



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: April 30, 2025

Certificate Number: 2551.01

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

I. Chemical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
pH – Fixed Points <sup>3</sup>	4.000 pH 7.000 pH 10.000 pH	0.01 pH 0.02 pH 0.04 pH	pH buffer standards
Conductivity <sup>3</sup>	10 µS 100 µS 1000 µS 1413 µS 10 000 µS	0.65 µS 2.2 µS 23 µS 32 µS 230 µS	Conductivity standards

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Micrometers <sup>3</sup>	Up to 24 in	10 µin + 8 µin/in	Gage blocks

Parameter/Equipment	Range	CMC <sup>2</sup> ( $\pm$ )	Comments
Calipers <sup>3</sup> – Outside	Up to 24 in	10 $\mu$ in + 8 $\mu$ in/in	Gage blocks
Calipers <sup>3</sup> – Depth and Step	Up to 24 in	15 $\mu$ in + 7 $\mu$ in/in	Gage blocks
Gage Blocks	Up to 0.05 in (0.05 to 0.10) in (0.10 to 0.20) in (0.20 to 0.50) in (0.5 to 1.00) in (1.00 to 2.00) in (2.00 to 4.00) in	8.7 $\mu$ in 9 $\mu$ in 9.6 $\mu$ in 12 $\mu$ in + 34 $\mu$ in/in 22 $\mu$ in + 38 $\mu$ in/in 41 $\mu$ in + 39 $\mu$ in/in 81 $\mu$ in + 40 $\mu$ in/in	Pratt & Whitney Labmaster <sup>TM</sup>
Rulers	Up to 12 in	35 $\mu$ in + 10 $\mu$ in/in	Glass scale
Dial Indicators	Up to 1 in	14 $\mu$ in + 32 $\mu$ in/in	Gage blocks

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2, 4, 5</sup> ( $\pm$ )	Comments
DC Voltage – Generate	(0 to 330) mV (0 to 3.3) V (0 to 33) V (0 to 330) V (100 to 1000) V	18 $\mu$ V/V + 1 $\mu$ V 14 $\mu$ V/V + 2.0 $\mu$ V 15 $\mu$ V/V + 20 $\mu$ V 21 $\mu$ V/V + 150 $\mu$ V 15 $\mu$ V/V + 1.5 mV	Fluke 5520A
DC Voltage – Measure	(0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	4.4 $\mu$ V/V + 0.24 $\mu$ V 4.1 $\mu$ V/V + 0.4 $\mu$ V 5.0 $\mu$ V/V + 4 $\mu$ V 6.4 $\mu$ V/V + 40 $\mu$ V 4.6 $\mu$ V/V + 500 $\mu$ V	Fluke 8508A
DC High Voltage – Measure	(1 to 20) kV (20 to 25) kV	2.3 % 1.2 %	Fluke 80K-40 with Fluke 8508A
DC Clamp-On – Generate	(20 to 150) A (150 to 1000) A	0.66 % + 0.14 A 0.43 % + 0.5 A	Fluke 5520A/Fluke 50 turn coil

