SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: July 31, 2026 Certificate Number: 4038.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the organization's compliance with A2LA's Calibration Program Requirements) accreditation is granted to this laboratory to perform the following calibrations[1, 6]:

I. Acoustical Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Sound Level –			
Measuring Devices @ 1 kHz	94 dB 114 dB	0.27 dB 0.27 dB	Comparison with: sound level calibrator
Frequency	1 kHz	0.12 Hz	Frequency source
Calibrators @ 1 kHz	60 dB (> 60 to 90) dB (> 90 to 94) dB (> 94 to 110) dB (> 110 to 114) dB	0.41 dB 0.79 dB 1.3 dB 1.5 dB 1.1 dB	Sound level meter
Calibrators @ 250 Hz	94 dB 114 dB	1.4 dB 1.4 dB	

II. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Evidential Alcohol Analyzers[3]	0.2420 g/L 0.6050 g/L 1.2100 g/L 1.8150 g/L 2.4200 g/L 4.800 g/L	0.014 g/L 0.011 g/L 0.015 g/L 0.023 g/L 0.032 g/L 0.094 g/L	Alcohol reference solutions
Conductivity Meters[3]	5 µS/cm 10 µS/cm 100 µS/cm 1000 µS/cm 1413 µS/cm 10 000 µS/cm 100 000 µS/cm 200 000 µS/cm	0.62 µS/cm 0.62 µS/cm 2.1 µS/cm 5.5 µS/cm 6.2 µS/cm 50 µS/cm 0.47 mS/cm 0.77 mS/cm	Conductivity standard solutions
pH Meters[3]	4 pH 7 pH 10 pH	0.018 pH 0.018 pH 0.018 pH	pH buffer solutions
Gas Detection Equipment[3]			
CO	10 µmol/mol 100 µmol/mol	0.77 µmol/mol 2.1 µmol/mol	Reference gas solutions
CO_2	50 µmol/mol 100 µmol/mol	2.6 µmol/mol 2.1 µmol/mol	
CH_4	10 µmol/mol 100 µmol/mol	0.77 µmol/mol 2.1 µmol/mol	
C_3H_6	10 µmol/mol 100 µmol/mol	0.76 µmol/mol 2.1 µmol/mol	
NO	100 µmol/mol	4.8 µmol/mol	

III. Dimensional

Parameter/Equipment	Range	CMC[2] (±)	Comments
Calipers[3] –			
Exterior	(1.0 to 500) mm	7.4 µm	Comparison with master gauge blocks
	(0.0625 to 4.0) in	290 µin	
	(> 4.0 to 12) in	340 µin	
Interior	(1.0 to 250) mm	8.2 µm	
	(> 250 to 500) mm	8.3 µm	
	(0.0625 to 12) in	370 µin	
Depth	(1.0 to 500) mm	7.1 µm	
	(0.0625 to 12) in	330 µin	
Depth Gauges[3]	(1.0 to 100) mm	5.8 µm	Comparison with master gauge blocks
	(> 100 to 500) mm	5.9 µm	
	(0.0625 to 0.25) in	230 µin	
	(> 0.25 to 2) in	240 µin	
	(> 2 to 4) in	230 µin	
	(> 4 to 5) in	290 µin	
	(> 5 to 7.5) in	300 µin	
	(> 7.5 to 12) in	290 µin	
Depth Micrometers[3]	(1.0 to 15) mm	0.58 µm	Comparison with master gauge blocks
	(> 15 to 50) mm	0.59 µm	
	(> 50 to 75) mm	0.61 µm	
	(> 75 to 100) mm	0.63 µm	
	(> 100 to 150) mm	0.64 µm	
	(> 150 to 175) mm	0.65 µm	
	(> 175 to 200) mm	0.67 µm	
	(> 200 to 250) mm	0.68 µm	
	(> 250 to 275) mm	0.69 µm	
	(> 275 to 300) mm	0.71 µm	
	(> 300 to 350) mm	0.72 µm	
	(> 350 to 375) mm	0.99 µm	
	(> 375 to 500) mm	1.0 µm	
	(0.0625 to 1.0) in	58 µin	
	(> 1.0 to 1.5) in	59 µin	
	(> 1.5 to 3.5) in	60 µin	
	(> 3.5 to 3.75) in	61 µin	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Depth Micrometers[3] (cont)	(> 3.75 to 4.0) in (> 4.0 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 8.0) in (> 8.0 to 9.0) in (> 9.0 to 10.5) in (> 10.5 to 12) in	60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin	Comparison with master gauge blocks
Height Gauges[3]	(1.0 to 175) mm (> 175 to 500) mm (0.0625 to 4.0) in (> 4.0 to 12) in	6.0 µm 6.1 µm 240 µin 300 µin	Comparison with master gauge blocks
Indicators[3]	1.0 mm (> 1.0 to 5) mm (> 5 to 10) mm (> 10 to 15) mm (> 15 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 150) mm (> 150 to 175) mm (> 175 to 200) mm (0.0625 to 1.0) in (> 1.0 to 1.5) in (> 1.5 to 3.5) in (> 3.5 to 3.75) in (> 3.75 to 4.0) in (> 4.0 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 8) in	0.59 µm 0.58 µm 0.59 µm 0.58 µm 0.59 µm 0.61 µm 0.63 µm 0.64 µm 0.65 µm 0.94 µm 58 µin 59 µin 60 µin 61 µin 60 µin 61 µin 62 µin 63 µin	Comparison with master gauge blocks
Inside Micrometers[3]	(1.0 to 15) mm (> 15 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 150) mm (> 150 to 175) mm (> 175 to 200) mm (> 200 to 250) mm (> 250 to 275) mm (> 275 to 300) mm	0.58 µm 0.59 µm 0.61 µm 0.63 µm 0.64 µm 0.65 µm 0.67 µm 0.68 µm 0.69 µm 0.71 µm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Inside Micrometers[3] (cont)	(> 300 to 350) mm (> 350 to 375) mm (> 375 to 500) mm (0.0625 to 1.0) in (> 1.0 to 1.5) in (> 1.5 to 3.5) in (> 3.5 to 3.75) in (> 3.75 to 4.0) in (> 4.0 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 8.0) in (> 8.0 to 9.0) in (> 9.0 to 10.5) in (> 10.5 to 12) in	0.72 µm 0.99 µm 1.0 µm 58 µin 59 µin 60 µin 61 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin	Comparison with master gauge blocks
Outside Micrometers[3]	(1.0 to 15) mm (> 15 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 150) mm (> 150 to 175) mm (> 175 to 200) mm (> 200 to 250) mm (> 250 to 275) mm (> 275 to 300) mm (> 300 to 350) mm (> 350 to 375) mm (> 375 to 500) mm (0.0625 to 1.0) in (> 1.0 to 1.5) in (> 1.5 to 3.5) in (> 3.5 to 3.75) in (> 3.75 to 4.0) in (> 4.0 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 8.0) in (> 8.0 to 9.0) in (> 9.0 to 10.5) in (> 10.5 to 12) in	0.58 µm 0.59 µm 0.61 µm 0.63 µm 0.64 µm 0.65 µm 0.67 µm 0.68 µm 0.69 µm 0.71 µm 0.72 µm 0.99 µm 1.0 µm 58 µin 59 µin 60 µin 61 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin	Comparison with master gauge blocks
Thickness Gauges[3]	23.2 µm (> 23.2 to 51.6) µm (> 51.6 to 125.2) µm (> 125.2 to 250.3) µm	0.058 µm 0.058 µm 0.061 µm 0.069 µm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thickness Gauges[3] (cont)	(> 250.3 to 486) µm (> 486 to 963) µm (1 to 15) mm (> 15 to 50) mm (0.91 to 37.91) mil (0.0625 to 1) in (> 1 to 1.5) in (> 1.5 to 4) in	0.093 µm 0.16 µm 0.58 µm 0.59 µm 58 µin 58 µin 59 µin 60 µin	Comparison with master gauge blocks
Clinometers, Inclinometers & Electronic Levels	0.25° (> 0.25 to 0.5)° (> 0.5 to 1)° (> 1 to 2)° (> 2 to 3)° (> 3 to 4)° (> 4 to 5)° (> 5 to 10)° (> 10 to 15)° (> 15 to 20)° (> 20 to 25)° (> 25 to 30)° (> 30 to 40)° (> 40 to 50)° (> 50 to 60)° (> 60 to 70)° (> 70 to 80)° (> 80 to 90)° (> 90 to 100)° (> 100 to 110)° (> 110 to 116)°	0.0065° 0.0065° 0.0058° 0.0060° 0.0059° 0.0063° 0.0069° 0.0070° 0.0059° 0.0062° 0.0066° 0.0064° 0.0060° 0.0059° 0.0069° 0.0076° 0.0060° 0.0065° 0.0071° 0.0079° 0.015°	Comparison with angle blocks
Protractor – Digital & Mechanical	0.25° (> 0.25 to 0.5)° (> 0.5 to 1)° (> 1 to 2)° (> 2 to 3)° (> 3 to 4)° (> 4 to 5)° (> 5 to 10)° (> 10 to 15)° (> 15 to 20)° (> 20 to 25)° (> 25 to 30)° (> 30 to 40)°	0.0065° 0.0065° 0.0058° 0.0060° 0.0059° 0.0063° 0.0069° 0.0070° 0.0059° 0.0062° 0.0066° 0.0064° 0.0060°	Comparison with angle blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Protractor – Digital & Mechanical (cont)	(> 40 to 50)° (> 50 to 60)° (> 60 to 70)° (> 70 to 80)° (> 80 to 90)° (> 90 to 100)° (> 100 to 110)° (> 110 to 116)°	0.0059° 0.0069° 0.0076° 0.0060° 0.0065° 0.0071° 0.0079° 0.015°	Comparison with angle blocks
Tape Measures, Rulers	Up to 0.7 m (0.7 to 0.8) m (0.8 to 0.9) m (0.9 to 1) m (1 to 2) m (2 to 4) m (4 to 5) m (5 to 20) m (20 to 40) m (40 to 60) m (60 to 80) m (80 to 100) m Up to 60 ft (60 to 120) ft (120 to 180) ft (180 to 240) ft (240 to 360) ft	0.43 mm 0.45 mm 0.43 mm 0.43 mm 0.47 mm 0.48 mm 0.46 mm 0.36 mm 0.52 mm 0.69 mm 0.89 mm 0.53 mm 0.0014 in 0.0018 in 0.0022 in 0.0028 in 0.0034 in	Comparison with reference rulers, tape measures Comparison with reference tape measure

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Measure	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (0.1 to 1) kV (1 to 2) kV (2 to 3) kV (3 to 4) kV (4 to 6) kV	0.90 µV 5.8 µV 60 µV 0.82 mV 8.6 mV 50 V 56 V 62 V 77 V	Precision multimeter & divider

