

# Calibration Certificate of Mass

**Calibration Date:** May 12, 2021

**Certificate Number:** 2021-080-1

**Submitted By:** FSCP Area 55  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** Chris Uglow  
Ph. 402-471-3422  
**email:** [chris.uglow@nebraska.gov](mailto:chris.uglow@nebraska.gov)  
**PO Number:** N/A

**Test Item(s):** (66) Cast weights  
**ID / Asset Number:** Area 55  
**Manufacture:** Various  
**Material:** Cast Iron

**Artifact(s) Description:**

**Date Received:** May 10, 2021  
**Serial Number(s):** See next page  
**Class Specification:** NIST Class F  
**Condition:** Good (some wear)

**Reference Standards Used:**

NSL lb standards

**Procedure Used:**

NIST HB 6969, SOP 8 (2019)  
**Metrologist:**  
JPL

**Equipment Used:**

Mettler XPR32003  
Mettler XP 604

**Environmental Cond.**      **Temp:** 20 °C      **Pressure:** 737.11 mmHg      **Relative Humidity:** 46 %

**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 (2020), 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.

Calibration Date: May 12, 2021

Certificate Number: 2021-080-1

### 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> )
15 lb	WM15-19	0.284	N	0.284	0.083	2	0.68	7.2
15 lb	WM15-20	0.014	N	0.014	0.083	2	0.68	7.2
25 lb	NE-23	-0.33	N	-0.33	0.14	2	1.1	7.2
25 lb	NE-25	0.09	N	0.09	0.14	2	1.1	7.2
25 lb	NE-27	-2.93	Y	-0.05	0.14	2	1.1	7.2
25 lb	NE-28	-0.11	N	-0.11	0.14	2	1.1	7.2
25 lb	NE-29	-0.40	N	-0.40	0.14	2	1.1	7.2
25 lb	NE-30	-0.05	N	-0.05	0.14	2	1.1	7.2
25 lb	NE-31	-0.58	N	-0.58	0.14	2	1.1	7.2
25 lb	NE-32	0.10	N	0.10	0.14	2	1.1	7.2
25 lb	NE-33	0.03	N	0.03	0.14	2	1.1	7.2
25 lb	NE-34	-0.42	N	-0.42	0.14	2	1.1	7.2
25 lb	NE-35	-0.07	N	-0.07	0.14	2	1.1	7.2
25 lb	NE-36	0.33	N	0.33	0.14	2	1.1	7.2
25 lb	NE-37	0.09	N	0.09	0.14	2	1.1	7.2
25 lb	NE-38	0.07	N	0.07	0.14	2	1.1	7.2
25 lb	NE-39	0.69	N	0.69	0.14	2	1.1	7.2
25 lb	NE-40	0.37	N	0.37	0.14	2	1.1	7.2
25 lb	WM-D17	-0.71	N	-0.71	0.14	2	1.1	7.2
25 lb	WM-D27	-0.44	N	-0.44	0.14	2	1.1	7.2
25 lb	WM-D31	-0.70	N	-0.70	0.14	2	1.1	7.2
25 lb	WM-D32	-2.27	Y	0.00	0.14	2	1.1	7.2
25 lb	WM-D33	-0.64	N	-0.64	0.14	2	1.1	7.2
25 lb	WM-D34	-0.63	N	-0.63	0.14	2	1.1	7.2
25 lb	WM-D35	-1.06	Y	-0.34	0.14	2	1.1	7.2
25 lb	WM-D36	-0.07	N	-0.07	0.14	2	1.1	7.2
25 lb	WM-D37	0.18	N	0.18	0.14	2	1.1	7.2
25 lb	WM-D38	-0.69	N	-0.69	0.14	2	1.1	7.2
25 lb	WM-D39	-0.04	N	-0.04	0.14	2	1.1	7.2
25 lb	WM-D40	-0.43	N	-0.43	0.14	2	1.1	7.2
25 lb	WM-D41	-0.63	N	-0.63	0.14	2	1.1	7.2
25 lb	WM-D42	-0.70	N	-0.70	0.14	2	1.1	7.2
25 lb	WM-D43	-0.65	N	-0.65	0.14	2	1.1	7.2
25 lb	WM-D45	-0.99	Y	-0.02	0.14	2	1.1	7.2
25 lb	WM-D46	-1.15	Y	-0.27	0.14	2	1.1	7.2
25 lb	WM-D47	-1.16	Y	-0.34	0.14	2	1.1	7.2
25 lb	WM-D48	-0.95	Y	-0.37	0.14	2	1.1	7.2
25 lb	WM-D49	-1.58	Y	-0.28	0.14	2	1.1	7.2
25 lb	WM-D50	-0.33	N	-0.33	0.14	2	1.1	7.2
50 lb	OPI-C61	-0.49	N	-0.49	0.28	2	2.3	7.2
50 lb	OPI-C64	0.70	N	0.70	0.28	2	2.3	7.2
50 lb	OPI-C65	-1.97	Y	-0.90	0.28	2	2.3	7.2
50 lb	OPI-C71	-0.39	N	-0.39	0.28	2	2.3	7.2
50 lb	OPI-C74	-1.22	N	-1.22	0.28	2	2.3	7.2
50 lb	OPI-C84	-0.06	N	-0.06	0.28	2	2.3	7.2
1000 lb	B2	17.4	N	17.4	5.8	2.019	45	7.2
1000 lb	B3	-1.0	N	-1.0	5.8	2.019	45	7.2
1000 lb	B4	-6.9	N	-6.9	5.8	2.019	45	7.2
1000 lb	B5	-14.7	N	-14.7	5.8	2.019	45	7.2
1000 lb	B6	2.7	N	2.7	5.8	2.019	45	7.2
1000 lb	B7	8.0	N	8.0	5.8	2.019	45	7.2
1000 lb	B8	8.0	N	8.0	5.8	2.019	45	7.2