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
DC Current – Generate	(0 to 330) $\mu$ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	16 nA + 0.12 nA/ $\mu$ A 42 nA + 77 nA/mA 0.23 $\mu$ A + 77 nA/mA 2 $\mu$ A + 79 nA/mA 32 $\mu$ A + 0.16 mA/A 0.36 mA + 0.3 mA/A 0.5 mA + 0.38 mA/A 9.2 mA + 0.79 mA/A	Fluke 5520A
DC Current – Measure	(0 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	570 pA + 20 pA/ $\mu$ A 5 nA + 17 nA/mA 71 nA + 20 nA/mA 2.1 $\mu$ A + 69 nA/mA 37 $\mu$ A + 230 $\mu$ A/A 820 $\mu$ A + 500 $\mu$ A/A	Fluke 8508A
Resistance – Generate	(0 to 11) $\Omega$ (11 to 33) $\Omega$ (33 to 110) $\Omega$ (110 to 330) $\Omega$ 330 $\Omega$ to 1.1 k $\Omega$ (1.1 to 3.3) k $\Omega$ (3.3 to 11) k $\Omega$ (11 to 33) k $\Omega$ (33 to 110) k $\Omega$ (110 to 330) k $\Omega$ 330 k $\Omega$ to 1.1 M $\Omega$ (1.1 to 3.3) M $\Omega$ (3.3 to 11) M $\Omega$ (11 to 33) M $\Omega$ (33 to 110) M $\Omega$ (110 to 330) M $\Omega$ (330 to 1100) M $\Omega$	34 $\mu\Omega/\Omega$ + 0.01 $\Omega$ 24 $\mu\Omega/\Omega$ + 0.015 $\Omega$ 23 $\mu\Omega/\Omega$ + 0.015 $\Omega$ 23 $\mu\Omega/\Omega$ + 0.02 $\Omega$ 21 $\mu\Omega/\Omega$ + 0.02 $\Omega$ 22 $\mu\Omega/\Omega$ + 0.2 $\Omega$ 23 $\mu\Omega/\Omega$ + 0.1 $\Omega$ 24 $\mu\Omega/\Omega$ + 1 $\Omega$ 24 $\mu\Omega/\Omega$ + 1 $\Omega$ 46 $\mu\Omega/\Omega$ + 10 $\Omega$ 24 $\mu\Omega/\Omega$ + 10 $\Omega$ 44 $\mu\Omega/\Omega$ + 150 $\Omega$ 0.011 % + 250 $\Omega$ 0.021 % + 2.5 k $\Omega$ 0.048 % + 3 k $\Omega$ 0.24 % + 100 k $\Omega$ 1.2 % + 500 k $\Omega$	Fluke 5520A
Resistance – Generate, Fixed Points	25 $\Omega$ 75 $\Omega$ 100 $\Omega$ 200 $\Omega$ 400 $\Omega$	0.000 18 $\Omega$ 0.0014 $\Omega$ 0.000 71 $\Omega$ 0.0014 $\Omega$ 0.0028 $\Omega$	M.I. 5420-25 IET SRX-75 M.I. 5420-100 M.I. 5420-200 M.I. 5420-400
Resistance – Measure	(0 to 2) $\Omega$ (2 to 20) $\Omega$ (20 to 200) $\Omega$ (0.2 to 2) k $\Omega$ (2 to 20) k $\Omega$ (20 to 200) k $\Omega$ (0.2 to 2) M $\Omega$ (2 to 20) M $\Omega$ (20 to 200) M $\Omega$ (0.2 to 2) G $\Omega$	8 $\mu\Omega$ + 17 $\mu\Omega/\Omega$ 58 $\mu\Omega$ + 8 $\mu\Omega/\Omega$ 190 $\mu\Omega$ + 8 $\mu\Omega/\Omega$ 1.4 m $\Omega$ + 8 $\mu\Omega/\Omega$ 14 m $\Omega$ + 8 $\mu\Omega/\Omega$ 0.13 $\Omega$ + 8 $\mu\Omega/\Omega$ 1.9 $\Omega$ + 10 $\mu\Omega/\Omega$ 130 $\Omega$ + 21 $\mu\Omega/\Omega$ 12 k $\Omega$ + 120 $\mu\Omega/\Omega$ 1.2 M $\Omega$ + 1.4 m $\Omega/\Omega$	Fluke 8508A

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Simulation of Thermocouple Indicators & Indicating Systems –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.40 °C 0.19 °C 0.17 °C 0.20 °C 0.54 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.24 °C 0.18 °C 0.17 °C 0.18 °C 0.58 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.28 °C 0.21 °C 0.18 °C 0.23 °C 0.57 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.51 °C 0.23 °C 0.19 °C 0.18 °C	

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
AC Voltage – Generate			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.063 % + 6 μV 0.016 % + 6 μV 0.019 % + 6 μV 0.08 % + 6 μV 0.28 % + 12 μV 0.63 % + 50 μV	Fluke 5520A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.037 % + 8 μV 0.012 % + 8 μV 0.013 % + 8 μV 0.028 % + 8 μV 0.063 % + 32 μV 0.16 % + 70 μV	