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Measure (ccont)	(6 to 8) kV (8 to 10) kV (10 to 12) kV Up to 6 kV (6 to 15) kV (15 to 30) kV (30 to 42) kV (42 to 60) kV	90 V 0.10 kV 0.12 kV 5.8 V 6.1 V 6.8 V 7.7 V 9.4 V	Precision multimeter & divider
DC Voltage[3] – Generate	Up to 10 mV (10 to 100) mV (100 to 200) mV (200 to 220) mV (0.22 to 1) V (1 to 2) V (2 to 2.2) V (2.2 to 10) V (10 to 20) V (20 to 100) V (100 to 200) V (200 to 220) V (0.22 to 1) kV	1.6 µV 1.8 µV 2.0 µV 5.0 µV 14 µV 28 µV 36 µV 0.11 mV 0.32 mV 1.2 mV 3.9 mV 4.0 mV 15 mV	Multifunction calibrator
Resistance[3] – Generate Simulated	Up to 30 Ω (30 to 100) Ω (100 to 300) Ω (0.3 to 1) kΩ (1 to 2) kΩ (2 to 3) kΩ (3 to 4) kΩ (4 to 6) kΩ (6 to 8) kΩ (8 to 10) kΩ (10 to 30) kΩ (30 to 100) kΩ (100 to 300) kΩ (0.3 to 1) MΩ (1 to 3) MΩ (3 to 10) MΩ (10 to 20) MΩ (20 to 30) MΩ (30 to 40) MΩ (40 to 50) MΩ	16 mΩ 10 mΩ 60 mΩ 82 mΩ 0.39 Ω 0.23 Ω 0.32 Ω 0.62 Ω 0.68 Ω 0.85 Ω 6.2 Ω 7.4 Ω 65 Ω 78 Ω 0.83 kΩ 1.2 kΩ 30 kΩ 69 kΩ 66 kΩ 0.31 MΩ	Multifunction calibrator & multiplier

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Resistance[3] – Generate (cont)			
Simulated	(50 to 60) MΩ (60 to 70) MΩ (70 to 80) MΩ (80 to 90) MΩ (90 to 100) MΩ (100 to 200) MΩ (200 to 400) MΩ (400 to 600) MΩ (600 to 800) MΩ (0.8 to 1) GΩ (1 to 2) GΩ (2 to 4) GΩ (4 to 6) GΩ (6 to 8) GΩ (8 to 10) GΩ (10 to 20) GΩ (20 to 40) GΩ (40 to 60) GΩ (60 to 80) GΩ (80 to 100) GΩ (100 to 200) GΩ (200 to 400) GΩ (400 to 600) GΩ (600 to 800) GΩ (0.8 to 1) TΩ	0.28 MΩ 0.30 MΩ 0.27 MΩ 0.27 MΩ 0.22 MΩ 0.14 MΩ 0.60 MΩ 1.7 MΩ 2.1 MΩ 2.8 MΩ 10 MΩ 20 MΩ 55 MΩ 65 MΩ 78 MΩ 0.17 GΩ 0.35 GΩ 0.52 GΩ 0.69 GΩ 0.87 GΩ 1.7 GΩ 3.5 GΩ 5.2 GΩ 6.9 GΩ 8.7 GΩ	Multifunction calibrator & multiplier
Resistance[3] – Generate			
Passive 2 Wire	0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 0.0515 Ω 0.0587 Ω 0.1091 Ω	2.4 mΩ 4.1 mΩ 2.6 mΩ 26 mΩ 13 mΩ 0.14 Ω 1.7 Ω 21 Ω 0.45 kΩ 50 kΩ 1.1 MΩ 1.7 mΩ 1.4 mΩ 2.9 mΩ	Multifunction calibrator

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Resistance[3] – Generate (cont)			
Passive 2 Wire	0.1260 Ω 0.1766 Ω 0.2322 Ω 0.2839 Ω 0.3547 Ω 0.4071 Ω 0.4940 Ω 0.5467 Ω 0.9750 Ω 1.0265 Ω 4.9961 Ω 5.0428 Ω 9.0307 Ω 9.0819 Ω 90.403 Ω 90.470 Ω 905.644 Ω 905.650 Ω	1.8 mΩ 3.2 mΩ 1.2 mΩ 3.0 mΩ 1.2 mΩ 4.5 mΩ 1.1 mΩ 3.2 mΩ 1.8 mΩ 3.2 mΩ 2.7 mΩ 1.7 mΩ 1.9 mΩ 2.4 mΩ 78 mΩ 42 mΩ 0.17 Ω 91 mΩ	Multifunction calibrator
Passive 4 Wire	100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	0.11 mΩ 1.3 mΩ 0.43 mΩ 6.0 mΩ 12 mΩ 0.13 Ω 1.6 Ω	
Resistance[3] – Measure			
2 Wire	Up to 1 Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ (1 to 10) GΩ (10 to 100) GΩ (0.1 to 1) TΩ	25 µΩ 0.16 mΩ 1.3 mΩ 12 mΩ 0.13 Ω 1.4 Ω 16 Ω 0.29 kΩ 59 kΩ 2.1 MΩ 0.28 GΩ 2.7 GΩ 28 GΩ	Precision multimeter

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Resistance[3] – Measure (cont) 4 Wire	Up to 1 Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ	25 µΩ 0.16 mΩ 1.3 mΩ 12 mΩ 0.13 Ω 1.4 Ω	Precision multimeter
Capacitance[3] – Generate, @ 1 kHz	1 nF 10 nF 20 nF 50 nF 100 nF 1 µF 10 µF	2.5 pF 12 pF 25 pF 56 pF 95 pF 1.0 nF 28 nF	Multifunction calibrator
Capacitance[3] – Generate, (Simulated)	100 µF 1 mF 10 mF	62 nF 1.1 µF 7.5 µF	Multifunction calibrator
DC Current[3] – Measure	Up to 10 nA (10 to 100) nA (0.1 to 1) µA (1 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 10) A (10 to 30) A	66 pA 0.21 nA 0.26 nA 0.50 nA 1.4 nA 14 nA 0.16 µA 4.3 µA 0.19 mA 4.6 mA 22 mA	Precision multimeter comparison
DC Current[3] – Generate	Up to 100 µA (100 to 200) µA (200 to 210) µA (0.21 to 1) mA (1 to 2) mA (2 to 5) mA (5 to 10) mA (10 to 15) mA (15 to 20) mA (20 to 100) mA	1.9 nA 7.7 nA 6.8 nA 18 nA 74 nA 0.13 µA 0.22 µA 1.2 µA 1.4 µA 6.4 µA	Multifunction calibrator

