



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ACCREDITED LABS DBA  
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CALIBRATION

Valid To: July 31, 2028

Certificate Number: 3316.01

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, 6</sup>:

I. Chemical

| Parameter/Equipment                                    | Range                                                                                                                      | CMC <sup>2, 4, 7</sup> (±)                                                                                                       | Comments                                     |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| CO <sub>2</sub> – Measure <sup>3</sup>                 | (0 to 4) % CO <sub>2</sub><br>(4 to 6) % CO <sub>2</sub><br>(6 to 10) % CO <sub>2</sub>                                    | 0.31 % CO <sub>2</sub><br>0.35 % CO <sub>2</sub><br>0.45 % CO <sub>2</sub>                                                       | Vaisala GMP 221                              |
| Gas Detection Equipment <sup>3</sup> – CO <sub>2</sub> | 5 % CO <sub>2</sub><br>10 % CO <sub>2</sub>                                                                                | 0.06 % CO <sub>2</sub><br>0.11 % CO <sub>2</sub>                                                                                 | Reference CO <sub>2</sub> gas – EPA protocol |
| pH Meters                                              | 4 pH<br>7 pH<br>10 pH                                                                                                      | 0.012 pH<br>0.013 pH<br>0.017 pH                                                                                                 | Standard solutions                           |
| Conductivity Meters                                    | 1 µS/cm<br>5 µS/cm<br>10 µS/cm<br>100 µS/cm<br>1000 µS/cm<br>1413 µS/cm<br>10 mS/cm<br>100 mS/cm<br>150 mS/cm<br>200 mS/cm | 0.30 µS/cm<br>0.30 µS/cm<br>0.30 µS/cm<br>1.0 µS/cm<br>3.3 µS/cm<br>3.7 µS/cm<br>38 µS/cm<br>350 µS/cm<br>700 µS/cm<br>750 µS/cm | Standard solutions                           |

| Parameter/Equipment           | Range                                                                                       | CMC <sup>2</sup> ( $\pm$ )                                                                              | Comments           |
|-------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------|
| Conductivity Meters<br>(cont) | 1 $\mu$ S/cm<br>10 $\mu$ S/cm<br>100 $\mu$ S/cm<br>1000 $\mu$ S/cm<br>10 mS/cm<br>100 mS/cm | 0.0013 $\mu$ S/cm<br>0.013 $\mu$ S/cm<br>0.13 $\mu$ S/cm<br>1.3 $\mu$ S/cm<br>0.013 mS/cm<br>0.13 mS/cm | Standard resistors |

## II. Dimensional

| Parameter/Equipment                                            | Range                      | CMC <sup>2, 7</sup> ( $\pm$ ) | Comments         |
|----------------------------------------------------------------|----------------------------|-------------------------------|------------------|
| Angle Indicator <sup>3</sup><br>(Wave Bioreactor) –<br>Measure | Up to 10 °<br>(10 to 90) ° | 0.22 °<br>0.29 °              | Mitutoyo Pro 360 |

## III. Electrical – DC/Low Frequency

| Parameter/Equipment                | Range                                                                                                                                                   | CMC <sup>2, 4, 5</sup> ( $\pm$ )                                                                                                                                           | Comments                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| DC Current – Measure <sup>3</sup>  | Up to 200 $\mu$ A<br>200 $\mu$ A to 2 mA<br>(2 to 20) mA<br>(20 to 200) mA<br>200 mA to 2 A                                                             | 12 $\mu$ A/A + 0.4 nA<br>12 $\mu$ A/A + 4 nA<br>13 $\mu$ A/A + 40 nA<br>36 $\mu$ A/A + 0.8 $\mu$ A<br>0.017 % + 16 $\mu$ A                                                 | Fluke 8508A                            |
|                                    | (2 to 20) A                                                                                                                                             | 0.038 % + 0.4 mA                                                                                                                                                           | Fluke 8508A                            |
|                                    | (2 to 50) A                                                                                                                                             | 0.012 %                                                                                                                                                                    | Fluke 8508A w/ Ohm<br>Labs CS-50 shunt |
| DC Current – Generate <sup>3</sup> | (0 to 330) $\mu$ A<br>330 $\mu$ A to 3.3 mA<br>(3.3 to 33) mA<br>(33 to 330) mA<br>330 mA to 1.1 A<br>(1.1 to 2.3) A<br>(2.3 to 11) A<br>(11 to 20.5) A | 0.015 % + 20 nA<br>0.01 % + 50 nA<br>0.01 % + 250 nA<br>0.01 % + 2.5 $\mu$ A<br>0.02 % + 40 $\mu$ A<br>0.038 % + 40 $\mu$ A<br>0.05 % + 500 $\mu$ A<br>0.1 % + 750 $\mu$ A | Fluke 5522A                            |

