



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

NORTHERN BALANCE AND SCALE, INC.
9150 Isanti Street NE
Blaine, MN 55449
Jacob Christianson Phone: 952 881 7716

CALIBRATION

Valid To: August 31, 2024

Certificate Number: 1684.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 5}:

I. Chemical

| Parameter/Equipment | Range | CMC ² (±) | Comments |
|--|--------------|----------------------|------------------------------------|
| pH Meter ³ | (0 to 14) pH | 0.016 pH | HANNA HI931001 pH/mV calibrator |
| Gas Concentration – CO ₂ | Up to 20 % | 1.3 % concentration | Vaisala GMP251 |

II. Electrical – DC/Low Voltage

| Parameter/Equipment | Range | CMC ² (±) | Comments |
|-----------------------------|---------|----------------------|---|
| Metal Detector ³ | | | |
| Ferrous | 0.50 mm | 0.090 mm | Manufacturer recommendations using Mediumz precision test balls |
| Ferrous | 1.00 mm | 0.090 mm | |
| Ferrous | 1.50 mm | 0.090 mm | |
| Ferrous | 2.00 mm | 0.090 mm | |
| Ferrous | 2.50 mm | 0.090 mm | |
| Ferrous | 3.00 mm | 0.090 mm | |
| Non Ferrous | 0.50 mm | 0.090 mm | |
| Non Ferrous | 1.00 mm | 0.090 mm | |
| Non Ferrous | 1.50 mm | 0.090 mm | |
| Non Ferrous | 2.00 mm | 0.090 mm | |
| Non Ferrous | 2.50 mm | 0.090 mm | |
| Non Ferrous | 3.00 mm | 0.090 mm | |
| Stainless Steel 316 | 0.50 mm | 0.090 mm | |
| Stainless Steel 316 | 1.00 mm | 0.090 mm | |
| Stainless Steel 316 | 1.50 mm | 0.090 mm | |
| Stainless Steel 316 | 2.00 mm | 0.090 mm | |
| Stainless Steel 316 | 2.50 mm | 0.090 mm | |
| Stainless Steel 316 | 3.00 mm | 0.090 mm | |
| Bronze | 1.50 mm | 0.090 mm | |
| Bronze | 2.00 mm | 0.090 mm | |
| Bronze | 2.50 mm | 0.090 mm | |
| Bronze | 3.00 mm | 0.090 mm | |
| Lead | 1.00 mm | 0.090 mm | |
| Lead | 2.00 mm | 0.090 mm | |
| Lead | 3.00 mm | 0.090 mm | |
| Copper | 0.50 mm | 0.090 mm | |
| Copper | 1.00 mm | 0.090 mm | |
| Stainless Steel 304 | 0.50 mm | 0.090 mm | |
| Stainless Steel 304 | 1.00 mm | 0.090 mm | |
| Stainless Steel 304 | 1.50 mm | 0.090 mm | |
| Stainless Steel 304 | 2.00 mm | 0.090 mm | |
| Stainless Steel 304 | 2.50 mm | 0.090 mm | |
| Stainless Steel 304 | 3.00 mm | 0.090 mm | |
| Aluminum | 1.00 mm | 0.090 mm | |
| Aluminum | 1.50 mm | 0.090 mm | |
| Aluminum | 2.00 mm | 0.090 mm | |
| Aluminum | 2.50 mm | 0.090 mm | |
| Aluminum | 3.00 mm | 0.090 mm | |