Parameter/Equipment	Range	CMC[2, 4, 7] (±)	Comments
DC Current[3] – Generate (cont)	(100 to 200) mA (0.2 to 1) A (1 to 2) A (2 to 10) A (10 to 20) A (20 to 30) A	52 µA 0.19 mA 0.41 mA 2.7 mA 6.3 mA 12 mA	Multifunction calibrator
DC Current[3] – Clamp-On Meters			
2 Turn Coil	(0 to 10) A (> 10 to 20) A (> 20 to 30) A (> 30 to 40) A (> 40 to 50) A (> 50 to 60) A	0.16 A 0.21 A 0.29 A 0.36 A 0.44 A 0.51 A	Multifunction calibrator & coil
10 Turn Coil	(0 to 50) A (> 50 to 100) A (> 100 to 150) A (> 150 to 200) A (> 200 to 250) A (> 250 to 300) A	0.61 A 1.1 A 1.9 A 2.3 A 2.7 A 3.2 A	
50 Turn Coil	(0 to 250) A (> 250 to 500) A (> 500 to 750) A (> 750 to 1000) A (> 1000 to 1250) A (> 1250 to 1500) A	2.6 A 4.4 A 6.3 A 8.1 A 10 A 12 A	
DC Power[3] – Generate			
Voltage Out = 20 V	Up to 1 mA (> 1 to 10) mA (> 10 to 100) mA (> 100 to 300) mA (> 0.3 to 2) A (> 2 to 3) A (> 3 to 20) A	0.019 % 0.018 % 0.013 % 0.023 % 0.039 % 0.034 % 0.025 %	Multifunction calibrator
Current Out = 3 A	Up to 20 V (> 20 to 200) V (> 200 to 500) V (> 500 to 1000) V	0.0033 % 0.0018 % 0.0016 % 0.0015 %	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Measure			
Up to 100 mV	10 Hz	0.080 mV	Precision multimeter
(100 to 200) mV	10 Hz	0.27 mV	
(0.2 to 1) V	10 Hz	0.68 mV	
(1 to 2) V	10 Hz	2.7 mV	
(2 to 10) V	10 Hz	6.8 mV	
(10 to 20) V	10 Hz	37 mV	
(20 to 100) V	10 Hz	79 V	
Up to 100 V	(10 to 23) Hz	75 mV	
Up to 100 mV	(23 to 106) Hz	35 µV	
(0.1 to 1) V	(23 to 106) Hz	0.29 mV	
(1 to 10) V	(23 to 106) Hz	2.9 mV	
(10 to 100) V	(23 to 106) Hz	34 mV	
(100 to 700) V	(40 to 106) Hz	0.27 V	
(700 to 1000) V	56 Hz	0.34 V	
Up to 100 mV	(106 to 206) Hz	30 µV	
(0.1 to 1) V	(106 to 206) Hz	0.24 mV	
(1 to 10) V	(106 to 206) Hz	2.5 mV	
(10 to 100) V	(106 to 206) Hz	30 mV	
(100 to 700) V	(106 to 206) Hz	0.24 V	
Up to 20 mV	206 Hz to 1 kHz	14 µV	
(20 to 100) mV	206 Hz to 1 kHz	30 µV	
(100 to 200) mV	206 Hz to 1 kHz	0.11 mV	
(0.2 to 1) V	206 Hz to 1 kHz	0.24 mV	
(1 to 2) V	206 Hz to 1 kHz	1.1 mV	
(2 to 10) V	206 Hz to 1 kHz	2.5 mV	
(10 to 20) V	206 Hz to 1 kHz	12 mV	
(20 to 100) V	206 Hz to 1 kHz	29 mV	
(100 to 200) V	206 Hz to 1 kHz	0.13 V	
(200 to 700) V	206 Hz to 1 kHz	0.23 V	
(700 to 1000) V	206 Hz to 1 kHz	0.29 V	
Up to 100 mV	(1 to 2) kHz	30 µV	
(0.1 to 1) V	(1 to 2) kHz	0.25 mV	
(1 to 10) V	(1 to 2) kHz	2.4 mV	
(10 to 100) V	(1 to 2) kHz	29 mV	
(100 to 700) V	(1 to 2) kHz	0.23 V	
Up to 100 mV	(2 to 5) kHz	48 µV	
(0.1 to 1) V	(2 to 5) kHz	0.41 mV	
(1 to 10) V	(2 to 5) kHz	4.1 mV	
(10 to 100) V	(2 to 5) kHz	49 mV	
(100 to 700) V	(2 to 5) kHz	0.38 V	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Measure (cont)			
Up to 100 mV	(5 to 10) kHz	41 µV	Precision multimeter
(0.1 to 1) V	(5 to 10) kHz	0.41 mV	
(1 to 10) V	(5 to 10) kHz	4.1 mV	
(10 to 100) V	(5 to 10) kHz	46 mV	
(100 to 700) V	(5 to 10) kHz	0.36 V	
(700 to 1000) V	56 Hz to 10 kHz	0.46 V	
Up to 100 mV	(10 to 20) kHz	41 µV	
(0.1 to 1) V	(10 to 20) kHz	0.41 mV	
(1 to 10) V	(10 to 20) kHz	4.1 mV	
(10 to 100) V	(10 to 20) kHz	47 mV	
Up to 100 mV	(20 to 50) kHz	0.13 mV	
(0.1 to 1) V	(20 to 50) kHz	1.3 mV	
(1 to 10) V	(20 to 50) kHz	13 mV	
(10 to 100) V	(20 to 50) kHz	0.15 V	
Up to 10 V	(50 to 75) kHz	13 mV	
Up to 100 mV	(50 to 100) kHz	0.13 mV	
(0.1 to 1) V	(50 to 100) kHz	1.3 mV	
(1 to 10) V	(75 to 100) kHz	13 mV	
Up to 1 V	(100 to 400) kHz	41 mV	
Up to 1 V	400 kHz to 1 MHz	41 mV	
(1 to 2) kV	50 Hz	44 V	
(2 to 3) kV	50 Hz	52 V	
(3 to 4) kV	50 Hz	59 V	
(4 to 6) kV	50 Hz	0.10 kV	
(6 to 8) kV	50 Hz	0.13 kV	
(8 to 10) kV	50 Hz	0.16 kV	
(10 to 12) kV	50 Hz	0.18 kV	
(0 to 10) kV	(50 to 75) Hz	0.32 kV	Digital voltage check meter
(10 to 20) kV	(50 to 75) Hz	0.38 kV	
(20 to 30) kV	(50 to 75) Hz	0.62 kV	
(30 to 40) kV	(50 to 75) Hz	0.98 kV	
(40 to 50) kV	(50 to 75) Hz	1.2 kV	
(50 to 60) kV	(50 to 75) Hz	1.4 kV	
(60 to 70) kV	(50 to 75) Hz	1.5 kV	
(70 to 80) kV	(50 to 75) Hz	1.7 kV	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Measure (cont)			
Up to 1 kV rms	60 Hz	6.1 V	Precision multimeter & voltage divider
(1 to 4) kV rms	60 Hz	11 V	
(4 to 11) kV rms	60 Hz	21 V	
(11 to 21) kV rms	60 Hz	39 V	
(21 to 32) kV rms	60 Hz	59 V	
(32 to 42) kV rms	60 Hz	77 V	
AC Voltage[3] – Generate			
(0 to 20) mV	(40 to 206) Hz	21 µV	Multifunction calibrator
(20 to 200) mV	10 Hz	0.17 mV	
(20 to 200) mV	40 Hz to 1 kHz	80 µV	
(20 to 200) mV	100 kHz	0.76 mV	
(20 to 200) mV	500 kHz	1.1 mV	
(0.2 to 0.21) V	(40 to 206) Hz	92 µV	
(0.2 to 0.21) V	100 kHz	0.33 mV	
(0.21 to 1) V	206 Hz	0.64 mV	
(1 to 1.5) V	206 Hz	0.89 mV	
(0.2 to 2) V	10 Hz	0.61 mV	
(0.21 to 2) V	40 Hz	0.26 mV	
(0.21 to 2) V	(56 to 206) Hz	0.23 mV	
(0.21 to 2) V	(1 to 10) kHz	0.38 mV	
(0.21 to 2) V	(10 to 100) kHz	1.7 mV	
(0.21 to 2) V	(100 to 500) kHz	20 mV	
(2 to 2.1) V	(40 to 206) Hz	0.45 mV	
(2 to 2.1) V	100 kHz	2.1 mV	
(2.1 to 10) V	200 Hz	6.1 mV	
(10 to 15) V	200 Hz	8.4 mV	
(2 to 20) V	10 Hz	6.4 mV	
(2.0 to 20) V	40 Hz to 1 kHz	2.4 mV	
(2.0 to 20) V	(5 to 20) kHz	2.1 mV	
(2.0 to 20) V	(20 to 100) kHz	19 V	
(20 to 21) V	(40 to 206) Hz	5.4 mV	
(20 to 21) V	20 kHz	12 mV	
(21 to 100) V	206 Hz	32 mV	
(20 to 200) V	30 Hz	62 mV	
(20 to 200) V	40 Hz to 1 kHz	46 mV	
(20 to 200) V	(1 to 10) kHz	42 mV	
(20 to 200) V	(10 to 20) kHz	0.44 V	
(200 to 210) V	(40 to 206) Hz	38 mV	
(200 to 210) V	206 Hz to 10 kHz	85 mV	
(0.21 to 0.7) kV	30 Hz to 1 kHz	0.11 V	
(0.21 to 0.7) kV	(1 to 10) kHz	0.14 V	
(0.7 to 1) kV	56 Hz	0.15 V	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Measure			
Up to 100 µA	10 Hz	88 nA	Precision multimeter
(0.1 to 1) mA	10 Hz	0.80 µA	
(1 to 10) mA	10 Hz	8.1 µA	
(10 to 100) mA	10 Hz	81 µA	
(0.1 to 1) A	10 Hz	1.0 mA	
(1 to 10) A	10 Hz	14 mA	
(10 to 30) A	10 Hz	29 mA	
Up to 100 µA	(10 to 40) Hz	50 nA	
(0.1 to 1) mA	(10 to 40) Hz	0.51 µA	
(1 to 10) mA	(10 to 40) Hz	5.0 µA	
(10 to 100) mA	(10 to 40) Hz	51 µA	
(0.1 to 1) A	(10 to 40) Hz	0.65 mA	
(1 to 10) A	(10 to 40) Hz	12 mA	
(10 to 30) A	(10 to 40) Hz	35 mA	
Up to 100 µA	(40 to 206) Hz	50 nA	
(0.1 to 1) mA	(40 to 206) Hz	0.50 µA	
(1 to 10) mA	(40 to 206) Hz	5.0 µA	
(10 to 100) mA	(40 to 206) Hz	51 µA	
(0.1 to 1) A	(40 to 206) Hz	0.66 mA	
(1 to 10) A	(40 to 206) Hz	12 mA	
(10 to 30) A	(40 to 206) Hz	35 mA	
Up to 25 µA	206 Hz to 1 kHz	25 nA	
(25 to 100) µA	206 Hz to 1 kHz	50 nA	
(100 to 200) µA	206 Hz to 1 kHz	0.12 µA	
(0.2 to 1) mA	206 Hz to 1 kHz	0.50 µA	
(1 to 2) mA	206 Hz to 1 kHz	1.1 µA	
(2 to 10) mA	206 Hz to 1 kHz	5.0 µA	
(10 to 20) mA	206 Hz to 1 kHz	21 µA	
(20 to 100) mA	206 Hz to 1 kHz	51 µA	
(100 to 200) mA	206 Hz to 1 kHz	0.27 mA	
(0.2 to 1) A	206 Hz to 1 kHz	0.66 mA	
(1 to 2) A	206 Hz to 1 kHz	5.1 mA	
(2 to 10) A	206 Hz to 1 kHz	12 mA	
(10 to 30) A	206 Hz to 1 kHz	35 mA	
Up to 1 mA	(1 to 2) kHz	1.2 µA	
Up to 1 mA	(2 to 5) kHz	1.2 µA	
Up to 100 µA	(5 to 10) kHz	0.12 µA	
(0.1 to 1) mA	(5 to 10) kHz	1.2 µA	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Measure (cont)			
(1 to 10) mA	(5 to 10) kHz	12 µA	Precision multimeter
(10 to 100) mA	(5 to 10) kHz	0.12 mA	
(0.1 to 1) A	(5 to 10) kHz	1.4 mA	
(0 to 3) A	50 Hz	0.15 A	Precision multimeter & clamp meter
(3 to 9) A	50 Hz	0.19A	
(9 to 15) A	50 Hz	0.23 A	
(15 to 21) A	50 Hz	0.29 A	
(21 to 30) A	50 Hz	0.37 A	
(30 to 90) A	50 Hz	1.7 A	
(90 to 150) A	50 Hz	5.5 A	
(150 to 270) A	50 Hz	5.6 A	
(270 to 1450) A	50 Hz	14 A	
AC Current[3] – Generate			
(0 to 25) µA	(40 to 206) Hz	0.13 µA	Multifunction calibrator
(0 to 25) µA	206 Hz to 1 kHz	0.14 µA	
(25 to 200) µA	10 Hz	0.29 µA	
(25 to 200) µA	(40 to 56) Hz	0.16 µA	
(25 to 200) µA	56 Hz to 10 kHz	0.16 µA	
(0.2 to 0.21) mA	(40 to 206) Hz	0.17 µA	
(0.2 to 0.21) mA	206 Hz to 10 kHz	0.16 µA	
(0.20 to 2) mA	10 Hz	1.7 µA	
(0.21 to 2) mA	40 Hz to 1 kHz	0.65 µA	
(0.21 to 2) mA	(1 to 10) kHz	3.4 µA	
(2 to 2.1) mA	(40 to 206) Hz	0.88 µA	
(2 to 2.1) mA	206 Hz to 10 kHz	0.72 µA	
(2.1 to 10) mA	56 Hz	4.0 µA	
(2 to 20) mA	10 Hz	16 µA	
(2 to 20) mA	(10 to 40) Hz	6.3 µA	
(2 to 20) mA	40 Hz to 10 kHz	6.3 µA	
(20 to 21) mA	(40 to 206) Hz	7.3 µA	
(20 to 21) mA	206 Hz to 10 kHz	7.1 µA	
(20 to 200) mA	10 Hz	0.16 mA	
(21 to 200) mA	40 Hz to 1 kHz	59 µA	
(21 to 200) mA	(1 to 10) kHz	0.32 mA	
(0.2 to 0.21) A	(40 to 206) Hz	0.10 mA	
(0.2 to 0.21) A	206 Hz to 5 kHz	0.11 mA	
(0.2 to 2) A	10 Hz	2.2 mA	
(0.21 to 2) A	40 Hz to 1 kHz	1.1 mA	
(0.21 to 2) A	5 kHz	2.1 mA	
(2 to 2.1) A	(40 to 206) Hz	1.9 mA	

Parameter/Range	Frequency	CMC[2, 4, 7] (±)	Comments
AC Current[3] – Generate (cont)			
(2 to 20) A (2.1 to 20) A (20 to 30) A	10 Hz 40 Hz to 1 kHz 56 Hz	14 mA 15 mA 47 mA	Multifunction calibrator
AC Current[3] – Clamp-On Meters			
2 Turn Coil			Multifunction calibrator & coil
(0 to 10) A (> 10 to 20) A (> 20 to 30) A (> 30 to 40) A (> 40 to 50) A (> 50 to 60) A	(30 to 60) Hz	0.16 A 0.21 A 0.29 A 0.36 A 0.44 A 0.51 A	
10 Turn Coil			
(0 to 50) A (> 50 to 100) A (> 100 to 150) A (> 150 to 200) A (> 200 to 250) A (> 250 to 300) A	(30 to 60) Hz	0.61 A 1.1 A 1.9 A 2.3 A 2.7 A 3.2 A	
50 Turn Coil			
(0 to 250) A (> 250 to 500) A (> 500 to 750) A (> 750 to 1000) A (> 1000 to 1250) A (> 1250 to 1500) A	(30 to 60) Hz	2.6 A 4.4 A 6.3 A 8.1 A 10 A 12 A	
AC Power[3] – Generate, PF = 1			
Voltage Out = 20 V:			
Up to 10 A Up to 0.3 mA (> 0.3 to 1) mA	45 Hz 56 Hz 56 Hz	0.091 % 0.18 % 0.10 %	Multifunction calibrator

