



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

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CALIBRATION

Valid To: September 30, 2027

Certificate Number: 1166.01

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<sup>1,8</sup>:

I. Chemical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
PH Meters	4 pH 7 pH 10 pH	0.023 pH 0.023 pH 0.023 pH	Standard PH Fluids

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Micrometer <sup>3</sup>	Up to 1 in (1 to 12) in (12 to 50) in	57 μin (57 + 1.8L) μin (77 + 4.2L) μin	Gage blocks, optical flats, length standards
Caliper <sup>3</sup>	Up to 6 in (6 to 12) in (12 to 24) in (24 to 50) in	61 μin (61 + 2.5L) μin (76 + 3.7L) μin (120 + 4.2L) μin	Gage blocks, surface plate, master long blocks
Gage Blocks – Length Only	Up to 4 in (4 to 20) in	(3.4 + 1.8L) μin (6.6 + 2.4L) μin	Comparator, master blocks ULM, master long blocks

Parameter/Equipment	Range	CMC <sup>2, 4, 5</sup> (±)	Comments
Indicators <sup>3</sup>	Up to 0.07 in (0.07 to 1.0) in (1.0 to 10.0) in	13 μin 14 μin (14 + 3.7L) μin	Gage blocks
Cylindrical Gages –  Outside Diameter (O.D.) Inside Diameter (I.D.)	Up to 16 in Up to 16 in	(8.2 + 4.4D) μin (9.5 + 4.3D) μin	Gage blocks, ULM
Angle <sup>3</sup>	±180°	12” + 0.6R	Gage blocks, sine plate, surface plate, angle blocks
Thread Wires	Up to 0.25 in	9.5 μin	ULM
Thread Plug – Simple Pitch, (4 to 80) TPI  Pitch Diameter Major Diameter	Up to 16 in Up to 16 in	(67 + 2.6D) μin (21 + 4.3D) μin	Gage blocks, ULM, thread wires
Thread Rings – Simple Pitch  Pitch Diameter Minor Diameter	Up to 16 in Up to 16 in	(45 + 3.2D) μin (45 + 3.2D) μin	Gage blocks, ULM (If set plug is used, CMC is that of set plug tolerance)
Granite Surface Plate <sup>3</sup> –  Flatness Repeat Reading	12 in to 10 ft 12 in to 10 ft	(11 + 2.1DL) μin 21 μin	Wyler electronic levels Repeat-o-meter
Optical Comparators <sup>3</sup> –  Linearity Magnification  Table Angular Alignment	Up to 12 in 10x, 20x, 31.25x, 50x, 62.5x Up to 12 in	120 μin 0.041 % 76 μin	Master glass scale Magnification checker Digital indicator

Parameter/Equipment	Range	CMC <sup>2, 4</sup> ( $\pm$ )	Comments
Length Standards	Up to 16 in	$(7 + 3.7L) \mu\text{in}$	ULM, gage blocks
	Up to 24 in	$(21 + 3.5L) \mu\text{in}$	Gage blocks, Supermicrometer™
	Up to 50 in	$(32 + 3.4L) \mu\text{in}$	Gage blocks, linear amplifier
Height Gages <sup>3</sup>	Up to 5 in Up to 10 in Up to 20 in Up to 30 in Up to 40 in Up to 50 in	45 $\mu\text{in}$ 56 $\mu\text{in}$ 88 $\mu\text{in}$ 130 $\mu\text{in}$ 160 $\mu\text{in}$ 200 $\mu\text{in}$	Master long blocks
Gage Block Comparator <sup>3</sup>			
Repeatability/Linearity	1 $\mu\text{in}$ resolution	3 $\mu\text{in}$	Gage blocks
Anvil Pressure	3 ozf	0.4 ozf	Mechanical force gage
Length Measuring Machines <sup>3</sup> (ULMs & Micrometer Heads)			
Linearity	Up to 4 in	$(7.6 + 0.8L) \mu\text{in}$	Gage blocks
Anvil Pressure	Up to 40 ozf	0.8 ozf	Mechanical force gage
Flatness (Anvil, Base, & Spindle)	Up to 1 in diameter	3.2 $\mu\text{in}$	Optical flat under helium- discharge (yellow-orange) monochromatic light
Taper Sine Block	Up to 3 in	33 $\mu\text{in}$	ULM, master plug gages
Bore Gages <sup>3</sup>	Up to 7 in	$(68 + 2.3D) \mu\text{in}$	Plain rings, ULM

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Torque Arms/Wheels & Cables			
Length	(2.5 to 40) in	(80 + 3.7L) μin	Height gage, optical comparator, gage blocks
Cable Diameter	0.035 in Up to 0.2 in	79 μin 66 μin	Micrometer
Stage Micrometers / Glass Scales	Up to 10 in	(76 + 4.4L) μin	Vision system

