



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: December 31, 2022

Certificate Number: 1570.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 10}:

I. Chemical Quantities

Parameter/Equipment	Range	CMC ² (±)	Comments
pH Meter	(4, 7, 10) pH	0.04 pH	pH buffer solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 9} (±)	Comments
Gage Blocks	Up to 3.999 in (4 to 20) in	(1.4 + L) μin (1 + 0.86L) μin	Federal comparator & gage blocks
Micrometers ³	Up to 12 in (12 to 24) in (24 to 36) in	(130 + 0.9L) μin (32 + 9L) μin (240 + 5L) μin	Gage blocks GageMaker Mic-Trac
Calipers ³	Up to 12 in (12 to 24) in (24 to 36) in (36 to 80) in	(300 + 1.2L) μin (280 + 4L) μin (300 + 3.5L) μin (210 + 3L) μin	Gage blocks GageMaker Mic-Trac Renishaw laser
2D Height Gages ³	Up to 36 in	(130 + 1.0L) μin	Surface plate & reference bar

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Bore Gages ³	Up to 2.0 in	74 μin	Indi-Check
Ring Gage ³	(0.035 to 0.350) in (0.350 to 3) in (3 to 10) in	(14 + 38 <i>L</i>) μin (8.1 + 1.1 <i>L</i>) μin (4.2 + 2.4 <i>L</i>) μin	Zeiss ULM & setting masters
Thread Plugs – Major Diameter Pitch Diameter	Up to 12 in Up to 3.6 in (3.6 to 12) in	(8.4 + 1.8 <i>L</i>) μin 68 μin (51 + 1.5 <i>L</i>) μin	Zeiss ULM & gage blocks Zeiss ULM, thread wires & gage blocks (2 to 120) TPI & (0.2 to 10) mm
Tapered Thread Plugs – Pitch Diameter	Up to 8 in	(86 + 1.2 <i>L</i>) μin	Super mic, thread wires, tapered sine block & gage blocks
Optical Comparator ³ – Linear Scale (X) Linear Scale (Y) Squareness of Scales	Up to 12 in Up to 12 in Up to 12 in	150 μin 150 μin 110 μin	J&L glass master scale Scale & square
Cylindrical Plug/Disc	Up to 11 in	(8.4 + 1.8 <i>L</i>) μin	Zeiss ULM & gage blocks
Thread Wires	(0.003 to 0.25) in	11 μin	Zeiss ULM & master discs
Bench Micrometer ³	Up to 1 in	15 μin	Gage blocks
Dial Indicators ³	(0.001 to 1) in (1 to 4) in	82 μin 330 μin	Indi-Check Mic-Trac

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Digital Indicators ³	Up to 0.5 in (0.5 to 1) in (1 to 4) in	47 μin 52 μin 330 μin	Indi-Check Mic-Trac
Test Indicators ³	Up to 0.03 in (0.03 to 0.06) in	66 μin 220 μin	Indi-Check
Pin Gages ³	Up to 2 in	(41 + 5L) μin	Laser micrometer & master disks
Indicator Calibrator	Up to 1 in (1 to 2) in	6 μin 17 μin	Renishaw laser
Mic-Trac ³	Up to 12 in Up to 24 in Up to 36 in Up to 48 in Up to 60 in	55 μin 88 μin 170 μin 170 μin 96 μin	Renishaw laser
Datum Balls	Up to 2 in	12 μin	Zeiss ULM & gage blocks
Universal Measuring Machine ³	Up to 20 in	(2.1 + 1.8L) μin	Gage blocks
Linear Rule	Up to 80 in	120 μin	Renishaw laser
Tape Measure ³	Up to 16 ft	0.043 in	Master linear rule, surface plate & angle plate
Micrometer Standard ³	(1 to 72) in	(40 + 5L) μin	Renishaw laser & gage blocks
Surface Plate ³ – Flatness Only	Up to 12 in (12 to 180) in	120 μin 0.68L + 65 μin	Gage blocks, amplifier & surface plate Federal leveling system