| Parameter/Equipment | Range | CMC ² (±) | Comments |
|-----------------------------|---------|----------------------|---|
| X-Ray Detector ³ | | | |
| Soda Lime Glass | 1.00 mm | 0.090 mm | Manufacturer recommendations using Mediumz precision test balls |
| Soda Lime Glass | 1.50 mm | 0.090 mm | |
| Soda Lime Glass | 2.00 mm | 0.090 mm | |
| Soda Lime Glass | 2.50 mm | 0.090 mm | |
| Soda Lime Glass | 3.00 mm | 0.090 mm | |
| Quartz Glass | 1.00 mm | 0.090 mm | |
| Quartz Glass | 2.00 mm | 0.090 mm | |
| Quartz Glass | 3.00 mm | 0.090 mm | |
| Ceramic | 1.00 mm | 0.090 mm | |
| Ceramic | 1.50 mm | 0.090 mm | |
| Ceramic | 2.00 mm | 0.090 mm | |
| Ceramic | 2.50 mm | 0.090 mm | |
| Teflon | 3.00 mm | 0.090 mm | |
| Teflon | 2.00 mm | 0.090 mm | |
| Teflon | 2.50 mm | 0.090 mm | |
| Teflon | 3.00 mm | 0.090 mm | |

III. Mechanical

| Parameter/Equipment | Range | CMC ^{2, 6} (±) | Comments |
|------------------------------|--|--|--|
| Mass – Measure, Fixed Points | 1 mg 2 mg 3 mg 5 mg 10 mg 20 mg 30 mg 50 mg 100 mg 200 mg 300 mg 500 mg | 1.6 µg 1.3 µg 1.4 µg 1.5 µg 2.0 µg 1.4 µg 1.6 µg 1.7 µg 2.3 µg 2.2 µg 1.7 µg 1.8 µg | NIST SOP 4 double substitution with ASTM Class 0 weights |

| Parameter/Equipment | Range | CMC ^{2, 6} (±) | Comments |
|-------------------------------------|--------------------|-------------------------|--|
| Mass – Measure, Fixed Points (cont) | 1 g | 6.8 µg | NIST SOP 4 double substitution with ASTM Class 0 weights |
| | 2 g | 5.3 µg | |
| | 3 g | 4.4 µg | |
| | 5 g | 6.4 µg | |
| | 10 g | 15 µg | |
| | 20 g | 15 µg | |
| | 30 g | 21 µg | |
| | 50 g | 30 µg | |
| | 100 g | 43 µg | |
| | 200 g | 68 µg | |
| | 300 g | 59 µg | |
| | 500 g | 0.12 mg | |
| | 1 kg | 0.37 mg | |
| | 2 kg | 1.1 mg | |
| | 3 kg | 1.0 mg | |
| | 5 kg | 1.4 mg | |
| | 10 kg | 1.9 mg | NIST SOP 4 double substitution with ASTM Class 1 weights |
| | 25 kg | 10 mg | |
| | 30 kg | 10 mg | |
| | 22.6 kg (50 lb) | 430 mg | NIST SOP 4 double substitution with ASTM Class 2 weights |
| | 11.4 kg (25 lb) | 170 mg | |
| | 4.5 kg (10 lb) | 3.0 mg | |
| | 2.3 kg (5 lb) | 2.2 mg | |
| | 907 g (2 lb) | 1.2 mg | |
| | 453 g (1 lb) | 0.84 mg | |
| | 226 g (8 oz) | 0.93 mg | |
| | 113 g (4 oz) | 1.5 mg | |
| | 56.7 g (2 oz) | 0.50 mg | |
| | 28.3 g (1 oz) | 0.040 mg | |
| | 14.2 g (1/2 oz) | 0.039 mg | |
| | 7.09 g (1/4 oz) | 0.013 mg | |
| | 3.54 g (1/8 oz) | 0.019 mg | |
| | 1.77 g (1/16 oz) | 0.013 mg | |
| | 0.886 g (1/32 oz) | 0.012 mg | |
| | 90.7 g (0.2 lb) | 0.27 mg | |
| | 45.4 g (0.1 lb) | 0.14 mg | |
| | 22.7 g (0.05 lb) | 0.10 mg | |
| | 9.07 g (0.02 lb) | 0.064 mg | |
| | 4.54 g (0.01 lb) | 0.046 mg | |
| | 2.27 g (0.005 lb) | 0.051 mg | |
| | 0.907 g (0.002 lb) | 0.041 mg | |
| | 0.454 g (0.001 lb) | 0.038 mg | |