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
AC Voltage – Generate (cont)			
330 mV to 3.3 V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 50 μV 0.012 % + 60 μV 0.015 % + 60 μV 0.024 % + 50 μV 0.055 % + 130 μV 0.19 % + 600 μV	Fluke 5520A
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 650 μV 0.012 % + 600 μV 0.019 % + 600 μV 0.028 % + 600 μV 0.07 % + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.016 % + 2 mV 0.016 % + 6 mV 0.02 % + 6 mV 0.025 % + 6 mV 0.16 % + 50 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz	0.024 % + 0.13 mV 0.02 % + 10 mV	
AC Voltage – Measure			
(0 to 200) mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz	160 nV/mV + 14 μV 0.014 % + 4 μV 93 μV/V + 4 μV 0.011 % + 2 μV 0.012 % + 4 μV 0.028 % + 8 μV	Fluke 8508A
(0.2 to 2) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	150 μV/V + 150 μV 0.01 % + 20 μV 83 μV/V + 20 μV 63 μV/V + 20 μV 90 μV/V + 20 μV 0.019 % + 40 μV 0.047 % + 200 μV	

Parameter/Range	Frequency	CMC <sup>2, 4, 5</sup> (±)	Comments
AC Voltage – Measure (cont)			
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz	160 $\mu\text{V}/\text{V}$ + 290 $\mu\text{V}$ 95 $\mu\text{V}/\text{V}$ + 200 $\mu\text{V}$ 74 $\mu\text{V}/\text{V}$ + 200 $\mu\text{V}$ 64 $\mu\text{V}/\text{V}$ + 200 $\mu\text{V}$ 89 $\mu\text{V}/\text{V}$ + 200 $\mu\text{V}$ 0.018 % + 400 $\mu\text{V}$ 0.045 % + 2 mV 0.24 % + 20 mV	Fluke 8508A
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	160 $\mu\text{V}/\text{V}$ + 12 mV 95 $\mu\text{V}/\text{V}$ + 2 mV 73 $\mu\text{V}/\text{V}$ + 2 mV 62 $\mu\text{V}/\text{V}$ + 2 mV 88 $\mu\text{V}/\text{V}$ + 2 mV 0.018 % + 4 mV 0.046 % + 20 mV	
(200 to 1000) V	(10 to 40) Hz 40 Hz to 10 kHz	0.01 % + 20 mV 93 $\mu\text{V}/\text{V}$ + 20 mV	
AC High Voltage – Measure			
(1 to 5) kV	60 Hz	5.8 %	Fluke 80K-40 with Fluke 8508A
AC Current – Generate			
(30 to 330) $\mu\text{A}$	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.12 % + 0.1 $\mu\text{A}$ 0.10 % + 0.1 $\mu\text{A}$ 0.23 % + 0.15 $\mu\text{A}$ 0.62 % + 0.2 $\mu\text{A}$ 1.3 % + 0.4 $\mu\text{A}$	Fluke 5520A
(0.33 to 3.3) mA	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.12 % + 0.4 $\mu\text{A}$ 0.08 % + 0.15 $\mu\text{A}$ 0.16 % + 0.2 $\mu\text{A}$ 0.39 % + 0.3 $\mu\text{A}$ 0.78 % + 0.6 $\mu\text{A}$	
(3.3 to 33) mA	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.07 % + 2 $\mu\text{A}$ 0.03 % + 2 $\mu\text{A}$ 0.06 % + 2 $\mu\text{A}$ 0.16 % + 3 $\mu\text{A}$ 0.32 % + 4 $\mu\text{A}$	