Parameter/Equipment	Range	CMC ² (±)	Comments
Precision Squares ³	Up to 18 in	130 μin	Amplifier, granite surface plate
Precision Height Gage Standard			
Block Size & Parallelism	Up to 1 in	13 μin	Zeiss ULM, ring gage, amplifier & granite surface plate
Base Parallelism		77 μin	
Sine Plate ³	Up to 5 in	180 μin	Gage blocks, amplifier & surface plate
Federal Levels ³	± 1000 arc seconds	3.8 arc seconds	Gage blocks, sine plate, & granite surface plate
Thread Ring Pitch Diameter	Up to 8 in	100 μin	IAC Masterscanner
Thread Ring Minor Diameter	Up to 8 in	100 μin	IAC Masterscanner
Adjustable Thread Rings ⁸	Up to 12 in	(X Class Set Plug Tolerance)	Set using master plug gages. ASME/ANSI B1.2 & ASME/ANSI B1.3
Profilometer	(0 to 250) μin	5 μin	Master Mitutoyo surface finish unit
	16.1 μin 119.5 μin	5 μin	Master ref standards
Precision Reference Standards	(16 to 120) μin	5 μin	Master Mitutoyo surface finish unit
			Master ref standards

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
DC Voltage – Measure ³	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	1.8 μV 22 μV 110 μV 1.7 mV 31 mV	HP 3458A w/ opt 002
DC Voltage – Generate ³	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	0.0016 % + 0.000 81 mV 0.000 46 % + 0.021 mV 0.000 83 % + 0.067 mV 0.0014 % + 0.12 mV 0.0014 % + 1.9 mV	Fluke 5520A
DC Current – Measure ³	(10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.0041 μA 0.037 μA 0.38 μA 6.1 μA 0.16 mA	HP 3458A
DC Current – Generate ³	(0 to 330) μA 330 μA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20) A	0.012 % + 0.016 μA 0.0075 % + 0.048 μA 0.0074 % + 0.35 μA 0.0062 % + 8.2 μA 0.015 % + 0.037 mA 0.028 % + 0.1 mA 0.036 % + 0.77 mA 0.077 % + 0.94 mA	Fluke 5520A
DC Current ³ – Clamp-On	(20 to 150) A (150 to 550) A (550 to 1000) A	0.44 A 1.7 A 3 A	Fluke 5520A w/50 turn coil
DC Current – Measure ³	(0.1 to 6) mA	0.048 % + 0.0024 mA	Voltage divider & multimeter

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Resistance – Measure ³	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 MΩ to 1 GΩ	0.001 Ω 0.003 Ω 0.016 Ω 0.17 Ω 1.7 Ω 26 Ω 1.7 kΩ 84 kΩ 25 MΩ	HP 3458A
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	0.0014 Ω 0.0019 Ω 0.0037 Ω 0.0092 Ω 0.027 Ω 0.095 Ω 0.28 Ω 0.94 Ω 2.8 Ω 11 Ω 31 Ω 0.55 kΩ 1.8 kΩ 0.01 MΩ 0.064 MΩ 2.5 MΩ 27 MΩ	Fluke 5520A
DC High Voltage – Measure ³	(0.5 to 6) kV	0.14 % + 0.001 kVdc	Voltage divider & multimeter
DC High Voltage – Measure ³	(6 to 60) kV	0.13 % + 0.011 kVdc	Voltage divider & multimeter

Parameter/Range	Frequency	CMC ^{2, 4, 5} (\pm)	Comments
AC High Voltage – Measure ³			
(0.5 to 6) kV	60 Hz	0.84 % + 0.022 kV	Voltage divider & multimeter
(6 to 42) kV	60 Hz	0.18 % + 1 kV	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (\pm)	Comments
AC Current – Measure ³			
(0.1 to 60) mA	60 Hz	1.2 % + 0.024 mA	Decade box & multimeter
AC Voltage – Measure ³			
(5 to 10) mV	(1 to 40) Hz	8.1 μ V	HP 3458A
	40 Hz to 1 kHz	4.9 μ V	
	(1 to 20) kHz	8.4 μ V	
	(20 to 50) kHz	18 μ V	
	(50 to 100) kHz	72 μ V	
	(100 to 300) kHz	560 μ V	
(10 to 100) mV	(1 to 40) Hz	16 μ V	
	40 Hz to 1 kHz	13 μ V	
	(1 to 20) kHz	23 μ V	
	(20 to 50) kHz	45 μ V	
	(50 to 100) kHz	0.12 mV	
	(100 to 300) kHz	0.43 mV	
	300 kHz to 1 MHz	1.4 mV	
	(1 to 2) MHz	2.2 mV	
100 mV to 1 V	(1 to 40) Hz	0.1 mV	
	40 Hz to 1 kHz	0.1 mV	
	(1 to 20) kHz	0.2 mV	
	(20 to 50) kHz	0.4 mV	
	(50 to 100) kHz	1.1 mV	
	(100 to 300) kHz	4.3 mV	
	300 kHz to 1 MHz	14 mV	
	(1 to 2) MHz	21 mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
AC Voltage – Measure ³ (cont)			
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	1.6 mV 1.3 mV 2.2 mV 4.4 mV 12 mV 43 mV 0.14 V 0.21 V	HP 3458A
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	33 mV 30 mV 30 mV 51 mV 0.17 V 0.6 V 2.2 V	
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.4 V 0.4 V 0.5 V 1.0 V 2.5 V	