Parameter/Range	Frequency	CMC[2, 4, 7] (±)	Comments
AC Power[3] – Generate, PF = 1 (cont)			
Voltage Out = 20 V:			Multifunction calibrator
Up to 10 A	45 Hz	0.17 %	
(0.3 to 1) mA	56 Hz	0.047 %	
(> 1 to 2) mA	56 Hz	0.081 %	
(> 2 to 10) mA	56 Hz	0.046 %	
(> 10 to 20) mA	56 Hz	0.074 %	
(> 20 to 100) mA	56 Hz	0.056 %	
(> 0.1 to 0.3) A	56 Hz	0.061 %	
(> 0.3 to 2) A	56 Hz	0.061 %	
(> 2 to 2.5) A	56 Hz	0.057 %	
(> 2.5 to 5) A	56 Hz	0.18 %	
(> 5 to 10) A	56 Hz	0.17 %	
(> 10 to 15) A	56 Hz	0.16 %	
(> 15 to 30) A	56 HZ	0.16 %	
Up to 10 A	206 Hz	0.045 %	
Up to 10 mA	400 Hz	0.052 %	
(> 10 to 100) mA	400 Hz	0.053 %	
(> 0.1 to 2) A	400 Hz		
Current Out = 3 A:			
Up to 200 V	45 Hz	0.014 %	
Up to 20 V	56 Hz	0.011 %	
Up to 50 V	60 Hz	0.019 %	
(> 50 to 200) V	60 Hz	0.016 %	
(> 200 to 500) V	60 Hz	0.018 %	
Up to 200 V	400 Hz	0.022 %	
Phase Angle[3] – Measuring Devices			
0°	(120 V, 10 A, 60 Hz)	0.23°	Multifunction calibrator
(> 0 to 60)°	(120 V, 10 A, 60 Hz)	0.16°	
(> 60 to 90)°	(120 V, 10 A, 60 Hz)	0.17°	
(> 90 to 180)°	(120 V, 10 A, 60 Hz)	0.19°	
(> 180 to 270)°	(120 V, 10 A, 60 Hz)	0.20°	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of RTD Temperature Indicators[3]	-100 °C	0.010 °C	Multifunction calibrator
	(> -100 to 0) °C	0.0079 °C	
	(> 0 to 30) °C	0.018 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Simulation of RTD Temperature Indicators[3] (cont)	(> 30 to 60) °C (> 60 to 100) °C (> 100 to 200) °C (> 200 to 400) °C (> 400 to 800) °C	0.019 °C 0.017 °C 0.020 °C 0.019 °C 0.024 °C	Multifunction calibrator
Electrical Simulation of Thermocouple Temperature Indicators[3] –			
Type B	(600 to 1000) °C (> 1000 to 1820) °C	0.42 °C 0.40 °C	Multifunction calibrator
Type C	(0 to 650) °C (> 650 to 1000) °C (> 1000 to 2316) °C	0.10 °C 0.12 °C 0.18 °C	
Type E	(-250 to -25) °C (> -25 to 350) °C (> 350 to 1000) °C	0.072 °C 0.077 °C 0.14 °C	
Type J	(-210 to -100) °C (> -100 to 0) °C (> 0 to 400) °C (> 400 to 760) °C	0.074 °C 0.040 °C 0.058 °C 0.14 °C	
Type K	(-200 to -140) °C (> -140 to -100) °C (> -100 to -50) °C (> -50 to -25) °C (> -25 to 120) °C (> 120 to 500) °C (> 500 to 700) °C (> 700 to 1000) °C (> 1000 to 1370) °C	0.071 °C 0.068 °C 0.12 °C 0.085 °C 0.041 °C 0.058 °C 0.066 °C 0.072 °C 0.11 °C	
Type L	(-200 to 0) °C (> 0 to 900) °C	0.064 °C 0.092 °C	
Type N	(-200 to -10) °C (> -10 to -25) °C (> -25 to 120) °C (> 120 to 1300) °C	0.13 °C 0.12 °C 0.066 °C 0.23 °C	
Type R	(0 to 400) °C (> 400 to 1760) °C	0.16 °C 0.18 °C	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Electrical Simulation of Thermocouple Temperature Indicators[3] – (cont)			
Type S	(0 to 400) °C (> 400 to 1760) °C	0.16 °C 0.19 °C	Multifunction calibrator
Type T	(-250 to 0) °C (> 0 to 400) °C	0.041 °C 0.049 °C	
Type U	(-200 to 0) °C (> 0 to 600) °C	0.072 °C 0.052 °C	
Energy – Defibrillator (Monophasic, Biphasic)	1 J (> 1 to 2) J (> 2 to 3) J (> 3 to 5) J (> 5 to 6) J (> 6 to 7) J (> 7 to 8) J (> 8 to 9) J (> 9 to 10) J (> 10 to 13) J (> 13 to 20) J (> 20 to 25) J (> 25 to 37) J (> 37 to 61) J (> 61 to 93) J (> 93 to 125) J (> 125 to 150) J (> 150 to 185) J (> 185 to 360) J	1.2 % 0.94 % 0.70 % 1.4 % 1.9 % 0.90 % 2.5 % 1.1 % 2.2 % 3.3 % 1.3 % 0.89 % 1.0 % 1.3 % 0.73 % 0.76 % 0.72 % 0.79 % 0.71 %	Defibrillator analyzer with pacer
Power/Electrosurgical – Measuring Equipment	At 200 Ω: 10 W (> 10 to 50) W (> 50 to 150) W (> 150 to 300) W At 500 Ω: 10 W (> 10 to 50) W (> 50 to 150) W (> 150 to 300) W	 1.4 % 1.4 % 1.4 % 1.4 % 0.72 % 0.72 % 0.72 % 0.72 %	Electrosurgery analyzer

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Power/Electrosurgical – Measuring Equipment (cont)	At 1000 Ω 10 W (> 10 to 50) W (> 50 to 150) W (> 150 to 300) W At 2000 Ω 10 W (> 10 to 50) W (> 50 to 150) W (> 150 to 300) W At 5000 Ω 10 W (> 10 to 50) W (> 50 to 150) W (> 150 to 300) W	 0.48 % 0.48 % 0.48 % 0.48 % 0.41 % 0.41 % 0.41 % 0.41 % 0.25 % 0.25 % 0.25 % 0.25 %	Electrosurgery analyzer

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] –			
Single Volume Pipettes	Up to 0.5 mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL	0.062 µL 0.080 µL 0.085 µL 0.19 µL 0.22 µL 0.43 µL 0.56 µL 1.0 µL 2.0 µL	Gravimetric method
One-mark Volumetric Flasks	Up to 1 mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL	0.068 µL 0.085 µL 0.18 µL 0.22 µL 0.43 µL 0.56 µL 1.0 µL 2.0 µL 3.1 µL 4.1 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] – (cont)			
One-mark Volumetric Flasks	(> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL (> 1000 to 2000) mL (> 2000 to 3000) mL (> 3000 to 5000) mL	5.3 µL 10 µL 20 µL 45 µL 74 µL 0.11 mL	Gravimetric method
Graduated Pipettes	Up to 0.1 mL (0.1 to 0.2) mL (> 0.2 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL	0.054 µL 0.055 µL 0.069 µL 0.087 µL 0.085 µL 0.19 µL 0.22 µL 0.43 µL 0.56 µL	
Graduated Measuring Cylinders	Up to 1 mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 4) mL (> 4 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 75) mL (> 75 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 750) mL (> 750 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL	0.087 µL 0.085 µL 0.13 µL 0.18 µL 0.19 µL 0.22 µL 0.34 µL 0.43 µL 0.56 µL 1.0 µL 1.5 µL 2.0 µL 3.1 µL 4.1 µL 5.3 µL 10 µL 15 µL 20 µL 37 µL 45 µL	
Plastic Graduated Measuring Cylinders	Up to 1 mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 4) mL (> 4 to 5) mL (> 5 to 10) mL (> 10 to 15) mL	0.090 µL 0.098 µL 0.15 µL 0.20 µL 0.23 µL 0.33 µL 0.51 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] – (cont)			
Plastic Graduated Measuring Cylinders	(> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 75) mL (> 75 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 750) mL (> 750 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL	0.66 µL 0.84 µL 1.6 µL 2.4 µL 3.2 µL 4.9 µL 6.5 µL 8.2 µL 16 µL 24 µL 32 µL 53 µL 68 µL	Gravimetric method
Burettes	Up to 0.5 mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 40) mL (> 40 to 50) mL (> 50 to 60) mL (> 60 to 70) mL (> 70 to 80) mL (> 80 to 90) mL (> 90 to 100) mL	0.13 µL 0.12 µL 0.15 µL 0.15 µL 0.19 µL 0.22 µL 0.34 µL 0.43 µL 0.56 µL 0.63 µL 0.82 µL 1.0 µL 1.2 µL 1.4 µL 1.6 µL 1.8 µL 2.0 µL	
Pyknometer Type 3 (Gay-Lussac), Type 4 (Reischauer), Type 5 (Hubbard), Type 6 (With Thermometer Coupled)	Up to 1 mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL	0.080 µL 0.085 µL 0.19 µL 0.22 µL 0.43 µL 0.56 µL 1.0 µL 2.0 µL	
Centrifuge Tube (6 in, 8 in)	Up to 0.1 mL (0.1 to 0.2) mL (> 0.2 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL	0.054 µL 0.055 µL 0.069 µL 0.087 µL 0.085 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume – (cont)			
Centrifuge Tube (6 in, 8 in)	(> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL	0.19 µL 0.22 µL 0.43 µL 0.56 µl 1.0 µL 2.0 µL	Gravimetric method
Imhoff Cone	Up to 0.1 mL (> 0.1 to 0.2) mL (> 0.2 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL	0.054 µL 0.055 µL 0.069 µL 0.087 µL 0.085 µL 0.19 µL 0.22 µL 0.43 µL 0.56 µL 1.0 µL 2.0 µL 3.1 µL 4.1 µL 5.3 µL 10 µL 20 µL	
Beaker	Up to 10 mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL	0.22 µL 0.43 µL 0.56 µL 1.0 µL 2.0 µL 3.1 µL 4.1 µL 5.3 µL 10 µL 20 µL	
Water Trap (Dean-Stark Trap)			
Style A (Conical)	Up to 0.1 mL (> 0.1 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL	0.054 µL 0.055 µL 0.057 µL 0.083 µL 0.12 µL 0.21 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume – (cont)			
Water Trap (Dean-Stark Trap)			Gravimetric method
Style B, C, D (Conical)	Up to 0.1 mL (> 0.1 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL	0.054 µL 0.069 µL 0.087 µL 0.085 µL 0.19 µL 0.22 µL 0.43 µL 0.56 µL	
Style E (Round)	Up to 0.1 mL (> 0.1 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL	0.054 µL 0.069 µL 0.087 µL 0.086 µL 0.19 µL 0.23 µL	
Style F (Round)	Up to 0.1 mL (> 0.1 to 0.5) mL (> 0.5 to 1) mL (> 1 to 2) mL	0.054 µL 0.069 µL 0.087 µL 0.085 µL	
Standard Test Measures (Seraphin Test Measures)	Up to 5 gal Up to 19 000 mL (> 19 000 to 22 000) ml (> 22 000 to 32 000) mL	0.84 mL 0.84 mL 0.95 mL 1.0 mL	Gravimetric method
Piston Operated Volumetric Apparatus –			
Piston Pipettes	(10 to 50) µL (> 50 to 100) µL (> 100 to 200) µL (> 200 to 250) µL (> 250 to 500) µL (> 500 to 1000) µL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL	0.052 µL 0.053 µL 0.057 µL 0.059 µL 0.063 µL 0.084 µL 0.098 µL 0.12 µL 0.23 µL 0.33 µL	Gravimetric method