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,5,6</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>			
Low Voltage	(0 to 1) mV (0 to 10) mV	76 nV 410 nV	Fluke 5730A, Kelvin-Varley divider
	(0 to 220) mV (0 to 2.2) V (0 to 11) V (0 to 22) V (0 to 220) V (0 to 1100) V	9 μV/V + 0.4 μV 6 μV/V + 0.7 μV 4 μV/V + 2.5 μV 4 μV/V + 4 μV 6 μV/V + 40 μV 8 μV/V + 400 μV	Fluke 5730A
High Voltage	(1 to 100) kV	0.13 %	Ross VD120Y, Fluke 8508A, HV power supply
DC Voltage – Measure <sup>3</sup>			
Low Voltage	(0 to 1) mV (0 to 10) mV (0 to 100) mV (0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1050) V	75 nV 410 nV 16 μV/V + 0.3 μV 7.5 μV/V + 0.1 μV 4.1 μV/V + 0.4 μV 4.1 μV/V + 4 μV 6.5 μV/V + 40 μV 6.4 μV/V + 0.5 mV	Keysight 34420A  Fluke 8508A
High Voltage	(1 to 100) kV	0.13 %	Ross VD120Y, Fluke 8508A

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> (±)	Comments
DC Current – Generate <sup>3</sup>	(0 to 220) $\mu$ A (0 to 2.2) mA (0 to 22) mA (0 to 220) mA (0 to 2.2) A (0 to 11) A (11 to 20.5) A	46 $\mu$ A/A + 6 nA 41 $\mu$ A/A + 7 nA 41 $\mu$ A/A + 40 nA 52 $\mu$ A/A + 0.7 $\mu$ A 93 $\mu$ A/A + 12 $\mu$ A 0.042 % + 480 $\mu$ A 0.12 % + 750 $\mu$ A	Fluke 5730A/5725  Fluke 5522A  55120A
Clamp Meters (Toroidal)	(20 to 5000) A	0.80 % + 1 A	52120A with coils
DC Current – Measure <sup>3</sup>			
Low Current	(0 to 100) nA (0 to 1) $\mu$ A (0 to 10) $\mu$ A (0 to 100) $\mu$ A	190 nA/A + 0.04 nA 290 nA/A + 0.4 nA 23 $\mu$ A/A + 1 nA 23 $\mu$ A/A + 0.8 nA	Keysight 3458A
	(2 to 200) $\mu$ A (0.2 to 2) mA (2 to 20) mA (20 to 200) mA (0.2 to 2) A (2 to 20) A	25 $\mu$ A/A + 0.4 nA 17 $\mu$ A/A + 4 nA 15 $\mu$ A/A + 0.04 $\mu$ A 60 $\mu$ A/A + 0.4 $\mu$ A 210 $\mu$ A/A + 16 $\mu$ A 500 $\mu$ A/A + 0.4 mA	Fluke 8508A
	(2 to 100) A (100 to 300) A	0.06 % 0.12 %	Guildline 9211A
	(300 to 3000) A	0.3 %	Empro shunt
Inductance – Generate			
Fixed Points:			
100 $\mu$ H	1 kHz	0.011 %	IET (GenRad) 1482 standard inductors
1 mH	1 kHz	0.011 %	
10 mH	1 kHz	0.011 %	
100 mH	1 kHz	0.011 %	
1 H	1 kHz	0.011 %	

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
Resistance – Generate <sup>3</sup>	(0 to 11) $\Omega$	50 $\mu\Omega/\Omega$ + 1 m $\Omega$	Fluke 5522A
	(11 to 33) $\Omega$	36 $\mu\Omega/\Omega$ + 1.5 m $\Omega$	
	(33 to 110) $\Omega$	33 $\mu\Omega/\Omega$ + 1.4 m $\Omega$	
	(110 to 330) $\Omega$	32 $\mu\Omega/\Omega$ + 2 m $\Omega$	
	330 $\Omega$ to 1.1 k $\Omega$	33 $\mu\Omega/\Omega$ + 2 m $\Omega$	
	(1.1 to 3.3) k $\Omega$	32 $\mu\Omega/\Omega$ + 20 m $\Omega$	
	(3.3 to 11) k $\Omega$	33 $\mu\Omega/\Omega$ + 0.02 $\Omega$	
	(11 to 33) k $\Omega$	33 $\mu\Omega/\Omega$ + 0.2 $\Omega$	
	(33 to 110) k $\Omega$	33 $\mu\Omega/\Omega$ + 0.2 $\Omega$	
	(110 to 330) k $\Omega$	37 $\mu\Omega/\Omega$ + 2 $\Omega$	
	330 k $\Omega$ to 1.1 M $\Omega$	37 $\mu\Omega/\Omega$ + 2 $\Omega$	
	(1.1 to 3.3) M $\Omega$	70 $\mu\Omega/\Omega$ + 30 $\Omega$	
	(3.3 to 11) M $\Omega$	0.015 % + 50 $\Omega$	
	(11 to 33) M $\Omega$	0.029 % + 2.5 k $\Omega$	
	(33 to 110) M $\Omega$	0.06 % + 3 k $\Omega$	
	(110 to 330) M $\Omega$	0.33 % + 100 k $\Omega$	
	(330 to 1100) M $\Omega$	1.7 % + 500 k $\Omega$	
Fixed Points	(10 to 100) M $\Omega$	0.12 %	IET HRRS decade
	100 M $\Omega$ to 1 G $\Omega$	0.23 %	
	(1 to 10) G $\Omega$	0.6 %	
	(10 to 100) G $\Omega$	1.2 %	
	(100 to 1000) G $\Omega$	2.9 %	Fluke 5320A & HV adapter
	(1 to 10) T $\Omega$	4.6 %	
	0.333 m $\Omega$	0.3 $\mu\Omega$	Guildline 9211A
	1 m $\Omega$	0.3 $\mu\Omega$	
	10 m $\Omega$	0.5 $\mu\Omega$	
	100 m $\Omega$	0.6 $\mu\Omega$	Alpha CSR-R10
	25 $\Omega$	76 $\mu\Omega$	Ohms-Lab 7509
	100 $\Omega$	0.24 m $\Omega$	
	200 $\Omega$	0.61 m $\Omega$	
	400 $\Omega$	0.96 m $\Omega$	
	1000 $\Omega$	2.2 m $\Omega$	
	1 $\Omega$	110 $\mu\Omega/\Omega$	
	1.9 $\Omega$	110 $\mu\Omega/\Omega$	
10 $\Omega$	27 $\mu\Omega/\Omega$		
19 $\Omega$	27 $\mu\Omega/\Omega$		
100 $\Omega$	12 $\mu\Omega/\Omega$		
190 $\Omega$	12 $\mu\Omega/\Omega$		
1 k $\Omega$	8 $\mu\Omega/\Omega$		
1.9 k $\Omega$	8 $\mu\Omega/\Omega$		
10 k $\Omega$	8 $\mu\Omega/\Omega$		
19 k $\Omega$	8 $\mu\Omega/\Omega$		
100 k $\Omega$	10 $\mu\Omega/\Omega$		

