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DEPARTMENT OF AGRICULTURE

Nebraska Standards Laboratory
3721 West Cuming St.
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(402) 471-2087

Director of Agriculture
Steve Wellman
P.O. Box 94947
Lincoln, NE 68509-4947
(402) 471-2341
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Calibration Date:	**5/24/2020**	***Certificate of Calibration of Volume Transfer***	**Certificate Number:**	**2020-058-1**

Items Submitted:

Quantity	Nominal Volume	Manufacturer	Type
2	100 gal	Brownie	Bottom Drain Prover

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

POC: Mike Boehler
402-471-3422
michael.boehler@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*)
100 gal	7861642	SS	0.0000265	**99.990 gal**	**99.990 gal**	0.010 gal	2.01
100 gal	88231102	SS	0.0000265	**99.985 gal**	**99.985 gal**	0.010 gal	2.01

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 in³
1 gal = 3.785 412 E-03 m³

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

Treatment of Item(s) before Calibration:
Tested as Found

Environmental conditions at time of calibration:

Temp ˚C	20.0	Humidity %	60.0
Pressure mmHg	730.25		

Laboratory Reference Standard Used;
100 gal NE 44158

Procedure Used:
NISTIR 7383, SOP 19 (2016)

Water temperature at time of calibration:
54.32 °F

Date Submitted: 5/24/2020

Joel P. Lavicky, Metrologist — 5/28/2020 (Date:)

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Calibration Certificate for Volume Transfer of LPG

Calibration Date: May 22, 2020

Certificate Number: 2020-058-2

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

POC: Mike Boehler
Phone: 402-417-2087

Date Received: 05/21/2020

PO Number: N/A
Job Order #: N/A

Artifact(s) Description

Test Item(s): 107 gal LPG Prover
Serial No: **104**
Manufacture: National BD
Condition: Poor

Material: Steel, Prover, Low Carbon
Specification: NIST HB 105-4
Cubical Coefficient of Expansion: 0.0000186 / ºF

Calibration Information

Reference Standards Used:
NE-44158-100gal
NE-1586-5 gal
NE-514-1 gal

Procedure: NIST SOP 21(2016)

Metrologist: JPL

Temperature: 19.7 ºC **Humidity:** 60.0 % RH **Water Temperature:** 13.5 ºC

Calibration Results

Nominal Volume (at zero mark on gauge)	Prover Volume As Found @ 60 ºF and 100 psig (gal)	Prover Volume As Left @ 60 ºF and 100 psig (gal)	Spec. Tol. ± (gal)	Uncertainty ± (gal)	*k* factor	Degrees of Freedom
107 gal	106.844	106.844	0.214	0.022	2	6700

Conversion Factors

1 gallon (U.S.) (gal) = 231 in³

1 gallon (U.S.) (gal) = 3.785 412 E-03 m³

Pertinent Information

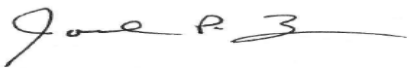
- The artifact is considered in-tolerance when the error is equal to or less than the specified tolerance minus the measurement uncertainty. RED print indicates an out-of-tolerance reading. All of the tolerances and specifications were evaluated according to NIST HB 105-4 (2016)
- Enter the Pressure Correction from Table 1 that corresponds with the pressure being tested on your LPG Meter Test form.
- The calibration item was calibrated in a 'wet down' condition using water. The calibration data above applies when the prover bottom zero is obtained during a 30 (± 5) second period after cessation of the main flow.
- The drain time (using gravity) to the bottom zero was approximately 2 minute(s) 0 seconds.
- The Top Securty Seal Number is "NE Lab" and the Bottom Security Seal Number is "NE Lab".

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 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 International System of Units (SI) for volume is the cubic meter (m³) (see Conversion Factors below). The report number for this report is the only unique report number to be used in referencing measurement traceability for the artifact(s) described in this report.

