

## Calibration Certificate of Mass

**Calibration Date:** April 6, 2023

**Certificate Number:** 2023-056-1

<p><b>Submitted By:</b> FSCP Area 35 3721 West Cuming St. Lincoln, NE 68524</p>	<p><b>Point of Contact:</b> Mike Boehler Ph. 402-471-3422 <b>email:</b> <a href="mailto:michael.boehler@nebraska.gov">michael.boehler@nebraska.gov</a> <b>PO Number:</b> N/A</p>
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<p><b>Test Item(s):</b> 41-cast weights <b>ID / Asset Number:</b> Area 35 <b>Manufacture:</b> Various <b>Material:</b> Cast Iron</p>	<p><b>Artifact(s) Description:</b></p>	<p><b>Date Received:</b> April 3, 2023 <b>Serial Number(s):</b> See Next Page <b>Class Specification:</b> NIST Class F <b>Condition:</b> Good (some wear)</p>
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<p><b>Reference Standards Used:</b> NSL lb standards</p>	<p><b>Procedure Used:</b> NIST HB 6969, SOP 8 (2019) <b>Metrologist:</b> JPL</p>	<p><b>Equipment Used:</b> Mettler XPR32003 Mettler XP 604</p>
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**Environmental Cond.**      **Temp:** 21.8 °C    **Pressure:** 739.3 mmHg    **Relative Humidity:** 48.2 %

### Pertinent Information

- The artifact(s) listed in this document have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. **RED** print indicates an out-of-compliance reading. It is the decision of the Laboratory to adjust the artifact(s) when the sum of the correction and the uncertainty exceed 95% of the maximum permissible error. All of the tolerances and design specifications (except density, hardness and magnetism) were evaluated according to ASTM E617 (2018) and/or NIST HB 105-1 (2019) for the artifacts designated class.
- All corrections stated in this report correlate to a “Conventional Mass” (CM), also known as “apparent mass”, scale versus 8.0 g/cm<sup>3</sup> reference mass density and an air density of 1.2 mg/cm<sup>3</sup> at 20 °C.
- It is the end user’s responsibility to verify that the weights meet the accuracy requirements outlined in NIST Handbook 44 (2022), Appendix A Fundamental Considerations, when using the weights for calibration of commercial (Legal for Trade) scales.

### Traceability Statement

The artifact(s) described in this certificate have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The calibration number for this certificate is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this certificate.

### Uncertainty Statement

The combined standard uncertainty includes uncertainties reported for the standard, uncertainties associated with the measurement process, uncertainties for any observed deviations from reference values which are less than surveillance limits and the standard uncertainty for any uncorrected errors associated with air buoyance corrections. The combined standard uncertainty is multiplied by a coverage factor (*k*), to give the expanded uncertainty, which defines an interval with a 95.45 percent level of confidence. The expanded uncertainty presented in this report is consistent with the *Guide to the Expression of Uncertainty in Measurement (2008, revised 2012)*. Some components of the calibration can be evaluated through a Type A evaluation, or the method of evaluation of uncertainty by the statistical analysis (standard deviation) from the observations taken. Magnetic testing has not been performed, therefore, there are no components for the effects of it in the uncertainty budget.

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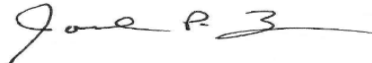
### Calibration Results

