

## Calibration Certificate of Mass

**Calibration Date:** December 4, 2019

**Certificate Number:** 2019-144-1

**Submitted By:** FSCP Area 75  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** JT Shaw  
Ph. 402-471-3422  
**email:** james.shaw@nebraska.gov  
**PO Number:** N/A

<b>Test Item(s):</b> (20)-1000, (20)-50, (20)-25 & (2)-15lb weights	<b>Date Received:</b> December 3, 2019
<b>Serial Number(s):</b> See Next Page	<b>ID / Asset Number:</b> FSCP Area 75
<b>Manufacture:</b> Various	<b>Class Specification:</b> NIST Class F
<b>Condition:</b> Good (some wear)	<b>Material:</b> Cast iron
<b>Artifact(s) Description:</b>	

<b>Reference Standards Used:</b> NSL lb standards	<b>Procedure Used:</b> NIST HB 6969, SOP 8 (2018)	<b>Equipment Used:</b> Mettler XPR32003 Mettler XP 604
	<b>Metrologist:</b> JPL	

**Environmental Cond.**    **Temp:** 20 °C    **Pressure:** 762.5 mmHg    **Relative Humidity:** 50 %

### 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. All of the tolerances and specifications were evaluated according to ASTM E617 (2018) and/or NIST HB 105-1 (2019).
- 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.

### 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: December 4, 2019

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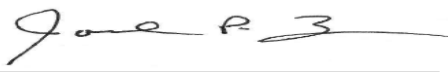
### Calibration Results

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> )
15 lb	WM15-21	2.056	Y	0.356	0.083	2	0.68	7.2
15 lb	WM15-22	1.646	Y	0.261	0.083	2	0.68	7.2
25 lb	WM25-33	1.09	Y	0.10	0.14	2	1.1	7.2
25 lb	WM25-39	2.15	Y	0.16	0.14	2	1.1	7.2
25 lb	WM25-43	0.03	N	0.03	0.14	2	1.1	7.2
25 lb	WM25-48	2.24	Y	0.41	0.14	2	1.1	7.2
25 lb	WM25-49	1.67	Y	0.24	0.14	2	1.1	7.2
25 lb	WM25-50	2.52	Y	0.38	0.14	2	1.1	7.2
25 lb	WM25-80	2.04	Y	0.08	0.14	2	1.1	7.2
25 lb	WM25-81	2.74	Y	0.14	0.14	2	1.1	7.2
25 lb	WM25-82	2.20	Y	0.52	0.14	2	1.1	7.2
25 lb	WM25-83	1.62	Y	0.23	0.14	2	1.1	7.2
25 lb	WM25-84	2.55	Y	0.36	0.14	2	1.1	7.2
25 lb	WM25-85	1.36	Y	0.13	0.14	2	1.1	7.2
25 lb	WM25-86	2.43	Y	0.46	0.14	2	1.1	7.2
25 lb	WM25-87	1.04	Y	0.33	0.14	2	1.1	7.2
25 lb	WM25-91	0.58	N	0.58	0.14	2	1.1	7.2
25 lb	WM25-93	0.49	N	0.49	0.14	2	1.1	7.2
25 lb	WM25-94	-0.03	N	-0.03	0.14	2	1.1	7.2
25 lb	WM25-95	-0.21	N	-0.21	0.14	2	1.1	7.2
25 lb	WM25-104	3.13	Y	0.28	0.14	2	1.1	7.2
25 lb	WM25-124	0.72	N	0.72	0.14	2	1.1	7.2
50 lb	OPI-C7	0.65	N	0.65	0.28	2	2.3	7.2
50 lb	OPI-C-8	0.77	N	0.77	0.28	2	2.3	7.2
50 lb	OPI-C-9	0.90	N	0.90	0.28	2	2.3	7.2
50 lb	OPI-C17	0.96	N	0.96	0.28	2	2.3	7.2
50 lb	OPI-C-24	1.05	N	1.05	0.28	2	2.3	7.2
50 lb	OPI-C-36	0.46	N	0.46	0.28	2	2.3	7.2
50 lb	OPI-C39	1.57	N	1.57	0.28	2	2.3	7.2
50 lb	OPI-C49	-0.19	N	-0.19	0.28	2	2.3	7.2
50 lb	SF-C21	1.57	N	1.57	0.28	2	2.3	7.2
50 lb	WM50-40	-0.38	N	-0.38	0.28	2	2.3	7.2
50 lb	WM50-41	-0.02	N	-0.02	0.28	2	2.3	7.2
50 lb	WM50-70	-0.31	N	-0.31	0.28	2	2.3	7.2
50 lb	WM-50-415	-0.15	N	-0.15	0.28	2	2.3	7.2
50 lb	WM-C-A13	0.51	N	0.51	0.28	2	2.3	7.2
50 lb	WM-C-A14	-0.16	N	-0.16	0.28	2	2.3	7.2
50 lb	WM-C-A17	1.45	N	1.45	0.28	2	2.3	7.2
50 lb	WM-C-A18	1.32	N	1.32	0.28	2	2.3	7.2
50 lb	WM-C-A20	0.35	N	0.35	0.28	2	2.3	7.2
50 lb	WM-OPI-C23	0.65	N	0.65	0.28	2	2.3	7.2
50 lb	WM-OPI-C32	1.22	N	1.22	0.28	2	2.3	7.2
1000 lb	2193	-25.0	N	-25.0	5.6	2.009	45	7.2
1000 lb	A-2	-16.4	N	-16.4	5.6	2.009	45	7.2
1000 lb	A-5	-38.7	Y	9.1	5.6	2.009	45	7.2
1000 lb	A-6	7.9	N	7.9	5.6	2.009	45	7.2
1000 lb	BA-14	-15.7	N	-15.7	5.6	2.009	45	7.2
1000 lb	OA3	-19.0	N	-19.0	5.6	2.009	45	7.2
1000 lb	OA4	-20.0	N	-20.0	5.6	2.009	45	7.2
1000 lb	OA5	-25.4	N	-25.4	5.6	2.009	45	7.2
1000 lb	OA6	-30.6	N	-30.6	5.6	2.009	45	7.2
1000 lb	OA10	3.3	N	3.3	5.6	2.009	45	7.2
1000 lb	OA13	-14.0	N	-14.0	5.6	2.009	45	7.2
1000 lb	OA14	-30.1	N	-30.1	5.6	2.009	45	7.2
1000 lb	OA16	-14.4	N	-14.4	5.6	2.009	45	7.2
1000 lb	OA17	-11.9	N	-11.9	5.6	2.009	45	7.2
1000 lb	OA19	-14.7	N	-14.7	5.6	2.009	45	7.2
1000 lb	OPI-A1	-12.1	N	-12.1	5.6	2.009	45	7.2
1000 lb	OPI-A11	-43.4	Y	8.4	5.6	2.009	45	7.2
1000 lb	OPI-A12	-35.6	N	-35.6	5.6	2.009	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**