Uncertainty Statement

The combined standard uncertainty includes uncertainties for the standard(s), for the measurement process, for the material cubical coefficient of expansion, for reading meniscus, for the pressure gauge, for graduated neck errors and for the thermometer(s) used for measuring the water temperature. The combined standard uncertainty is multiplied by a coverage factor, *k* , to give the expanded uncertainty, which defines an interval with a 95.45 % level of confidence. The expanded uncertainty presented in this report is consistent with JCGM 100:2008, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement (GUM 1995 with minor corrections)* . A component for the effects of viscosity was not included in the uncertainty budget.

Signature:  Date: 6/1/2020

Joel P. Lavicky, State Metrologist

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

Attachments: Table 1 and Chart 1 - LPG Prover Pressure Corrections
Table 2 - LPG Prover Temperature Corrections
Table 3 - Volume Corrections for Thermal Expansion or Contraction of Prover
Table 4 - Volume Correction Factors to 60 ºF

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LPG Prover Pressure Corrections

Attachment To Certificate No.: 2020-058-2 **Calibration Date:** May 22, 2020

Tested Item(s): 107 gal LPG Prover Serial Number: 104

Table 1 - 107 gal LPG Prover Pressure Corrections @ 60 ºF

psig	Prover Scale Reading (gal)	Pressure Correction (Pcorr) (gal)
20	0.180	-0.052
30	0.168	-0.044
40	0.157	-0.036
50	0.145	-0.028
60	0.136	-0.022
70	0.127	-0.017
80	0.118	-0.011
90	0.109	-0.006
100	0.100	0.000
110	0.090	0.007
120	0.080	0.013
130	0.070	0.020
140	0.060	0.026
150	0.050	0.033
160	0.038	0.041
170	0.026	0.050
180	0.014	0.058
190	0.002	0.067
200	-0.010	0.076

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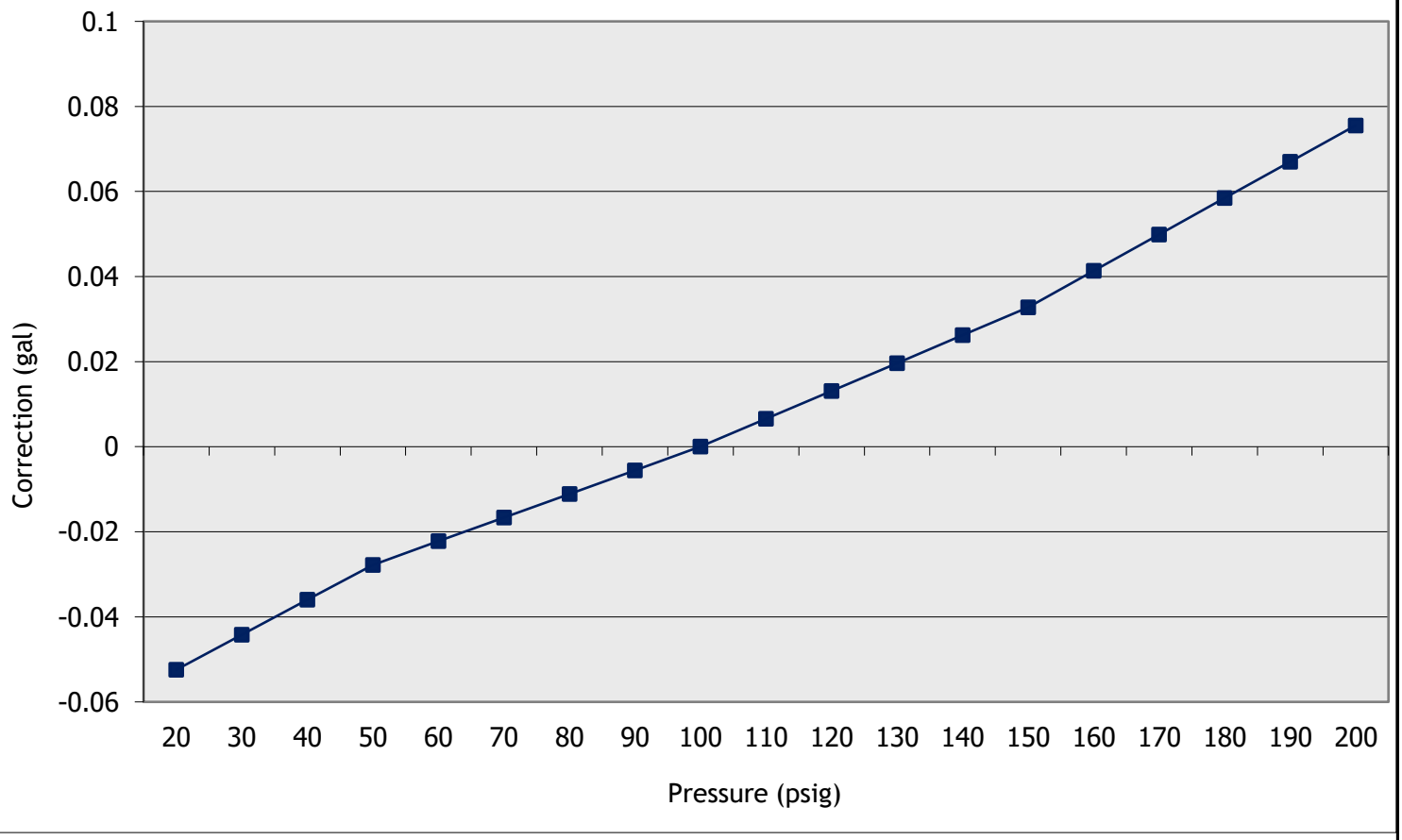
LPG Prover Pressure Corrections

