRA[3]	(20 to 65) HRA (70 to 78) HRA (80 to 84) HRA	0.34 HRA 0.34 HRA 0.33 HRA	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HR15N[3]	(70 to 77) HR15N (78 to 88) HR15N (90 to 92) HR15N	0.36 HR15N 0.35 HR15N 0.35 HR15N	Hardness test block masters

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Indirect Verification of Rockwell Superficial Hardness Testers HR30N[3]	(40 to 59) HR30N (60 to 79) HR30N (80 to 90) HR30N	0.34 HR30N 0.33 HR30N 0.32 HR30N	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HR15TW[3]	(65 to 72) HR15TW (73 to 85) HR15TW (86 to 93) HR15TW	0.35 HR15TW 0.34 HR15TW 0.33 HR15TW	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HR30TW[3]	(43 to 56) HR30TW (57 to 69) HR30TW (70 to 83) HR30TW	0.37 HR30TW 0.34HR30TW 0.34 HR30TW	Hardness test block masters
Knoop Hardness Testers HK, (Indirect verification) [3]	(100 to 200) HK (300 to 400) HK (500 to 600) HK	6.3 HK 14 HK 14 HK	Hardness test block masters
Vickers Hardness Testers HV, (Indirect Verification) [3]	(200 to 400) HV (400 to 750) HV	9.9 HV 12 HV	Hardness test block masters
Brinell Hardness Testers HBW, (Indirect Verification) [3]	(200 to 650) HBW	22 HBW	Hardness test block masters Brinell scope
Durometers – Force Length	 Up to 100 Duros Up to 0.2 in	 0.6 Duros 0.000 24 in	 A&D balance, gage blocks Gage blocks, vision system
Torque Wrenches[3]	(0.25 to 20) in·lb (1.5 to 29) ft·lb (29 to 1100) ft·lb	1.5 % 1.2 % 1.1 %	Torque transducers Norbar pro-test 40 Norbar pro-test 1500 ER
Torque Testers[3]	Up to 500 lbf Up to 150 in/lbf Up to 750 lbf	0.6 % 0.084 % 0.044 %	Stainless steel hanging weight set, lever arm Torque arm, weights

Parameter/Equipment	Range	CMC[2, 6, 7] (±)	Comments
Rate of Rotation – Measurement Equipment[3]			
Contact[3]	(10 to 3800) RPM	0.017 %	Monarch optical tach
Non-Contact[3]	(5 to 99 999) RPM	0.012 %	Monarch strobe
Rate of Rotation – Measure[3]	(1 to 99 999) RPM	0.005 %	Monarch optical tach

VI. Optical

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Spectrophotometer[3] –			
Photometric Accuracy[3]	(200 to 700) nm	0.0025 abs %	Neutral density filter, holmium oxide filter
Wavelength Accuracy[3]	(240 to 640) nm	0.25 nm	
Measuring Microscope[3]	(0.01 to 1) mm	8.9 µm	Glass scale, gage blocks
Light Meters/ Light Booth[3]	(400 nm to 700 nm)/ (0.01 to 50 000) Lux	4.8 %	ILT2400 light meter, broadband sensor
UVA Light/ UVA Light Booth[3]	365 nm	5.2 %	ILT2400 / UVA sensor

VII. Thermodynamic

Parameter/Equipment	Range	CMC[2, 6, 7] (±)	Comments
Temperature Measuring Equipment – Infrared Thermometers[3]	(25 to 500) °C	2.2 °C	Black body calibrator, Fluke 744 w/ probe
Thermohygrometers – Humidity (% RH) [3]	(20 to 95) % RH (10 to 95) % RH	2.5 % RH 1.8 % RH	Incubator, thermohygrometer Vaisala thermohygrometer
Thermohygrometers – Temperature[3]	(5 to 60) °C (5 to 60) °C	2.5 °C 0.15 °C	Incubator, thermohygrometer Vaisala thermohygromete
Temperature – Measuring Equipment[3]	(-90 to 40) °C (40 to 280) °C (280 to 420) °C (420 to 660) °C (-200 to 420) °C (400 to 1372) °C	0.08 °C 0.04 °C 0.16 °C 0.53 °C 0.04 °C 0.4 %	PTC-125 dry block calibrator, Hart 850 w/ PRT Hart bath 6022, Hart 850 w/ PRT 5614 probe Jofra PTC 660, Hart 850 w/ PRT 5614 probe Jofra PTC 660, Fluke 744, K thermocouple Hart 850 w/ PRT 5614 probe Fluke 744, K thermocouple