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
Resistance – Generate <sup>3</sup> (cont)  Fixed Points	190 k $\Omega$ 1 M $\Omega$ 1.9 M $\Omega$ 10 M $\Omega$ 19 M $\Omega$ 100 M $\Omega$	10 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 21 $\mu\Omega/\Omega$ 46 $\mu\Omega/\Omega$ 54 $\mu\Omega/\Omega$ 120 $\mu\Omega/\Omega$	Fluke 5730A
Resistance – Measure <sup>3</sup>	1 m $\Omega$ to 2 $\Omega$ (2 to 20) $\Omega$ (20 to 200) $\Omega$ 200 $\Omega$ to 2 k $\Omega$ (2 to 20) k $\Omega$ (20 to 200) k $\Omega$ 200 k $\Omega$ to 2 M $\Omega$ (2 to 20) M $\Omega$ (20 to 200) M $\Omega$ 200 M $\Omega$ to 2 G $\Omega$  (2 to 100) G $\Omega$ (100 to 1000) G $\Omega$	20 $\mu\Omega/\Omega$ + 4 $\mu\Omega$ 16 $\mu\Omega/\Omega$ + 14 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 9 $\mu\Omega/\Omega$ + 0.05 m $\Omega$ 9 $\mu\Omega/\Omega$ + 5 m $\Omega$ 9 $\mu\Omega/\Omega$ + 50 m $\Omega$ 11 $\mu\Omega/\Omega$ + 1 $\Omega$ 23 $\mu\Omega/\Omega$ + 100 $\Omega$ 140 $\mu\Omega/\Omega$ + 10 k $\Omega$ 0.18 % + 1 M $\Omega$  1.2 % 1.3 %	Fluke 8508A          Quadtech 1865+
Electrical Calibration of Thermocouple Indicating Systems <sup>3</sup> –			
Type E	(-250 to -100) $^{\circ}\text{C}$ (-100 to 650) $^{\circ}\text{C}$ (650 to 1000) $^{\circ}\text{C}$	0.51 $^{\circ}\text{C}$ 0.17 $^{\circ}\text{C}$ 0.22 $^{\circ}\text{C}$	Fluke 5522A, AMS 2750E
Type J	(-210 to -100) $^{\circ}\text{C}$ (-100 to 760) $^{\circ}\text{C}$ (760 to 1200) $^{\circ}\text{C}$	0.28 $^{\circ}\text{C}$ 0.18 $^{\circ}\text{C}$ 0.24 $^{\circ}\text{C}$	
Type K	(-200 to -100) $^{\circ}\text{C}$ (-100 to 120) $^{\circ}\text{C}$ (120 to 1000) $^{\circ}\text{C}$ (1000 to 1372) $^{\circ}\text{C}$	0.34 $^{\circ}\text{C}$ 0.19 $^{\circ}\text{C}$ 0.27 $^{\circ}\text{C}$ 0.41 $^{\circ}\text{C}$	
Type N	(-200 to -100) $^{\circ}\text{C}$ (-100 to -25) $^{\circ}\text{C}$ (-25 to 120) $^{\circ}\text{C}$ (120 to 410) $^{\circ}\text{C}$ (410 to 1300) $^{\circ}\text{C}$	0.41 $^{\circ}\text{C}$ 0.23 $^{\circ}\text{C}$ 0.20 $^{\circ}\text{C}$ 0.19 $^{\circ}\text{C}$ 0.28 $^{\circ}\text{C}$	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicating Systems <sup>3</sup> – (cont)			
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.58 °C 0.36 °C 0.36 °C 0.41 °C	Fluke 5522A, AMS 2750E
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.48 °C 0.38 °C 0.47 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.25 °C 0.17 °C 0.16 °C	
Electrical Simulation of RTDs <sup>3</sup> –			
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	0.05 °C 0.05 °C 0.07 °C 0.09 °C 0.10 °C 0.12 °C 0.23 °C	Fluke 5522A
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	0.05 °C 0.05 °C 0.07 °C 0.09 °C 0.10 °C 0.12 °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	0.25 °C 0.05 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.10 °C 0.23 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Simulation of RTDs <sup>3</sup> – (cont)			
Pt 385, 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	0.04 °C 0.04 °C 0.05 °C 0.05 °C 0.06 °C 0.07 °C 0.07 °C 0.23 °C	Fluke 5522A

