



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

ISOLAB, Inc.
6260 Hawthorne Drive
Windsor, ON N8T 1J9

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R.D.L.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU
Expiry Date: 02 December 2024
Certificate Number: L2434



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
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).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ISOLAB, Inc.
6260 Hawthorne Dr.
Windsor, ON N8T 1J9
Pradip Jansari 519-948-8371

CALIBRATION

Valid to: **December 2, 2024**

Certificate Number: **L2434**

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|--|--|---|
| DC Current Generate | (1 to 10) mA (10 to 20) mA (20 to 100) mA (0.1 to 1) A (1 to 3) A (3 to 10) A | 0.004 mA 0.006 mA 0.06 mA 0.006 A 0.02 A 0.06 A | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| DC Current Measure | (1 to 10) mA (10 to 20) mA (20 to 100) mA (0.1 to 1) A (1 to 3) A (3 to 10) A | 0.007 mA 0.003 mA 0.055 A 0.007 5 A 0.003 A 0.017 A | Measurement with Fluke 8846A/Agilent 34401A Multimeter |
| AC Current Generate 1 kHz | (0 to 100) μ A (0.1 to 100) mA (0 to 1) A (0 to 3) A (0 to 10) A | 0.65 μ A 0.6 mA 0.007 A 0.02 A 0.07 A | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| AC Current Measure 1 kHz | (0 to 100) μ A (0.1 to 100) mA (0 to 1) A (0 to 3) A (0 to 10) A | 0.22 μ A 0.016 mA 0.001 6 A 0.005 A 0.022 A | Measurement with 8846A/Agilent 34401A Multimeter |
| Electrical Simulation of RTD Temperature Recorders, Controllers, and Indicators ¹ | (-200 to 400) $^{\circ}$ C | 0.17 $^{\circ}$ C | Flue 741B, Fluke 753 Calibrator, Decade box. |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|--|---|---|
| Resistance | (0 to 10 Ω) (1 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω | 0.004 Ω 0.015 Ω 0.16 Ω 1.5 Ω 15 Ω 0.002 M Ω 0.004 5 M Ω 0.82 M Ω | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| DC Voltage Generate | (0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V | 0.007 5 mV 0.35 mV 0.004 6 V 0.005 5 V 0.053 V | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| DC Voltage Measure | (0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V | 0.007 5 mV 0.35 mV 6 mV 3 mV 0.053 mV | Measurement with Fluke 8846A/Agilent 34401A Multimeter |
| AC Voltage Generate | (1 to 100) mV 10 Hz 20 kHz 50 kHz 100 kHz (0.1 to 1) V 10 Hz 20 kHz 50 kHz 100 kHz (0 to 10) V 10 Hz 20 kHz 50 kHz 100 kHz | 0.6 mV 0.6 mV 1 mV 1 mV 0.006 V 0.006 V 0.007 V 0.01 V 0.06 V 0.06 V 0.07 V 0.1 V | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| AC Voltage Generate | (0 to 100) V 10 Hz 20 kHz 50 kHz 100 kHz | 0.1 V 0.1 V 0.7 V 1 V | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|--|--|---|
| AC Voltage Generate | (0 to 1 000) V 10 Hz 20 kHz 50 kHz 100 kHz | 7 V 7 V 7 V 7 V | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| AC Voltage Measure | (1 to 100) mV 10 Hz 20 kHz 50 kHz 100 kHz (0.1 to 1) V 10 Hz 20 kHz 50 kHz 100 kHz (0 to 10) V 10 Hz 20 kHz 50 kHz 100 kHz (0 to 100) V 10 Hz 20 kHz 50 kHz 100 kHz (0 to 1 000) V 10 Hz 20 kHz 50 kHz 100 kHz | 0.11 mV 0.11 mV 0.7 mV 0.7 mV 0.001 mV 0.001 mV 0.002 mV 0.007 mV 0.01 V 0.01 V 0.02 V 0.07 V 0.1 V 0.1 V 0.2 V 0.2 V 0.9 V 0.9 V 0.9 V 1 V | Measurement with Fluke 8846A/Agilent 34401A Multimeter |
| Electrical Simulation of TC Temperature Recorders/ Controllers/Indicators ¹ | Type J & K (-180 to 1 370) °C Type R & S (-50 to 1 760) °C Type T (-200 to 400) °C | 0.35 °C 0.6 °C 0.15 °C | Fluke 743, Fluke 753 Calibrator |