Parameter/Equipment	Range	CMC[2] (±)	Comments
Piston Operated Volumetric Apparatus – (cont)			
Piston Burettes	Up to 1 mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL	0.063 µL 0.098 µL 0.12 µL 0.23 µL 0.33 µL 0.49 µL 0.66 µL 0.84 µL 0.98 µL 1.6 µL 3.2 µL	Gravimetric method
Dispensers	(10 to 50) µL (> 50 to 100) µL (> 100 to 200) µL (> 200 to 250) µL (> 250 to 500) µL (> 500 to 1000) µL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL	0.052 µL 0.053 µL 0.057 µL 0.059 µL 0.063 µL 0.063 µL 0.098 µL 0.12 µL 0.23 µL 0.33 µL 0.49 µL 0.66 µL 0.84 µL 0.98 µL 1.6 µL 3.2 µL 4.9 µL 6.5 µL	
Volumetric Containers –			
Plastic, Metal, Glass	(10 to 50) µL (> 50 to 100) µL (> 100 to 200) µL (> 200 to 250) µL (> 250 to 500) µL (> 500 to 1000) µL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL	0.052 µL 0.053 µL 0.057 µL 0.059 µL 0.063 µL 0.067 µL 0.085 µL 0.12 µL 0.23 µL 0.33 µL 0.49 µL	Gravimetric method

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volumetric Containers – (cont)			
Plastic, Metal, Glass	(> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 220) mL (> 220 to 500) mL (> 500 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL (> 2000 to 3000) mL (> 3000 to 5000) mL (> 4500 to 6000) mL (> 6000 to 7500) mL (> 7500 to 9000) mL (> 9000 to 15 000) mL (> 15 000 to 20 000) mL (> 20 000 to 25 000) mL (> 25 000 to 32 000) mL	0.66 µL 0.84 µL 0.98 µL 1.6 µL 2.0 µL 3.1 µL 4.1 µL 5.3 µL 10 µL 20 µL 37 µL 45 µL 74 µL 0.11 mL 0.13 mL 0.38 mL 0.40 mL 0.56 mL 0.63 mL 0.78 mL 0.88 mL	Gravimetric method
Volumetric Flow/Infusion Pump[3]	(0.1 to 10) mL/h (> 10 to 25) mL/h (> 25 to 50) mL/h (> 50 to 100) mL/h (> 100 to 200) mL/h (> 200 to 300) mL/h (> 300 to 400) mL/h (> 400 to 500) mL/h (> 500 to 600) mL/h (> 600 to 700) mL/h (> 700 to 800) mL/h (> 800 to 900) mL/h (> 900 to 1000) mL/h (> 1000 to 1100) mL/h (> 1100 to 1200) mL/h (> 1200 to 1300) mL/h (> 1300 to 1500) mL/h	0.0058 mL/h 0.0059 mL/h 0.0061 mL/h 0.0071 mL/h 0.010 mL/h 0.014 mL/h 0.017 mL/h 0.021 mL/h 0.025 mL/h 0.029 mL/h 0.033 mL/h 0.037 mL/h 0.042 mL/h 0.050 mL/h 0.054 mL/h 0.057 mL/h 0.065 mL/h	Comparison using analytical balance & timer with distilled water as medium

V. Mechanical

Parameter/Range	Frequency	CMC[2, 5] (±)	Comments
Vibration Measuring Devices[3] Peak Acceleration: 0.4 g_n (3.92 m/s^2) 0.8 g_n (7.84 m/s^2) 1 g_n (9.81 m/s^2)	 7 Hz 10 Hz 30 Hz to 2 kHz (> 2 to 3) kHz (> 3 to 4) kHz (> 4 to 5) kHz (> 5 to 6) kHz (> 6 to 8) kHz (> 8 to 9) kHz (> 9 to 10) kHz	 0.012 g_n (0.12 m/s^2) 0.018 g_n (0.18 m/s^2) 0.021 g_n (0.21 m/s^2) 0.028 g_n (0.27 m/s^2) 0.030 g_n (0.29 m/s^2) 0.035 g_n (0.34 m/s^2) 0.029 g_n (0.28 m/s^2) 0.035 g_n (0.34 m/s^2) 0.039 g_n (0.38 m/s^2) 0.045 g_n (0.44 m/s^2)	Back-to-back comparison using portable reference calibrator (shaker & transducer) (g_n = acceleration of free fall, standard) = 9.80665 m/s^2)
Gauge Pressure[3] – Pneumatic, Hydraulic	-12 psig 0 psig (> 0 to 2) psig (> 2 to 4) psig (> 4 to 5) psig (> 5 to 7) psig (> 7 to 9) psig (> 9 to 10) psig (> 10 to 25) psig (> 25 to 50) psig (> 50 to 100) psig (> 100 to 145) psig (> 145 to 290) psig (> 290 to 435) psig (> 435 to 580) psig (> 580 to 750) psig (> 750 to 1000) psig (> 1000 to 1250) psig (> 1250 to 1500) psig (> 1500 to 1750) psig (> 1750 to 2000) psig (> 2000 to 3750) psig (> 3750 to 5000) psig (> 5000 to 6250) psig (> 6250 to 7500) psig (> 7500 to 10000) psig (> 10000 to 30000) psig	0.074 psig 0.015 psig 0.0087 psig 0.0090 psig 0.011 psig 0.010 psig 0.011 psig 0.012 psig 0.021 psig 0.023 psig 0.024 psig 0.14 psig 0.16 psig 0.15 psig 0.16 psig 0.49 psig 0.43 psig 0.45 psig 0.60 psig 0.81 psig 0.78 psig 1.4 psig 1.3 psig 1.1 psig 1.3 psig 2.1 psig 37 psig	Pressure gauges

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Pressure/Blood Pressure Cuff[3]	(0 to 50) mmHg (> 50 to 100) mmHg (> 100 to 150) mmHg (> 150 to 200) mmHg (> 200 to 300) mmHg	0.66 mmHg 0.65 mmHg 0.66 mmHg 0.68 mmHg 0.75 mmHg	Patient calibrator
Non-Invasive Blood Pressure/Multi-Parameter Monitors[3]	(0 to 50) mmHg (> 50 to 100) mmHg (> 100 to 150) mmHg (> 150 to 200) mmHg (> 200 to 300) mmHg	0.66 mmHg 0.65 mmHg 0.66 mmHg 0.68 mmHg 0.75 mmHg	Patient calibrator
Torque Wrench & Tools	1 N·m (> 1 to 10) N·m (> 10 to 20) N·m (> 20 to 40) N·m (> 40 to 60) N·m (> 60 to 100) N·m (> 100 to 240) N·m (> 240 to 400) N·m (> 400 to 600) N·m (> 600 to 800) N·m (> 800 to 1000) N·m	0.39 % 0.32 % 0.30 % 0.31 % 0.22 % 0.24 % 0.18 % 0.17 % 0.16 % 0.17 % 0.18 %	Torque transducers
Torque Transducers	(1 to 1000) N·m	0.13 %	Comparison with torque arm & weights
Scales & Balances[3]	1 mg (> 1 to 2) mg (> 2 to 5) mg (> 5 to 20) mg (> 20 to 50) mg (> 50 to 100) mg (> 100 to 200) mg (> 200 to 500) mg (> 0.5 to 1) g (> 1 to 2) g (> 2 to 5) g (> 5 to 10) g (> 10 to 20) g (> 20 to 50) g (> 50 to 100) g (> 100 to 150) g	0.014 mg 0.016 mg 0.010 mg 0.014 mg 0.010 mg 0.013 mg 0.034 mg 0.020 mg 0.010 mg 0.016 mg 0.021 mg 0.038 mg 0.049 mg 0.11 mg 0.19 mg 0.38 mg	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Scales & Balances[3] (cont)	(> 150 to 220) g	0.57 mg	OIML class E2 & F1 weights
	(> 220 to 250) g	0.82 mg	
	(> 250 to 400) g	0.89 mg	
	(> 400 to 500) g	0.90 mg	
	(> 500 to 600) g	1.0 mg	
	(> 600 to 700) g	1.3 mg	
	(> 700 to 800) g	1.4 mg	
	(> 800 to 1000) g	1.6 mg	
	(> 1000 to 1250) g	8.4 mg	
	(> 1250 to 1500) g	8.5 mg	
	(> 1500 to 1750) g	8.7 mg	
	(> 1750 to 2000) g	8.8 mg	
	(> 2000 to 2500) g	9.2 mg	
	(> 2500 to 3000) g	10 mg	
	(> 3000 to 5000) g	19 mg	
	(> 5000 to 10 000) g	86 mg	
	(> 10 000 to 12 500) g	89 mg	
	(> 12 500 to 15 000) g	91 mg	
	(> 15 000 to 20 000) g	93 mg	
	(> 20 000 to 25 000) g	97 mg	
	(> 25 000 to 30 000) g	0.10 g	
	(> 30 000 to 32 000) g	0.11 g	
	(> 32 to 35) kg	0.41 g	OIML class F1 weights
	(> 35 to 55) kg	0.42 g	
	(> 55 to 60) kg	0.43 g	
	(> 60 to 75) kg	0.87 g	
	(> 75 to 100) kg	0.85 g	
	(> 100 to 150) kg	94 g	
	(> 150 to 200) kg	98 g	
	(> 200 to 250) kg	1.0 g	
	(> 250 to 300) kg	1.1 g	OIML class F1 & M1 weights
	(> 300 to 550) kg	4.2 g	
	(> 550 to 700) kg	4.3 g	
	(> 700 to 750) kg	4.4 g	
Weights –			OIML R 111-1 method using reference masses:
OIML Classes F1, F2, M1, M2 & M3	1 mg	0.012 mg	OIML Class E2
	2 mg	0.015 mg	
	5 mg	0.0085 mg	
	10 mg	0.0061 mg	
	20 mg	0.013 mg	
	50 mg	0.0082 mg	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Weights – (cont)			OIML R 111-1 method using reference masses:
OIML Classes F1, F2, M1, M2 & M3	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	0.012 mg 0.033 mg 0.019 mg 0.0082 mg 0.013 mg 0.019 mg 0.037 mg 0.048 mg 0.11 mg 0.19 mg 0.45 mg 0.79 mg 1.6 mg 3.2 mg	OIML Class E2
OIML Classes F2, M1, M2 & M3	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 5 kg 10 kg 20 kg 25 kg	0.010 mg 0.011 mg 0.011 mg 0.012 mg 0.013 mg 0.014 mg 0.018 mg 0.021 mg 0.028 mg 0.037 mg 0.041 mg 0.053 mg 0.11 mg 0.22 mg 0.47 mg 0.89 mg 1.7 mg 1.2 mg 4.5 mg 14 mg 26 mg 86 mg 93 mg 98 mg	OIML Class F1 OIML Class F1

VI. Thermodynamics

Parameter/Equipment	Range	CMC[2] (±)	Comments
Liquid Baths[3]	(-25 to 0) °C (0 to 140) °C (140 to 200) °C (200 to 250) °C (250 to 660) °C	0.041 °C 0.033 °C 0.066 °C 0.089 °C 0.091 °C	PRT probe & temperature indicator
Dry Blocks[3]	(-25 to 0) °C (0 to 140) °C (140 to 350) °C (350 to 660) °C	0.062 °C 0.057 °C 0.074 °C 0.091 °C	PRT probe & temperature indicator
Climatic Chambers[3] – (Including Oven, Incubator, Refrigerator, Freezer, Autoclave, Sterilizers, Muffles)	(-25 to 0) °C (0 to 60) °C (> 60 to 140) °C (> 140 to 300) °C (> 300 to 660) °C (> 660 to 1050) °C	0.9 °C 1.1 °C 1.3 °C 1.6 °C 3.6 °C 4.5 °C	PRT probe & temperature indicator, Elitech datalogger Thermocouple & readout
Bi-Metal Thermometers[3]	(-25 to 660) °C	0.12 °C	PRT probe & temperature indicator
Digital Thermometers (TC or RTD Probes & Indicators)[3]	(-25 to <0) °C 0 °C (> 0 to 30) °C (> 30 to 140) °C (> 140 to 232) °C (> 232 to 420) °C (> 420 to 660) °C (> 660 to 1000) °C	0.0030 °C 0.0028 °C 0.0030 °C 0.0043 °C 0.019 °C 0.017 °C 0.014 °C 0.58 °C	PRT probe & precision multimeter
IR Thermometers (Fixed emissivity of 0.95)	-15 °C (> -15 to 0) °C (> 0 to 50) °C (> 50 to 100) °C (> 100 to 120) °C	1.2 °C 0.67 °C 0.67 °C 1.5 °C 1.8 °C	Blackbody (8 to 14) µm spectral band & Emissivity of 0.95

