

## Calibration Certificate of Mass

<b>Calibration Date:</b> April 14, 2021		<b>Certificate Number:</b> 2021-065-1	
<b>Submitted By:</b> FSCP Area 15 3721 West Cuming St. Lincoln, NE 68524		<b>Point of Contact:</b> Kent McConnell Ph. 402-471-3422 <b>email:</b> kent.mcconnell@nebraska.gov <b>PO Number:</b> N/A	
<b>Test Item(s):</b> Precision weight kit	<b>Artifact(s) Description:</b>	<b>Date Received:</b> 4/12/2021	
<b>Serial Number(s):</b> WM-G89-2		<b>ID / Asset Number:</b> FSCP Area 15	
<b>Condition:</b> Excellent (little wear)		<b>Class Specification:</b> ASTM 4	
<b>Material:</b> Stainless Steel		<b>Manufacture:</b> Troemner	
<b>Reference Standards Used:</b>	<b>Procedure Used:</b>	<b>Equipment Used:</b>	
OPI & /Den Metric Volland-1707	NIST HB 6969, SOP 8 (2019) <b>Metrologist:</b> JPL	Sartorius CC 1201 Sartorius CCE6 Mettler AT 106	
<b>Environmental Cond.</b>	<b>Temp:</b> 22.2 °C	<b>Pressure:</b> 736.7 mmHg	<b>Relative Humidity:</b> 48.1 %
<b><u>Pertinent Information</u></b>			
<ul style="list-style-type: none"> <li>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. <b>RED</b> 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.</li> <li>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.</li> <li><b>The Artifacts in "red" do not meet ASTM 4 tolerances but do meet ASTM 5 tolerances.</b></li> <li>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.</li> </ul>			
<b><u>Traceability Statement</u></b>			
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.			
<b><u>Uncertainty Statement</u></b>			
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 ( <i>k</i> ), 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 <i>Guide to the Expression of Uncertainty in Measurement (2008, revised 2012)</i> . 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 14, 2021

Certificate Number: 2021-065-1

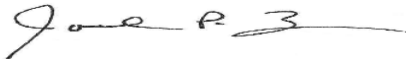
**Calibration Results**

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(k) factor	ASTM 4 MPE ± (g)	Assumed Density (g/cm <sup>3</sup> )
300 g		0.00322	n	0.00322	0.00084	2	0.006	7.95
200 g		0.00079	n	0.00079	0.00059	2.004	0.004	7.95
100 g		0.00153	n	0.00153	0.00025	2.003	0.002	7.95
50 g		0.00030	n	0.00030	0.00015	2.003	0.0012	7.95
30 g		0.00060	n	0.00060	0.00012	2.008	0.0009	7.95
20 g		0.000309	n	0.000309	0.000084	2.001	0.0007	7.95
10 g		0.000443	n	0.000443	0.000061	2.002	0.0005	7.95
5 g		0.000205	n	0.000205	0.000044	2.002	0.00036	7.95
3 g		0.000031	n	0.000031	0.000037	2.004	0.0003	7.95
2 g		0.000066	n	0.000066	0.000032	2.004	0.00026	7.95
1 g		0.000015	n	0.000015	0.000025	2.008	0.0002	7.95

**Conversion Factors**

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

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



**Joel P. Lavicky Metrologist**

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**4/16/2021**

**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 Certificate of Mass

**Calibration Date:** July 13, 2021

**Certificate Number:** 2021-105-1

**Submitted By:** FSCP Area 15  
3721 West Cuming St.  
Lincoln, NE 68524

**Point of Contact:** Kent McConnell  
Ph. 402-471-3422  
**email:** kent.mcconnell@nebraska.gov  
**PO Number:** N/A

<b>Test Item(s):</b> 22 cast weights	<b>Date Received:</b> July 12, 2021
<b>ID / Asset Number:</b> Area 15	<b>Serial Number(s):</b> See Next Page
<b>Manufacture:</b> Troemner	<b>Class Specification:</b> NIST Class F
<b>Material:</b> Cast Iron	<b>Condition:</b> Good (some wear)

<b>Reference Standards Used:</b> NSL lb standards	<b>Procedure Used:</b> NIST HB 6969, SOP 8 (2019)	<b>Equipment Used:</b> Mettler XPR32003
	<b>Metrologist:</b> JPL	

**Environmental Cond.**      **Temp:** 23.9 °C      **Pressure:** 731.77 mmHg      **Relative Humidity:** 49.4 %

**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.
- 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: July 13, 2021