**12/26/2019**

**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: 12/2/2019

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2019-144-2

**Items Submitted:**

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

**Submitted By:** FSCP Area 75

3721 West Cuming St.  
Lincoln, NE 68524

**POC:** JT Shaw

402-471-3422  
[james.shaw@nebraska.gov](mailto:james.shaw@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	43872	SS	0.0000265	<b>5.0008 gal</b>	<b>5.0008 gal</b>	0.0010 gal	2.12
5 gal	43935 H	SS	0.0000265	<b>4.9995 gal</b>	<b>4.9995 gal</b>	0.0010 gal	2.12

*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. 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 (2016)

**Environmental conditions at time of calibration:**

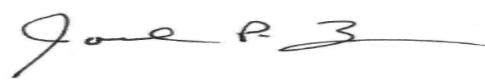
Temp °C	20.2	Humidity %	48.8
Pressure mmHg	764.29		

**Water temperature at time of calibration:**

55.31 °F

**Date Submitted:**

12/2/2019



Joel P. Lavicky, Metrologist

12/2/2019

Date:

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Calibration Date: 12/3/2019

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2019-144-3

**Items Submitted:**

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

**Submitted By:** FSCP Area 75  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** JT Shaw  
402-471-3422  
[james.shaw@nebraska.gov](mailto:james.shaw@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	144	SS	0.0000265	4.99868 gal	4.99868 gal	0.00095 gal	2.05
5 gal	145	SS	0.0000265	4.99886 gal	4.99886 gal	0.00095 gal	2.05
5 gal	146	SS	0.0000265	4.99992 gal	4.99992 gal	0.00095 gal	2.05

*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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**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 (2016)

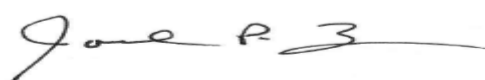
**Environmental conditions at time of calibration:**

Temp °C	19.6	Humidity %	51.6
Pressure mmHg	760.73		

**Water temperature at time of calibration:**

54.99 °F

**Date Submitted:** 12/3/2019



12/26/2019

Joel P. Lavicky, Metrologist

Date:

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## Calibration Certificate of Mass

**Calibration Date:** December 4, 2019

**Certificate Number:** 2019-144-4

**Submitted By:** FSCP Area 75  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** JT Shaw  
Ph. 402-471-3422  
**email:** [james.shaw@nebraska.gov](mailto:james.shaw@nebraska.gov)  
**PO Number:** N/A

**Test Item(s):** lb weight kit  
**Serial Number(s):** WM-6C98  
**Manufacture:** Tromner  
**Condition:** Good (some wear)

**Artifact(s) Description:**

**Date Received:** December 3, 2019  
**ID / Asset Number:** FSCP Area 75  
**Class Specification:** NIST Class F  
**Material:** SS & AL

**Reference Standards Used:**

NSL lb standards

**Procedure Used:**

NIST HB 6969, SOP 8 (2018)

**Metrologist:**

JPL

**Equipment Used:**

Sartorius CC10000S    Mettler AT 106  
Sartorius CC 1201    Sartorius CCE6

**Environmental Cond.**    **Temp:** 22.2 °C    **Pressure:** 765.81 mmHg    **Relative Humidity:** 49 %

**Pertinent Information**

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- 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.