VIII. Time & Frequency

Parameter/Equipment	Range	CMC[2,6] (±)	Comments
Timers & Stopwatches[3]	(0.01 to 3600) s (3600 to 86 400) s	0.094 s 2.1 s	Naval atomic clock/ calibrated stopwatch
Frequency – Measure[3]	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz 300 kHz to 1 MHz	0.1 % 0.05 % 0.03 % 0.01 % 0.1 %	Fluke 8846A

SATELLITE

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CALIBRATION

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
pH Meter[3]	4 pH 7 pH 10 pH	0.026 pH 0.026 pH 0.026 pH	Std buffer solution
Conductivity Meter[3]	10 µS/cm 100 µS/cm 1000 µS/cm	0.55 µS/cm 2.5 µS/cm 5.5 µS/cm	Std conductivity solution

II. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Micrometers[3]	Up to 60 in	(65 + 5.2*L*) µin	Gauge blocks, length standard
Caliper[3]	Up to 60 in	(290 + 5.2*L*) µin	Gauge blocks length standard
Standard Length[3]	Up to 11.5 in	65 µin	Universal supermic P&W Labmaster™
Standard Diameter[3]	Up to 4 in	590 µin	Universal supermic P&W Labmaster™

Parameter/Equipment	Range	CMC[2, 4, 7](±)	Comments
Pin & Plug Gauges[3]	Up to 6 in	74 µin	Universal supermic P&W Labmaster™
Feeler Gauges[3]	Up to 0.2 in	28 µin	Universal supermic P&W Labmaster™
External Threads Major Diameter[3]	Up to 6 in	69 µin	Universal supermic P&W Labmaster™
External Threads Pitch Diameter[3]	Up to 6 in	110 µin	Universal supermic P&W Labmaster
Snap Gauges[3]	Up to 11.5 in	380 µin	Universal supermic P&W Labmaster™
Ring Gauges[3]	Up to 1 in (1 to 6) in (6 to 11) in	9.5 µin 14 µin 29 µin	Universal supermic P&W Labmaster™
Dimensional Measurement Inspection	X Axis: Up to 12 in Y Axis: Up to 8 in Z Axis: Up to 40 in	(60 + 11*L*) µin (130 + 5*L*) µin (69 + 0.5*L*) µin	Keyence vision system, Starrett vision system, 2D height gauge
Surface Finish Measurement	(4 to 320) µin Ra	2.3 µin Ra	Profilometer
Surface Finish Equipment[3]	(4 to 320) µin Ra	2.1 µin Ra	Master finish standards
Height Gages[3]	Up to 40 in	(69 + 0.51*L*) µin	Length standard, gage blocks
Dial/Digital Indicators[3]	Up to 4 in	11 µin	Universal supermic P&W Labmaster™

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Height Gages[3]	Up to 40 in	(69 + 0.51*L*) µin	Length standard, gage blocks
Dial/Digital Indicators[3]	Up to 4 in	11 µin	Universal supermic P&W Labmaster™
Vision Machine[3]			
X/Y Axis[3]	Up to 12 in	(110 + 10*L*) µin	Gage blocks / glass masters
Z Axis[3]	Up to 8 in	(80 + 35*L*) µin	
Gage Block	Up to 4 in (4 to 8) in	4.2 µin 6.8 µin	P&W Labmaster™
Thread Ring –			
Pitch Diameter	Up to 6 in	260 µin	Bore gage/pin gage/ universal supermic
Minor Diameter	Up to 6 in	120 µin	
NPT Thread Plug	Up to 6 in	490 µin	Master ring/height gage
Glass Scale	Up to 12 in	230 µin	Vision system
ULM[3]	Up to 4 in (4 to 12) in (12 to 24) in	9.5 µin 150 µin 500 µin	Gage blocks/length standards
Steel Rules[3]	Up to 72 in	0.0055 in	Master steel rule, reticle
Diameter of Sphere[3]	Up to 3 in	580 µin	Universal supermic P&W Labmaster™