| Parameter /Equipment | Range | CMC ² (±) | Comments |
|--|--|--|--|
| Scales ³ – Class III | Up to 5 lb [Up to 2.3 kg] (>5 to 10) lb [(>2.3 to 4.5) kg] (>10 to 30) lb [(>4.5 to 13.6) kg] (>30 to 50) lb [(>13.6 to 22.7) kg] (>50 to 100) lb [(>22.7 to 45.3) kg] (>100 to 500) lb [(>45.3 to 226) kg] (>500 to 1000) lb [(>226 to 453) kg] (>1000 to 5000) lb [(>453 to 2267) kg] (>5000 to 10 000) lb [(>2267 to 4535) kg] (>10 000 to 20 000) lb [(>4535 to 9071) kg] | 0.0015 lb 0.0031 lb 0.015 lb 0.015 lb 0.031 lb 0.15 lb 0.31 lb 1.5 lb 1.5 lb 7.6 lb | NIST Handbook 44 verification using NIST Class F weights |
| Balances ³ – Class I Class II | Up to 6 g (>6 to 200) g (>200 to 500) g Up to 3000 g (>3000 to 5000) g (>5000 to 10 000) g (>10 000 to 30 000) g (>30 000 to 150 000) g | 11 µg 72 µg 3.7 mg 37 mg 370 mg 370 mg 310 mg 3.7 g | NIST Handbook 44 verification with: ASTM E617 Class 1 weights ASTM E617 Class 2 weights |
| Pipettes ³ | (0.5 to 1) µl (>1 to 5) µl (>5 to 10) µl (>10 to 50) µl (>50 to 100) µl (>100 to 500) µl (>500 to 1000) µl (>1 to 10) ml | 0.048 µl 0.048 µl 0.049 µl 0.049 µl 0.063 µl 0.063 µl 0.065 µl 10 µl | Gravimetric method using Class I analytical balance |
| Dispenser ³ | Up to 25 ml (>25 to 50) ml | 38 µl 50 µl | Gravimetric method using Class I analytical balance |
| Force Gages ³ , Fixed Points | Up to 10 lb (>10 to 50) lb (>50 to 110) lb | 0.04 lb 0.22 lb 0.50 lb | Dead weight method using NIST Class F weights |

| Parameter/Equipment | Range | CMC ² (\pm) | Comments |
|---|---|---|--|
| Pressure Gages ³ – Pneumatic | (-12 to 100) psi (>100 to 300) psi | 0.079 psi 0.30 psi | Fluke 719 calibrator and 700 pressure module |
| Centrifuge ³ – Rotation Time Interval Temperature | (6 to 15 000) rpm (>15 000 to 30000) rpm Up to 10 min (600 s) (-20 to 40) °C | 7.4 rpm 21 rpm 0.13 s 1.2 °C | Laser tachometer Laser tachometer Stopwatch Fluke 724 |

IV. Thermodynamic

| Parameter/Equipment | Range | CMC ^{2,6} (\pm) | Comments |
|--|------------------|------------------------------|--|
| Thermometers and Temperature Indicating Systems ³ | (-80 to -30) °C | 0.026 °C | Dry block by comparison to thermometer readout and PRT |
| | (-30 to 100) °C | 0.013 °C | Silicon oil bath by comparison to thermometer readout and PRT |
| | (>100 to 300) °C | 0.014 °C | Silicon oil bath by comparison to thermometer readout and PRT |
| | (>300 to 650) °C | 0.13 °C | Dry block by comparison to thermometer readout and PRT |
| Relative Humidity – Measure ³ | (10 to 85) % RH | 2.4 % RH | Environmental chamber or direct comparison to Vaisala humidity probe |

¹ This laboratory offers commercial calibration service 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 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.
- ⁴ In the statement of CMC, R is the Resolution of the unit under test/calibration.
- ⁵ This scope meets A2LA's *P112 Flexible Scope Policy*.
- ⁶ 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

NORTHERN BALANCE AND SCALE, INC.

Blaine, MN

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 1st day of August 2022.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1684.01
Valid to August 31, 2024

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