Parameter/Equipment	Range	CMC[2] (±)	Comments
Liquid-In-Glass Thermometers[3]	(-25 to 0) °C (> 0 to 6) °C (> 6 to 30) °C (> 30 to 35) °C (> 35 to 140) °C	0.042 °C 0.032 °C 0.031 °C 0.032 °C 0.042 °C	PRT probe & temperature indicator
Environmental Thermometers	(-5 to 10) °C (> 10 to 25) °C (> 25 to 45) °C (> 45 to 50) °C	0.24 °C 0.17 °C 0.16 °C 0.18 °C	PRT probe & temperature indicator
Relative Humidity – Thermo-Hygrometer	20 % RH (> 20 to 30) % RH (> 30 to 50) % RH (> 50 to 80) % HR (> 80 to 90) % RH	1.5 % RH 1.4 % RH 1.0 % RH 1.2 % HR 1.1 % RH	Temperature sensor & readout
Humidity Chambers[3]	20 % RH (> 20 to 30) % RH (> 30 to 50) % RH (> 50 to 70) % RH (> 70 to 80) % HR (> 80 to 90) % HR	1.5 % RH 1.4 % RH 1.2 % RH 1.3 % RH 1.4 % RH 1.2 % RH	Humidity sensor & readout

VII. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Frequency[3] – Measuring Equipment	(0 to 100) Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz	0.066 mHz 0.91 mHz 10 mHz 20 mHz 50 mHz 0.10 Hz 1.0 Hz 12 Hz	Multifunction calibrator comparison

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Frequency[3] – Measure	Up to 5 Hz (> 5 to 10) Hz (> 10 to 100) Hz > 100 Hz to 1 kHz (> 1 to 10) kHz (> 10 to 100) kHz > 100 kHz to 1 MHz (> 1 to 10) MHz (> 10 to 500) MHz > 500 MHz to 1 GHz	0.058 mHz 0.12 mHz 1.2 mHz 12 mHz 0.12 Hz 1.2 Hz 12 Hz 0.12 kHz 0.58 kHz 0.58 kHz	Multifunction calibrator
Stopwatches, Hour Meters & Timers[3]	10 s to 1.0 h (> 1.0 to 2.5) h (> 2.5 to 5.0) h (> 5.0 to 10.0) h (> 10.0 to 15.0) h (> 15.0 to 20.0) h (> 20.0 to 24.0) h	0.092 s 0.11 s 0.15 s 0.26 s 0.38 s 0.51 s 0.61 s	Reference stopwatch
Tachometers[3]	Up to 60 RPM (> 60 to 600) RPM (> 600 to 6000) RPM (> 6000 to 60 000) RPM (> 60 000 to 100 000) RPM	0.0040 RPM 0.0070 RPM 0.058 RPM 0.58 RPM 0.84 RPM	Multifunction calibrator & LED artifact
Cardiac Rate ECG/Multiparameter Monitor[3] (-6 to 14) mV	(20 to 300) BPM	0.67 BPM	Defibrillator analyzer with pacer
Cardiac Rate/Electrocardiogram[3] (-6 to 14) mV	(20 to 300) BPM	0.67 BPM	Defibrillator analyzer with pacer
Cardiac Rate (Pacer)[3] (5 to 200) mA	(20 to 300) BPM	0.67 BPM	Defibrillator analyzer with pacer
Centrifuges[3]	Up to 5000 RPM	0.58 RPM	Optical tachometer

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
RCD Trip Time[3] (Electronically Activated)	Up to 20 ms (> 20 to 30) ms (> 30 to 40) ms (> 40 to 100) ms (> 100 to 200) ms (> 200 to 390) ms (> 390 to 900) ms	0.72 ms 0.82 ms 0.68 ms 0.69 ms 0.55 ms 0.62 ms 8.1 ms	Multifunction calibrator

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CALIBRATION

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Evidential Alcohol Analyzers[3]	0.2420 g/l 0.6050 g/l 1.2100 g/l 1.8150 g/l 2.4200 g/l 4.800 g/l	0.014 g/l 0.011 g/l 0.015 g/l 0.023 g/l 0.032 g/l 0.094 g/l	Alcohol reference solutions
Conductivity Meters[3]	5 µS/cm 10 µS/cm 100 µS/cm 1000 µS/cm 1413 µS/cm 10 000 µS/cm 100 000 µS/cm 200 000 µS/cm	0.62 µS/cm 0.62 µS/cm 2.1 µS/cm 5.5 µS/cm 6.2 µS/cm 50 µS/cm 0.47 mS/cm 0.77 mS/cm	Conductivity standard solutions
pH Meters[3]	4 pH Unit 7 pH Unit 10 pH Unit	0.018 pH Unit 0.018 pH Unit 0.018 pH Unit	pH buffer solutions

II. Dimensional

Parameter/Equipment	Range	CMC[2] (±)	Comments
Calipers[3] – Exterior	(1.0 to 280) mm (0.05 to 7.5) in	7.4 µm 340 µin	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Calipers[3] – (cont)			
Interior	(1.0 to 280) mm (0.05 to 7.5) in	8.2 µm 370 µin	Comparison with master gauge blocks
Depth	(1.0 to 280) mm (0.05 to 7.5) in	7.1 µm 330 µin	
Depth Gauges[3]	(1.0 to 280) mm (0.05 to 7.5) in	5.9 µm 290 µin	Comparison with master gauge blocks
Depth Micrometers[3]	(1.0 to 10) mm (> 10 to 20) mm (> 20 to 30) mm (> 30 to 50) mm (> 50 to 60) mm (> 60 to 70) mm (> 70 to 100) mm (> 100 to 110) mm (> 110 to 120) mm (> 120 to 150) mm (> 150 to 160) mm (> 160 to 170) mm (> 170 to 180) mm (> 180 to 200) mm (> 200 to 210) mm (> 210 to 220) mm (> 220 to 250) mm (> 250 to 260) mm (> 260 to 270) mm (> 270 to 280) mm (0.05 to 0.5) in (> 0.5 to 1.0) in (> 1.0 to 2.0) in (> 2.0 to 3.0) in (> 3.0 to 3.9) in (> 3.9 to 4.0) in (> 4.0 to 4.5) in (> 4.5 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 7.5) in	0.58 µm 0.61 µm 0.64 µm 0.62 µm 0.63 µm 0.65 µm 0.68 µm 0.69 µm 0.71 µm 0.72 µm 0.73 µm 0.75 µm 0.77 µm 0.76 µm 0.77 µm 0.79 µm 0.80 µm 0.81 µm 0.82 µm 0.84 µm 58 µin 59 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin 67 µin	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indicators[3]	1.0 to 10) mm (> 10 to 20) mm (> 20 to 30) mm (> 30 to 50) mm (> 50 to 60) mm (> 60 to 70) mm (> 70 to 100) mm (> 100 to 110) mm (> 110 to 120) mm (> 120 to 150) mm (> 150 to 160) mm (> 160 to 170) mm (> 170 to 180) mm (> 180 to 200) mm (0.05 to 0.5) in (> 0.5 to 1.0) in (> 1.0 to 2.0) in (> 2.0 to 3.0) in (> 3.0 to 3.9) in (> 3.9 to 4.0) in (> 4.0 to 4.5) in (> 4.5 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 7.5) in	0.58 µm 0.61 µm 0.64 µm 0.62 µm 0.63 µm 0.65 µm 0.68 µm 0.69 µm 0.71 µm 0.72 µm 0.73 µm 0.75 µm 0.77 µm 0.76 µm 58 µin 59 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin 67 µin	Comparison with master gauge blocks
Inside Micrometers[3]	(1.0 to 10) mm (> 10 to 20) mm (> 20 to 30) mm (> 30 to 50) mm (> 50 to 60) mm (> 60 to 70) mm (> 70 to 100) mm (> 100 to 110) mm (> 110 to 120) mm (> 120 to 150) mm (> 150 to 160) mm (> 160 to 170) mm (> 170 to 180) mm (> 180 to 200) mm (> 200 to 210) mm (> 210 to 220) mm (> 220 to 250) mm (> 250 to 260) mm (> 260 to 270) mm (> 270 to 280) mm	0.58 µm 0.61 µm 0.64 µm 0.62 µm 0.63 µm 0.65 µm 0.68 µm 0.69 µm 0.71 µm 0.72 µm 0.73 µm 0.75 µm 0.77 µm 0.76 µm 0.77 µm 0.79 µm 0.80 µm 0.81 µm 0.82 µm 0.84 µm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Inside Micrometers[3] (cont)	(0.05 to 0.5) in (> 0.5 to 1.0) in (> 1.0 to 2.0) in (> 2.0 to 3.0) in (> 3.0 to 3.9) in (> 3.9 to 4.0) in (> 4.0 to 4.5) in (> 4.5 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 7.5) in	58 µin 59 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin 67 µin	
Outside Micrometers[3]	(1.0 to 10) mm (> 10 to 20) mm (> 20 to 30) mm (> 30 to 50) mm (> 50 to 60) mm (> 60 to 70) mm (> 70 to 100) mm (> 100 to 110) mm (> 110 to 120) mm (> 120 to 150) mm (> 150 to 160) mm (> 160 to 170) mm (> 170 to 180) mm (> 180 to 200) mm (> 200 to 210) mm (> 210 to 220) mm (> 220 to 250) mm (> 250 to 260) mm (> 260 to 270) mm (> 270 to 280) mm (0.05 to 0.5) in (> 0.5 to 1.0) in (> 1.0 to 2.0) in (> 2.0 to 3.0) in (> 3.0 to 3.9) in (> 3.9 to 4.0) in (> 4.0 to 4.5) in (> 4.5 to 5.5) in (> 5.5 to 6.5) in (> 6.5 to 7.5) in	0.58 µm 0.61 µm 0.64 µm 0.62 µm 0.63 µm 0.65 µm 0.68 µm 0.69 µm 0.71 µm 0.72 µm 0.73 µm 0.75 µm 0.77 µm 0.76 µm 0.77 µm 0.79 µm 0.80 µm 0.81 µm 0.82 µm 0.84 µm 58 µin 59 µin 60 µin 61 µin 62 µin 63 µin 64 µin 65 µin 66 µin 67 µin	Comparison with master gauge blocks
Thickness Gauges[3]	1.0 to 10) mm (> 10 to 20) mm	0.58 µm 0.61 µm	Comparison with master gauge blocks