Parameter/Equipment	Range	CMC[2] (±)	Comments
Optical Comparators[3] –			
X & Y Linearity[3]	Up to 20 in	0.0006 in	Glass master, gage blocks
Magnification[3]	5X to 100X	0.0006 in	Glass master, magnification glass scale, gage blocks
Stage Squareness[3]	Up to 12 in	0.000 14 in	Glass master, dial indicator
Angle Blocks, Angle Measurements & Protractors[3]	(1 to 90)°	0.002°	10 pc. standard angle blocks surface plate
Precision Levels	(1 to 90)°	0.002°	Granite plate, precision level, gage blocks
Crimpers[3] –			
Crimp Height[3]	Up to 1 in	100 µin	Crimp micrometer
Crimp Die Diameter[3]	Up to 1 in	200 µin	Pin/plug sets
Coating Thickness Testers[3]	Up to 1560 µm	3.3 µm	Coating thickness standards
Tape Measures[3]	Up to 50 ft	0.0015 in	Tape measure, reticle, push-pull block

III. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC[2, 8] (±)	Comments
AC Current – Generate[3]			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.03 % rdg + 6.0 µA 0.15 % rdg + 1.0 µA 0.13 % rdg + 0.1 µA 0.3 % rdg + 0.20 µA 0.8 % rdg + 0.10 µA 1.6 % rdg + 0.50 µA	Fluke 5522A
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 30) kHz	0.20 % rdg + 17 µA 0.14 % rdg + 16 µA 0.11 % rdg + 15 µA 0.20 % rdg + 0.30 µA 0.90 % rdg + 0.60 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.20 % rdg + 5.0 µA 0.20 % rdg + 15 µA 0.12 % rdg + 15 µA 0.08 % rdg + 2.0 µA 0.19 % rdg + 3.0 µA 1.0 % rdg + 6.0 µA	
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.18 % rdg + 20 µA 0.50 % rdg + 50 µA 0.050 % rdg + 5.0 µA 0.10 % rdg + 50 µA 0.15 % rdg + 75 µA 0.40 % rdg + 500 µA	
330 mA to 1.1 A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.19 % rdg + 300 µA 0.050 % rdg + 200 µA 0.10 % rdg + 500 µA 3.0 % rdg + 2.0 mA	
(1.1 to 3) A	(10 to 45) Hz (0.45 to 1) kHz (1 to 10) kHz	0.18 % rdg + 100 µA 0.80 % rdg + 600 µA 0.80 % rdg + 1.0 mA	
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	1.8 % rdg + 5.0 mA 2.5 % rdg + 5.0 mA 3.0 % rdg + 5.0 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 5) kHz	1.0 % rdg + 500 mA 2.5 % rdg + 500 mA	

Parameter/Range	Frequency	CMC[2, 6, 8] (±)	Comments
AC Current – Generate[3] (cont)			
Clamp-On Only (20.5 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.80 % 0.99 %	Fluke 5522A with Fluke 50-turn coil
AC Voltage – Generate[3]			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.080 % + 6.0 µV 0.015 % + 6.0 µV 0.02 % + 6.0 µV 0.10 % + 6.0 µV 0.36 % + 12 µV 0.80 % + 50 µV	Fluke 5522A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.030 % + 8.0 µV 0.015 % + 8.0 µV 0.016 % + 8.0 µV 0.035 % + 8.0 µV 0.080 % + 32 µV 0.20 % + 70 µV	
(0.33 to 3.3) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.030 % + 50 µV 0.015 % + 60 µV 0.019 % + 60 µV 0.030 % + 50 µV 0.070 % + 130 µV 0.24 % + 600 µV	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.030 % + 650 µV 0.015 % + 600 µV 0.024 % + 600 µV 0.035 % + 600 µV 0.090 % + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.019 % + 2.0 mV 0.020 % + 6.0 mV 0.025 % + 6.0 mV 0.030 % + 6.0 mV 0.20 % + 6.0 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.030 % + 10 mV	