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Certificate Number: 2019-144-4

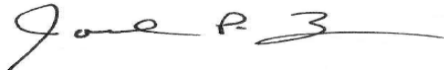
### Calibration Results

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> )
10 lb		0.139	n	0.139	0.054	2	0.45	7.84
5 lb		0.068	n	0.068	0.028	2	0.23	7.84
2 lb		0.039	n	0.039	0.011	2	0.091	7.84
2 lb	*	0.049	n	0.049	0.011	2	0.091	7.84
1 lb		0.0355	n	0.0355	0.0083	2	0.07	7.84
0.5 lb		0.0311	n	0.0311	0.0054	2	0.045	7.84
0.2 lb		0.0082	n	0.0082	0.0022	2	0.018	7.84
0.2 lb	*	0.0089	n	0.0089	0.0022	2	0.018	7.84
0.1 lb		0.0043	n	0.0043	0.0011	2	0.0091	7.84
0.05 lb		0.00223	n	0.00223	0.00054	2	0.0045	7.84
0.02 lb		0.00080	n	0.00080	0.00022	2	0.0018	7.84
0.02 lb	*	0.00077	n	0.00077	0.00022	2	0.0018	7.84
0.01 lb		0.00065	n	0.00065	0.00018	2	0.0015	7.84
0.005 lb		0.00071	n	0.00071	0.00014	2	0.0012	2.7
0.002 lb		0.00054	n	0.00054	0.00011	2	0.00087	2.7
0.002 lb	*	0.00009	n	0.00009	0.00011	2	0.00087	2.7
0.001 lb		0.000210	n	0.000210	0.000083	2	0.0007	2.7

#### Conversion Factors

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

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



Joel P. Lavicky Metrologist

12/26/2019

Date of Issue

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## Calibration Certificate of Mass

<b>Calibration Date:</b> December 4, 2019	<b>Certificate Number:</b> 2019-144-5
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<p><b>Submitted By:</b> FSCP Area 75 3721 West Cuming St. Lincoln, NE 68524</p>	<p><b>Point of Contact:</b> JT Shaw Ph. 402-471-3422 <b>email:</b> <a href="mailto:james.shaw@nebraska.gov">james.shaw@nebraska.gov</a> <b>PO Number:</b> N/A</p>
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<p><b>Test Item(s):</b> (1) Metric weight kit <b>Serial Number(s):</b> WM-2-89-2 <b>Manufacture:</b> Tromner <b>Condition:</b> Good (some wear)</p>	<p><b>Artifact(s) Description:</b></p>	<p><b>Date Received:</b> December 3, 2019 <b>ID / Asset Number:</b> FSCP Area 75 <b>Class Specification:</b> NIST Class F <b>Material:</b> Stainless Steel</p>
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<p><b>Reference Standards Used:</b> OPI &amp; /Den Metric</p>	<p><b>Procedure Used:</b> NIST HB 6969, SOP 8 (2018) <b>Metrologist:</b> JPL</p>	<p><b>Equipment Used:</b> Sartorius CC10000S    Mettler AT 106 Sartorius CC 1201    Sartorius CCE6</p>
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**Environmental Cond.**    Temp: 22.35 °C    Pressure: 760.095 mmHg    Relative Humidity: 49.5 %

**Pertinent Information**

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**Traceability Statement**

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Calibration Date: December 4, 2019

Certificate Number: 2019-144-5

**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> )
2 kg	K3	-0.070	n	-0.070	0.024	2	0.2	7.84
1 kg		0.051	n	0.051	0.012	2	0.1	7.84
500 g		0.0497	n	0.0497	0.0083	2	0.07	7.84
200 g		0.0148	n	0.0148	0.0048	2	0.04	7.84
200 g	*	0.0121	n	0.0121	0.0048	2	0.04	7.84
100 g		-0.0034	n	-0.0034	0.0024	2	0.02	7.84
50 g		0.0014	n	0.0014	0.0012	2	0.01	7.84
20 g		0.00110	n	0.00110	0.00048	2	0.004	7.84
20 g	*	0.00104	n	0.00104	0.00048	2	0.004	7.84
10 g		0.00077	n	0.00077	0.00024	2	0.002	7.84
5 g		-0.00011	n	-0.00011	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



**Joel P. Lavicky Metrologist**

**12/26/2019**

**Date of Issue**

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