



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

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CALIBRATION

Valid To: December 31, 2025

Certificate Number: 1888.08

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 7</sup>:

I. Chemical

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
pH – Measuring Equipment <sup>3</sup>	4.01 pH 7.0 pH 10.0 pH	0.026 pH 0.035 pH 0.033 pH	pH buffer solutions
Conductivity <sup>3</sup> –  Liquid	(>10 to 100) µS (>100 to 1413) µS (>1413 to 10 000) µS (>10 000 to 100 000) µS	0.83 % rdg + 0.047 µS 0.42 % rdg + 0.46 µS 0.48 % rdg – 0.45 µS 0.34 % rdg + 14 µS	Conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Calipers <sup>3</sup>	Up to 1 in (1 to 25) in (25 to 80) in	220 µin (220 + 1.1L) µin (170 + 2.9L) µin	Gage blocks

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Micrometers <sup>3</sup>	Up to 1 in (1 to 25) in (25 to 80) in	16 μin (21 + 1.7L) μin (16 + 4.0L) μin	Gage blocks
Height Gages <sup>3</sup>	Up to 80 in	(120 + 8L) μin	Gage blocks
Length Indicators <sup>3</sup> (Dial, Digital, Test, & Bore)	Up to 4 in	(25 + 6L) μin	Gage blocks
Rigid Rulers <sup>3</sup>	Up to 80 in	0.010 in	Gage blocks
Tape Measures <sup>3</sup>	Up to 100 ft	0.014 in per 6 ft	Gage blocks
Cylindrical – OD Pins, Plugs, Master Disc  Outside Diameter <sup>3</sup>	Up to 10 in Up to 15 in	30 μin 60 μin	P&W Supermicrometer™
Micrometer Standards <sup>3</sup>	Up to 24 in	(33 + 8L) μin	P&W Supermicrometer™, gage blocks
Feeler Gages <sup>3</sup>	Up to 1 in	70 μin	P&W Supermicrometer™
Optical Comparator & Vision Machines <sup>3</sup> –  X-Y Linearity  Angle	Up to 12 in  (15, 30, 45, 60, 75, 90, 180)°	250 μin + 0.58R  0.013°	Glass master  Angle blocks
Crimp Tools <sup>3</sup>	Go/No Go Crimp Height Wire Pull	600 μin 0.001 in 0.5 lbf	Pin gages Crimp micrometer Pull tester

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Protractors <sup>3</sup>	0°, 30°, 45°, 60°, 90°	0.033° + 0.58R	Angle blocks

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,5,6</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	16 µV/V + 1.0 µV 8.5 µV/V + 2.0 µV 9.7 µV/V + 20 µV 14 µV/V + 150 µV 14 µV/V + 1.5 mV	Fluke multi-function calibrator
DC Voltage – Measure <sup>3</sup>	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V  (1 to 9) kV (10 to 35) kV (35 to 70) kV	14 µV/V + 0.35 µV 10 µV/V + 0.35 µV 9.3 µV/V + 0.58 µV 13 µV/V + 35 µV 12 V/V + 120 µV  0.042 % 0.049 % 0.08 %	Agilent precision DMM  Vitretek 4700  Vitretek 4700 with HVL-35 & HVL-70
DC Current – Generate <sup>3</sup>	Up 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 3.0) A (3.0 to 11) A (11 to 20.5) A (20.5 to 150) A	0.012 % + 0.020 µA 0.0079 % + 0.050 µA 0.0082 % + 0.25 µA 0.0082 % + 2.5 µA 0.015 % + 40 µA 0.03 % + 40 µA 0.039 % + 500 µA 0.085 % + 750 µA 0.52 % + 0.14 A	Fluke multi-function calibrator
Clamp-on Only	(150 to 1025) A	0.54 % + 0.5 A	Fluke 5500A/coil