Attachment To Certificate No.: 2020-058-2 **Calibration Date:** May 22, 2020

Tested Item(s): 107 gal LPG Prover Serial Number: 104

Chart 1 - LPG Pressure Corrections (gal) @ 60 ºF



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LPG Prover Temperature Corrections

Attachment To Certificate No.: 2020-058-2 **Calibration Date:** May 22, 2020

Tested Item(s): 107 gal LPG Prover Serial Number: 104

Table 2 - LPG Temperature Corrections

Correction Per ºF Difference between Meter Temperature and Prover Temperature

Propane Specific Gravity 60/60 ºF 0.505*

Liquid in Prover Temp. ºF	in³ / ºF	gal / ºF	Liquid in Prover Temp. ºF	in³ / ºF	gal / ºF	Liquid in Prover Temp. ºF	in³ / ºF	gal / ºF
0	36.959	0.1600	34	38.707	0.1676	68	40.831	0.1768
1	37.007	0.1602	35	38.763	0.1678	69	40.901	0.1771
2	37.054	0.1604	36	38.820	0.1681	70	40.972	0.1774
3	37.102	0.1606	37	38.877	0.1683	71	41.043	0.1777
4	37.150	0.1608	38	38.935	0.1685	72	41.114	0.1780
5	37.198	0.1610	39	38.992	0.1688	73	41.186	0.1783
6	37.246	0.1612	40	39.050	0.1690	74	41.259	0.1786
7	37.295	0.1615	41	39.108	0.1693	75	41.332	0.1789
8	37.343	0.1617	42	39.167	0.1696	76	41.404	0.1792
9	37.393	0.1619	43	39.226	0.1698	77	41.479	0.1796
10	37.442	0.1621	44	39.286	0.1701	78	41.554	0.1799
11	37.492	0.1623	45	39.346	0.1703	79	41.629	0.1802
12	37.542	0.1625	46	39.406	0.1706	80	41.705	0.1805
13	37.592	0.1627	47	39.466	0.1708	81	41.782	0.1809
14	37.642	0.1630	48	39.527	0.1711	82	41.859	0.1812
15	37.693	0.1632	49	39.588	0.1714	83	41.936	0.1815
16	37.744	0.1634	50	39.650	0.1716	84	42.015	0.1819
17	37.795	0.1636	51	39.712	0.1719	85	42.094	0.1822
18	37.846	0.1638	52	39.774	0.1722	86	42.173	0.1826
19	37.898	0.1641	53	39.837	0.1725	87	42.253	0.1829
20	37.950	0.1643	54	39.900	0.1727	88	42.334	0.1833
21	38.002	0.1645	55	39.964	0.1730	89	42.415	0.1836
22	38.055	0.1647	56	40.028	0.1733	90	42.498	0.1840
23	38.107	0.1650	57	40.093	0.1736	91	42.581	0.1843
24	38.160	0.1652	58	40.158	0.1738	92	42.664	0.1847
25	38.214	0.1654	59	40.223	0.1741	93	42.748	0.1851
26	38.267	0.1657	60	40.289	0.1744	94	42.833	0.1854
27	38.321	0.1659	61	40.355	0.1747	95	42.919	0.1858
28	38.375	0.1661	62	40.422	0.1750	96	43.006	0.1862
29	38.430	0.1664	63	40.489	0.1753	97	43.093	0.1865
30	38.485	0.1666	64	40.556	0.1756	98	43.181	0.1869
31	38.540	0.1668	65	40.624	0.1759	99	43.270	0.1873
32	38.595	0.1671	66	40.693	0.1762	100	43.359	0.1877
33	38.651	0.1673	67	40.762	0.1765			