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(k) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm <sup>3</sup> )
25 lb	WM-D22	-1.01	N	-1.01	0.14	2	1.1	7.84
25 lb	WM-D23	0.80	N	0.80	0.14	2	1.1	7.84
25 lb	WM-D24	0.29	N	0.29	0.14	2	1.1	7.84
25 lb	WM-D25	0.19	N	0.19	0.14	2	1.1	7.84
25 lb	WM-D26	0.51	N	0.51	0.14	2	1.1	7.84
25 lb	WM-D28	0.51	N	0.51	0.14	2	1.1	7.84
25 lb	WM-D29	0.62	N	0.62	0.14	2	1.1	7.84
25 lb	WM-D30	-0.18	N	-0.18	0.14	2	1.1	7.84
50 lb	A5C1	-0.89	N	-0.89	0.28	2	2.3	7.2
50 lb	A5C4	1.57	N	1.57	0.28	2	2.3	7.2
50 lb	A5C11	1.31	N	1.31	0.28	2	2.3	7.2
50 lb	WM50-16	0.77	N	0.77	0.28	2	2.3	7.2
50 lb	B-C-1	-0.33	N	-0.33	0.28	2	2.3	7.2
50 lb	B-C-2	2.92	Y	0.43	0.28	2	2.3	7.2
50 lb	B-C-3	0.14	N	0.14	0.28	2	2.3	7.2
50 lb	B-C-4	-0.83	N	-0.83	0.28	2	2.3	7.2
50 lb	B-C-6	3.60	Y	-0.07	0.28	2	2.3	7.2
50 lb	B-C-7	-2.65	Y	0.37	0.28	2	2.3	7.2
50 lb	B-C-9	1.24	N	1.24	0.28	2	2.3	7.2
50 lb	B-C-12	1.43	N	1.43	0.28	2	2.3	7.2
500 lb	WM-T519	65.1	Y	3.2	2.9	2.002	23	7.2
1000 lb	1	-29.1	N	-29.1	5.8	2.018	45	7.2
1000 lb	2	30.8	N	30.8	5.8	2.018	45	7.2
1000 lb	3	-30.0	N	-30.0	5.8	2.018	45	7.2
1000 lb	4	4.8	N	4.8	5.8	2.018	45	7.2
1000 lb	5	22.4	N	22.4	5.8	2.018	45	7.2
1000 lb	6	17.3	N	17.3	5.8	2.018	45	7.2
1000 lb	7	26.2	N	26.2	5.8	2.018	45	7.2
1000 lb	8	30.5	N	30.5	5.8	2.018	45	7.2
1000 lb	9	7.6	N	7.6	5.8	2.018	45	7.2
1000 lb	10	-17.3	N	-17.3	5.8	2.018	45	7.2
1000 lb	11	-24.2	N	-24.2	5.8	2.018	45	7.2
1000 lb	12	-36.5	N	-36.5	5.8	2.018	45	7.2
1000 lb	13	-0.7	N	-0.7	5.8	2.018	45	7.2
1000 lb	14	29.5	N	29.5	5.8	2.018	45	7.2
1000 lb	15	17.3	N	17.3	5.8	2.018	45	7.2
1000 lb	16	12.2	N	12.2	5.8	2.018	45	7.2
1000 lb	17	11.8	N	11.8	5.8	2.018	45	7.2
1000 lb	18	7.8	N	7.8	5.8	2.018	45	7.2
1000 lb	19	-47.9	Y	7.1	5.8	2.018	45	7.2
1000 lb	20	-30.7	N	-30.7	5.8	2.018	45	7.2

#### Conversion Factors

1 ounce (avoirdupois) (oz) = 28.349 52 g

1 pound (avoirdupois) (lb) = 453.592 37 g exactly



Joel P. Lavicky Metrologist

4/10/2023

Date of Issue

The results in this certificate only applies to those item specifically listed in this certificate. This certificate cannot be considered complete unless it contains all pages. This document may not be reproduced except in full, without the written consent of the Nebraska Standards Laboratory.

## Calibration Certificate of Mass

**Calibration Date:** April 5, 2023

**Certificate Number:** 2023-056-2

**Submitted By:** FSCP Area 35  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** Mike Boehler  
Ph. 402-471-3422  
**email:** [michael.boehler@nebraska.gov](mailto:michael.boehler@nebraska.gov)  
**PO Number:** N/A

**Test Item(s):** lb weight kit  
**Serial Number(s):** WM-2B86  
**Condition:** Good (some wear)  
**Material:** Stainless Steel and Aluminum

**Artifact(s) Description:**

**Date Received:** April 3, 2023  
**ID / Asset Number:** Area 35  
**Class Specification:** NIST Class F  
**Manufacture:** Rice Lake

**Reference Standards Used:**

NSL lb standards

**Procedure Used:**

NIST HB 6969, SOP 8 (2019)

**Metrologist:**

JPL

**Equipment Used:**

Sartorius MCM5004      Mettler XPR 205

Sartorius CC 1201      Sartorius CCE6

**Environmental Cond.**    **Temp:** 21.39 °C    **Pressure:** 729.7 mmHg    **Relative Humidity:** 48.99 %

**Pertinent Information**

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- All corrections stated in this report correlate to a "Conventional Mass" (CM), also known as "apparent mass", scale versus 8.0 g/cm<sup>3</sup> reference mass density and an air density of 1.2 mg/cm<sup>3</sup> at 20 °C.
- It is the end user's responsibility to verify that the weights meet the accuracy requirements outlined in NIST Handbook 44 (2020), Appendix A Fundamental Considerations, when using the weights for calibration of commercial (Legal for Trade) scales.

**Traceability Statement**

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**Uncertainty Statement**

The combined standard uncertainty includes uncertainties reported for the standard, uncertainties associated with the measurement process, uncertainties for any observed deviations from reference values which are less than surveillance limits and the standard uncertainty for any uncorrected errors associated with air buoyance corrections. The combined standard uncertainty is multiplied by a coverage factor (*k*), to give the expanded uncertainty, which defines an interval with a 95.45 percent level of confidence. The expanded uncertainty presented in this report is consistent with the *Guide to the Expression of Uncertainty in Measurement (2008, revised 2012)*. Some components of the calibration can be evaluated through a Type A evaluation, or the method of evaluation of uncertainty by the statistical analysis (standard deviation) from the observations taken. Magnetic testing has not been performed, therefore, there are no components for the effects of it in the uncertainty budget.