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
DC Current – Measure <sup>3</sup>	(10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 10) A 10 A to 2 kA (2 to 10) kA	38 $\mu$ A/A + 0.80 nA 27 $\mu$ A/A + 5.0 nA 27 $\mu$ A/A + 50 nA 39 $\mu$ A/A + 0.50 nA 0.011 % + 10 $\mu$ A 0.12 % + 0.60 mA 0.25 % 1.0 %	Agilent Precision DMM  Agilent 34465A with current shunts
Resistance – Generate <sup>3</sup>	(0 to 11) $\Omega$ (11 to 33) $\Omega$ (33 to 110) $\Omega$ 110 W to 1.1 k $\Omega$ (1.1 to 11) k $\Omega$ (11 to 110) k $\Omega$ 110 k to 1.1 M $\Omega$ (1.1 to 3.3) M $\Omega$ (3.3 to 11) M $\Omega$ (11 to 33) M $\Omega$ (33 to 110) M $\Omega$ (110 to 330) M $\Omega$ (330 to 1100) M $\Omega$  10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$ 10 G $\Omega$ 100 G $\Omega$ 1 T $\Omega$	35 $\mu\Omega/\Omega$ + 1.0 m $\Omega$ 24 $\mu\Omega/\Omega$ + 1.5 m $\Omega$ 23 $\mu\Omega/\Omega$ + 2.0 m $\Omega$ 23 $\mu\Omega/\Omega$ + 2.0 m $\Omega$ 25 $\mu\Omega/\Omega$ + 20 m $\Omega$ 23 $\mu\Omega/\Omega$ + 0.20 $\Omega$ 27 $\mu\Omega/\Omega$ + 2.0 $\Omega$ 48 $\mu\Omega/\Omega$ + 30 $\Omega$ 0.010 % + 50 $\Omega$ 0.02 % + 2.5 k $\Omega$ 0.04 % + 3.0 k $\Omega$ 0.23 % + 100 k $\Omega$ 1.2 % + 500 k $\Omega$  0.051 M $\Omega$ 0.13 M $\Omega$ 0.25 G $\Omega$ 0.37 G $\Omega$ 0.45 G $\Omega$ 0.01 T $\Omega$	Fluke multi-function calibrator  Decade box Decade box  Standard resistors
Fixed Points <sup>3</sup>	1.0 m $\Omega$ 10.0 m $\Omega$ 100.0 m $\Omega$ 1 $\Omega$	0.1 $\mu\Omega$ 1.2 $\mu\Omega$ 11 $\mu\Omega$ 51 $\mu\Omega$	L&N resistor L&N resistor L&N resistor L&N resistor
Resistance – Measure <sup>3</sup>	(0 to 10) $\Omega$ (10 to 100) $\Omega$ (100 to 1000) $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 kW to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ 100 MW to 1 G $\Omega$	17 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 0.50 m $\Omega$ 10 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 13 $\mu\Omega/\Omega$ + 5 m $\Omega$ 13 $\mu\Omega/\Omega$ + 50 m $\Omega$ 18 $\mu\Omega/\Omega$ + 2 $\Omega$ 54 $\mu\Omega/\Omega$ + 100 $\Omega$ 0.05 % + 1.0 k $\Omega$ 0.54 % + 10 k $\Omega$	Agilent precision DMM