Parameter/Range	Frequency	CMC[2, 8] (±)	Comments
AC Current – Measure[3]			
(1 to 100) µA	29 Hz to 10 kHz	0.36 µA	Fluke 8846A
100 µA to 1 mA		0.0024 mA	
(1 to 10 mA)		0.024 mA	
(10 to 100) mA		0.24 mA	
(100 to 400) mA		0.84 mA	
400 mA to 1 A		0.0024 A	
(1 to 3) A		0.011 A	
(3 to 10) A		0.036 A	
(10 to 400) A	(50 to 400) Hz	7.0 A	Amprobe AMP-330
AC Voltage – Measure[3]			
Up to 100 mV	10 Hz to 300 kHz	0.16 mV	Fluke 8846A
100 mV to 1 V	10 Hz to 300 kHz	0.0015 V	
(1 to 10) V	10 Hz to 300 kHz	0.0017 V	
(10 to 100) V	10 Hz to 300 kHz	0.0015 V	
(100 to 1000) V	45 Hz to 100 kHz	1.5 V	
(10 to 20) kV	60 Hz	0.23 kV	Fluke 27 & high voltage probe
(1 to 10) kV	60 Hz	0.1 V + 0.34 %	Vitrek 4700

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
DC Current – Generate[3]	Up to 329.999 µA 329.999 µA to 3.299 99 mA (3.299 999 9 to 32.999 99) mA (32.999 99 to 329.9999) mA 329.999 mA to 1.099 99 A (1.1 to 2.999 99) A (2.999 99 to 10.9999) A (10.9999 to 20) A (20 to 1010) A	0.05 µA 0.33 µA 3.3 µA 36 µA 0.22 mA 1.7 mA 5.6 mA 36 mA 2.2 A	Fluke 5522A w/ 50 turn coil
DC Voltage – Generate[3]	Up to 330 mV 330 mV to 3.299 999 V (3.299 999 to 32.999 99) V (32.999 99 to 329.9999) V (329.9999 to 1020) V	22 µV 39 µV 0.4 mV 6.1 mV 20 mV	Fluke 5522A
Capacitance – Generate[3]	Up to 399.999 pF (0.4 to 10.999) nF 11 nF to 1.0999 µF (1.1 to 32.999) µF 33 µF to 1.0999 mF (1.1 to 32.999) mF (33 to 110) mF	0.02 nF 0.07 nF 0.01 µF 0.29 µF 0.02 mF 0.53 mF 2.6 mF	Fluke 5522A
Resistance – Generate[3]	Up to 10.999 Ω (11 to 32.999) Ω (32.999 to 109.999) Ω (109.999 to 329.999) Ω 330 Ω to 1.099 99 kΩ (1.1 to 3.299 99) kΩ (3.3 to 10.999) kΩ (11 to 32.999) kΩ (33 to 109.999) kΩ (110 to 329.999) kΩ 330 kΩ to 1.0999 MΩ (1.1 to 3.2999) MΩ (3.3 to 10.9999) MΩ (11 to 32.999) MΩ (33 to 109.999) MΩ (110 to 329.999) MΩ (330 to 1100) MΩ	1.1 mΩ 1.9 mΩ 2 mΩ 9.5 mΩ 0.04 Ω 0.1 Ω 0.3 Ω 1 Ω 3.4 Ω 11 Ω 0.1 kΩ 0.2 kΩ 1.4 kΩ 8.7 kΩ 56 kΩ 1 MΩ 17 MΩ	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Temperature Calibration, Indication, & Control Equipment Used With RTD – (Electrical Simulation)[3] (cont)			
Cu 42 710 Ω[3]	(-100 to 260) °C	0.32 °C	]Fluke 5502A
PT 385 100 Ω[3]	(-200 to 300) °C (300 to 630) °C (630 to 800) °C	0.15 °C 0.18 °C 0.26 °C	
PT 385 200 Ω[3]	(-200 to 100) °C (100 to 630) °C	0.12 °C 0.20 °C	
PT 385 500 Ω[3]	(-200 to 100) °C (100 to 630) °C	0.13 °C 0.16 °C	
PT 3 851 000 Ω[3]	(-200 to 100) °C	0.12 °C 0.26 °C	
PT 3 916 100 Ω	(-200 to 100) °C (100 to 630) °C	0.28 °C 0.27 °C	
PT 3 926 100 Ω	(-200 to 100) °C (100 to 630) °C	0.14 °C 0.18 °C	
PtNi 385 120 Ω	(-80 to 100) °C (100 to 260) °C	0.14 °C 0.18 °C	
Temperature – Instruments (Electrical Simulation) – Thermocouple Devices[3]			
Type B	(600 to 1000) °C (1000 to 1820) °C	0.45 °C 0.35 °C	Fluke 5502A
Type E	(-250 to -25) °C (-25 to 1000) °C	0.51 °C 0.24 °C	
Type J	(-210 to -30) °C (-30 to 1200) °C	0.34 °C 0.29 °C	
Type K	(-200 to 120) °C (120 to 1372) °C	0.35 °C 0.42 °C	
Type N	(-200 to 120) °C (120 to 1300) °C	0.42 °C 0.29 °C	