| Parameter/Equipment                | Range                                                                                                                                                                                                                                                                                                                                                      | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comments    |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| DC Voltage – Measure <sup>3</sup>  | Up to 200 mV<br>200 mV to 2 V<br>(2 to 20) V<br>(20 to 200) V<br>(200 to 1000) V                                                                                                                                                                                                                                                                           | 4.5 $\mu$ V/V + 110 nV<br>3.0 $\mu$ V/V + 500 nV<br>3.0 $\mu$ V/V + 4 $\mu$ V<br>4.5 $\mu$ V/V + 50 $\mu$ V<br>4.5 $\mu$ V/V + 500 $\mu$ V                                                                                                                                                                                                                                                                                                                                                                           | Fluke 8508A |
| DC Voltage– Generate <sup>3</sup>  | (0 to 330) mV<br>330 mV to 3.3 V<br>(3.3 to 33) V<br>(33 to 330) V<br>(330 to 1020) V                                                                                                                                                                                                                                                                      | 20 $\mu$ V/V + 1 $\mu$ V<br>11 $\mu$ V/V + 2 $\mu$ V<br>12 $\mu$ V/V + 20 $\mu$ V<br>18 $\mu$ V/V + 150 $\mu$ V<br>18 $\mu$ V/V + 1.5 mV                                                                                                                                                                                                                                                                                                                                                                             | Fluke 5522A |
| Resistance – Measure <sup>3</sup>  | Up to 2 $\Omega$<br>(2 to 20) $\Omega$<br>(20 to 200) $\Omega$<br>200 $\Omega$ to 2 k $\Omega$<br>(2 to 20) k $\Omega$<br>(20 to 200) k $\Omega$<br>200 k $\Omega$ to 2 M $\Omega$<br>(2 to 20) M $\Omega$<br>(20 to 200) M $\Omega$<br>200 M $\Omega$ to 2 G $\Omega$                                                                                     | 15 $\mu\Omega/\Omega$ + 5 $\mu\Omega$<br>9 $\mu\Omega/\Omega$ + 16 $\mu\Omega$<br>7.5 $\mu\Omega/\Omega$ + 50 $\mu\Omega$<br>7.5 $\mu\Omega/\Omega$ + 0.5 m $\Omega$<br>7.5 $\mu\Omega/\Omega$ + 5 m $\Omega$<br>7.5 $\mu\Omega/\Omega$ + 50 m $\Omega$<br>8.5 $\mu\Omega/\Omega$ + 1 $\Omega$<br>15 $\mu\Omega/\Omega$ + 100 $\Omega$<br>60 $\mu\Omega/\Omega$ + 10 k $\Omega$<br>0.053 % + 1 M $\Omega$                                                                                                            | Fluke 8508A |
| Resistance – Generate <sup>3</sup> | (0 to 11) $\Omega$<br>(11 to 33) $\Omega$<br>(33 to 110) $\Omega$<br>110 $\Omega$ to 1.1 k $\Omega$<br>(1.1 to 11) k $\Omega$<br>(11 to 110) k $\Omega$<br>110 k $\Omega$ to 1.1 M $\Omega$<br>(1.1 to 3.3) M $\Omega$<br>(3.3 to 11) M $\Omega$<br>(11 to 33) M $\Omega$<br>(33 to 110) M $\Omega$<br>(110 to 330) M $\Omega$<br>(330 to 1100) M $\Omega$ | 40 $\mu\Omega/\Omega$ + 0.001 $\Omega$<br>30 $\mu\Omega/\Omega$ + 0.0015 $\Omega$<br>28 $\mu\Omega/\Omega$ + 0.0014 $\Omega$<br>28 $\mu\Omega/\Omega$ + 0.002 $\Omega$<br>28 $\mu\Omega/\Omega$ + 0.02 $\Omega$<br>28 $\mu\Omega/\Omega$ + 0.2 $\Omega$<br>32 $\mu\Omega/\Omega$ + 2 $\Omega$<br>60 $\mu\Omega/\Omega$ + 30 $\Omega$<br>130 $\mu\Omega/\Omega$ + 50 $\Omega$<br>250 $\mu\Omega/\Omega$ + 2.5 k $\Omega$<br>500 $\mu\Omega/\Omega$ + 3 k $\Omega$<br>0.3 % + 100 k $\Omega$<br>1.5 % + 500 k $\Omega$ | Fluke 5522A |