Certificate Number: 2021-105-1

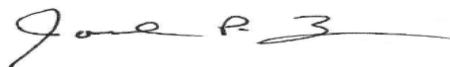
### Calibration Results

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	WM15-3	0.269	Y	0.569	0.083	2	0.68	7.2
15 lb	WM15-4	-0.831	Y	-0.196	0.083	2	0.68	7.2
25 lb	WM25-28	-0.45	N	-0.45	0.14	2	1.1	7.2
25 lb	WM25-38	-0.36	N	-0.36	0.14	2	1.1	7.2
25 lb	WM25-45	0.46	N	0.46	0.14	2	1.1	7.2
25 lb	WM25-55	-1.14	Y	0.42	0.14	2	1.1	7.2
25 lb	WM25-56	-0.70	N	-0.70	0.14	2	1.1	7.2
25 lb	WM25-57	-0.14	N	-0.14	0.14	2	1.1	7.2
25 lb	WM25-58	-0.20	N	-0.20	0.14	2	1.1	7.2
25 lb	WM25-59	0.03	N	0.03	0.14	2	1.1	7.2
25 lb	WM25-75	-0.66	N	-0.66	0.14	2	1.1	7.2
25 lb	WM25-76	-0.01	N	-0.01	0.14	2	1.1	7.2
25 lb	WM25-77	-0.68	N	-0.68	0.14	2	1.1	7.2
25 lb	WM25-78	-0.75	N	-0.75	0.14	2	1.1	7.2
25 lb	WM25-79	-0.40	N	-0.40	0.14	2	1.1	7.2
25 lb	WM25-96	0.66	N	0.66	0.14	2	1.1	7.2
25 lb	WM25-97	0.63	N	0.63	0.14	2	1.1	7.2
25 lb	WM25-98	-0.15	N	-0.15	0.14	2	1.1	7.2
25 lb	WM25-100	0.06	N	0.06	0.14	2	1.1	7.2
25 lb	WM25-101	0.49	N	0.49	0.14	2	1.1	7.2
25 lb	WM25-102	-0.10	N	-0.10	0.14	2	1.1	7.2
25 lb	WM25-103	0.67	N	0.67	0.14	2	1.1	7.2

**Conversion Factors**

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

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



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**Joel P. Lavicky Metrologist**

**7/28/2021**

**Date of Issue**

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Calibration Date: 7/21/2021

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2021-105-2

**Items Submitted:**

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

**Submitted By:** FSCP Area 15  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Kent McConnell  
402-471-3422  
kent.mcconnell@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	39423 A	SS	0.0000265	4.9997 gal	4.9997 gal	0.0012 gal	2.04
5 gal	39423 D	SS	0.0000265	4.9996 gal	4.9996 gal	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:**

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**Uncertainty 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 (2019)

**Environmental conditions at time of calibration:**

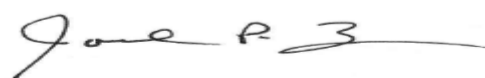
Temp °C	24.2	Humidity %	45.2
Pressure mmHg	733.30		

**Water temperature at time of calibration:**

71.08 °F

**Date Submitted:** 7/12/2021

E-signature is copy only



7/28/2021

Joel P. Lavicky, Metrologist

Issue Date:

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<b>Calibration Date:</b> 7/21/2021	<b>Certificate of Calibration of Volume Transfer</b>	<b>Certificate Number:</b> 2021-105-3
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**Items Submitted:**

Quantity	Nominal Volume	Manufacturer	Type
1	5 gal	SMI	Test Measure 2" Neck

**Submitted By:** FSCP Area 15

3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Kent McConnell

402-471-3422

[kent.mcconnell@nebraska.gov](mailto:kent.mcconnell@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	87280	SS	0.0000265	<b>4.99897 gal</b>	<b>4.99897 gal</b>	0.00100 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-3 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 (2019)

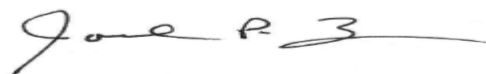
**Environmental conditions at time of calibration:**

Temp °C	24.2	Humidity %	45.2
Pressure mmHg	733.30		

**Water temperature at time of calibration:**

71.44 °F

**Date Submitted:** 7/12/2021



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**Joel P. Lavicky, Metrologist**

7/28/2021

Issue Date:

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Calibration Date: 7/23/2021

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2021-105-4

**Items Submitted:**

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

**Submitted By:** FSCP Area 15  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Kent McConnell  
402-471-3422  
kent.mcconnell@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	05-4547-01	SS	0.0000265	4.99991 gal	4.99991 gal	0.00074 gal	2.02
5 gal	05-4547-02	SS	0.0000265	4.99965 gal	4.99965 gal	0.00074 gal	2.02
5 gal	05-4547-03	SS	0.0000265	4.99965 gal	4.99965 gal	0.00074 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:**

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

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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:**

Repaired before Calibration

**Procedure Used:**

NISTIR 7383, SOP 19 (2019)

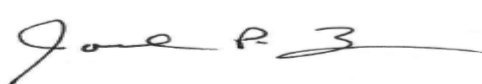
**Environmental conditions at time of calibration:**

Temp °C	24.2	Humidity %	45.2
Pressure mmHg	733.30		

**Water temperature at time of calibration:**

71.98 °F

**Date Submitted:** 7/12/2021



E-signature is copy only

7/28/2021

Joel P. Lavicky, Metrologist

Issue Date:

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