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
Capacitance – Generate <sup>3</sup>	(0.19 to 3.3) nF (3.3 to 330) nF 330 nF to 3.3 $\mu$ F (3.3 to 33) $\mu$ F (33 to 330) $\mu$ F 330 $\mu$ F to 3.3 mF (3.3 to 33) mF (33 to 110) mF	0.42 % + 0.01 nF 0.21 % + 0.30 nF 0.20 % + 3.0 nF 0.42 % + 30 nF 0.36 % + 300 nF 0.36 % + 3.0 $\mu$ F 0.58 % + 30 $\mu$ F 0.85 % + 100 $\mu$ F	Fluke multi-function calibrator
Capacitance – Generate, Fixed Points <sup>3</sup>	0.001 $\mu$ F 0.01 $\mu$ F 0.1 $\mu$ F	0.048 nF 0.022 nF 0.075 nF	GR 1409 series
Inductance – Generate <sup>3</sup> @ 1 kHz	1 mH 10.0 mH 100 mH	0.12 % 0.10 % 0.08 %	GR 1482- (series)
Electrical Calibration of Thermocouple Indicators <sup>3</sup> –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1800) °C	0.35 °C 0.28 °C 0.24 °C 0.27 °C	Fluke multi-function calibrator
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.24 °C 0.22 °C 0.25 °C 0.40 °C 0.66 °C	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.40 °C 0.15 °C 0.13 °C 0.14 °C 0.18 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.22 °C 0.15 °C 0.13 °C 0.15 °C 0.19 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments	
Electrical Calibration of Thermocouple Indicators <sup>3</sup> – (cont)				
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.16 °C 0.14 °C 0.21 °C 0.32 °C	Fluke multi-function calibrator	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.32 °C 0.19 °C 0.17 °C 0.16 °C 0.22 °C		
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.27 °C 0.32 °C		
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.29 °C 0.30 °C 0.36 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.20 °C 0.14 °C 0.13 °C		
Electrical Calibration of RTD Indicators <sup>3</sup> –				
Pt 385, 100 W	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C (630 to 800) °C	0.039 °C 0.057 °C 0.072 °C 0.095 °C 0.18 °C		Fluke multi-function calibrator
Pt 3926, 100 W	(-200 to 0) °C (0 to 300) °C (300 to 630) °C	0.039 °C 0.072 °C 0.095 °C		
Pt 3916, 100 W	(-200 to -190) °C (-190 to 0) °C (0 to 260) °C	0.23 °C 0.049 °C 0.055 °C		

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of RTD Indicators <sup>3</sup> – (cont)			
Pt 385, 200 W	(260 to 600) °C (600 to 630) °C	0.078 °C 0.18 °C	Fluke multi-function calibrator
Pt 3916, 100 W	(-200 to -190) °C (-190 to 0) °C (0 to 260) °C	0.23 °C 0.049 °C 0.055 °C	
Pt 385, 200 W	(260 to 600) °C (600 to 630) °C	0.078 °C 0.18 °C	
Pt 385, 500 W	(-200 to 260) °C (260 to 630) °C	0.041 °C 0.12 °C	
Pt 385, 1000 W	(-200 to 260) °C (260 to 400) °C (400 to 630) °C	0.049 °C 0.071 °C 0.088 °C	
Ni 120, 120 W	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.041 °C 0.055 °C 0.18 °C	
Cu 427, 10 W	(-80 to 100) °C (100 to 260) °C (-100 to 260) °C	0.063 °C 0.11 °C 0.23 °C	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			
(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	0.064 % + 4.7 μV 0.018 % + 4.7 μV 0.022 % + 4.7 μV 0.082 % + 4.7 μV 0.28 % + 9.3 μV 0.63 % + 39 μV	Fluke multi-function calibrator
(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	0.023 % + 6.2 μV 0.012 % + 6.2 μV 0.013 % + 6.2 μV 0.028 % + 6.2 μV 0.064 % + 25 μV 0.048 % + 54 μV	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (cont)			
(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	0.024 % + 39 μV 0.012 % + 47 μV 0.015 % + 47 μV 0.024 % + 39 μV 0.054 % + 97 μV 0.19 % + 0.47 μV	Fluke multi- function calibrator
(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	0.024 % + 500 μV 0.012 % + 470 μV 0.015 % + 470 μV 0.024 % + 470 μV 0.070 % + 1.2 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	0.015 % + 1.6 mV 0.016 % + 4.7 mV 0.018 % + 4.7 mV 0.025 % + 4.7 mV 0.16 % + 39 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.024 % + 7.8 mV	
AC Voltage – Measure <sup>3</sup>			
(1 to 10) mV	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.036 % rdg + 0.030 % rng 0.086 % rdg + 0.011 % rng 0.085 % rdg + 0.011 % rng 0.014 % rdg + 0.011 % rng 0.51 % rdg + 0.011 % rng 4.0 % rdg + 0.020 % rng	Agilent precision DMM
(10 to 100) mV, 100 mV to 1 V, (1 to 10) V	(10 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	0.021 % rdg + 0.0040 % rng 0.021 % rdg + 0.0020 % rng 0.024 % rdg + 0.0020 % rng 0.037 % rdg + 0.0020 % rng 0.083 % rdg + 0.0020 % rng 0.031 % rdg + 0.010 % rng 1.0 % rdg + 0.010 % rng 1.5 % rdg + 0.010 % rng	



Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
AC Voltage – Measure <sup>3</sup> (cont)			
(10 to 100) V	(10 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	0.021 % rdg + 0.0040 % rng 0.021 % rdg + 0.0020 % rng 0.021 % rdg + 0.0020 % rng 0.035 % rdg + 0.0020 % rng 0.12 % rdg + 0.0020 % rng 0.40 % rdg + 0.010 % rng 1.5 % rdg + 0.010 % rng	Agilent precision DMM
(100 to 750) V	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.042 % rdg + 0.0040 % rng 0.042 % rdg + 0.0020 % rng 0.061 % rdg + 0.0020 % rng 0.12 % rdg + 0.0020 % rng 0.30 % rdg + 0.0020 % rng	
750 V to 9 kV	(50 to 60) Hz	0.45 %	Vitrek 4700 / HVL35
(9 to 70) kV	(50 to 60)Hz	1.5%	Vitrek 4700 with HVL-35, HVL-70
AC Current – Generate <sup>3</sup>			
(29 to 330) $\mu$ A	(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	0.16 % rdg + 0.08 $\mu$ A 0.12 % rdg + 0.08 $\mu$ A 0.10 % rdg + 0.08 $\mu$ A 0.23 % rdg + 0.12 $\mu$ A 0.64 % rdg + 0.16 $\mu$ A 1.2 % rdg + 0.31 $\mu$ A	Fluke multi- function calibrator
330 $\mu$ A 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	0.16 % rdg + 0.12 $\mu$ A 0.097 % rdg + 0.12 $\mu$ A 0.079 % rdg + 0.12 $\mu$ A 0.39 % rdg + 0.23 $\mu$ A 0.79 % rdg + 0.47 $\mu$ A	
(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	0.14 % rdg + 1.6 $\mu$ A 0.070 % rdg + 1.6 $\mu$ A 0.033 % rdg + 1.6 $\mu$ A 0.08 % rdg + 2.0 $\mu$ A 0.064 % rdg + 1.6 $\mu$ A 0.33 % rdg + 3.1 $\mu$ A	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
AC Current – Generate <sup>3</sup> (cont)			
(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	0.14 % rdg + 16 $\mu$ A 0.070% rdg + 16 $\mu$ A 0.033 % rdg + 16 $\mu$ A 0.079 % rdg + 39 $\mu$ A 0.16 % rdg + 78 $\mu$ A 0.30 % rdg + 160 $\mu$ A	Fluke multi-function calibrator
330 mA to 1.1 A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.15 % rdg + 78 $\mu$ A 0.041 % rdg + 78 $\mu$ A 0.46 % rdg + 0.78 $\mu$ A 1.9 % rdg + 3.9 mA	
(1.1 to 3) A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % rdg + 78 $\mu$ A 0.053 % rdg + 78 $\mu$ A 0.47 % rdg + 0.78 mA 1.9 % rdg + 3.9 mA	
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.045 % rdg + 1.6 mA 0.081 % rdg + 1.6 mA 2.4 % rdg + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (0.1 to 5) kHz	0.10 % rdg + 3.9 mA 0.12% + 3.9 mA 2.5 % rdg + 500 mA	
Clamp-on Only – (20.5 to 1025) A:			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.35 % 0.82 %	Fluke multi-function calibrator with Fluke 50- turn coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.60 % 1.00 %	
AC Current – Measure <sup>3</sup>			
(5 to 100) $\mu$ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz	0.46 % rdg + 0.030 % rng 0.18 % rdg + 0.030 % rng 0.071 % rdg + 0.030 % rng	Precision DMM