| Parameter/Range                   | Frequency                                                                                                                                                        | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                    | Comments    |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Voltage – Measure <sup>3</sup> |                                                                                                                                                                  |                                                                                                                                                                                                                                  |             |
| Up to 200 mV                      | (1 to 10) Hz<br>(10 to 20) Hz<br>(20 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                        | 0.1 % + 100 $\mu$ V<br>0.1 % + 100 $\mu$ V<br>0.025 % + 50 $\mu$ V<br>0.011 % + 4 $\mu$ V<br>0.011 % + 2 $\mu$ V<br>0.011 % + 4 $\mu$ V<br>0.031 % + 8 $\mu$ V<br>0.071 % + 20 $\mu$ V                                           | Fluke 8508A |
| 200 mV to 2 V                     | (1 to 10) Hz<br>(10 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz | 140 $\mu$ V/V + 120 $\mu$ V<br>110 $\mu$ V/V + 20 $\mu$ V<br>85 $\mu$ V/V + 20 $\mu$ V<br>65 $\mu$ V/V + 20 $\mu$ V<br>85 $\mu$ V/V + 20 $\mu$ V<br>0.021 % + 40 $\mu$ V<br>0.051 % + 200 $\mu$ V<br>0.3 % + 2 mV<br>1 % + 20 mV |             |
| (2 to 20) V                       | (1 to 10) Hz<br>(10 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz | 140 $\mu$ V/V + 1.2 mV<br>110 $\mu$ V/V + 200 $\mu$ V<br>85 $\mu$ V/V + 200 $\mu$ V<br>65 $\mu$ V/V + 200 $\mu$ V<br>85 $\mu$ V/V + 200 $\mu$ V<br>0.021 % + 400 $\mu$ V<br>0.051 % + 2 mV<br>0.3 % + 20 mV<br>1 % + 200 mV      |             |
| (20 to 200) V                     | (1 to 10) Hz<br>(10 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz | 140 $\mu$ V/V + 12 mV<br>110 $\mu$ V/V + 2 mV<br>85 $\mu$ V/V + 2 mV<br>65 $\mu$ V/V + 2 mV<br>85 $\mu$ V/V + 2 mV<br>0.021 % + 4 mV<br>0.051 % + 20 mV<br>0.3 % + 200 mV<br>1 % + 2 V                                           |             |
| (200 to 1000) V                   | (1 to 10) Hz<br>(10 to 40) Hz<br>40 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                            | 140 $\mu$ V/V + 70 mV<br>110 $\mu$ V/V + 20 mV<br>95 $\mu$ V/V + 20 mV<br>0.021 % + 40 mV<br>0.051 % + 200 mV                                                                                                                    |             |

| Parameter/Range                    | Frequency                                                                                                                    | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                             | Comments    |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Voltage – Generate <sup>3</sup> |                                                                                                                              |                                                                                                                                                           |             |
| (1 to 33) mV                       | (10 to 45) Hz<br>45 Hz to 10 kHz<br>(10 to 20) kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 500) kHz                  | 0.14 % + 6 $\mu$ V<br>0.015 % + 6 $\mu$ V<br>0.02 % + 6 $\mu$ V<br>0.1 % + 6 $\mu$ V<br>0.35 % + 12 $\mu$ V<br>0.8 % + 50 $\mu$ V                         | Fluke 5522A |
| (33 to 330) mV                     | (10 to 20) Hz<br>(20 to 45) Hz<br>45 Hz to 10 kHz<br>(10 to 20) kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 500) kHz | 0.2 % + 8 $\mu$ V<br>0.03 % + 8 $\mu$ V<br>0.015 % + 8 $\mu$ V<br>0.016 % + 8 $\mu$ V<br>0.035 % + 8 $\mu$ V<br>0.08 % + 32 $\mu$ V<br>0.2 % + 70 $\mu$ V |             |
| 330 mV to 3.3 V                    | (10 to 45) Hz<br>45 Hz to 10 kHz<br>(10 to 20) kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 500) kHz                  | 0.03 % + 50 $\mu$ V<br>0.015 % + 60 $\mu$ V<br>0.019 % + 60 $\mu$ V<br>0.03 % + 50 $\mu$ V<br>0.07 % + 130 $\mu$ V<br>0.24 % + 600 $\mu$ V                |             |
| (3.3 to 33) V                      | (10 to 45) Hz<br>45 Hz to 10 kHz<br>(10 to 20) kHz<br>(20 to 50) kHz<br>(50 to 100) kHz                                      | 0.03 % + 650 $\mu$ V<br>0.015 % + 600 $\mu$ V<br>0.024 % + 600 $\mu$ V<br>0.035 % + 600 $\mu$ V<br>0.09 % + 1.6 mV                                        |             |
| (33 to 330) V                      | 45 Hz to 1 kHz<br>(1 to 10) kHz<br>(10 to 20) kHz<br>(20 to 50) kHz<br>(50 to 100) kHz                                       | 0.019 % + 2 mV<br>0.02 % + 6 mV<br>0.025 % + 6 mV<br>0.03 % + 6 mV<br>0.2 % + 50 mV                                                                       |             |
| (330 to 1020) V                    | 45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz                                                                              | 0.03 % + 10 mV<br>0.025 % + 10 mV<br>0.03 % + 10 mV                                                                                                       |             |