Parameter/Range	Frequency	CMC ^{2,4,5,6} (±)	Comments
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	0.054 % + 0.0081 mV 0.0084 % + 0.0078 mV 0.0069 % + 0.011 mV 0.059 % + 0.013 mV 0.27 % + 0.012 mV 0.13 % + 0.33 mV	Fluke 5520A
(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	0.015 % + 0.047 mV 0.01 % + 0.01 mV 0.012 % + 0.01 mV 0.026 % + 0.012 mV 0.061 % + 0.03 mV 0.15 % + 0.083 mV	
(0.33 to 3.3) V	(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	0.015 % + 0.43 mV 0.011 % + 0.072 mV 0.014 % + 0.066 mV 0.021 % + 0.11 mV 0.052 % + 0.17 mV 0.18 % + 0.87 mV	
(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	0.015 % + 4.4 mV 0.011 % + 0.78 mV 0.018 % + 0.74 mV 0.027 % + 0.48 mV 0.07 % + 1.3 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	0.013 % + 7.4 mV 0.014 % + 9.1 mV 0.018 % + 8.7 mV 0.018 % + 26 mV 0.14 % + 100 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.022 % + 20 mV 0.019 % + 20 mV 0.022 % + 19 mV	

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Current – Measure ³			
(5 to 100) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.61 µA 0.25 µA 0.12 µA 0.12 µA	HP 3458A
100 µA to 1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.0059 mA 0.0024 mA 0.0011 mA 0.000 67 mA 0.0011 mA 0.0062 mA 0.0096 mA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.06 mA 0.024 mA 0.011 mA 0.0067 mA 0.011 mA 0.062 mA 0.096 mA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.6 mA 0.24 mA 0.11 mA 0.067 mA 0.11 mA 0.62 mA 0.96 mA	
1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.029 A 0.026 A 0.025 A 0.025 A 0.028 A 0.06 A	
AC Current – Generate ³			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.15 % + 0.091 µA 0.12 % + 0.091 µA 0.097 % + 0.089 µA 0.23 % + 0.4 µA 0.62 % + 0.44 µA 1.2 % + 2.2 µA	Fluke 5520A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current – Generate ³ (cont)			
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.15 % + 0.0002 mA 0.089 % + 0.000 45 mA 0.076 % + 0.000 18 mA 0.15 % + 0.000 57 mA 0.39 % + 0.000 64 mA 0.78 % + 0.003 mA	Fluke 5520A
(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 (10 to 30) kHz	0.14 % + 0.0032 mA 0.067 % + 0.0026 mA 0.028 % + 0.0031 mA 0.059 % + 0.003 mA 0.15 % + 0.0033 mA 0.31 % + 0.0064 mA	
(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 (10 to 30) kHz	0.14 % + 0.028 mA 0.065 % + 0.034 mA 0.029 % + 0.023 mA 0.077 % + 0.042 mA 0.15 % + 0.08 mA 0.31 % + 0.16 mA	
33 mA to 1.1 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.074 % + 0.0012 A 0.0087 % + 0.0011 A 0.45 % + 0.0011 A 1.9 % + 0.004 A	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.000 14 A 0.045 % + 0.000 14 A 0.47 % + 0.000 78 A 1.9 % + 0.0039 A	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.044 % + 0.0021 A 0.077 % + 0.0017 A 2.3 % + 0.0019 A	
(11 to 21) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.091 % + 0.0046 A 0.11 % + 0.0045 A 2.3 % + 0.0056 A	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current – Generate ³ (cont) Clamp-On (10 to 16.5) A (16.5 to 150) A (150 to 975) A (10 to 16.5) A (16.5 to 150) A (150 to 975) A	 (45 to 65) Hz (65 to 440) Hz	 0.082 A 0.53 A 3.8 A 0.17 A 1.5 A 9.7 A	 Fluke 5520A w/50 turn coil