Calibration Date: May 12, 2021

Certificate Number: 2021-080-1

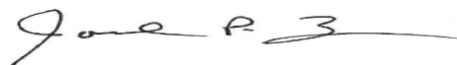
### Calibration Results

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> )
1000 lb	B9	19.9	N	19.9	5.8	2.019	45	7.2
1000 lb	B10	-10.8	N	-10.8	5.8	2.019	45	7.2
1000 lb	B12	-46.0	Y	0.2	5.8	2.019	45	7.2
1000 lb	B13	3.4	N	3.4	5.8	2.015	45	7.2
1000 lb	B14	1.1	N	1.1	5.8	2.015	45	7.2
1000 lb	B17	-21.6	N	-21.6	5.8	2.015	45	7.2
1000 lb	B19	20.7	N	20.7	5.8	2.015	45	7.2
1000 lb	B20	-0.3	N	-0.3	5.8	2.015	45	7.2
1000 lb	B21	0.9	N	0.9	5.8	2.015	45	7.2
1000 lb	B24	24.6	N	24.6	5.8	2.015	45	7.2
1000 lb	B26	8.0	N	8.0	5.8	2.015	45	7.2
1000 lb	B-8	30.5	N	30.5	5.8	2.015	45	7.2

#### Conversion Factors

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

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



e-signature is copy only

Joel P. Lavicky Metrologist

5/14/2021

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 Date: 5/11/2021

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2021-080-2

**Items Submitted:**

Quantity	Nominal Volume	Manufacturer	Type
2	5 gal	Seraphin	Test Measure 4" Neck

**Submitted By:** FSCP Area 55

3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Chris Uglow

402-471-3422

[chris.uglow@nebraska.gov](mailto:chris.uglow@nebraska.gov)

**Test Results**

Nominal Volume	Serial Number	Material	Cubical Coefficient of Expansion (°F)	As Found Volume Delivered @ 60 °F	As left Volume Delivered @ 60 °F	Uncertainty (U)	(k)
5 gal	4393-5A	SS	0.0000265	<b>5.0011 gal</b>	<b>5.0011 gal</b>	0.0012 gal	2.04
5 gal	4393-5D	SS	0.0000265	<b>5.0012 gal</b>	<b>4.9997 gal</b>	0.0012 gal	2.04

*The data in this report only applies to those items specifically listed on this report.*

Volume delivered at 60°F after a 30 second pour and 10 second drain for test measures. For provers a 30 second drain time would apply.