| Parameter/Range                    | Frequency                                                                                           | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                          | Comments    |
|------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Current – Generate <sup>3</sup> |                                                                                                     |                                                                                                                                        |             |
| (29 to 330) $\mu$ A                | (10 to 20) Hz<br>(20 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz<br>(10 to 30) kHz | 0.2 % + 100 nA<br>0.15 % + 100 nA<br>0.13 % + 100 nA<br>0.3 % + 150 nA<br>0.8 % + 200 nA<br>1.6 % + 400 nA                             | Fluke 5522A |
| 300 $\mu$ A to 3.3 mA              | (10 to 20) Hz<br>(20 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz<br>(10 to 30) kHz | 0.2 % + 150 nA<br>0.13 % + 150 nA<br>0.1 % + 150 nA<br>0.2 % + 200 nA<br>0.5 % + 300 nA<br>1.0 % + 600 nA                              |             |
| (3.3 to 33.3) mA                   | (10 to 20) Hz<br>(20 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz<br>(10 to 30) kHz | 0.18 % + 2 $\mu$ A<br>0.09 % + 2 $\mu$ A<br>0.04 % + 2 $\mu$ A<br>0.08 % + 2 $\mu$ A<br>0.2 % + 3 $\mu$ A<br>0.4 % + 4 $\mu$ A         |             |
| (33.3 to 330) mA                   | (10 to 20) Hz<br>(20 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz<br>(10 to 30) kHz | 0.18 % + 20 $\mu$ A<br>0.09 % + 20 $\mu$ A<br>0.04 % + 20 $\mu$ A<br>0.10 % + 50 $\mu$ A<br>0.2 % + 100 $\mu$ A<br>0.4 % + 200 $\mu$ A |             |
| 330 mA to 1.1 A                    | (10 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz                                    | 0.18 % + 100 $\mu$ A<br>0.05 % + 100 $\mu$ A<br>0.6 % + 1 mA<br>2.5 % + 5 mA                                                           |             |
| (1.1 to 3.0) A                     | (10 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz                                    | 0.18 % + 100 $\mu$ A<br>0.06 % + 100 $\mu$ A<br>0.6 % + 1 mA<br>2.5 % + 5 mA                                                           |             |
| (3.0 to 11) A                      | (45 to 100) Hz<br>100 Hz to 1 kHz<br>(1 to 5) kHz                                                   | 0.06 % + 2 mA<br>0.1 % + 2 mA<br>3.0 % + 2 mA                                                                                          |             |
| (11 to 20.5) A                     | (45 to 100) Hz<br>100 Hz to 1 kHz<br>(1 to 5) kHz                                                   | 0.12 % + 5 mA<br>0.15 % + 5 mA<br>3.0 % + 5 mA                                                                                         |             |