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
Capacitance – Generate <sup>3</sup>			
Up to 1.111 11 μF	1 kHz	0.08 %	GenRad 1413
(0.19 to 0.4) nF	10 Hz to 10 kHz	0.6 % + 0.01 nF	Fluke 5522A
(0.4 to 1.1) nF	10 Hz to 10 kHz	0.58 % + 0.01 nF	
(1.1 to 3.3) nF	10 Hz to 3 kHz	0.58 % + 0.01 nF	
(3.3 to 11) nF	10 Hz to 1 kHz	0.29 % + 0.01 nF	
(11 to 33) nF	10 Hz to 1 kHz	0.29 % + 0.1 nF	
(33 to 110) nF	10 Hz to 1 kHz	0.29 % + 0.1 nF	
(110 to 330) nF	10 Hz to 1 kHz	0.29 % + 0.3 nF	
(0.33 to 1.1) μF	(10 to 600) Hz	0.29 % + 1 nF	
(1.1 to 3.3) μF	(10 to 300) Hz	0.29 % + 3 nF	
(3.3 to 11) μF	(10 to 150) Hz	0.29 % + 10 nF	
(11 to 33) μF	(10 to 120) Hz	0.46 % + 30 nF	
(33 to 110) μF	(10 to 80) Hz	0.52 % + 100 nF	
(110 to 330) μF	(0 to 50) Hz	0.52 % + 300 nF	
(0.33 to 1.1) mF	(0 to 20) Hz	0.52 % + 1 μF	
(1.1 to 3.3) mF	(0 to 6) Hz	0.52 % + 3 μF	
(3.3 to 11) mF	(0 to 2) Hz	0.52 % + 10 μF	
(11 to 33) mF	(0 to 0.6) Hz	0.88 % + 30 μF	
(33 to 110) mF	(0 to 0.2) Hz	1.3 % + 100 μF	
Capacitance – Measure			
Up to 1000 pF	1 kHz	6 μF/F	Andeen Hagerling 2500A
(1 to 10) nF		16 μF/F	
(10 to 100) nF		35 μF/F	
100 nF to 1.2 μF		71 μF/F	

Parameter/Range	Frequency	CMC <sup>2,6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			
(0.22 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.04 % + 4 μV 0.03 % + 4 μV 0.03 % + 4 μV 0.04 % + 4 μV 0.06 % + 5 μV 0.13 % + 10 μV 0.16 % + 20 μV 0.33 % + 20 μV	Fluke 5730A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.03 % + 4 μV 0.011 % + 4 μV 0.01 % + 4 μV 0.024 % + 4 μV 0.058 % + 5 μV 0.12 % + 10 μV 0.16 % + 20 μV 0.31 % + 20 μV	
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.028 % + 12 μV 0.01 % + 7 μV 70 μV/V + 7 μV 0.014 % + 7 μV 0.036 % + 17 μV 0.076 % + 20 μV 0.16 % + 25 μV 0.31 % + 45 μV	
(0.22 to 2.2) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.028 % + 40 μV 0.01 % + 15 μV 50 μV/V + 8 μV 80 μV/V + 10 μV 0.01 % + 30 μV 0.04 % + 80 μV 0.12 % + 0.20 mV 0.2 % + 0.30 mV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.028 % + 0.40 mV 0.01 % + 0.15 mV 50 μV/V + 50 μV 80 μV/V + 0.10 mV 0.01 % + 0.20 mV 0.029 % + 0.60 mV 0.12 % + 2.0 mV 0.17 % + 3.2 mV	Fluke 5730A/5725A

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
AC Voltage – Generate <sup>3</sup> (cont)			
(22 to 220) V <sup>10</sup>	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.028 % + 4.0 mV 0.01 % + 1.5 mV 60 $\mu$ V/V + 0.60 mV 90 $\mu$ V/V + 1.0 mV 0.017 % + 2.5 mV 0.017 % + 2.5 mV 0.017 % + 2.5 mV 0.017 % + 2.5 mV	Fluke 5730A/5725A
(220 to 750) V <sup>10</sup>	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz (30 to 50) kHz (50 to 100) kHz	0.011 % + 4 mV 0.019 % + 6 mV 0.069 % + 11 mV 0.069 % + 11 mV 0.27 % + 45 mV	Ikonix/Associated Research 7715 Ross VD120Y
(750 to 1100) V <sup>10</sup>	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	0.011 % + 4 mV 0.019 % + 6 mV 0.069 % + 11 mV	
(1.1 to 20) kV	(50 to 60) Hz	0.15 %	
AC Voltage Flatness – Generate			
0.3 mV to 3.5 V	(10 to 30) Hz 30 Hz to 119.999 kHz	0.035 % 0.12 %	Fluke 5730A/3
(0.3 to 1.1) mV	120 kHz to 2 MHz (2 to 11.9) MHz (12 to 20) MHz (20 to 30) MHz	0.23 % + 3 $\mu$ V 0.46 % + 3 $\mu$ V 0.69 % + 3 $\mu$ V 1.7 % + 15 $\mu$ V	
(1.1 to 3.3) mV	120 kHz to 2 MHz (2 to 11.9) MHz (12 to 20) MHz (20 to 30) MHz	0.12 % + 3 $\mu$ V 0.35 % + 3 $\mu$ V 0.58 % + 3 $\mu$ V 1.7 % + 3 $\mu$ V	
3.3 mV to 3.5 V	120 kHz to 2 MHz (2 to 11.9) MHz (12 to 20) MHz (20 to 30) MHz	0.12 % + 3 $\mu$ V 0.23 % + 3 $\mu$ V 0.46 % + 3 $\mu$ V 1.2 % + 3 $\mu$ V	