Length – Dimensional Metrology

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------|-----------------------------|---|--|
| Micrometer End Rods | (1 to 6) in (7 to 12) in | 75 μ m 200 μ m | Gage Blocks and Dial Indicator |
| Calipers | (1 to 6) in (7 to 12) in | 100 μ m 200 μ m | Gauge Blocks/ Micrometer Head |
| Dial Indicators | (0 to 1) in | 15 μ m | |
| Micrometer (Outside) | (1 to 6) in (7 to 12) in | 100 μ m 175 μ m | |

Mass and Mass Related

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|-----------------------------------|---|---|--|
| Pressure Pneumatic ^{1,2} | (0 to 1) inH ₂ O (1 to 4) inH ₂ O | 0.002 inH ₂ O 0.01 inH ₂ O | Ametek PTE100 Pressure Indicator |
| | (4 to 354) inH ₂ O | 0.03 % of reading + 0.6R | Ametek PK-II Deadweight Tester |
| | (10 to 1 000) psi | 0.03 % of reading + 0.6R | Ametek HK-1000 Deadweight Tester |
| Pressure Hydraulic ^{1,2} | (50 to 10 000) psi | 0.03 % of reading + 0.6R | Ametek T-50 Deadweight Tester |
| Vacuum Pneumatic ^{1,2} | (0 to 29) inHg | 0.04 inHg + 0.6R | Ashcroft PTE100 Pressure Indicator |
| Torque Tools ^{1,2} | (0.01 to 250) lbf·in (250 to 1 000) lbf·in (0.01 to 1 000) lbf·ft | 0.53 % of reading + 0.6R 0.1 % of reading + 0.6R 0.15 % of reading + 0.6R | Torque Tester |
| Torque Testers ² | (1 to 200) lbf·in (10 to 1 000) lbf·ft | 0.04 % of reading + 0.6R 0.087 % of reading + 0.6R | Torque Arm and Weights |

Thermodynamic

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|------------------------------------|---|---|
| Temperature Sources | (-40 to 250) °C (250 to 660) °C | 0.1 °C 0.5 °C | PRT and Fluke 741B Calibrator /Hart Scientific 1502 Indicator |

Thermodynamic

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|------------------------------|---|---|
| Thermocouples | Type J &K (-40 to 400) °C | 0.3 °C | Temperature Bath/Drywell, PRT and Fluke 741B Calibrator /Hart Scientific 1502 Indicator |
| | (401 to 660) C | 0.45 °C | |
| | Type R &S (-40 to 400) °C | 0.45 °C | |
| | (401 to 660) °C | 0.6 °C | |
| | Type T (-40 to 400) °C | 0.3 °C | |
| RTD and Thermistor Probes | (-40 to 250) °C | 0.12 °C | Temperature Bath/Drywell, PRT and Fluke 741B Calibrator /Hart Scientific 1502 Indicator |
| | (250 to 400) °C | 0.17 °C | |
| | (400 to 660) °C | 0.56 °C | |
| Liquid in Glass Thermometer ² | (-30 to 250) °C | 0.53 °C + 0.6R | Temperature Bath, PRT and Fluke 741B Calibrator /Hart Scientific 1502 Indicator |

Time and Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|-------------------|---|---|
| Frequency Generate | (1 to 110) Hz | 0.011 Hz | Comparison with Fluke 8846A/Agilent 34401A Multimeter (Fluke 741B/760A Calibrator sourcing) |
| | (110 to 1 100) Hz | 0.013 Hz | |
| | (1.1 to 11) kHz | 0.028 Hz | |
| Frequency Measure | (1 to 110) Hz | 0.06 Hz | |
| | (110 to 1 100) Hz | 0.6 Hz | |
| | (1.1 to 11) kHz | 0.012 kHz | |

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. R = resolution of unit under test
3. This scope is formatted as part of a single document including Certificate of Accreditation No. L2434.



R. Douglas Leonard Jr., VP, PILR SBU