| Parameter/Range                   | Frequency                                                                            | CMC <sup>2, 5</sup> (±)                                                                     | Comments                               |
|-----------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------|
| AC Current – Measure <sup>3</sup> |                                                                                      |                                                                                             |                                        |
| Up to 200 µA                      | 1 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                  | 0.048 % + 20 nA<br>0.065 % + 20 nA<br>0.4 % + 20 nA                                         | Fluke 8508A                            |
| 200 µA to 2 mA                    | (1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                 | 0.029 % + 200 nA<br>0.028 % + 200 nA<br>0.065 % + 200 nA<br>0.4 % + 200 nA                  |                                        |
| (2 to 20) mA                      | (1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                 | 0.029 % + 2 µA<br>0.028 % + 2 µA<br>0.065 % + 2 µA<br>0.4 % + 2 µA                          |                                        |
| (20 to 200) mA                    | (1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz                                    | 0.029 % + 20 µA<br>0.025 % + 20 µA<br>0.06 % + 20 µA                                        |                                        |
| 200 mA to 2 A                     | 10 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz                                    | 0.06 % + 200 µA<br>0.071 % + 200 µA<br>0.3 % + 200 µA                                       |                                        |
| (2 to 20) A                       | 10 Hz to 2 kHz<br>(2 to 10) kHz                                                      | 0.08 % + 2 mA<br>0.25 % + 2 mA                                                              |                                        |
|                                   | (1 to 10) Hz<br>(10 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 20) kHz | 0.022 % + 1.6 mA<br>0.022 % + 5 mA<br>0.022 % + 2.4 mA<br>0.022 % + 5 mA<br>0.025 % + 10 mA | Fluke 8508A w/ Ohm<br>Labs CS-50 shunt |
| (20 to 50) A                      | (1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 20) kHz                                    | 0.022 % + 14 mA<br>0.022 % + 2.4 mA<br>0.024 % + 5 mA                                       |                                        |
| Distortion – Measure <sup>3</sup> |                                                                                      |                                                                                             |                                        |
| (-99.9 to 0) dB                   | 20 Hz to 20 kHz                                                                      | 1.1 dB                                                                                      | Keithley 2015                          |

| Parameter/Equipment                                                             | Range                                                                                                                                                                                                                                                                                                                                                                  | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                                                                                                                                                    | Comments    |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Capacitance – Generate <sup>3</sup>                                             | (220 to 400) pF<br>(0.4 to 1.1) nF<br>(1.1 to 3.3) nF<br>(3.3 to 11) nF<br>(11 to 33) nF<br>(33 to 110) nF<br>(110 to 330) nF<br>(0.33 to 1.1) $\mu$ F<br>(1.1 to 3.3) $\mu$ F<br>(3.3 to 11) $\mu$ F<br>(11 to 33) $\mu$ F<br>(33 to 110) $\mu$ F<br>(110 to 330) $\mu$ F<br>(0.33 to 1.1) mF<br>(1.1 to 3.3) mF<br>(3.3 to 11) mF<br>(11 to 33) mF<br>(33 to 110) mF | 0.5 % + 10 pF<br>0.5 % + 0.01 nF<br>0.5 % + 0.01 nF<br>0.25 % + 0.01 nF<br>0.25 % + 0.01 nF<br>0.25 % + 0.01 nF<br>0.25 % + 0.03 nF<br>0.25 % + 1 nF<br>0.25 % + 3 nF<br>0.25 % + 10 nF<br>0.40 % + 30 nF<br>0.45 % + 100 nF<br>0.45 % + 300 nF<br>0.45 % + 1 $\mu$ F<br>0.45 % + 3 $\mu$ F<br>0.45 % + 10 $\mu$ F<br>0.75 % + 30 $\mu$ F<br>1.1 % + 100 $\mu$ F | Fluke 5522A |
| Electrical Calibration<br>of Thermocouples – Generate<br>& Measure <sup>3</sup> |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                  |             |
| Type B                                                                          | (600 to 800) °C<br>(800 to 1000) °C<br>(1000 to 1550) °C<br>(1550 to 1820) °C                                                                                                                                                                                                                                                                                          | 0.35 °C<br>0.27 °C<br>0.24 °C<br>0.26 °C                                                                                                                                                                                                                                                                                                                         | Fluke 5522A |
| Type E                                                                          | (-250 to -100) °C<br>(-100 to 650) °C<br>(650 to 1000) °C                                                                                                                                                                                                                                                                                                              | 0.40 °C<br>0.13 °C<br>0.17 °C                                                                                                                                                                                                                                                                                                                                    |             |
| Type J                                                                          | (-210 to -100) °C<br>(-100 to 760) °C<br>(760 to 1200) °C                                                                                                                                                                                                                                                                                                              | 0.22 °C<br>0.14 °C<br>0.18 °C                                                                                                                                                                                                                                                                                                                                    |             |
| Type K                                                                          | (-200 to -100) °C<br>(-100 to 120) °C<br>(120 to 1000) °C<br>(1000 to 1372) °C                                                                                                                                                                                                                                                                                         | 0.26 °C<br>0.15 °C<br>0.21 °C<br>0.32 °C                                                                                                                                                                                                                                                                                                                         |             |
| Type N                                                                          | (-200 to -100) °C<br>(-100 to 410) °C<br>(410 to 1300) °C                                                                                                                                                                                                                                                                                                              | 0.32 °C<br>0.19 °C<br>0.22 °C                                                                                                                                                                                                                                                                                                                                    |             |