Parameter/Range	Frequency	CMC <sup>2,6</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			
(0 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	2.8 mV/V + 1.3 μV 2.2 mV/V + 1.3 μV 2.1 mV/V + 1.3 μV 2.2 mV/V + 2 μV 2.4 mV/V + 2.5 μV 3.3 mV/V + 4 μV 3.4 mV/V + 8 μV 4.5 mV/V + 8 μV	Fluke 5790B/5
(2.2 to 7) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	1.2 mV/V + 1.3 μV 0.74 mV/V + 1.3 μV 0.65 mV/V + 1.3 μV 0.76 mV/V + 2 μV 0.92 mV/V + 2.5 μV 1.5 mV/V + 4 μV 1.6 mV/V + 8 μV 2.7 mV/V + 8 μV	
(7 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.39 mV/V + 1.3 μV 0.3 mV/V + 1.3 μV 0.24 mV/V + 1.3 μV 0.32 mV/V + 2 μV 0.41 mV/V + 2.5 μV 0.96 mV/V + 4 μV 1.0 mV/V + 8 μV 2.0 mV/V + 8 μV	
(22 to 70) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.28 mV/V + 1.5 μV 0.15 mV/V + 1.5 μV 96 μV/V + 1.5 μV 0.16 mV/V + 2 μV 0.31 mV/V + 2.5 μV 0.59 mV/V + 4 μV 0.78 mV/V + 8 μV 1.3 mV/V + 8 μV	
(70 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.24 mV/V + 1.5 μV 0.1 mV/V + 1.5 μV 48 μV/V + 1.5 μV 82 μV/V + 2 μV 0.19 mV/V + 2.5 μV 0.29 mV/V + 4 μV 0.44 mV/V + 8 μV 1.2 mV/V + 8 μV	

Parameter/Range	Frequency	CMC <sup>2,6</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup> (cont)			
(220 to 700) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.25 mV/V + 1.5 μV 0.11 mV/V + 1.5 μV 71 μV/V + 1.5 μV 84 μV/V + 2 μV 0.11 mV/V + 2.5 μV 0.22 mV/V + 4 μV 0.35 mV/V + 8 μV 1.1 mV/V + 8 μV	Fluke 5790B/5
700 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.23 mV/V 79 μV/V 34 μV/V 57 μV/V 84 μV/V 0.19 mV/V 0.3 mV/V 1 mV/V	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.23 mV/V 80 μV/V 34 μV/V 59 μV/V 96 μV/V 0.22 mV/V 0.46 mV/V 1.4 mV/V	
(22 to 70) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.24 mV/V 99 μV/V 71 μV/V 89 μV/V 0.12 mV/V 0.24 mV/V 0.48 mV/V 1.4 mV/V	
(70 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.23 mV/V 81 μV/V 41 μV/V 82 μV/V 0.11 mV/V 0.24 mV/V 0.58 mV/V	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup> (cont)			
(220 to 700) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.23 mV/V 0.12 mV/V 62 μV/V 0.16 mV/V 0.58 mV/V	Fluke 5790B/5
(700 to 1000) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.23 mV/V 0.12 mV/V 59 μV/V 0.16 mV/V 0.58 mV/V	
High Voltage: (1 to 85) kV	(50 to 60) Hz	0.12 %	Fluke 8508A with Ross VD120Y
AC Voltage Flatness – Measure <sup>3</sup>			
Up to 2.2 mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.2 % 0.1 % 0.1 % + 1 μV 0.2 % + 1 μV 0.4 % + 1 μV 0.8 % + 2 μV 1.2 % + 2 μV	Fluke 5790B/5
(2.2 to 7) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.07 % 0.09 % + 1 μV 0.1 % + 1 μV 0.2 % + 1 μV 0.4 % + 2 μV 0.6 % + 1 μV	
(7 to 22) mV	(10 to 30) Hz 30 Hz to 120 kHz 120 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.06 % 0.08 % 0.1 % 0.2 % 0.4 % 0.7 %	
(22 to 70) mV	(10 to 30) Hz 30 Hz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.07 % 0.1 % 0.2 % 0.4 % 0.7 %	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Voltage Flatness – Measure <sup>3</sup> (cont)			
(70 to 220) mV	(10 to 30) Hz 30 Hz to 500 kHz 500 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.05 % 0.06 % 0.1 % 0.2 % 0.4 % 0.7 %	Fluke 5790B/5
(220 to 700) mV	(10 to 30) Hz 30 Hz to 500 kHz 500 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.05 % 0.07 % 0.1 % 0.2 % 0.4 % 0.7 %	
700 mV to 2.2 V	(10 to 30) Hz 30 Hz to 500 kHz 500 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.04 % 0.06 % 0.1 % 0.2 % 0.4 % 0.7 %	
(2.2 to 7) V	(10 to 30) Hz 30 Hz to 500 kHz 500 kHz to 2 MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (30 to 50) MHz	0.1 % 0.05 % 0.07 % 0.1 % 0.2 % 0.4 % 0.7 %	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> ( $\pm$ )	Comments
AC Current – Generate <sup>3</sup>			
(9 to 220) $\mu$ A	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.029 % + 16 nA 0.018 % + 10 nA 0.012 % + 8 nA 0.032 % + 12 nA 0.12 % + 65 nA	Fluke 5730A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.029 % + 40 nA 0.018 % + 35 nA 0.012 % + 35 nA 0.023 % + 110 nA 0.12 % + 650 nA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.029 % + 400 nA 0.018 % + 350 nA 0.012 % + 350 nA 0.023 % + 550 nA 0.13 % + 5 $\mu$ A	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.029 % + 4 $\mu$ A 0.018 % + 3.5 $\mu$ A 0.012 % + 2.5 $\mu$ A 0.023 % + 3.5 $\mu$ A 0.13 % + 10 $\mu$ A	
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.028 % + 35 $\mu$ A 0.052 % + 80 $\mu$ A 0.81 % + 0.16 mA	
(2 to 20) A	(10 to 65) Hz (65 to 300) Hz 300 Hz to 1 kHz (1 to 3) kHz (3 to 6) kHz	0.01 % + 0.8 mA 0.027 % + 9.4 mA 0.09 % + 9.4 mA 0.27 % + 31 mA 0.9 % + 62 mA	
(20 to 120) A	(10 to 65) Hz (65 to 300) Hz 300 Hz to 1 kHz (1 to 3) kHz (3 to 6) kHz	0.015 % + 19 mA 0.027 % + 28 mA 0.09 % + 94 mA 0.27 % + 0.23 A 0.9 % + 0.42 A	
Up to 6000 A (Torroidal)	10 Hz to 1 kHz	0.81 %	Fluke 52120A, Fluke coils