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
AC Current – Measure <sup>3</sup> (cont)			
(1, 10, 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	0.46 % rdg + 0.020 % rng 0.17 % rdg + 0.020 % rng 0.07 % rdg + 0.020 % rng 0.036 % rdg + 0.020 % rng 0.40 % rdg + 0.040 % rng 0.42 % rdg + 0.040 % rng 0.56 % rdg + 0.16 % rng	Precision DMM
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	0.46 % rdg + 0.020 % rng 0.19 % rdg + 0.020 % rng 0.095 % rdg + 0.020 % rng 0.12 % rdg + 0.020 % rng 0.35 % rdg + 0.020 % rng 0.35 % rdg + 0.020 % rng	
3 A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.1 % rdg + 1.8 mA 0.44 % rdg + 1.8 mA 0.20 % rdg + 1.8 mA	HP DMM
3 A to 1 kA	45 Hz to 5 kHz	0.80 %	Clamp-on meter
Oscilloscopes <sup>3</sup> –			
DC: 1 mW to 50 W	(0 to +/- 6.6) V	0.26 % + 40 $\mu$ V	Fluke multi- function calibrator with scope option
Square Wave: 1 mW to 50 W	(0 to +/- 130) V	0.068 % + 40 $\mu$ V	
Level Sine Wave: Amplitude (50 kHz Reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	0.26 % + 40 $\mu$ V 0.25 % + 40 $\mu$ V 0.26 % + 40 $\mu$ V 0.26 % + 40 $\mu$ V	
Flatness (50 kHz Reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	0.26 % + 40 $\mu$ V 0.25 % + 40 $\mu$ V 0.26 % + 40 $\mu$ V 0.26 % + 40 $\mu$ V	
Time Marker	1 ns to 20 ms 50 ms to 5 s	3 $\mu$ s/s (30 + 1000t) $\mu$ s/s	
Rise Time	250 ps	120 ps	
			<i>t</i> = time in seconds

IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> (±)	Comments
Calibration of Force Gages <sup>3</sup> , – Compression & Tension	Up to 120 lbf	0.02 %	Comparison to Class F weights
Pressure Gages & Transducers –  Hydraulic <sup>3</sup>  Pneumatic <sup>3</sup>	(75 to 16 000) psi  (-14 to 30) psi (30 to 100) psi (100 to 300) psi (300 to 500) psi (500 to 1000) psi (1000 to 10 000) psi  (-2 to 2) inches H <sub>2</sub> O (-30 to 30) inches H <sub>2</sub> O	0.12 %  0.003 psi 0.01 psi 0.03 psi 0.05 psi 0.24 psi 1.0 psi  0.002 inches H <sub>2</sub> O 0.03 inches H <sub>2</sub> O	Deadweight tester  Pressure controller, sensors  Presser calibrator, sensor
Torque <sup>3</sup> – Wrenches	20 ozf · in to 600 lbf · ft	1.0 %	CDI torque standard
Guns, Drivers, Screwdrivers	(0.2 to 250) Nm	0.40 %	Crane torque transduces
RPM <sup>3</sup> – Measure	(6 to 8300) RPM (8300 to 99 999) RPM	0.02 % + 0.1 RPM 0.02 % + 1.0 RPM	Laser tachometer