Capacitance – Generate ³ (0.19 to 0.4) nF (0.4 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 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 330 μF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz Up to 80 Hz Up to 50 Hz Up to 20 Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	 0.0095 nF 0.013 nF 0.021 nF 0.031 nF 0.15 nF 0.31 nF 1.1 nF 0.003 μF 0.011 μF 0.031 μF 0.15 μF 0.49 μF 1.6 μF 4.7 μF 16 μF 47 μF 0.22 mF 1.1 mF	 Fluke 5520A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicators and Indicating Systems ³ – (cont)			
Pt 3926, 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	0.039 °C 0.039 °C 0.055 °C 0.070 °C 0.078 °C 0.094 °C	Fluke 5520A
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 630) °C	0.20 °C 0.031 °C 0.039 °C 0.047 °C 0.055 °C 0.063 °C 0.070 °C 0.094 °C	
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.031 °C 0.039 °C 0.093 °C 0.11 °C 0.11 °C 0.13 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.031 °C 0.039 °C 0.047 °C 0.063 °C 0.071 °C 0.18 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.023 °C 0.032 °C 0.040 °C 0.048 °C 0.055 °C 0.18 °C	
Ni 120, 120 Ω	(-80 to 100) °C (100 to 260) °C	0.062 °C 0.11 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.24 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators & Indicating Systems ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.37 °C 0.29 °C 0.28 °C 0.30 °C	Fluke 5520A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.41 °C 0.18 °C 0.17 °C 0.19 °C 0.22 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.18 °C 0.17 °C 0.20 °C 0.23 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.29 °C 0.21 °C 0.18 °C 0.25 °C 0.34 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.34 °C 0.23 °C 0.19 °C 0.20 °C 0.26 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.46 °C 0.30 °C 0.30 °C 0.34 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.39 °C 0.31 °C 0.33 °C 0.39 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.51 °C 0.22 °C 0.18 °C 0.18 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators & Indicating Systems ³ – (cont)			
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.26 °C	Fluke 5520A
Oscilloscopes ³ – Square Wave Signal			
10 Hz to 10 kHz 50 Ω Impedance	1 mV to 6.6 V _{pk-pk}	2.2 % of value + 0.0038 V _{pk-pk}	Fluke 5520A w/SC600
1 MΩ Impedance	1 mV to 130 V _{pk-pk}	2.2 % of value + 0.047 V _{pk-pk}	
Rise Time – 50 Ω	≥ 300 ps	260 ps	
Time Marker – 50 Ω	2 ns	0.74 %	
	5 ns	0.40 %	
	10 ns	0.29 %	
	20 ns	0.15 %	
	50 ns	0.13 %	
	100 ns	0.14 %	
	200 ns	0.11 %	
	500 ns	0.099 %	
	1 μs	0.12 %	
	2 μs	0.090 %	
	5 μs	0.080 %	
	10 μs	0.12 %	
	20 μs	0.054 %	
	50 μs	0.018 %	
	100 μs	0.058 %	
	200 μs	0.029 %	
	500 μs	0.012 %	
	1 ms	0.058 %	
	2 ms	0.029 %	
	5 ms	0.012 %	
	10 ms	0.058 %	
	20 ms	0.029 %	
	50 ms	0.013 %	
	100 ms	0.059 %	
	200 ms	0.034 %	
	500 ms	0.043 %	
	1 s	0.11 %	
	2 s	0.17 %	
	5 s	0.41 %	

Parameter/Range	Frequency	CMC ² (±)	Comments
Oscilloscopes ³ – Leveled Sine Wave			
5 mV to 5.5 V	50 kHz	0.091 Vpk - pk	Fluke 5520A w/SC600
Absolute	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	0.16 Vpk - pk 0.18 Vpk - pk 0.27 Vpk - pk	
Flatness	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	0.068 Vpk - pk 0.090 Vpk - pk 0.18 Vpk - pk	