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Current – Measure <sup>3</sup>			
Up to 200 µA	(1 to 10) Hz 10 Hz to 10 kHz	0.058 % + 0.02 µA 0.058 % + 0.02 µA	Fluke 8508A
Up to 2 mA	(1 to 10) Hz 10 Hz to 10 kHz	0.036 % + 0.2 µA 0.035 % + 0.2 µA	
Up to 20 mA	(1 to 10) Hz 10 Hz to 10 kHz	0.036 % + 2 µA 0.035 % + 2 µA	
Up to 200 mA	(1 to 10) Hz 10 Hz to 10 kHz	0.036 % + 20 µA 0.034 % + 20 µA	
Up to 2 A	10 Hz to 2 kHz (2 to 10) kHz	0.072 % + 200 µA 0.085 % + 200 µA	
Up to 20 A	10 Hz to 2 kHz (2 to 10) kHz	0.095 % + 2 mA 0.29 % + 2 mA	
(20 to 30) A	45 Hz to 1 kHz (1 to 5) kHz	0.35 % 5.8 %	Fluke 8508A, Agilent 34330A
(30 to 2500) A	(45 to 500) Hz	4 %	Clamp meter with Iflex

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> (±)	Comments
DC Power – Generate <sup>3,9</sup>			
(0.33 to 330) mA	11 µW to 336 W	0.026 %	Fluke 5522A
(> 0.33 to 3) A	11 mW to 3 kW	0.025 %	
(> 3 to 20.5) A	100 mW to 20.9 kW	0.08 %	

Parameter/Equipment	Range	CMC <sup>2,5,6</sup> (±)	Comments
AC Power Generate <sup>3,9</sup>			
(3.3 to 9) mA	(0.11 to 3) mW > 3 mW to 9 W	0.16 % 0.14 %	Fluke 5522A  (PF = 1, $\Phi = 0^\circ$ @ 45 to 65 Hz)
(> 9 to 33) mA	(0.3 to 10) mW > 10 mW to 33 W	0.12 % 0.10 %	
(> 33 to 90) mA	(1 to 30) mW > 30 mW to 90 W	0.16 % 0.14 %	
(> 90 to 330) mA	(3 to 100) mW (300 to 900) mW	0.12 % 0.10 %	
(> 0.33 to 0.9) A	(11 to 330) mW > 300 mW to 900 W	0.15 % 0.13 %	
(> 0.9 to 2.2) A	(30 to 720) mW > 720 mW to 2 kW	0.13 % 0.11 %	
(> 2.2 to 4.5) A	80 mW to 1.4 W > 1.4 W to 4.5 kW	0.15 % 0.14 %	
(> 4.5 to 20.5) A	150 mW to 6.7 W > 6.7 W to 20 kW	0.13 % 0.12 %	
Oscilloscopes –			
Voltage Amplitude – DC – 1 M $\Omega$ DC – 50 $\Omega$	1 mV to 200 V 1 mV to 5 V	0.03 % + 25 $\mu$ V 0.03 % + 25 $\mu$ V	Fluke 9500B with active heads
Square Wave – 50 $\Omega$	(0.04 to 1) mV 1 mV to 5 V	1.2 % + 10 $\mu$ V 0.23 % + 10 $\mu$ V	
Rise Time	150 ps @ 5 mV to 3 V 70 ps @ 25 mV to 2 V	29 ps 23 ps	
Timing	Narrow Triangle 900.91 ms to 55 s	3 $\mu$ s/s	
Leveled Sine Wave Amplitude	5 mV to 5 V	1.8 %	
Bandwidth (Flatness)	0.1 Hz to 300 MHz (300 to 550) MHz 550 MHz to 3.0 GHz (3.0 to 6.0) GHz	2.4 % 3 % 4.5 % 5.5 %	
Pulse Width	(1 to 100) ns	5.8 % + 200 ps	