* Approximate specific gravity for a commercial LPG product.

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Volume Corrections for Thermal Expansion or Contraction of Prover

Attachment To Certificate No.: 2020-058-2 **Calibration Date:** May 22, 2020

Tested Item(s): 107 gal LPG Prover Serial Number: 104

Table 3 - Volume Corrections for Thermal Expansion or Contraction of Prover

Coefficient of Cubical Expansion = 0.0000186 / ºF

Temp. ºF	Correction (in³)	Correction (gal)	Temp. ºF	Correction (in³)	Correction (gal)	Temp. ºF	Correction (in³)	Correction (gal)
0	-27.6	-0.119	34	-12.0	-0.052	68	3.7	0.016
1	-27.1	-0.117	35	-11.5	-0.050	69	4.1	0.018
2	-26.7	-0.115	36	-11.0	-0.048	70	4.6	0.020
3	-26.2	-0.113	37	-10.6	-0.046	71	5.1	0.022
4	-25.7	-0.111	38	-10.1	-0.044	72	5.5	0.024
5	-25.3	-0.109	39	-9.7	-0.042	73	6.0	0.026
6	-24.8	-0.107	40	-9.2	-0.040	74	6.4	0.028
7	-24.4	-0.105	41	-8.7	-0.038	75	6.9	0.030
8	-23.9	-0.103	42	-8.3	-0.036	76	7.4	0.032
9	-23.4	-0.102	43	-7.8	-0.034	77	7.8	0.034
10	-23.0	-0.100	44	-7.4	-0.032	78	8.3	0.036
11	-22.5	-0.098	45	-6.9	-0.030	79	8.7	0.038
12	-22.1	-0.096	46	-6.4	-0.028	80	9.2	0.040
13	-21.6	-0.094	47	-6.0	-0.026	81	9.7	0.042
14	-21.1	-0.092	48	-5.5	-0.024	82	10.1	0.044
15	-20.7	-0.090	49	-5.1	-0.022	83	10.6	0.046
16	-20.2	-0.088	50	-4.6	-0.020	84	11.0	0.048
17	-19.8	-0.086	51	-4.1	-0.018	85	11.5	0.050
18	-19.3	-0.084	52	-3.7	-0.016	86	12.0	0.052
19	-18.8	-0.082	53	-3.2	-0.014	87	12.4	0.054
20	-18.4	-0.080	54	-2.8	-0.012	88	12.9	0.056
21	-17.9	-0.078	55	-2.3	-0.010	89	13.3	0.058
22	-17.5	-0.076	56	-1.8	-0.008	90	13.8	0.060
23	-17.0	-0.074	57	-1.4	-0.006	91	14.3	0.062
24	-16.6	-0.072	58	-0.9	-0.004	92	14.7	0.064
25	-16.1	-0.070	59	-0.5	-0.002	93	15.2	0.066
26	-15.6	-0.068	60	0.0	0.000	94	15.6	0.068
27	-15.2	-0.066	61	0.5	0.002	95	16.1	0.070
28	-14.7	-0.064	62	0.9	0.004	96	16.6	0.072
29	-14.3	-0.062	63	1.4	0.006	97	17.0	0.074
30	-13.8	-0.060	64	1.8	0.008	98	17.5	0.076
31	-13.3	-0.058	65	2.3	0.010	99	17.9	0.078
32	-12.9	-0.056	66	2.8	0.012	100	18.4	0.080
33	-12.4	-0.054	67	3.2	0.014			