**Conversion Factors:**

1 gal = 231 in<sup>3</sup>

1 gal = 3.785 412 E-03 m<sup>3</sup>

**Traceability Statement:**

The artifact(s) described in this report 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 report is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this report.

**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. 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.

**Pertinent Information:**

The artifact(s) listed above 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. It is the decision of the Laboratory to adjust the artifact(s) when the sum of the correction and uncertainty exceed 95% of the maximum permissible error. All of the tolerances and specifications were evaluated according to NIST HB 105-3 (2010).

**Condition of Item(s) Submitted for Calibration:**

Good

**Laboratory Reference Standard Used:**

5 gal SP NE 1586

**Treatment of Item(s) before Calibration:**

Tested as Found

**Procedure Used:**

NISTIR 7383, SOP 19 (2019)

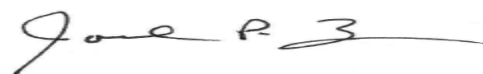
**Environmental conditions at time of calibration:**

Temp °C	19.4	Humidity %	54.3
Pressure mmHg	711.71		

**Water temperature at time of calibration:**

60.89 °F

**Date Submitted:** 5/10/2021



E-signature is copy only

5/14/2021

Joel P. Lavicky, Metrologist

Issue Date:

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Calibration Date: 5/11/2021

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2021-080-3

**Items Submitted:**

Quantity	Nominal Volume	Manufacturer	Type
3	5 gal	SMI	"Special" J Prover

**Submitted By:** FSCP Area 55  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Chris Uglov  
402-471-3422  
[chris.uglov@nebraska.gov](mailto:chris.uglov@nebraska.gov)

**Test Results**

Nominal Volume	Serial Number	Material	Cubical Coefficient of Expansion (1/°F)	As Found Volume Delivered @ 60 °F	As left Volume Delivered @ 60 °F	Uncertainty (U)	(k)
5 gal	0233	SS	0.0000265	5.00078 gal	5.00078 gal	0.00095 gal	2.02
5 gal	0234	SS	0.0000265	4.99904 gal	4.99904 gal	0.00095 gal	2.02
5 gal	0235	SS	0.0000265	4.99882 gal	4.99882 gal	0.00095 gal	2.02

*The data in this report only applies to those items specifically listed on this report.*

Volume delivered at 60°F after a 30 second pour and 10 second drain for test measures. For provers a 30 second drain time would apply.

**Conversion Factors:**

1 gal = 231 in<sup>3</sup>  
1 gal = 3.785 412 E-03 m<sup>3</sup>

**Traceability Statement:**

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**Uncertainty Statement:**

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**Pertinent Information:**

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**Condition of Item(s) Submitted for Calibration:**

Good

**Laboratory Reference Standard Used:**

5 gal SP NE 1586

**Treatment of Item(s) before Calibration:**

Tested as Found

**Procedure Used:**

NISTIR 7383, SOP 19 (2019)

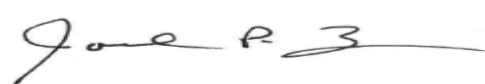
**Environmental conditions at time of calibration:**

Temp °C	19.4	Humidity %	54.3
Pressure mmHg	711.71		

**Water temperature at time of calibration:**

60.89 °F

**Date Submitted:** 5/10/2021



E-signature is copy only

5/14/2021

Joel P. Lavicky, Metrologist

Issue Date:

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