

## Calibration Certificate of Mass

**Calibration Date:** December 27, 2017

**Certificate Number:** 2017-059-2

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

**Point of Contact:** Jeffery Grassmich  
Ph. 402-471-2087

**email:**  
**PO Number:**

<b>Test Item(s):</b> 31 lb weight kit	<b>Artifact(s) Description:</b>	<b>Date Received:</b> December 8, 2017
<b>Serial Number(s):</b> 13A9		<b>ID / Asset Number:</b>
<b>Manufacture:</b> Tromner		<b>Class Specification:</b> NIST Class F
<b>Condition:</b> Fair (significant wear)		<b>Material:</b> SS and AL

<b>Reference Standards Used:</b> NSL lb standards	<b>Procedure Used:</b> NIST HB 6969, SOP 8 <b>Metrologist:</b> JPL	<b>Equipment Used:</b> Sartorius CC10000S    Mettler AT 106 Sartorius CC 1201    Sartorius CCE6
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**Environmental Cond.**    **Temp:** 20.5 °C    **Pressure:** 771.904 mmHg    **Relative Humidity:** 47.5 %

### 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 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 27, 2017

Certificate Number: 2017-059-2

**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> )
2 lb	1	-0.005	n	-0.005	0.011	2	0.091	7.84
2 lb	2	-0.041	n	-0.041	0.011	2	0.091	7.84
2 lb	3	-0.041	n	-0.041	0.011	2	0.091	7.84
2 lb	4	-0.046	n	-0.046	0.011	2	0.091	7.84
2 lb	5	-0.040	n	-0.040	0.011	2	0.091	7.84
2 lb	6	-0.058	n	-0.058	0.011	2	0.091	7.84
2 lb	7	-0.045	n	-0.045	0.011	2	0.091	7.84
2 lb	8	-0.015	n	-0.015	0.011	2	0.091	7.84
2 lb	9	-0.037	n	-0.037	0.011	2	0.091	7.84
2 lb	10	-0.039	n	-0.039	0.011	2	0.091	7.84
2 lb	11	-0.034	n	-0.034	0.011	2	0.091	7.84
2 lb	12	-0.016	n	-0.016	0.011	2	0.091	7.84
2 lb	13	-0.060	n	-0.060	0.011	2	0.091	7.84
2 lb	14	-0.048	n	-0.048	0.011	2	0.091	7.84
1 lb	15	-0.0163	n	-0.0163	0.0083	2	0.07	7.84
1 lb	16	-0.0208	n	-0.0208	0.0083	2	0.07	7.84
0.3 lb	26	0.0024	n	0.0024	0.0032	2	0.027	7.84
0.2 lb	27	-0.0018	n	-0.0018	0.0022	2	0.018	7.84
0.1 lb	28	-0.0016	n	-0.0016	0.0011	2	0.0091	7.84
0.05 lb	29	-0.00039	n	-0.00039	0.00054	2	0.0045	7.84
0.03 lb		-0.00126	n	-0.00126	0.00032	2	0.0027	7.84
0.02 lb		0.00045	n	0.00045	0.00022	2	0.0018	7.84
0.01 lb		0.00055	n	0.00055	0.00018	2	0.0015	7.84
0.005 lb		-0.00037	n	-0.00037	0.00015	2	0.0012	16.6
0.003 lb		0.00050	n	0.00050	0.00012	2	0.00099	16.6
0.002 lb		0.00058	n	0.00058	0.00011	2	0.00087	16.6
0.001 lb		0.00085	n	0.00085	0.000083	2	0.0007	16.6
0.001 lb	*	-0.000374	n	-0.000374	0.000083	2	0.0007	16.6
8 oz	17	-0.0127	n	-0.0127	0.0054	2	0.045	7.84
4 oz	18	0.0020	n	0.0020	0.0028	2	0.023	7.84
2 oz		0.0018	n	0.0018	0.0013	2	0.011	7.84
1 oz		0.00145	n	0.00145	0.00064	2	0.0054	7.84
1/2 oz		-0.00064	n	-0.00064	0.00034	2	0.0028	7.84
1/4 oz		-0.00024	n	-0.00024	0.00021	2	0.0017	7.84
1/8 oz		-0.00007	n	-0.00007	0.00016	2	0.0013	7.84
1/16 oz		0.00054	n	0.00054	0.00013	2	0.0011	7.84
1/16 oz	*	0.00029		0.00029	0.00013	2	0.0011	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