IV. Fluid

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Viscometers <sup>3</sup> – Fixed Points	C20 C60 C100 RT100 RT1000 RT5000 RT12 500 RT30 000 RT100 000	0.46 % 0.5 % 0.5 % 0.46 % 0.5 % 0.55 % 0.6 % 0.6 % 0.6 %	Standard viscosity fluids

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Direct Verification of Type A & D Durometers –			ASTM D2240
Indenter Extension & Shape –			
Extension	0.098 in	100 µin	Gage blocks
Spring & Display Calibration –			
Type – A	Up to 100 Duro points	0.59 Duro points	Durocalibrator
Type – D	Up to 100 Duro points	0.53 Duro points	
Diameter	(0.05 to 0.111) in	0.000 093 in	Vision system
Angle	(30 to 35)°	0.05°	Optical comparator
Durocalibrator (A & D Scales)	(0 to 20 000) g	1.4 g	Class 1 & 2 weights

Parameter/Equipment	Range	CMC <sup>2, 5, 7</sup> (±)	Comments
Force <sup>3</sup> –			
Force Gages	Up to 1000 lbf	0.041 %	Universal test machine
Force Measuring Equipment – Tension & Compression	Up to 250 lbf	0.15 %	Interface 9840 readout with load cell standards
	Up to 1000 lbf	0.12 %	
	Up to 25 000 lbf	0.13 %	
	Up to 100 000 lbf	0.14 %	
	Up to 2000 lbf (10 to 10 000) lbf (10 to 100 000) lbf	0.017 % 0.01 % 0.01 %	Morehouse universal calibrating machine
Pressure – Measure & Measuring Equipment <sup>3</sup> –			
Vacuum	(-15 to -10) psi	0.0024 psi	ADT681
	(-10 to -5) psi	0.001 psi	ADT715
	(-5 to 0) psi	0.000 36 psi	ADT715
Low Pressure	(-1 to 1) inH20	0.0015 inH20	ADT761
	(-10 to 10) inH20	0.013 inH20	ADT761
	(3 to 850) inH20	0.026 %	Ruska T9000
High Pressure	(0 to 5) psi	0.000 59 psi	ADT715
	(5 to 10) psi	0.001 psi	ADT715
	(10 to 36) psi	0.0070 %	ADT161
High Pressure	(10 to 1600) psi	0.0049 %	DH Budenburg
	(1000 to 3000) psi	0.0073 %	ADT161
	(3000 to 10 000) psi	0.0077 %	ADT161
	(10 000 to 15 000) psi	0.0080 %	ADT715
	(15 000 to 30 000) psi	22 psi	ADT681
Absolute	(8.7 to 17.4) psi.a	0.0022 psi.a	ADT715
	Up to 30 psi.a	0.010 psi.a	ADT681
	Up to 150 psi.a	0.041 psi.a	ADT681

Parameter/Equipment	Range	CMC <sup>2,5,7</sup> (±)	Comments
Pressure – Measure & Measuring Equipment <sup>3</sup> – (cont)  Air Data Test Set <sup>3</sup>  Altitude (Geopotential Feet) (-7000 to -4100) ft (-4100 to 2690) ft (2690 to 6690) ft (6690 to 11 245) ft (11 245 to 16 570) ft (16 570 to 23 038) ft  (23 038 to 31 409) ft (31 409 to 43 985) ft  (43 985 to 80 004) ft  Airspeed Up to 184 kts (184 to 469) kts (469 to 613) kts (613 to 1000) kts		3.9 ft 3.3 ft 4.0 ft 4.4 ft 5.4 ft 6.8 ft  8.4 ft 11 ft  $(1.3 \times 10^{-8} \cdot A^2 - 2.0 \times 10^{-4} \cdot A + 5.5)$ ft	PAMB11H      RVSM range  A=Altitude  PAMB11H, calibrated airspeed at sea level & temperature of 15°C
Torque – Measuring Equipment	Up to 2000 lbf·ft	0.063 %	Torque arm, torque wheel, ASTM6 weights
Torque Wrenches <sup>3</sup>	Up to 2000 lbf·ft	0.49 %	CDI multitest system
Scales <sup>3</sup>	Up to 10 lbs Up to 50 lbs Up to 100 lbs Up to 200 lbs Up to 500 lbs Up to 1000 lbs	0.000 37 lbs 0.000 43 lbs 0.000 68 lbs 0.0013 lbs 0.0038 lbs 0.0068 lbs	ASTM Class 6 weights

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Mass			
Metric	500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg	0.27 mg 0.27 mg 0.27 mg 0.27 mg 0.34 mg 0.34 mg 0.35 mg 0.41 mg 22 mg 22 mg 22 mg 22 mg 22 mg 22 mg 22 mg 22 mg	Electronic Comparator & Class 1 Weights
Ounces	2 oz 4 oz 8 oz	0.37 mg 0.78 mg 22 mg	Electronic comparator & Class 4 Weights
lb	1 lb 2 lb 5 lb 7.5 lb 10 lb 15 lb 20 lb 25 lb 50 lb	22 mg 44 mg 45 mg 44 mg 45 mg 46 mg 48 mg 51 mg 100 mg	Electronic comparator & Class 4 Weights
Balances <sup>3</sup>	Up to 20 g Up to 100 g Up to 200 g Up to 300 g Up to 500 g Up to 1000 g Up to 3000 g Up to 5000 g Up to 10 000 g  Up to 20 000 g	0.27 mg 0.13 mg 0.29 mg 0.60 mg 0.63 mg 1.5 mg 2.7 mg 3.4 mg 15 mg  16 mg	ASTM Class 1 weights          ASTM Class 1 & 2 weights