| Parameter/Equipment                                                                       | Range                                                  | CMC <sup>2</sup> (±)          | Comments    |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------|-------------|
| Electrical Calibration<br>of Thermocouples –<br>Generate & Measure <sup>3</sup><br>(cont) |                                                        |                               |             |
| Type R                                                                                    | (0 to 250) °C<br>(250 to 1000) °C<br>(1000 to 1767) °C | 0.45 °C<br>0.28 °C<br>0.32 °C | Fluke 5522A |
| Type S                                                                                    | (0 to 250) °C<br>(250 to 1400) °C<br>(1400 to 1767) °C | 0.39 °C<br>0.29 °C<br>0.36 °C |             |
| Type T                                                                                    | (-250 to -150) °C<br>(-150 to 0) °C<br>(0 to 400) °C   | 0.50 °C<br>0.19 °C<br>0.13 °C |             |
| Type U                                                                                    | (-200 to 0) °C<br>(0 to 600) °C                        | 0.44 °C<br>0.22 °C            |             |

#### IV. Fluid Quantities

| Parameter/Equipment                    | Range                                     | CMC <sup>2, 4, 5, 7</sup> (±) | Comments                                            |
|----------------------------------------|-------------------------------------------|-------------------------------|-----------------------------------------------------|
| Flow Rate – Measure                    |                                           |                               |                                                     |
| Liquid Mass Flow <sup>3</sup>          | (0 to 250) g/min<br>(250 to 7500) g/min   | 0.5 g/min<br>0.21 %           | Endress & Hauser<br>Promass Coriolis flow<br>meters |
|                                        | (0 to 9) kg/min<br>(9 to 300) kg/min      | 15 g/min<br>0.17 %            |                                                     |
| Liquid Volume Flow <sup>3</sup>        | (0 to 250) ml/min<br>(250 to 7500) ml/min | 0.5 ml/min<br>0.21 %          | Endress & Hauser<br>Promass Coriolis flow<br>meters |
|                                        | (0 to 9) l/min<br>(9 to 300) l/min        | 15 ml/min<br>0.17 %           |                                                     |
| Liquid Mass Flow<br>(15 to 4000) g/min | (0 to 3200) g                             | 0.63 g                        | Gravimetric flow bench<br>with balance              |

| Parameter/Equipment                    | Range                                                                                                | CMC <sup>2, 4, 5, 7</sup> ( $\pm$ )                                                                  | Comments                             |
|----------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------|
| Gas Flow Rate –<br>Measuring Equipment | (500 to 50 000) sccm<br><br>(0 to 10) slpm<br>(10 to 20) slpm<br>(20 to 50) slpm<br>(50 to 100) slpm | 0.23 %<br><br>0.62 % + 0.024 slpm<br>0.62 % + 0.048 slpm<br>0.62 % + 0.12 slpm<br>0.62 % + 0.24 slpm | Mesa Dry-Cal<br><br>Mass flow meters |

## V. Mechanical

| Parameter/Equipment                                                        | Range                                                                                                                                                                                                                                                                                                                                                                                                                            | CMC <sup>2, 4, 5, 7</sup> ( $\pm$ )                                                                                                                                                                                                                                                                                          | Comments                                                                                                                                                                                                       |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pneumatic/Hydraulic<br>Gage Pressure –<br>Measuring Equipment <sup>3</sup> | (0 to 0.25) in·H <sub>2</sub> O<br>(0 to 3) in·H <sub>2</sub> O<br>(0 to 15) in·H <sub>2</sub> O<br>(0 to 25) in·H <sub>2</sub> O<br><br>(0 to 60) psig<br>(0 to 600) psig<br>(0 to 1000) psig<br><br>(0 to 400) psig<br>(400 to 1000) psig<br><br>(0 to 9) psig<br>(9 to 30) psig<br><br>(0 to 90) psig<br>(90 to 300) psig<br><br>(0 to 11) in·H <sub>2</sub> O<br>(11 to 415) in·H <sub>2</sub> O<br><br>(100 to 15 000) psig | 0.000 48 in·H <sub>2</sub> O<br>0.0027 in·H <sub>2</sub> O<br>0.011 in·H <sub>2</sub> O<br>0.031 in·H <sub>2</sub> O<br><br>0.019 psig<br>0.19 psig<br>0.31 psig<br><br>0.24 psig<br>0.059 %<br><br>0.0028 psig<br>0.03 %<br><br>0.03 psig<br>0.03 %<br><br>0.0048 in·H <sub>2</sub> O<br>0.042 %<br><br>0.01 % + 0.015 psig | Heise ST-2H / HQS-1<br><br><br><br><br>Heise ST-2H / HQS-2<br><br><br>Crystal/Ametek XP3i<br><br>Crystal/Ametek<br>APM30PSI<br><br>Crystal/Ametek<br>AMP300PSI<br><br>Crystal/Ametek HPC52<br><br>Ametek T-150 |
| Pneumatic Absolute<br>Pressure – Measuring<br>Equipment <sup>3</sup>       | Up to 15 psia                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.0061 psia                                                                                                                                                                                                                                                                                                                  | Heise ST-2H / HQS-2                                                                                                                                                                                            |
| Vacuum – Measuring<br>Equipment <sup>3</sup>                               | Up to 30 in·Hg                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.013 in·Hg                                                                                                                                                                                                                                                                                                                  | Heise ST-2H / HQS-2                                                                                                                                                                                            |