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thickness Gauges[3] (cont)	(> 20 to 30) mm (> 30 to 50) mm (0.05 to 0.5) in (> 0.5 to 1.0) in (> 1.0 to 2.0) in (> 2.0 to 3.0) in (> 3.0 to 3.9) in (> 3.9 to 4.0) in	0.64 µm 0.62 µm 58 µin 59 µin 60 µin 61 µin 62 µin 63 µin	Comparison with master gauge blocks
Clinometers, Inclinometers & Electronic Levels	0.25° (0.25 to 0.5)° (0.5 to 1)° (1 to 2)° (2 to 3)° (3 to 4)° (4 to 5)° (5 to 10)° (10 to 15)° (15 to 20)° (20 to 25)° (25 to 30)° (30 to 45)° (45 to 60)° (60 to 90)° (90 to 120)° (120 to 135)° (135 to 150)° (150 to 165)° (165 to 180)° (180 to 210)° (210 to 225)° (225 to 300)° (300 to 360)°	0.0086° 0.0086° 0.0069° 0.0091° 0.0058° 0.0058° 0.0062° 0.0070° 0.0062° 0.0062° 0.0070° 0.0087° 0.0061° 0.0060° 0.0077° 0.0066° 0.0088° 0.0075° 0.0064° 0.011° 0.0072° 0.0069° 0.0069° 0.0070°	Comparison with angle blocks
Protractor – Digital & Mechanical	0.25° (0.25 to 0.5)° (0.5 to 1)° (1 to 2)° (2 to 3)° (3 to 4)° (4 to 5)° (5 to 10)°	0.0086° 0.0086° 0.0069° 0.0091° 0.0058° 0.0058° 0.0062° 0.0070°	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Protractor – Digital & Mechanical (cont)	(10 to 15)° (15 to 20)° (20 to 25)° (25 to 30)° (30 to 45)° (45 to 60)° (60 to 90)° (90 to 120)° (120 to 135)° (135 to 150)° (150 to 165)° (165 to 180)° (180 to 210)° (210 to 225)° (225 to 300)° (300 to 360)°	0.0062° 0.0062° 0.0070° 0.0087° 0.0061° 0.0060° 0.0077° 0.0066° 0.0088° 0.0075° 0.0064° 0.011° 0.0072° 0.0069° 0.0069° 0.0070°	Comparison with angle blocks
Rulers	(0 to 1) m	0.55 mm	Comparison with reference rulers

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Measure	(0 to 100) mV (0.1 to 100) V (100 to 1000) V	22 µV 4.6 mV 46 mV	Precision multimeter
DC Voltage[3] – Generate	(0 to 20) mV (20 to 50) mV (50 to 100) mV (0.1 to 0.2) V (0.2 to 0.5) V (0.5 to 1) V (1 to 2) V (2 to 5) V (5 to 10) V (10 to 50) V (50 to 100) V (100 to 200) V (200 to 500) V (500 to 1000) V	13 µV 16 µV 21 µV 0.15 mV 0.16 mV 0.20 mV 1.6 mV 1.7 mV 1.9 mV 8.8 mV 13 mV 49 mV 84 mV 0.13 V	Multifunction calibrator

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Resistance[3] – Generate			
Simulated	(0 to 3) Ω (3 to 10) Ω (10 to 20) Ω (20 to 30) Ω (30 to 100) Ω (0.1 to 0.2) kΩ (0.2 to 0.3) kΩ (0.3 to 1) kΩ (1 to 2) kΩ (2 to 4) kΩ (4 to 6) kΩ (6 to 8) kΩ (8 to 9) kΩ (9 to 10) kΩ (10 to 30) kΩ (30 to 100) kΩ (0.1 to 0.3) MΩ (0.3 to 1) MΩ (1 to 10) MΩ	58 mΩ 60 mΩ 63 mΩ 65 mΩ 81 mΩ 0.20 Ω 0.84 Ω 0.88 Ω 1.3 Ω 6.5 Ω 6.6 Ω 6.7 Ω 6.8 Ω 6.9 Ω 62 Ω 66 kΩ 0.11 kΩ 1.5 kΩ 70 kΩ	Multifunction calibrator
Resistance[3] – Generate			
Passive 2 Wire	10.755 Ω 100.536 Ω 1.001 25 kΩ 10.0013 kΩ 99.964 kΩ 0.999 39 MΩ 9.9792 MΩ 99.38 MΩ	64 mΩ 0.12 Ω 0.87 Ω 7.0 Ω 67 Ω 1.4 kΩ 71 kΩ 0.42 MΩ	Multifunction calibrator
Resistance[3] – Measure			
2 Wire	(Up to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ	1.4 mΩ 13 mΩ 0.13 mΩ	Precision multimeter
Resistance[3] – Measure			
4 Wire	(Up to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ	1.4 mΩ 13 mΩ 0.13 mΩ	Precision multimeter

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Current[3] – Measure	(0 to 10) mA (10 to 100) nA (0.1 to 2) A	6.4 µA 64 µA 1.8 mA	Precision multimeter
DC Current[3] – Generate	(0 to 20) µA (20 to 50) µA (50 to 100) µA (0.1 to 0.2) mA (0.2 to 0.5) mA (0.5 to 1) mA (1 to 2) mA (2 to 4) mA (4 to 6) mA (6 to 8) mA (8 to 10) mA (10 to 20) mA (20 to 50) mA (50 to 100) mA (0.1 to 0.2) A (0.2 to 0.5) A (0.5 to 1) A (1 to 2) A (2 to 5) A (5 to 10) A	0.042 µA 0.052 µA 0.069 µA 0.21 µA 0.30 µA 0.47 µA 2.1 µA 2.7 µA 3.4 µA 4.0 µA 4.7 µA 20 µA 30 µA 47 µA 0.47 mA 0.53 mA 0.65 mA 9.9 mA 11 mA 12 mA	Multifunction calibrator
DC Current[3] – Clamp-On Meters			Multifunction calibrator & coil
2 Turn Coil	(0 to 2) A (> 2 to 4) A (> 4 to 8) A (> 8 to 12) A (> 12 to 16) A (> 16 to 20) A	0.13 A 0.14 A 0.18 A 0.19 A 0.21 A 0.23 A	
10 Turn Coil	(0 to 10) A (> 10 to 20) A (> 20 to 40) A (> 40 to 60) A (> 60 to 80) A (> 80 to 100) A	0.61 A 1.1 A 1.9 A 2.3 A 2.7 A 3.2 A	
50 Turn Coil	(0 to 50) A (> 50 to 100) A (> 100 to 200) A	1.3 A 1.6 A 2.3 A	

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Current[3] – Clamp-On Meters			
50 Turn Coil	(> 200 to 300) A (> 300 to 400) A (> 400 to 500) A	3.0 A 3.7 A 4.4 A	Multifunction calibrator & coil

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Generate			
(0 to 50) mV	(10 to 206) Hz	0.17 mV	Multifunction calibrator
(0 to 50) mV	206 Hz to 20 kHz	0.23 mV	
(50 to 100) mV	10 Hz to 1 kHz	0.20 mV	
(50 to 100) mV	1 kHz to 20 kHz	0.30 mV	
(0.1 to 0.5) V	10 Hz to 1 kHz	1.5 mV	
(0.1 to 0.5) V	1 kHz to 20 kHz	2.1 mV	
(0.5 to 1) V	10 Hz to 1 kHz	1.8 mV	
(0.5 to 1) V	1 kHz to 20 kHz	2.9 mV	
(1 to 2) V	(10 to 206) Hz	18 mV	
(1 to 2) V	206 Hz to 20 kHz	20 mV	
(2 to 3) V	(10 to 206) Hz	18 mV	
(3 to 4) V	(10 to 206) Hz	18 mV	
(4 to 6) V	(10 to 206) Hz	19 mV	
(6 to 8) V	(10 to 206) Hz	20 mV	
(8 to 10) V	10 Hz to 1 kHz	21 mV	
(2 to 10) V	(1 to 20) kHz	30 mV	
(10 to 50) V	10 Hz to 1 kHz	0.17 V	
(50 to 100) V	10 Hz to 1 kHz	0.20 V	
(100 to 500)	10 Hz to 1 kHz	1.7 V	
(0.5 to 1) kV	10 Hz to 1 kHz	1.9 V	
AC Current[3] – Measure			
(0 to 10) mA	60 Hz	16 µA	Precision multimeter
(10 to 100) mA	60 Hz	0.16 mA	
(0.1 to 2) A	60 Hz	3.4 mA	
AC Current[3] – Generate			
(0 to 20) µA	10 Hz to 2 kHz	0.51 µA	Multifunction calibrator
(0 to 50) µA	200 Hz	0.54 µA	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Generate (cont)			
(20 to 100) µA	10 Hz to 2 kHz	0.60 µA	Multifunction calibrator
(0.1 to 0.2) mA	10 Hz to 2 kHz	1.7 µA	
(0 .05 to 0.5) mA	200 Hz	2.0 µA	
(0.2 to 1) mA	10 Hz to 2 kHz	2.5 µA	
(1 to 2) mA	10 Hz to 2 kHz	25 µA	
(0.5 to 5) mA	200 Hz	27 µA	
(2 to 10) mA	10 Hz to 2 kHz	31 µA	
(10 to 20) mA	10 Hz to 2 kHz	0.26 mA	
(5 to 50) mA	200 Hz	0.27mA	
(20 to 100) mA	10 Hz to 2 kHz	0.31 mA	
(0.1 to 0.2) A	10 Hz to 2 kHz	2.8 mA	
(0.05 to 0.5) A	200 Hz	3.0 mA	
(0.2 to 1) A	10 Hz to 2 kHz	3.3 mA	
(1 to 2) A	10 Hz to 2 kHz	28 mA	
(0.5 to 5) A	200 Hz	29 mA	
(2 to 10) A	10 Hz to 2 kHz	31 mA	
AC Current[3] – Clamp-On Meters			
2 Turn Coil			Multifunction calibrator & coil
(0 to 2) A	(30 to 60) Hz	0.13 A	
(> 2 to 4) A		0.14 A	
(> 4 to 8) A		0.18 A	
(> 8 to 12) A		0.19 A	
(> 12 to 16) A		0.21 A	
(> 16 to 20) A		0.23 A	
10 Turn Coil			
(0 to 10) A	(30 to 60) Hz	0.61 A	
(> 10 to 20) A		1.1 A	
(> 20 to 40) A		1.9 A	
(> 40 to 60) A		2.3 A	
(> 60 to 80) A		2.7 A	
(> 80 to 100) A		3.2 A	
50 Turn Coil			
(0 to 50) A	(30 to 60) Hz	1.3 A	
(> 50 to 100) A		1.6 A	
(> 100 to 200) A		2.3 A	
(> 200 to 300) A		3.0 A	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Clamp-On Meters			
50 Turn Coil			
(0 to 50) A (> 50 to 100) A (> 100 to 200) A (> 200 to 300) A (> 300 to 400) A (> 400 to 500) A	(30 to 60) Hz	3.7 A 4.4 A	Multifunction calibrator & coil