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Volume Correction Factors to 60 ºF

Attachment To Certificate No.: 2020-058-2 **Calibration Date:** May 22, 2020

Tested Item(s): 107 gal LPG Prover Serial Number: 104

Table 4 - Volume Correction Factors to 60 ºF

Propane Specific Gravity 60/60 ºF 0.505*

Temp. ºF	Correction Factor	Temp. ºF	Correction Factor	Temp. ºF	Correction Factor	Temp. ºF	Correction Factor
0	1.09008	26	1.05283	52	1.01293	78	0.96955
1	1.08869	27	1.05134	53	1.01133	79	0.96780
2	1.08729	28	1.04986	54	1.00973	80	0.96604
3	1.08590	29	1.04837	55	1.00812	81	0.96427
4	1.08449	30	1.04688	56	1.00651	82	0.96249
5	1.08309	31	1.04538	57	1.00489	83	0.96071
6	1.08168	32	1.04388	58	1.00326	84	0.95892
7	1.08027	33	1.04237	59	1.00163	85	0.95712
8	1.07889	34	1.04086	60	1.00000	86	0.95532
9	1.07744	35	1.03935	61	0.99836	87	0.95351
10	1.07602	36	1.03783	62	0.99671	88	0.95168
11	1.07460	37	1.03631	63	0.99506	89	0.94986
12	1.07317	38	1.03478	64	0.99340	90	0.94802
13	1.07174	39	1.03325	65	0.99174	91	0.94617
14	1.07031	40	1.03172	66	0.99007	92	0.94432
15	1.06887	41	1.03018	67	0.98840	93	0.94246
16	1.06743	42	1.02863	68	0.98671	94	0.94059
17	1.06599	43	1.02708	69	0.98503	95	0.93871
18	1.06454	44	1.02553	70	0.98333	96	0.93682
19	1.06309	45	1.02397	71	0.98163	97	0.93493
20	1.06163	46	1.02241	72	0.97993	98	0.93302
21	1.06017	47	1.02084	73	0.97821	99	0.93110
22	1.05871	48	1.01927	74	0.97649	100	0.92918
23	1.05725	49	1.01769	75	0.97477		
24	1.05578	50	1.01611	76	0.97307		
25	1.05430	51	1.01452	77	0.97130		

* Approximate specific gravity for a commercial LPG product.

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Calibration Certificate of Mass

Calibration Date: November 9, 2020 | **Certificate Number:** 2020-117-1

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*
PO Number: N/A

Test Item(s): (48)-Cast Iron Weights
Serial Number(s): See Next Page
Manufacture: Various
Condition: Good (some wear)

Artifact(s) Description:

Date Received: November 5, 2020
ID / Asset Number: **FSCP Area 35**
Class Specification: NIST Class F
Material: Cast Iron

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

Environmental Cond. **Temp:** 19.4 °C **Pressure:** 726.69 mmHg **Relative Humidity:** 48.8 %

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/cm³ reference mass density and an air density of 1.2 mg/cm³ 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.

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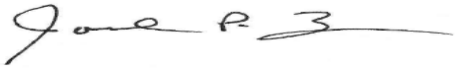
Calibration Date: November 9, 2020 | **Certificate Number:** 2020-117-1