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Indirect Verification of Rockwell Hardness Testers <sup>3</sup>	HRBW: (40 to 59) HRBW (60 to 79) HRBW (80 to 100) HRBW  HRC : (20 to 30) HRC (35 to 55) HRC (60 to 65) HRC  HR15N : (70 to 77) HR15N (78 to 88) HR15N (90 to 92) HR15N  HR15TW : (74 to 80) HR15TW (81 to 86) HR15TW (87 to 93) HR15TW  HRA : (20 to 65) HRA (70 to 78) HRA (80 to 84) HRA  HRRW : 114 HRRW  HREW : (70 to 79) HREW (84 to 90) HREW (93 to 100) HREW  HRMW : 93 HRMW 112 HRMW	0.7 HRBW 0.6 HRBW 0.6 HRBW  0.5 HRC 0.5 HRC 0.5 HRC  0.5 HR15N 0.5 HR15N 0.5 HR15N  0.5 HR15TW 0.6 HR15TW 0.5 HR15TW  0.5 HRA 0.6 HRA 0.5 HRA  0.6 HRRW  0.6 HREW 0.5 HREW 0.7 HREW  0.7 HRMW 0.6 HRMW	Indirect verification per ASTM E18
Indirect Verification of Brinell Hardness Testers <sup>3</sup>  HBW 10/3000	< 196 HBW (196 to 650) HRMW	2.1 HBW 2.7 HBW	Indirect verification per ASTM E10
Indirect Verification of Vickers Hardness Testers <sup>3</sup>	> 600 HV	12 HV	Indirect verification per ASTM E384 with ASTM E92

VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Relative Humidity – Measuring Equipment	(10 to 95) % RH	0.6 % RH	Thunder Scientific 2500
Measure <sup>3</sup> (15 to 25) °C	Up to 95 % RH	1.2 % RH	Vaisala M170/HMP76
Temperature – Measure	(-200 to 0) °C (0 to 230) °C (230 to 420) °C (420 to 660)	0.018 °C 0.019 °C 0.020 °C 0.022 °C	AM1751, ADT286
Temperature – Generate	(-45 to 150) °C  (-40 to 160) °C  (50 to 660) °C  Triple Point of Water	0.024 °C  0.025 °C  0.12 °C  0.0054 °C	7341, AM1751  ADT878, ADT286, AM1751  ADT878 ADT286, AM1751  ADT286, TPW cell
Surface Temperature Measuring Devices	(35 to 400) °C	0.16 °C	3125-400 AM1751, ADT286
Infrared Non-Contact – Measuring Equipment <sup>3</sup>	(-15 to 120) °C  35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.58 °C  0.48 °C 0.61 °C 0.65 °C 1.0 °C 1.2 °C	Fluke 4180 black body Fluke 4181 black body  $\epsilon = 0.9$ to 1.0 $\lambda = (8$ to 14) $\mu\text{m}$

## V. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 7</sup> ( $\pm$ )	Comments
Frequency –	Generate		
	10 MHz	$2.1 \times 10^{-8}$ Hz/Hz	Datum 9300
	1 $\mu$ Hz to 30 MHz	$2.1 \times 10^{-8}$ Hz/Hz	Datum 9300/33522B
	30 Mhz to 6 GHz	$2.1 \times 10^{-8}$ Hz/Hz	Datum 9300/9500B
Measure	10 Hz to 6 GHz	$2.1 \times 10^{-8}$ Hz/Hz	Datum 9300/53230A
Tachometers	(0.001 to 100,000) RPM	0.035 RPM	Datum 9300/33522B & LED.
Timers/Stopwatches <sup>3</sup>	1 s to 24 hr	37 ms	GPS receiver, totalize method

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

<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 the CMC,  $R$  is the resolution of the device under test,  $L$  is the numerical value of the nominal length of the device measured in inches,  $D$  is the numerical value of the nominal diameter of the device measured in inches, and  $DL$  is the dimensional length measured in inches.

<sup>5</sup> In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.

<sup>6</sup> 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. CMCs 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.

<sup>7</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>8</sup> This scope meets A2LA's *PI12 Flexible Scope Policy*.

<sup>9</sup> Uncertainties are listed at optimal conditions ( $PF = 1$ ,  $\Phi = 0^\circ$  at 10 to 65 Hz). Under different conditions, the uncertainty of the power measurement will vary based on the laboratory's AC voltage and current measurement uncertainties. PFs of less than one will increase the uncertainty of the power measurement, ramping up as PF approaches zero. Probata may also report reactive power, apparent power, and power factor under this accreditation. Uncertainties at other conditions can be obtained from the laboratory.

<sup>10</sup> Not all Voltages and Frequencies available for listed parameter, see Volt-Hertz capability Figure of the Manufacturer's manual.



# Accredited Laboratory

A2LA has accredited

## PROBATA CORPORATION

Edmond, OK

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/NCCL 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 17<sup>th</sup> day of October 2025.

A blue ink signature of Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1166.01  
Valid to September 30, 2027

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