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Temperature – Instruments (Electrical Simulation) – Thermocouple Devices[3] (cont)			
Type R	(0 to 400) °C (400 to 1767) °C	0.58 °C 0.42 °C	Fluke 5502A
Type S	(0 to 1000) °C (1000 to 1767) °C	0.62 °C 0.48 °C	
Type T	(-250 to 0) °C Up to 400 °C	0.64 °C 0.18 °C	
Type U	(-250 to 0) °C Up to 600 °C	0.29 °C 0.31 °C	
DC Current – Measure[3]	(1 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA (100 to 400) mA 400 mA to 1 A (1 to 3) A (3 to 10) A	0.12 µA 0.001 mA 0.013 mA 0.11 mA 0.42 mA 0.0012 A 0.0066 A 0.031 A	Fluke 8846A
	(10 to 400) A	8.4 A	Amprobe AMP-330
DC Voltage – Measure[3]	(0.01 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	0.011 mV 0.58 mV 0.000 48 V 0.0082 V 0.092 V	Fluke 8846A
	(1 to 6) kV (10 to 20) kV	0.095 kV 0.24 kV	Fluke 27 & high voltage probe
	(1 to 10) kV	0.03 V + 0.23 % of rdg	Vitrek 4700 & high voltage probe

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Capacitance – Measure[3]	1 nF 10 nF 100 nF 1 µF 10 µF 100 µF 1 mF 10 mF 100 mF	0.065 nF 0.028 nF 2.5 nF 0.025 µF 0.25 µF 2.5 µF 0.025 mF 0.25 mF 8.2 mF	Fluke 8846A
Resistance – Measure[3] Equipment to Source	Up 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 to 1000) MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ Up to 1000 Ω	4 mΩ 14 mΩ 0.11 Ω 1.1 Ω 11 Ω 110 Ω 4.2 kΩ 9.1 kΩ 20 MΩ 0.02 MΩ 0.16 MΩ 0.001 GΩ 0.08 GΩ 16 µΩ/Ω + 0.000 18 Ω	Fluke 8846A Megger insulation resistance standard Transfer standard, fixed resistors, Fluke multimeter

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Liquid Flow Meter (Field Only)	Up to 30 GPM (31 to 200) GPM Up to 6 kg/sec	0.45 % 0.68 % 0.87 %	Fuji portaflow FSC3 Fuji portaflow
Liquid Flow Meter[3]	Up to 30 GPM (31 to 200) GPM Up to 6000 grams	0.12 % 0.15 % 0.09 %	Coriolis Flow Meter Balance
POVA (Piston/Plunger Operated Volumetric Apparatus)3 – Including But Not Limited To: Pipettes, Syringes, Dispensers, & Burettes	(0.1 to 20) µL (20 to 200) µL (200 to 1000) µL (1000 to 10 000) µL (10 000 to 20 000) µL (10 to 100) mL	0.16 µL 0.22 µL 0.53 µL 5 µL 11 µL (0.58 % + 0.3) mL	Micro balance Balance
Graduated Cylinder/Flask/Beaker3	Up to 50 mL (50 to 6000) mL	12 µL 64 µL	Micro balance Balance
Viscometers[3]	Up to 10 000 cP	2.5 %	Viscosity reference standards
Anemometers	(445 to 2680) fpm (452 to 2800) fpm	1.5 % 1.4 %	Kanomax reference anemometer / wind tunnel Differential pressure transducer, wind tunnel, pitot tube

V. Mechanical

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Force Gauges[3]	(1 to 220) lbf	0.3 %	Calibrated weights
Load Cells, Load Stands & Tension/Compression Testers[3]	(1 to 220) lbf	0.23 %	Calibrated weights
	(220 to 1000) lbf	0.11 %	Futek LSB350 load cell w/ IHH500 indicator
	(1000 to 5000) lbf	0.12 %	Futek LSB453 load cell w/ IHH500 indicator
	(5000 to 20 000) lbf	0.39 %	TT-SWO-20K load cell w/ IHH500 indicator
	(20 000 to 50 000) lbf	0.26 %	Futek 50K load cell
Compression[3]	(20 000 to 300 000) lbf	0.08 %	TT CLC-300K load cell w/ IHH500 indicator
Load Cells[3]			
Tension & Compression	(500 to 25 000) lbf	0.025 %	Morehouse load cell w/ indicator
Compression Only	(28 200 to 500 000) lbf	0.032 %	Strainsense load cell w/ indicator
Scales[3]	Up to 100 lb (100 to 10 000) lb	0.08 lb 1.0 lb	ASTM Class 6 weights Class F weights