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Scales and Balances <sup>3</sup>	(1 to 20) mg (20 to 500) mg 500 mg to 5 g (5 to 20) g 20g to 20 kg	30 µg 30 µg 50 µg 0.001 % 0.0005 %	Comparison to precision weights
	0.25 oz to 1 lb (1 to 10) lb (10 to 600) lb	0.05 % 0.002 % 0.012 %	Comparison to standard weights
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Tester <sup>3</sup>	HRA: Low Medium High  HRBW: Low Medium High  HRC: Low Medium High  HRE: Low Medium High  HR15N: Low Medium High  HR15TW: Low Medium High	0.22 HRA 0.30 HRA 0.19 HRA  0.47 HRBW 0.46 HRBW 0.34 HRBW  0.33 HRC 0.37 HRC 0.25 HRC  0.17 HRE 0.13 HRE 0.14 HRE  0.32 HR15N 0.12 HR15N 0.17 HR15N  0.49 HR15TW 0.25 HR15TW 0.43 HR15TW	Indirect verification per ASTM E18

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Tester <sup>3</sup> (cont)	HR30N: Low Medium High	0.26 HR30N 0.27 HR30N 0.17 HR30N	Indirect verification per ASTM E18
	HR30TW: Low Medium High	0.49 HR30TW 0.46 HR30TW 0.46 HR30TW	
	HR45N: Low Medium High	0.24 HR45N 0.31 HR45N 0.20 HR45N	
	HR45TW: Low Medium High	0.35 HR45TW 0.49 HR45TW 0.35 HR45TW	

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Temperature – Measuring Equipment <sup>3</sup>  Liquid in Glass Thermometers, Dial, RTDs, & Thermocouples	(-40 to 200) °C	0.056 °C	Master PRT display with probe, temperature bath
	(200 to 660) °C	0.14 °C	Block calibrations with master PRT display with probe
Temperature – Measure <sup>3</sup>	(-195 to 660) °C	0.056 °C	Master PRT display with probe

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Relative Humidity – Measure <sup>3</sup>	(10 to 90) % RH (90 to 95) % RH	1.2 % RH 2.3 % RH	Vaisala HMP 70 series
Relative Humidity – Measuring Equipment <sup>3</sup>	(10 to 90) % RH (90 to 95) % RH	1.2 % RH 2.3 % RH	Vaisala HMP with chamber
Ovens, Chambers, Freezers, Incubators, Furnaces <sup>3</sup>	(-196 to 660) °C (>400 to 550) °C (550 to 800) °C (800 to 1000) °C (1000 to 1200) °C	0.14 °C 1.6 °C 3.8 °C 4.7 °C 5.6 °C	PRT with readout Fluke process calibrator with TC

## VI. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Frequency – Measure <sup>3</sup>	1 µHz to 350 MHz	0.002 µHz/Hz	Frequency counter
Frequency – Measuring Equipment <sup>3</sup>	1 µHz to 20 MHz	0.002 µHz/Hz	Function generator
Tachometer – Optical <sup>3</sup>	(0 to 180 000) RPM	0.001 RPM	Signal generator
Stopwatches & Timers <sup>3</sup>	(0.1 to 86 400) s	0.03 s/day	Helmut timometer

<sup>1</sup> This laboratory offers commercial calibration and field calibration service.

<sup>2</sup> 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.

- <sup>3</sup> 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 actual 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.
- <sup>4</sup> In the statement of CMC,  $L$  is the length of the unit under test in inches; and  $R$  is the resolution of the device under test.
- <sup>5</sup> In the statement of CMC, the first percentage given is the percentage of the reading, unless otherwise noted; the second percentage or fraction given is a percentage or fraction of the range.
- <sup>6</sup> 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.
- <sup>7</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.





# Accredited Laboratory

A2LA has accredited

## APPLIED TECHNICAL SERVICES, LLC.

Tempe, AZ

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 26<sup>th</sup> day of October 2023.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1888.08  
Valid to December 31, 2025

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