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 7, 9, 11} (±)	Comments
Pressure ³ – Measure & Measuring Equipment	(0 to 100) psi (100 to 1000) psi (1000 to 3000) psi (3000 to 10 000) psi	0.015 psi + 0.6R 0.15 psi + 0.6R 4.8 psi + 0.6R 5.5 psi	Mensor CPC6000 Mensor CPC6000 Fluke pressure module Fluke pressure module
Torque – Measure	(0 to 300) in·lbf (0 to 1000) ft·lbf	1.4 % R 1.5 ft·lbf	AKO torque calibrator
Torque Meters/Calibrators	Up to 500 Ft-Lb	0.69 Ft-Lb	NIST traceable weight set w/ calibrated extension arms
Analytical Balances	Up to 2 kg	17 mg	ASTM Class 1 weights, method per NIST handbook 44
Bench & Floor Scales	Up to 250 lb Up to 600 lb Up to 2000 lb	0.10 lb 0.60 lb 2 lb	ASTM Class 6 & NIST 105-1 Class F weights per NIST handbook 44

Parameter/Equipment	Range	CMC ² (±)	Comments
Force Gages	(0 to 50) lb	0.052 lb	Test stand with master weight set
	(50 to 500) lb	0.66 lb	Master load cell and test stand
Indirect Verification of Rockwell Hardness Testers ³	HRA: Low	0.58 HRA	Indirect verification method per ASTM E18
	Medium	0.40 HRA	
	High	0.35 HRA	
	HRC: Low	0.57 HRC	
	Medium	0.64 HRC	
	High	0.53 HRC	
	HRBW: Low	0.53 HRBW	
	Medium	0.55 HRBW	
	High	0.52 HRBW	
	HR15N: Low	0.56 HR15N	
	Medium	0.54 HR15N	
	High	0.55 HR15N	
	HR30N: Low	0.65 HR30N	
	Medium	0.53 HR30N	
High	0.52 HR30N		
HR45N: Low	0.52 HR45N		
Medium	0.59 HR45N		
High	0.54 HR45N		
HR15TW: Low	0.54 HR15TW		
Medium	0.55 HR15TW		
High	0.71 HR15TW		
HR30TW: Low	0.56 HR30TW		
Medium	0.66 HR30TW		
High	0.62 HR30TW		
HR45TW: Low	0.59 HR45TW		
Medium	0.62 HR45TW		
High	0.60 HR45TW		

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 7, 11} (±)	Comments
Temperature – Measure	(-38 to 420) °C	0.062 °C	PRT w/indicator
Temperature – Measuring Equipment ³	(-38 to 100) °C	0.09 °C	PRT w/ASL temperature indicator & fluid bath
	(-15 to 110) °C (50 to 350) °C	0.16 °C 0.35 °C	PRT w/ASL temperature indicator & Hart 9009 block
Relative Humidity – Measuring Equipment ³	(3 to 20) % RH	1.9 % RH	Vapatron relative humidity chamber
	(20 to 35) % RH	1.6 % RH	
	(35 to 50) % RH	1.2 % RH	
	(50 to 70) % RH	1.6 % RH	
	(70 to 97) % RH	1.9 % RH	
Relative Humidity – Measure	(3 to 95) % RH At (15 to 60) °C	0.014 % + 0.21 % RH	General Eastern Optica chilled mirror

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 11} (±)	Comments
Frequency – Measure ³	1 Hz to 1 MHz	5 Hz	HP 53131A counter
	(1 to 225) MHz	1.2 kHz	
Frequency – Measuring Equipment ³	0.01 Hz to 2 MHz	4.2 Hz	Fluke 5520A
Time Stopwatches & Timers	(60 to 3600) s	0.64 sec	NIST atomic clock

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 or 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 Calibration and Measurement Capability Uncertainty (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 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.
- ⁵ Based on using the standard at the temperature the HP 3458A was calibrated (tcal) within ± 5 °C and an auto-calibration (ACAL) was performed within the previous 24 hours (± 1 °C of ambient temperature). CMC is based upon 1-year specifications and using the standard at ambient temperature that is within ± 5 °C of tcal.
- ⁶ For $V_{IN} > 100$ V add $12 \mu\text{V}/\text{V} (V_{IN}/1000)^2$.
- ⁷ In the statement of CMC, percentage (%) refers to percent of reading unless otherwise noted.
- ⁸ Adjustable thread rings are set to applicable specification using calibrated master set plug gages.
- ⁹ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches. R is the numerical value of the resolution of the device under test.
- ¹⁰ This scope meets A2LA's *P112 Flexible Scope Policy*.
- ¹¹ 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.



Accredited Laboratory

A2LA has accredited

CPI, A TRESICAL COMPANY

Cincinnati, OH

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 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 26th day of March 2021.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1570.01
Valid to December 31, 2022
Revised July 14, 2022

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