IV. Fluid Quantities

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] –			
Single Volume Pipettes	Up to 0.5 mL (> 0.5 to 1) mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL	0.20 µL 0.21 µL 0.32 µL 0.33 µL 0.34 µL 0.50 µL 0.50 µL 0.63 µL 1.1 µL 2.1 µL	Gravimetric method
One-Mark Volumetric Flasks	Up to 1 mL (> 1 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL (> 2000 to 3000) mL	0.21 µL 0.32 µL 0.34 µL 0.49 µL 0.63 µL 1.1 µL 2.1 µL 3.2 µL 4.3 µL 23 µL 24 µL 30 µL 37 µL 47 µL 73 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] – (cont)			
Graduated Pipettes	Up to 0.5 mL (> 0.5 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL	0.21 µL 0.26 µL 0.31 µL 0.34 µL 0.49 µL 0.63 µL	Gravimetric method
Graduated Measuring Cylinders	Up to 2 mL (> 2 to 3) mL (> 3 to 4) mL (> 4 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 75) mL (> 75 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 750) mL (> 750 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL	0.26 µL 0.28 µL 0.30 µL 0.31 µL 0.34 µL 0.42 µL 0.49 µL 0.63 µL 1.1 µL 1.6 µL 2.1 µL 3.2 µL 4.3 µL 21 µL 23 µL 26 µL 30 µL 37 µL 47 µL	
Plastic Graduated Measuring Cylinders	Up to 1 mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 4) mL (> 4 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 75) mL (> 75 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 750) mL	0.21 µL 0.26 µL 0.29 µL 0.32 µL 0.34 µL 0.42 µL 0.56 µL 0.70 µL 0.89 µL 1.7 µL 2.5 µL 3.3 µL 4.9 µL 6.6 µL 22 µL 26 µL 32 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] – (cont)			
Plastic Graduated Measuring Cylinders	(> 750 to 1000) mL (> 1000 to 1500) mL (> 1500 to 2000) mL	39 µL 53 µL 69 µL	Gravimetric method
Burettes	Up to 2 mL (> 2 to 3) mL (> 3 to 4) mL (> 4 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 40) mL (> 40 to 50) mL (> 50 to 60) mL (> 60 to 70) mL (> 70 to 80) mL (> 80 to 90) mL (> 90 to 100) mL	0.29 µL 0.29µL 0.31 µL 0.31 µL 0.34 µL 0.41 µL 0.50 µL 0.63 µL 0.69 µL 0.89 µL 1.1 µL 1.3 µL 1.5 µL 1.7 µL 1.9 µL 2.1 µL	
Pyknometer Type 3 (Gay-Lussac), Type 4 (Reischauer), Type 5 (Hubbard), Type 6 (With Thermometer Coupled)	Up to 1 mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL	0.21 µL 0.26 µL 0.31 µL 0.34 µL 0.50 µL 0.63 µL 1.1 µL 2.1 µL	
Centrifuge Tube (6 in, 8 in)	Up to 0.5 mL (> 0.5 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL	0.21 µL 0.26 µL 0.31 µL 0.34 µL 0.50 µL 0.63 µL 1.1 µL 1.1 µL 2.1 µL	
Imhoff Cone	Up to 0.5 mL (> 0.5 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL	0.21 µL 0.26 µL 0.31 µL 0.34 µL 0.50 µL 0.63 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volume[3] – (cont)			
Imhoff Cone	(> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL	1.1 µL 2.1 µL 3.2 µL 4.3 µL 21 µL 23 µL 29 µL	Gravimetric method
Beaker	Up to 10 mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 250) mL (> 250 to 500) mL (> 500 to 1000) mL	0.34 µL 0.41 µL 0.50 µL 0.63 µL 1.1 µL 2.1 µL 3.2 µL 4.3 µL 21 µL 23 µL 29 µL	
Water Trap (Dean-Stark Trap) –			
Style A (Conical)	Up to 1 mL (> 1 to 5) mL (> 5 to 10) mL	0.21 µL 0.33 µL 0.33 µL	
Style B, C, D (Conical)	Up to 1 mL (> 1 to 5) mL (> 5 to 10) mL (> 10 to 20) mL (> 20 to 25) mL	0.21 µL 0.32 µL 0.34 µL 0.49 µL 0.63 µL	
Style E (Round)	Up to 1 mL (> 1 to 5) mL (> 5 to 10) mL	0.21 µL 0.31 µL 0.33 µL	
Style F (Round)	Up to 1 mL (> 1 to 2) mL	0.21 µL 0.34 µL	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Piston Operated Volumetric Apparatus –			
Piston Pipettes	(10 to 100) µL (> 100 to 200) µL (> 200 to 250) µL (> 250 to 500) µL (> 500 to 1000) µL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL	0.23 µL 0.21 µL 0.32 µL 0.30 µL 0.21 µL 0.26 µL 0.27 µL 0.34 µL 0.42 µL	Gravimetric method
Piston Burettes	Up to 1 mL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL	0.20 µL 0.27 µL 0.27 µL 0.34 µL 0.42 µL 0.54 µL 0.71 µL 0.89 µL 1.0 µL 1.7 µL 3.3 µL	
Dispensers	Up to 1000 µL (> 1 to 2) mL (> 2 to 3) mL (> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL	0.20 µL 0.26 µL 0.27 µL 0.34 µL 0.42 µL 0.54 µL 0.70 µL 0.89 µL 1.0 µL 1.7 µL 3.3 µL 4.9 µL 6.6 µL	
Volumetric Containers –			
Plastic, Metal, Glass	Up to 1000 µL (> 1 to 2) mL (> 2 to 3) mL	0.21 µL 0.31 µL 0.29 µL	Gravimetric method

Parameter/Equipment	Range	CMC[2] (±)	Comments
Volumetric Containers – (cont)			
Plastic, Metal, Glass	(> 3 to 5) mL (> 5 to 10) mL (> 10 to 15) mL (> 15 to 20) mL (> 20 to 25) mL (> 25 to 30) mL (> 30 to 50) mL (> 50 to 100) mL (> 100 to 150) mL (> 150 to 200) mL (> 200 to 220) mL (> 220 to 500) mL (> 500 to 1000) mL (> 1000 to 1250) mL (> 1250 to 1500) mL (> 1500 to 2000) mL (> 2000 to 3000) mL	0.31 µL 0.34 µL 0.41 µL 0.50 µL 0.63 µL 0.70 µL 1.1 µL 2.1 µL 3.2 µL 4.3 µL 4.7 µL 23 µL 29 µL 34 µL 37 µL 67 µL 73 mL	Gravimetric method

V. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Gauge Pressure[3] – Pneumatic, Hydraulic	(-12 to 0) psig 0 psig (> 0 to 50) psig (> 50 to 100) psig (> 100 to 150) psig (> 150 to 200) psig (> 200 to 250) psig (> 250 to 350) psig (> 350 to 400) psig (> 400 to 450) psig (> 450 to 1450) psig (> 1450 to 2900) psig (> 2900 to 4351) psig (> 4351 to 5801) psig (> 5801 to 7252) psig (> 7252 to 8702) psig	0.15 psig 0.072 psig 0.29 psig 0.34 psig 0.47 psig 0.44 psig 0.38 psig 0.88 psig 0.87 psig 0.89 psig 0.92 psig 0.90 psig 1.2 psig 0.92 psig 1.3 psig 1.1 psig	Pressure gauges

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Gauge Pressure[3] – Pneumatic, Hydraulic (cont)	(> 8702 to 10 153) psig (> 10 153 to 14 504) psig (> 14 504 to 29 008) psig (> 29 008 to 36 259) psig	1.5 psig 11 psig 10 psig 9.2 psig	Pressure gauges
Torque Wrench & Tools	Up 100 N·m (> 100 to 400) N·m (> 400 to 600) N·m (> 600 to 800) N·m (> 800 to 1000) N·m	0.27 % 0.62 % 0.49 % 0.23 % 1.1 %	Torque transducers
Scales & Balances[3]	1 mg (> 1 to 2) mg (> 2 to 5) mg (> 5 to 20) mg (> 20 to 50) mg (> 50 to 100) mg (> 100 to 200) mg (> 200 to 500) mg (> 0.5 to 1) g (> 1 to 2) g (> 2 to 5) g (> 5 to 10) g (> 10 to 20) g (> 20 to 50) g (> 50 to 100) g (> 100 to 200) g (> 200 to 400) g (> 400 to 500) g (> 500 to 600) g (> 600 to 700) g (> 700 to 800) g (> 800 to 900) g (> 900 to 1000) g (> 1000 to 1250) g (> 1250 to 1500) g (> 1500 to 1750) g (> 1750 to 2000) g (> 2000 to 2500) g (> 2500 to 3000) g (> 3000 to 5000) g (> 5000 to 10 000) g (> 10 000 to 12 500) g (> 12 500 to 15 000) g (> 15 000 to 20 000) g	0.023 mg 0.024 mg 0.021 mg 0.027 mg 0.033 mg 0.043 mg 0.054 mg 0.065 mg 0.074 mg 0.10 mg 0.14 mg 0.16 mg 0.22 mg 0.36 mg 0.82 mg 1.3 mg 2.4 mg 2.6 mg 3.1 mg 3.4 mg 4.0 mg 4.4 mg 5.3 mg 10 mg 11 mg 12 mg 13 mg 11 mg 55 mg 69 mg 0.10 g 0.11 g 0.13 g 0.56 g	OIML F1 & M1 weights

Parameter/Equipment	Range	CMC[2] (±)	Comments
Scales & Balances[3] (cont)	(> 20 000 to 25 000) g (> 25 000 to 30 000) g (> 30 to 35) kg (> 35 to 40) kg (> 40 to 45) kg (> 45 to 50) kg (> 50 to 60) kg (> 60 to 75) kg (> 75 to 100) kg (> 100 to 150) kg (> 150 to 200) kg (> 200 to 250) kg (> 250 to 300) kg (> 300 to 400) kg (> 400 to 450) kg (> 450 to 500) kg (> 500 to 550) kg (> 550 to 600) kg (> 600 to 625) kg	0.63 g 0.70 g 0.89 g 0.96 g 1.0 g 1.1 g 1.2 g 1.5 g 1.8 g 2.7 g 3.3 g 3.6 g 3.4 g 5.3 g 5.5 g 5.4 g 6.1 g 6.7 g 7.2 g	OIML F1 & M1 weights

VI. Thermodynamic

Parameter/Equipment	Range	CMC[2] (±)	Comments
Bi-Metal Thermometers[3]	(-25 to 140) °C (> 140 to 375) °C	0.13 °C 0.49 °C	PRT & precision multimeter
Digital Thermometers (TC or RTD Probes & Indicators)[3]	(-25 to 140) °C (> 140 to 375) °C	0.060 °C 0.48 °C	PRT & precision multimeter
Liquid-In-Glass Thermometers[3]	(-25 to 140) °C	0.30 °C	PRT & precision multimeter
Environmental Thermometers	(10 to 50) °C	1.3 °C	Humidity sensor & readout

Parameter/Equipment	Range	CMC[2] (±)	Comments
Relative Humidity – Thermo-Hygrometer	(33 to 90) % RH	2.1 % RH	Humidity sensor & readout

VII. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Frequency[3] – Measuring Equipment	(0 to 100) Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	3.4 Hz 12 Hz 10 Hz 13 Hz 13 Hz 13 Hz	Multifunction calibrator comparison
Stopwatches, Hour Meters & Timers[3]	10 s to 1.0 h (> 1.0 to 2.5) h (> 2.5 to 5.0) h (> 5.0 to 10.0) h (> 10.0 to 15.0) h (> 15.0 to 20.0) h (> 20.0 to 24.0) h	0.089 s 0.10 s 0.14 s 0.23 s 0.32 s 0.42 s 0.51 s	Reference stopwatch
Photo Tachometers[3]	(60 to 600) RPM (> 600 to 6000) RPM (> 6000 to 60 000) RPM (> 60 000 to 100 000) RPM	0.22 RPM 0.23 RPM 1.0 RPM 7.9 RPM	Multifunction calibrator comparison & LED artifact

[1] This laboratory offers commercial 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 these calibrations. 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.

[4] In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.

[5] 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.

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

[7] 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

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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 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 12th day of September 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4038.01
Valid to July 31, 2026

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