Parameter/Range	Frequency	CMC <sup>2,5</sup> (±)	Comments
AC Current – Generate (cont)			
(33 to 330) mA	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.07 % + 20 µA 0.03 % + 20 µA 0.08 % + 50 µA 0.2 % + 100 µA	Fluke 5520A
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.13 % + 100 µA 0.04 % + 100 µA 0.42 % + 1 mA 1.8 % + 5 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 10 mA 0.05 % + 10 mA 0.47 % + 1 mA 2 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.05 % + 2 mA 0.08 % + 2 mA 2.4 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.1 % + 5 mA 0.12 % + 5 mA 2.4 % + 5 mA	
Clamp-On Meters – Generate			
Toroidal:			Fluke 5520A & Fluke 50 turn coil
(20 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.48 % + 0.025 A 0.76 % + 0.027 A	
(150 to 1000) A	(45 to 65) Hz (65 to 440) Hz	0.24 % + 0.09 A 0.98 % + 0.1 A	
Non-Toroidal:			
(20 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.61 % + 0.25 A 0.89 % + 0.25 A	
(150 to 1000) A	(45 to 65) Hz (65 to 440) Hz	0.45 % + 0.9 A 1.1 % + 0.9 A	

Parameter/Range	Frequency	CMC <sup>2, 5</sup> (±)	Comments
AC Current – Measure			
(0 to 200) μA	(1 to 10) Hz (0.010 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.02 % + 0.02 μA 0.03 % + 0.02 μA 0.06 % + 0.02 μA 0.31 % + 0.02 μA	Fluke 8508A
(0.2 to 2) mA	(1 to 10) Hz (0.010 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.02 % + 0.2 μA 0.02 % + 0.2 μA 0.06 % + 0.2 μA 0.31 % + 0.2 μA	
(2 to 20) mA	(1 to 10) Hz (0.010 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.03 % + 2 μA 0.03 % + 2 μA 0.06 % + 2 μA 0.31 % + 2 μA	
(20 to 200) mA	(1 to 10) Hz (0.010 to 10) kHz (10 to 30) kHz	0.02 % + 20 μA 0.02 % + 20 μA 0.05 % + 20 μA	
(0.2 to 2) A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.05 % + 200 μA 0.06 % + 200 μA 0.23 % + 200 μA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.06 % + 2 mA 0.19 % + 2 mA	

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Oscilloscope –			
Amplitude – DC Signal:			Fluke 5522A/ SC1100
50 Ω Load	(0 to 6.6) V	33 μV + 2 mV/V	
1 MΩ Load	(0 to 130) V	33 μV + 390 μV/V	
Amplitude – Square Wave:			
50 Ω Load	1 mV to 6.6 Vp-p 10 Hz to 10 kHz	40 μV + 2 mV/V	
1 MΩ Load	1 mV to 130 Vp-p 10 Hz to 1 kHz 1 mV to 130 Vp-p (1 to 10) kHz	190 μV + 780 μV/V 230 μV + 1.9 mV/V	



Parameter/Equipment	Range	CMC <sup>2,4,5</sup> (±)	Comments
Oscilloscope – (cont)			
Edge Into 50 Ω	(200 to 300) ps 1 kHz to 2 MHz	82 ps	Fluke 5522A/ SC1100
	(200 to 350) ps (2 to 10) MHz	82 ps	
Bandwidth Into 50 Ω: 5 mV to 5.5 V	50 kHz (Reference)	330 μV + 17 mV/V	
	50 kHz to 100 MHz	400 μV + 31 mV/V	
	(100 to 300) MHz	420 μV + 36 mV/V	
	(300 to 600) MHz	520 μV + 57 mV/V	
4 mV to 3.5 V	(600 to 1100) MHz	580 μV + 67 mV/V	
Time Marker Into 50 Ω	2 ns to 20 ms 50 ms to 5 s	0.000 52 % 0.000 63 % x T x 0.1 %	T = time in seconds