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/cm³)
25 lb	WM-D15	0.57	N	0.57	0.14	2	1.1	7.2
25 lb	WM-D23	0.45	N	0.45	0.14	2	1.1	7.2
25 lb	WM-D24	0.61	N	0.61	0.14	2	1.1	7.2
25 lb	WM-D25	0.25	N	0.25	0.14	2	1.1	7.2
25 lb	WM-D26	0.38	N	0.38	0.14	2	1.1	7.2
25 lb	WM-D28	0.53	N	0.53	0.14	2	1.1	7.2
25 lb	WM-D29	0.59	N	0.59	0.14	2	1.1	7.2
25 lb	WM-D44	0.26	N	0.26	0.14	2	1.1	7.2
25 lb	WM-D60	-1.69	Y	-0.14	0.14	2	1.1	7.2
25 lb	WM-D61	-1.18	Y	-0.06	0.14	2	1.1	7.2
50 lb	A5C-1	0.63	N	0.63	0.28	2	2.3	7.2
50 lb	A5C-4	1.38	N	1.38	0.28	2	2.3	7.2
50 lb	A5C-11	0.14	N	0.14	0.28	2	2.3	7.2
50 lb	B-C-1	2.53	Y	-0.03	0.28	2	2.3	7.2
50 lb	B-C-2	0.18	N	0.18	0.28	2	2.3	7.2
50 lb	B-C-3	0.71	N	0.71	0.28	2	2.3	7.2
50 lb	B-C-4	1.06	N	1.06	0.28	2	2.3	7.2
50 lb	B-C-5	0.26	N	0.26	0.28	2	2.3	7.2
50 lb	B-C-6	1.69	N	1.69	0.28	2	2.3	7.2
50 lb	B-C-7	0.52	N	0.52	0.28	2	2.3	7.2
50 lb	B-C-8	1.18	N	1.18	0.28	2	2.3	7.2
50 lb	B-C-9	1.73	N	1.73	0.28	2	2.3	7.2
50 lb	B-C-11	-0.38	N	-0.38	0.28	2	2.3	7.2
50 lb	B-C-12	0.96	N	0.96	0.28	2	2.3	7.2
50 lb	WM50-7	0.19	N	0.19	0.28	2	2.3	7.2
50 lb	WM50-12	0.08	N	0.08	0.28	2	2.3	7.2
50 lb	WM50-16	0.68	N	0.68	0.28	2	2.3	7.2
50 lb	WM50-52	1.38	N	1.38	0.28	2	2.3	7.2
50 lb	WM50-53	2.12	Y	0.13	0.28	2	2.3	7.2
50 lb	USC-C213	1.32	N	1.32	0.28	2	2.3	7.2
1000 lb	1	7.8	N	7.8	5.6	2.009	45	7.2
1000 lb	2	10.2	N	10.2	5.6	2.009	45	7.2
1000 lb	3	5.8	N	5.8	5.6	2.009	45	7.2
1000 lb	4	-27.1	N	-27.1	5.6	2.009	45	7.2
1000 lb	5	-26.3	N	-26.3	5.6	2.009	45	7.2
1000 lb	6	59.7	Y	4.6	5.6	2.009	45	7.2
1000 lb	7	1.2	N	1.2	5.6	2.009	45	7.2
1000 lb	8	16.8	N	16.8	5.6	2.009	45	7.2
1000 lb	9	109.9	Y	-1.0	5.6	2.009	45	7.2
1000 lb	10	-16.8	N	-16.8	5.6	2.009	45	7.2
1000 lb	11	-36.6	N	-36.6	5.6	2.009	45	7.2
1000 lb	12	8.9	N	8.9	5.6	2.009	45	7.2
1000 lb	13	6.3	N	6.3	5.6	2.009	45	7.2
1000 lb	14	-18.7	N	-18.7	5.6	2.009	45	7.2
1000 lb	15	-35.4	N	-35.4	5.6	2.009	45	7.2
1000 lb	16	-7.4	N	-7.4	5.6	2.009	45	7.2
1000 lb	17	31.8	N	31.8	5.6	2.009	45	7.2
1000 lb	18	-12.7	N	-12.7	5.6	2.009	45	7.2
1000 lb	19	0.5	N	0.5	5.6	2.009	45	7.2
1000 lb	20	-58.1	Y	5.9	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



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Joel P. Lavicky *Metrologist*

11/12/2020
Date of Issue

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Nebraska Standards Laboratory
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Director of Agriculture
Steve Wellman
P.O. Box 94947
Lincoln, NE 68509-4947
(402) 471-2341
www.nda.nebraska.gov

Calibration Certificate of Mass

Calibration Date: November 10, 2020 | **Certificate Number:** 2020-117-2

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*
PO Number: N/A

Test Item(s): lb weight kit
Serial Number(s): WM-2B86
Manufacture: Rice Lake
Material: Stainless Steel and Aluminum

Artifact(s) Description:

Date Received: November 5, 2020
ID / Asset Number: Area 35
Class Specification: NIST Class F
Condition: Good (some wear)

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:** 21.1 ºC **Pressure:** 734.2 mmHg **Relative Humidity:** 40 %

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/cm³ reference mass density and an air density of 1.2 mg/cm³ at 20 ºC.