| Parameter/Equipment                                           | Range             | CMC <sup>2, 4 5, 7</sup> ( $\pm$ ) | Comments                                                               |
|---------------------------------------------------------------|-------------------|------------------------------------|------------------------------------------------------------------------|
| Rotational Speed – Measure (Optical) <sup>3</sup>             | (6 to 99 999) RPM | 0.05 % + 0.6 <i>R</i>              | Ametek 1726C                                                           |
| Rotational Speed – Measuring Equipment (Optical) <sup>3</sup> | (6 to 99 999) RPM | 0.0024 % + 0.6 <i>R</i>            | Agilent 33120A                                                         |
| Scales & Balances <sup>3</sup><br>(1 g to 35 kg)              | (10 to 500) mg    | 12 $\mu$ g                         | ASTM Class 1 mass pieces, fixed values. Uncertainties are per weight.  |
|                                                               | 1 g               | 41 $\mu$ g                         |                                                                        |
|                                                               | 2 g               | 41 $\mu$ g                         |                                                                        |
|                                                               | 3 g               | 41 $\mu$ g                         |                                                                        |
|                                                               | 5 g               | 41 $\mu$ g                         |                                                                        |
|                                                               | 10 g              | 60 $\mu$ g                         |                                                                        |
|                                                               | 20 g              | 87 $\mu$ g                         |                                                                        |
|                                                               | 30 g              | 87 $\mu$ g                         |                                                                        |
|                                                               | 50 g              | 0.15 mg                            |                                                                        |
|                                                               | 100 g             | 0.30 mg                            |                                                                        |
|                                                               | 200 g             | 0.60 mg                            |                                                                        |
|                                                               | 500 g             | 1.5 mg                             |                                                                        |
|                                                               | 1 kg              | 3.0 mg                             |                                                                        |
|                                                               | 2 kg              | 5.9 mg                             |                                                                        |
|                                                               | 5 kg              | 14 mg                              |                                                                        |
|                                                               | 1 g               | 0.13 mg                            | OIML Class F1 mass pieces, fixed values. Uncertainties are per weight. |
|                                                               | 2 g               | 0.15 mg                            |                                                                        |
|                                                               | 5 g               | 0.19 mg                            |                                                                        |
|                                                               | 10 g              | 0.24 mg                            |                                                                        |
|                                                               | 20 g              | 0.30 mg                            |                                                                        |
|                                                               | 50 g              | 0.36 mg                            |                                                                        |
|                                                               | 100 g             | 0.59 mg                            |                                                                        |
|                                                               | 200 g             | 1.2 mg                             |                                                                        |
|                                                               | 500 g             | 2.9 mg                             |                                                                        |
|                                                               | 1 kg              | 5.9 mg                             |                                                                        |
|                                                               | 2 kg              | 12 mg                              |                                                                        |
|                                                               | 5 kg              | 29 mg                              |                                                                        |
|                                                               | 10 kg             | 58 mg                              |                                                                        |
|                                                               | 20 kg             | 120 mg                             |                                                                        |

| Parameter/Equipment                                       | Range                                                                                                                         | CMC <sup>2, 4, 5</sup> ( $\pm$ )                                                                                                                                                                | Comments                                                                                                                                                                    |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scales & Balances <sup>3</sup><br>(1 g to 35 kg) – (cont) | (10 to 500) mg<br>1 g<br>2 g<br>3 g<br>5 g<br>10 g<br>20 g<br>30 g<br>50 g<br>100 g<br>200 g<br>500 g<br>1 kg<br>2 kg<br>5 kg | 7 $\mu$ g<br>10 $\mu$ g<br>12 $\mu$ g<br>16 $\mu$ g<br>16 $\mu$ g<br>21 $\mu$ g<br>38 $\mu$ g<br>38 $\mu$ g<br>38 $\mu$ g<br>79 $\mu$ g<br>89 $\mu$ g<br>0.34 mg<br>0.67 mg<br>1.1 mg<br>1.3 mg | ASTM Class 1 mass pieces & correction factors, fixed values. Uncertainties are per weight.                                                                                  |
| Scales & Balances <sup>3</sup><br>(10 kg to 600 kg)       | 10 kg<br>20 kg<br><br>(10 to 3000) kg                                                                                         | 1.5 g<br>2.5 g<br><br>0.16 %                                                                                                                                                                    | ASTM Class 6 mass pieces & correction factors, fixed values. Uncertainties are per weight.<br><br>Liquid flow totalized by Endress & Hauser Promass 83F Coriolis flow meter |