#### IV. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2,4,6</sup> (±)	Comments
Gas Flow – Measuring Equipment	10 sccm to 5 SLPM (5 to 30) SLPM (30 to 100) SLPM (100 to 2000) SLPM	0.31 % 0.41 % 0.68 % 0.38 %	Molbox™1 + /Molbloc™-L  Molbox™1 + /Molbloc™-S
Volume – Calibration of Pipettes, Fixed Points <sup>3</sup>	0.1 μL 0.5 μL 1 μL 2 μL 5 μL 10 μL 20 μL 50 μL 100 μL 200 μL 500 μL 1000 μL 2000 μL 5000 μL 10 000 μL	0.01 μL 0.021 μL 0.029 μL 0.027 μL 0.048 μL 0.048 μL 0.062 μL 0.12 μL 0.21 μL 0.31 μL 1.4 μL 1.5 μL 1.5 μL 3.9 μL 7 μL	Gravimetric method

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	Comments
Gas Concentration <sup>3</sup> –			
O <sub>2</sub>	(0 to 5) Mole % O <sub>2</sub> (5 to 20) Mole % O <sub>2</sub>	0.83 Mole % 0.83 Mole % + 0.55 % of rdg	Extech SDL 150 oxygen meter
CO <sub>2</sub>	(0 to 5) Mole % CO <sub>2</sub> (5 to 20) Mole % CO <sub>2</sub>	0.48 Mole % 0.48 Mole % + 1.5 % of rdg	Vaisala MI70 w/GMP70
Gas Detection Equipment –			
O <sub>2</sub>	5 Mole % O <sub>2</sub> 10 Mole % O <sub>2</sub> 20 Mole % O <sub>2</sub>	0.12 Mole % 0.23 Mole % 0.46 Mole %	Certified gas
CO <sub>2</sub>	5 Mole % CO <sub>2</sub> 10 Mole % CO <sub>2</sub> 20 Mole % CO <sub>2</sub>	0.12 Mole % 0.23 Mole % 0.46 Mole %	

#### V. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Calibration of Mass Standards – Fixed Points	0.001 g 0.002 g 0.003 g 0.005 g 0.010 g 0.020 g 0.030 g 0.050 g 0.10 g 0.20 g 0.30 g 0.50 g 1.0 g 2.0 g 5.0 g 10 g 20 g 30 g	1.4 µg 1.2 µg 1.2 µg 1.4 µg 1.4 µg 1.5 µg 1.5 µg 1.7 µg 0.9 µg 0.8 µg 1.4 µg 1.4 µg 2.6 µg 2.7 µg 5.3 µg 8 µg 8 µg 11 µg	Mass measurement by appropriate mass comparator method (ABBA Sw, ABA, modified ABA, etc.)

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Calibration of Mass Standard – Fixed points (cont)	50 g 100 g 200 g 300 g 500 g 1000 g 2000 g 3000 g 5000 g 10 kg 20 kg 25 kg 30 kg	14 µg 0.03 mg 0.05 mg 0.13 mg 0.17 mg 0.22 mg 0.39 mg 0.75 mg 1.5 mg 2.3 mg 5.9 mg 6.1 mg 6.6 mg	Mass measurement by appropriate mass comparator method (ABBA Sw, ABA, modified ABA, etc.)
Calibration of Scales and Balances– Fixed Points	0.001 g 0.002 g 0.005 g 0.010 g 0.020 g 0.050 g 0.10 g 0.20 g 0.50 g 1.0 g 2.0 g 5.0 g 10 g 20 g 50 g 100 g 200 g 500 g 1000 g 2000 g 5000 g 10 000 g 20 000 g	6.4 µg 7.7 µg 8.8 µg 7.6 µg 6.7 µg 7.9 µg 8.8 µg 6.9 µg 5.8 µg 24 µg 23 µg 33 µg 31 µg 36 µg 63 µg 0.18 mg 0.26 mg 0.64 mg 1.6 mg 12 mg 14 mg 31 mg 39 mg	Using Class 1 & Class 3 weights