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Analytical Balance	Up to 1 g (1 to 50) g (50 to 220) g 220 g to 1 kg (1 to 10) kg	8 µg 20 µg 70 µg 0.58 mg 60 mg	ASTM class 1 mass
Crimpers – Pull Force[3] Jaw Force[3]	 Up to 500 lbf Up to 15 Tons	 3.2 % 2.4 %	 Force gauge
Mass – Fixed Points	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1000 g 2000 g 5000 g 10 000 g 20 000 g 22 679.62 g	2.2 µg 2.1 µg 2.9 µg 1.4 µg 1.5 µg 2.2 µg 1.6 µg 1.6 µg 2.1 µg 11 µg 3.3 µg 5.7 µg 7.2 µg 13 µg 11 µg 39 µg 140 µg 320 µg 390 µg 1.7 mg 2.6 mg 93 mg 94 mg 140 mg	Class 1 weights, mass comparator
Pressure Gauge[3]	Up to 1 in H2O (1 to 10) in H2O Up to 1 psi (1 to 15) psi (15 to 300) psi (300 to 1000) psi	0.0016 in H2O 0.01 in H2O 0.0017 psi 0.0031 psi 0.044 psi 0.2 psi	Additel ADT760-LLP-DL Fluke 744/700PD2 Fluke 2700G-BG100K Fluke 2700G-BG2M Fluke 2700G-BG7M

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Pressure Gauge[3] (cont)			
	(1000 to 10 000) psi	1.8 psi	Fluke 2700G-G70M
Absolute[3]	Up to 30 psia	0.012 psia	Pressure module, Fluke calibrator
Pressure Gauge	(10 to 10 000) psi	0.015 %	Deadweight tester
Vacuum Gauge[3]	(-14 to -1) psi	0.0033 psi	Fluke 744/700PV4
	(-1 to 0) psi	0.0013 psi	Fluke 744/700PD2
	(-10 to -1) in H2O (-1 to 0) in H2O	0.02 H_2O 0.0016 in H_20	Additel ADT760-LLP-DL
Indirect Verification of Rockwell Hardness Testers HRC[3]	(20 to 39) HRC (40 to 59) HRC (60 to 70) HRC	0.34 HRC 0.34 HRC 0.32 HRC	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HRB[3]	(50 to 59) HRB (60 to 79) HRB (80 to 89) HRB	0.33 HRB 0.34 HRB 0.33 HRB	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HRA[3]	(20 to 65) HRA (70 to 78) HRA (80 to 84) HRA	0.34 HRA 0.34 HRA 0.33 HRA	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HR15N[3]	(70 to 77) HR15N (78 to 88) HR15N (90 to 92) HR15N	0.36 HR15N 0.35 HR15N 0.35 HR15N	Hardness test block masters
Indirect Verification of Rockwell Superficial Hardness Testers HR30N[3]	(40 to 59) HR30N (60 to 79) HR30N (80 to 90) HR30N	0.34 HR30N 0.33 HR30N 0.32 HR30N	Hardness test block masters
Indirect Verification of Rockwell Hardness Testers HR15TW[3]	(65 to 72) HR15TW (73 to 85) HR15TW (86 to 93) HR15TW	0.35 HR15TW 0.34 HR15TW 0.33 HR15TW	Hardness test block masters