## VI. Thermodynamics

| Parameter/Equipment                            | Range                                                                                                  | CMC <sup>2, 7</sup> ( $\pm$ )                                       | Comments                                                                                              |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Temperature – Measure <sup>3</sup>             | (-196 to -100) °C<br>(-100 to 50) °C<br>(50 to 200) °C<br>(200 to 400) °C<br>(400 to 660) °C           | 0.013 °C<br>0.014 °C<br>0.022 °C<br>0.033 °C<br>0.047 °C            | Hart Scientific 5628 w/ Hart Scientific 1502A                                                         |
| Temperature – Measuring Equipment <sup>3</sup> | -196 °C<br>(-95 to -80) °C<br>(-80 to -20) °C<br>(-20 to 100) °C<br>(100 to 200) °C<br>(200 to 650) °C | 0.013 °C<br>0.019 °C<br>0.018 °C<br>0.025 °C<br>0.033 °C<br>0.13 °C | Hart Scientific 5628 w/ Hart Scientific 1502A with LN <sub>2</sub> , dry ice / ethanol slurry & baths |

| Parameter/Equipment                                 | Range                                                                                               | CMC <sup>2, 7</sup> (±)                         | Comments                            |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------|
| Controlled Temperature Units – Measure <sup>3</sup> |                                                                                                     |                                                 |                                     |
| Refrigerators                                       | (2 to 8) °C                                                                                         | 0.25 °C                                         | RTD w/ temperature readout          |
| -20 °C Freezers                                     | (-30 to -10) °C                                                                                     | 0.27 °C                                         |                                     |
| -80 °C Freezers                                     | (-90 to -60) °C                                                                                     | 0.30 °C                                         |                                     |
| Cryo Freezers                                       | (-196 to -120) °C                                                                                   | 0.52 °C                                         |                                     |
| Incubators                                          | (0 to 65) °C                                                                                        | 0.25 °C                                         | Thermocouple w/ temperature readout |
| Glass Washers, Ovens, & Furnaces                    | (0 to 260) °C<br>(260 to 660) °C                                                                    | 0.85 °C<br>2.4 °C                               |                                     |
| Relative Humidity – Measure <sup>3</sup>            | Up to 90 % RH<br>(90 to 100) % RH                                                                   | 1.4 % RH<br>2.1 % RH                            | Vaisala HMP77B                      |
| Relative Humidity – Measuring Equipment             | LiCl 11 % RH<br>MgCl <sub>2</sub> 33 % RH<br>NaCl 75 % RH<br>K <sub>2</sub> SO <sub>4</sub> 97 % RH | 0.57 % RH<br>0.90 % RH<br>0.95 % RH<br>1.2 % RH | Salt solutions                      |

## VII. Time & Frequency

| Parameter/Equipment                          | Range                | CMC <sup>2, 4, 7</sup> (±)                | Comments             |
|----------------------------------------------|----------------------|-------------------------------------------|----------------------|
| Frequency – Measuring Equipment <sup>3</sup> | 100 µHz to 15 MHz    | 24 µHz/Hz                                 | Agilent 33120A       |
|                                              | 0.01 Hz to 2 MHz     | 2 µHz/Hz + 5 µHz                          | Fluke 5522A          |
| Frequency – Measure <sup>3</sup>             | 10 Hz to 1 MHz       | 12 parts in 10 <sup>6</sup> Hz + 2 digits | Fluke 8508A          |
| Time – Measure <sup>3</sup>                  | 1 s to 9:59:59:99 hr | 0.001 % + 67 ms                           | Control Company 1221 |

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

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



## Accredited Laboratory

A2LA has accredited

### ACCREDITED LABS DBA INSTRUMENT TECHNOLOGIES, INC.

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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 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 2026.

A blue ink signature of Trace McInturff.

Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3316.01  
Valid to July 31, 2028  
Revised August 17, 2026

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