12/27/2017

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:** December 27, 2017

**Certificate Number:** 2017-059-3

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

**Point of Contact:** Jeffery Grassmich  
Ph. 402-471-2087

**email:**  
**PO Number:**

<b>Test Item(s):</b> 31 lb weight kit	<b>Artifact(s) Description:</b>	<b>Date Received:</b> December 8, 2017
<b>Serial Number(s):</b> WM-2A86		<b>ID / Asset Number:</b>
<b>Manufacture:</b> Tromner		<b>Class Specification:</b> NIST Class F
<b>Condition:</b> Fair (significant wear)		<b>Material:</b> SS and AL

<b>Reference Standards Used:</b> NSL lb standards	<b>Procedure Used:</b> NIST HB 6969, SOP 8	<b>Equipment Used:</b> Sartorius CC10000S    Mettler AT 106 Sartorius CC 1201    Sartorius CCE6
	<b>Metrologist:</b> JPL	

**Environmental Cond.**    **Temp:** 20.35 °C    **Pressure:** 772.11 mmHg    **Relative Humidity:** 48.5 %

### 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 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 27, 2017

Certificate Number: 2017-059-3

**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> )
5 lb	1	0.141	n	0.141	0.028	2	0.23	7.84
5 lb	2	0.122	n	0.122	0.028	2	0.23	7.84
5 lb	3	0.131	n	0.131	0.028	2	0.23	7.84
5 lb	4	0.151	n	0.151	0.028	2	0.23	7.84
5 lb	5	0.107	n	0.107	0.028	2	0.23	7.84
1 lb	1	-0.0233	n	-0.0233	0.0083	2	0.07	7.84
1 lb	2	-0.0094	n	-0.0094	0.0083	2	0.07	7.84
1 lb	3	-0.0285	n	-0.0285	0.0083	2	0.07	7.84
1 lb	4	-0.0034	n	-0.0034	0.0083	2	0.07	7.84
1 lb	5	-0.0002	n	-0.0002	0.0083	2	0.07	7.84
8 oz	1	-0.0452	y	0.0159	0.0054	2	0.045	7.84
4 oz		0.0058	n	0.0058	0.0028	2	0.023	7.84
2 oz		0.0049	n	0.0049	0.0013	2	0.011	7.84
1 oz		0.00272	n	0.00272	0.00064	2	0.0054	7.84
1/2 oz		0.00039	n	0.00039	0.00034	2	0.0028	7.84
1/4 oz		0.00068	n	0.00068	0.00021	2	0.0017	7.84
1/8 oz		0.00057	n	0.00057	0.00016	2	0.0013	7.84
1/16 oz		0.00014	n	0.00014	0.00013	2	0.0011	7.84
1/32 oz		0.00021	n	0.00021	0.00011	2	0.00087	7.84
1/32 oz	*	0.00049	n	0.00049	0.00011	2	0.00087	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

12/27/2017

Date of Issue

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## Calibration Certificate of Mass

**Calibration Date:** December 27, 2017

**Certificate Number:** 2017-059-4

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

**Point of Contact:** Jeffery Grassmich  
Ph. 402-471-2087

**email:**  
**PO Number:**

**Test Item(s):** Metric Weight Kit  
**Serial Number(s):** WM-1G14  
**Manufacture:** Rice lake  
**Condition:** Good (some wear)

**Artifact(s) Description:**

**Date Received:** December 8, 2017

**ID / Asset Number:**

**Class Specification:** NIST Class F

**Material:** SS

**Reference Standards Used:**

**Procedure Used:**

**Equipment Used:**

OPI & /Den Metric

NIST HB 6969, SOP 8

Sartorius CC10000S    Mettler AT 106

**Metrologist:**

Sartorius CC 1201    Sartorius CCE6

JPL

**Environmental Cond.**    **Temp:** 20.8 °C    **Pressure:** 771.52 mmHg    **Relative Humidity:** 49 %

### 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 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

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Calibration Date: December 27, 2017

Certificate Number: 2017-059-4

**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> )
2 kg		0.072	n	0.072	0.024	2	0.2	7.84
1 kg		0.030	n	0.030	0.012	2	0.1	7.84
200 g		0.0107	n	0.0107	0.0048	2	0.04	7.84
200 g	*	0.0099	n	0.0099	0.0048	2	0.04	7.84
100 g		0.0059	n	0.0059	0.0024	2	0.02	7.84
50 g		0.0026	n	0.0026	0.0012	2	0.01	7.84
20 g		0.00106	n	0.00106	0.00048	2	0.004	7.84
20 g	*	0.00097	n	0.00097	0.00048	2	0.004	7.84
10 g		0.00070	n	0.00070	0.00024	2	0.002	7.84
5 g		0.00044	n	0.00044	0.00018	2	0.0015	7.84
2 g		0.00024	n	0.00024	0.00013	2	0.0011	7.84
2 g	*	0.00030	n	0.00030	0.00013	2	0.0011	7.84
1 g		0.00022	n	0.00022	0.00011	2	0.0009	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

12/27/2017

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