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	Comments
Pneumatic Pressure – Measuring Equipment	(0 to 30) inH <sub>2</sub> O	0.000 17 inH <sub>2</sub> O + 0.0001 inH <sub>2</sub> O/inH <sub>2</sub> O	Fluke 7250LP
	(-15 to 0) psig (0 to 145) psig	0.0084 psi 0.0084 psi + 0.000 058 psi/psi	Mensor CPC6000
	(-15 to 0) psig (0 to 500) psig	0.029 psi 0.0291 psi + 0.000 059 psi/psi	
	(0 to 17.5) psia	0.0006 psia	
	(0 to 35) psia	0.002 psia + 0.000 056 psia/psia	
	(8.75 to 17.5) psia	0.001 psia	
Hydraulic Gage Pressure – Measuring Equipment	(50 to 10 000) psig	0.03 %	580DX dead weight tester
Pressure – Measuring Equipment <sup>3</sup>	(0 to 1) inH <sub>2</sub> O	0.0036 psi	Fluke 700P00
	(0 to 10) inH <sub>2</sub> O	0.031 psi	Fluke 700P01
	(0 to 15) psi	0.0081 psi + 0.0001 psi/psi	Fluke 700P04
	(-15 to 200) psi	0.16 psi	Fluke 700PD7
	(50 to 10 000) psi	8.1 psi + 0.000 029 psi/psi	Fluke 700P31
Vacuum – Measuring Equipment	(Up to 1000) mTorr (1 to 1000) Torr	2.5 % 2.5 %	MKS PVS6
Torque Wrenches	(5 to 50) ozf·in (15 to 200) ozf·in (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1000) lbf·in (20 to 250) lbf·ft (0.3 to 44) lbf·in (2 to 440) lbf·in (3 to 362) lbf·ft (60 to 600) lbf·ft	0.63 % 0.53 % 0.3 % 0.3 % 0.33 % 0.3 % 0.33 lbf·in 2.9 lbf·in 2.4 lbf·ft 0.31 %	CDI torque calibration system
Torque Transducers	(0.026 to 250) lbf·ft	0.036 %	Torque arms, wheels, & standard weights

VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Infrared Temperature – Measuring Equipment	(-15 to -12) °C (-12 to -8) °C (-8 to -4) °C (-4 to 0) °C (0 to 120) °C	0.51 °C 0.5 °C 0.49 °C 0.48 °C 0.6 °C + 0.0017 °C/°C	Fluke 4180
	(35 to 500) °C	0.54 °C + $\Delta T_{\text{Change from 35 °C}}$ x 0.0042 °C	Fluke 4181
Relative Humidity – Measuring Equipment (0 to 70) °C	(10 to 95) % RH	0.63 % RH	Thunder Scientific 2500ST-LT
Relative Humidity – Measure <sup>3</sup>	(10 to 90) % RH	1.7 % RH	Vaisala MI70 & HMP77
Temperature – Measure <sup>3</sup>	(-196 to 660) °C	0.0025 °C + 0.000 021 °C/ °C	Fluke 1595A thermometer, Fluke 5699 SPRT
	(-196 to 660) °C	0.0058 °C + 0.000 016 °C/ °C	Additel 286 thermometer, Fluke 5699 SPRT
	(-196 to 660) °C	0.0029 °C + 0.000 002 °C/ °C	Additel 286 thermometer, standard resistor, Fluke 5699 SPRT
	(-196 to 660) °C	0.13 °C	Additel 286 Thermometer w/286-TS temperature scanner, Fluke 5699 SPRT
	(660 to 1200) °C	1.1 °C + 0.004 °C/°C	Thermocouple scanner w/Type S thermocouple probe
Temperature – Measuring Equipment, Fixed Points			
Liquid Nitrogen	-195.8 °C	3.4 mK	Fluke miniature fixed reference point cells, SPRT
Mercury	-38.8344 °C	2.6 mK	
Triple Point Water	0.010 °C	0.25 mK	
Indium	156.5985 °C	3 mK	
Tin	231.928 °C	3.2 mK	
Zinc	419.527 °C	3.5 mK	
Aluminum	660.323 °C	5.3 mK	