Calibration Date: April 5, 2023

Certificate Number: 2023-056-2

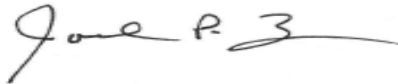
### Calibration Results

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(k) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm <sup>3</sup> )
5 lb	1	-0.042	n	-0.042	0.028	2	0.23	7.84
5 lb	2	-0.077	n	-0.077	0.028	2	0.23	7.84
5 lb	3	-0.056	n	-0.056	0.028	2	0.23	7.84
5 lb	4	-0.013	n	-0.013	0.028	2	0.23	7.84
5 lb	5	-0.104	n	-0.104	0.028	2	0.23	7.84
1 lb	6	0.0064	n	0.0064	0.0083	2	0.07	7.84
1 lb	7	-0.0330	n	-0.0330	0.0083	2	0.07	7.84
1 lb	8	0.0140	n	0.0140	0.0083	2	0.07	7.84
1 lb	9	-0.0239	n	-0.0239	0.0083	2	0.07	7.84
1 lb	10	0.0442	n	0.0442	0.0083	2	0.07	7.84
8 oz	11	-0.0037	n	-0.0037	0.0054	2	0.045	7.84
4 oz		-0.0187	n	-0.0187	0.0028	2	0.023	7.84
4 oz	18	-0.0161	n	-0.0161	0.0028	2	0.023	7.84
2 oz		0.0034	n	0.0034	0.0013	2	0.011	7.84
1 oz		-0.00017	n	-0.00017	0.00064	2	0.0054	7.84
1/2 oz		-0.00022	n	-0.00022	0.00034	2	0.0028	7.84
1/4 oz		-0.00010	n	-0.00010	0.00021	2	0.0017	7.84
1/8 oz		0.00018	n	0.00018	0.00016	2	0.0013	7.84

#### Conversion Factors

1 ounce (avoirdupois) (oz) = 28.349 52 g

1 pound (avoirdupois) (lb) = 453.592 37 g exactly



Joel P. Lavicky Metrologist

4/10/2023

Date of Issue

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## Calibration Certificate of Mass

**Calibration Date:** April 5, 2023

**Certificate Number:** 2023-056-3

**Submitted By:** FSCP Area 35  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** Mike Boehler  
Ph. 402-471-3422  
**email:** [michael.boehler@nebraska.gov](mailto:michael.boehler@nebraska.gov)  
**PO Number:** N/A

**Test Item(s):** Metric Weight Kit  
**Serial Number(s):** WM-2-89-3  
**Condition:** Good (some wear)  
**Material:** Stainless Steel.

**Artifact(s) Description:**

**Date Received:** 4/3/2023  
**ID / Asset Number:** Area 35  
**Class Specification:** NIST Class F  
**Manufacture:** Troemner

**Reference Standards Used:**

NSL & /Den Metric  
Volland-1707

**Procedure Used:**

NIST HB 6969, SOP 8 (2019)

**Metrologist:**

JPL

**Equipment Used:**

Sartorius CC 1201 Sartorius CCE6  
Mettler XPR 205

**Environmental Cond.**

**Temp:** 21.39 °C    **Pressure:** 729.7 mmHg    **Relative Humidity:** 48.99 %

**Pertinent Information**

- The artifact(s) listed in this document have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. **RED** print indicates an out-of-compliance reading. It is the decision of the Laboratory to adjust the artifact(s) when the sum of the correction and the uncertainty exceed 95% of the maximum permissible error. All of the tolerances and design specifications (except density, hardness and magnetism) were evaluated according to ASTM E617 (2018) and/or NIST HB 105-1 (2019) for the artifacts designated class.
- All corrections stated in this report correlate to a "Conventional Mass" (CM), also known as "apparent mass", scale verses 8.0 g/cm<sup>3</sup> reference mass density and an air density of 1.2 mg/cm<sup>3</sup> at 20 °C.
- It is the end user's responsibility to verify that the weights meet the accuracy requirements outlined in NIST Handbook 44 (2020), Appendix A Fundamental Considerations, when using the weights for calibration of commercial (Legal for Trade) scales.

**Traceability Statement**

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**Uncertainty Statement**

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**DEPARTMENT OF AGRICULTURE**

Calibration Date: April 5, 2023

Certificate Number: 2023-056-3

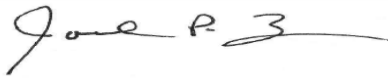
**Calibration Results**

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(k) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm <sup>3</sup> )
1 kg		0.043	n	0.043	0.012	2	0.1	7.84
500 g		0.0358	n	0.0358	0.0083	2	0.07	7.84
200 g		0.0148	n	0.0148	0.0048	2	0.04	7.84
200 g	*	0.0131	n	0.0131	0.0048	2	0.04	7.84
100 g		-0.0043	n	-0.0043	0.0024	2	0.02	7.84
50 g		0.0061	n	0.0061	0.0012	2	0.01	7.84
20 g		0.00055	n	0.00055	0.00048	2	0.004	7.84
20 g	*	-0.00066	n	-0.00066	0.00048	2	0.004	7.84
10 g		0.00161	n	0.00161	0.00024	2	0.002	7.84
5 g		-0.00060	n	-0.00060	0.00018	2	0.0015	7.84

**Conversion Factors**

1 ounce (avoirdupois) (oz) = 28.349 52 g

1 pound (avoirdupois) (lb) = 453.592 37 g exactly



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