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Indirect Verification of Rockwell Hardness Testers HR30TW[3]	(43 to 56) HR30TW (57 to 69) HR30TW (70 to 83) HR30TW	0.37 HR30TW 0.34HR30TW 0.34 HR30TW	Hardness test block masters
Knoop Hardness Testers HK (Indirect Verification)[3]	(100 to 200) HK (300 to 400) HK (500 to 600) HK	6.3 HK 14 HK 14 HK	Hardness test block masters
Vickers Hardness Testers HV (Indirect Verification)[3]	(200 to 400) HV (400 to 750) HV	9.9 HV 12 HV	Hardness test block masters
Brinell Hardness Testers HBW (Indirect Verification) [3]	(200 to 650) HBW	22 HBW	Hardness test block masters Brinell scope
Durometers –			
Force	Up to 100 Duros	0.6 Duros	A&D balance, gage blocks
Length	Up to 0.2 in	0.000 24 in	Gage blocks, vision system
Torque Wrenches[3]	(0.25 to 20) in·lb	1.5 %	Torque transducers
	(1.5 to 29) ft·lb	1.2 %	Norbar pro-test 40
	(29 to 1100) ft·lb	1.1 %	Norbar pro-test 1500 ER
Torque Testers[3]	Up to 500 lbf	0.6 %	Stainless steel hanging weight set, lever arm
	Up to 150 in/lbf Up to 750 lbf	0.084 % 0.044 %	Torque arm, weights
Rate of Rotation – Measurement Equipment[3]			
Contact[3]	(10 to 3800) RPM	0.017 %	Monarch optical tach
Non-Contact[3]	(5 to 99 999) RPM	0.012 %	Monarch strobe
Rate of Rotation – Measure[3]	(1 to 99 999) RPM	0.005 %	Monarch optical tach

VI. Optical

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Spectrophotometer[3] –			
Photometric Accuracy[3]	(200 to 700) nm	0.0025 abs %	Neutral density filter holmium oxide filter
Wavelength Accuracy[3]	(240 to 640) nm	0.25 nm	
Measuring Microscope[3]	(0.01 to 1) mm	8.9 µm	Glass scale, gage blocks
Light Meters/ VIS Light Booth[3]	(400 nm to 700 nm)/ (0.003 to 500 000) Lux	4.8 %	ILT2400 light meter, broadband sensor
UVA Light/ UVA Light Booth[3]	(315 nm to 390 nm)/ (2.0 E-1 to 2.0 E-8) W/cm^2	5.2 %	ILT2400 / UVA sensor

VII. Thermodynamic

Parameter/Equipment	Range	CMC[2, 6, 7] (±)	Comments
Temperature Measuring Equipment – Infrared Thermometers[3]	(25 to 500) °C	2.2 °C	Black body calibrator, Fluke 744 w/ probe
Thermohygrometers – Humidity (%RH) [3]	(20 to 95) % RH	2.5 % RH	Incubator, thermohygrometer
	(10 to 95) % RH	1.8 % RH	Vaisala thermohygrometer
Thermohygrometers – Temperature[3]	(5 to 60) °C	2.5 °C	Incubator, thermohygrometer
	(5 to 60) °C	0.15 °C	Vaisala thermohygromete

Parameter/Equipment	Range	CMC[2, 6, 7] (±)	Comments
Temperature – Measuring Equipment[3]	(-90 to 40) °C	0.08 °C	PTC-125 dry block calibrator, Hart 850 w/ PRT
	(40 to 280) °C	0.04 °C	Hart bath 6022, Hart 850 w/ PRT 5614 probe
	(280 to 420) °C	0.16 °C	Jofra PTC 660, Hart 850 w/ PRT 5614 probe
	(420 to 660) °C	0.53 °C	Jofra PTC 660, Fluke 744, K thermocouple
	(-200 to 420) °C	0.04 °C	Hart 850 w/ PRT 5614 probe
	(400 °C to 1372) °C	1.3 °C	Fluke 744, K thermocouple

VIII. Time & Frequency

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Timers & Stopwatches[3]	(0.01 to 3600) s (3600 to 86 400) s	0.094 s 2.1 s	Naval atomic clock/ calibrated stopwatch
Frequency – Measure[3]	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz 300 kHz to 1 MHz	0.1 % 0.05 % 0.03 % 0.01 % 0.1 %	Fluke 8846A

[1] This laboratory offers commercial calibration service and field calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

[4] In the statement of CMC, *L* is length measured in inches.

[5] This scope meets A2LA's *P112 Flexible Scope Policy*.

[6] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

[7] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter

[8] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

Accredited Laboratory

A2LA has accredited

ALDINGER COMPANY DBA PRECISION CALIBRATION SYSTEMS

Morristown, TN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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*).

Presented this 15th day of October 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1509.03
Valid to May 31, 2025
Revised April 3, 2025

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.