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Temperature – Measuring Equipment, PRT’s using Blocks/Baths	(-90 to -80) °C (-80 to -5) °C (-5 to 110) °C (110 to 180) °C (180 to 550) °C (550 to 660) °C  (660 to 1200) °C	0.017 °C 0.013 °C 0.011 °C 0.016 °C + 0.000 056 °C/°C 0.016 °C + 0.000 052 °C/°C 0.028 °C  1.2 °C + 0.0039 °C/°C	Fluke 5628 PRT, calibration baths & furnaces      Type “S” thermocouple, calibration furnace
Temperature – Measuring Equipment, High Quality PRT’s by Comparison			
Liquid Nitrogen	-195.8 °C (-90 to 0) °C	3.4 mK 8.3 mK	Fluke 1595A, Fluke 5699 PRT, calibration baths & reference point cells
Triple Point Water	0.01 °C (0 to 200) °C (200 to 300) °C (300 to 400) °C (400 to 550) °C	2.3 mK 4 mK 4.3 mK 6.5 mK + 0.078 mK/K 14 mK + 0.061 mK/K	
Aluminum	660.323 °C	5.3 mK	
Temperature – Measuring Equipment, Any Quality PRT’s by Comparison			
Liquid Nitrogen	-195.8 °C (-90 to 0) °C	6.7 mK 10 mK	Fluke 2560, Fluke 5699 PRT, calibration baths & reference point cells
Triple Point Water	0.01 °C (0 to 200) °C (200 to 300) °C (300 to 400) °C (400 to 550) °C	2.3 mK 7 mK 7.1 mK 8.5 mK + 0.067 mK/K 15 mK + 0.058 mK/K	
Aluminum	660.323 °C	5.3 mK	
Temperature – Measuring Equipment, Thermistors	(0 to 100) °C	3.7 mK	Fluke 1595A, Fluke 5681 PRT, calibration bath

Parameter/Equipment	Range	CMC <sup>2,6</sup> (±)	Comments
Temperature – Measuring Equipment <sup>3</sup>	(-195 to 200) °C	1.4 °C + 0.0049 °C/°C	Fluke 741, Type T thermocouple
	(200 to 1100) °C	2.6 °C + 0.0086 °C/°C	Fluke 741, Type K thermocouple
	(-195 to 500) °C	0.12 °C	Fluke 1524, Burns 200G RTD
	(20 to 60) °C	0.27 °C + 0.0026 °C/°C	Vaisala MI70 w/HMP77B
Dew Point – Measuring Equipment	(-95 to -90) °C	0.93 °C	Thunder Scientific 3900 humidity generator
	(-90 to -80) °C	0.56 °C	
	(-80 to -70) °C	0.54 °C	
	(-70 to 10) °C	0.38 °C	
	(10 to 60) °C	0.44 °C	Thunder Scientific 2500ST-LT

## VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,6</sup> (±)	Comments
Frequency – Measure	0.1 Hz to 225 MHz	5.8 µHz + 5.8 µHz/Hz	Keysight 53131A
Frequency – Measuring Equipment	(0.01 to 15) MHz	5.8 µHz + 26 µHz/Hz	33120A function generator
Rotational Speed – Optical <sup>3</sup> – Measuring Equipment	(2.5 to 100 000) RPM	0.000 031 RPM + 0.000 039 RPM/RPM	Fluke 5522A
RPM – Measure <sup>3</sup>	(2.5 to 100 000) RPM	1.1 RPM + 0.0058 RPM/RPM	Tachometer
Stopwatches & Timers <sup>3</sup>	(0 to 19.99) s/day	0.037 s/day	Timometer

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

- <sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.
- <sup>3</sup> Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g., resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.
- <sup>4</sup> In the statement of CMC,  $L$  is the measured displacement in inches; a percent refers to percent of reading unless otherwise noted.
- <sup>5</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>6</sup> The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.
- <sup>7</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.





# Accredited Laboratory

A2LA has accredited

**TRESCAL, INC.**

*Lansdale, PA*

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 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 23<sup>rd</sup> day of June 2023.

A blue ink signature of Mr. Trace McInturff, written in a cursive style.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 2551.01  
Valid to April 30, 2025

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