- 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.

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Director of Agriculture
Steve Wellman
P.O. Box 94947
Lincoln, NE 68509-4947
(402) 471-2341
www.nda.nebraska.gov

Calibration Date: November 10, 2020 | **Certificate Number:** 2020-117-2

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/cm³)
5 lb	1	0.016	n	0.016	0.028	2	0.23	7.84
5 lb	2	0.060	n	0.060	0.028	2	0.23	7.84
5 lb	3	0.059	n	0.059	0.028	2	0.23	7.84
5 lb	4	0.015	n	0.015	0.028	2	0.23	7.84
5 lb	5	0.083	n	0.083	0.028	2	0.23	7.84
1 lb	6	0.0046	n	0.0046	0.0083	2	0.07	7.84
1 lb	7	-0.0338	n	-0.0338	0.0083	2	0.07	7.84
1 lb	8	0.0154	n	0.0154	0.0083	2	0.07	7.84
1 lb	9	-0.0223	n	-0.0223	0.0083	2	0.07	7.84
1 lb	10	-0.0324	n	-0.0324	0.0083	2	0.07	7.84
8 oz	10	-0.0035	n	-0.0035	0.0054	2	0.045	7.84
4 oz		-0.0183	n	-0.0183	0.0028	2	0.023	7.84
4 oz	18	-0.0158	n	-0.0158	0.0028	2	0.023	7.84
2 oz		0.0037	n	0.0037	0.0013	2	0.011	7.84
1 oz		-0.00026	n	-0.00026	0.00064	2	0.0054	7.84
1/2 oz		-0.00023	n	-0.00023	0.00034	2	0.0028	7.84
1/4 oz		-0.00016	n	-0.00016	0.00021	2	0.0017	7.84
1/8 oz		0.00017	n	0.00017	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

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Joel P. Lavicky Metrologist

11/12/2020
Date of Issue

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P.O. Box 94947
Lincoln, NE 68509-4947
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Calibration Certificate of Mass

Calibration Date: November 12, 2020 | **Certificate Number:** 2020-117-3

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*
PO Number: N/A

Test Item(s): Metric weight kit
Serial Number(s): **WM-2-89-3**
Manufacture: Troemner
Condition: Good (some wear)

Artifact(s) Description:

Date Received: 11/5/2020
ID / Asset Number: **Area 35**
Class Specification: NIST Class F
Material: Stainless Steel

Reference Standards Used:
OPI & /Den Metric
Voland-1707

Procedure Used:
NIST HB 6969, SOP 8 (2018)
Metrologist:
JPL

Equipment Used:
Sartorius CC 1201 Sartorius CCE6
Mettler AT 106

Environmental Cond. **Temp:** 21.4 °C **Pressure:** 734.2 mmHg **Relative Humidity:** 40 %

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/cm³ reference mass density and an air density of 1.2 mg/cm³ 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.

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Director of Agriculture
Steve Wellman
P.O. Box 94947
Lincoln, NE 68509-4947
(402) 471-2341
www.nda.nebraska.gov

Calibration Date: November 12, 2020 | **Certificate Number:** 2020-117-3

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/cm³)
1 kg		0.046	n	0.046	0.012	2	0.1	7.84
500 g		0.0364	n	0.0364	0.0083	2	0.07	7.84
200 g		0.0213	n	0.0213	0.0048	2	0.04	7.84
200 g	*	0.0198	n	0.0198	0.0048	2	0.04	7.84
100 g		-0.0039	n	-0.0039	0.0024	2	0.02	7.84
50 g		0.0059	n	0.0059	0.0012	2	0.01	7.84
20 g		0.00025	n	0.00025	0.00048	2	0.004	7.84
20 g	*	-0.00068	n	-0.00068	0.00048	2	0.004	7.84
10 g		0.00170	n	0.00170	0.00024	2	0.002	7.84
5 g		-0.00061	n	-0.00061	0.00018	2	0.0015	7.84

Conversion Factors

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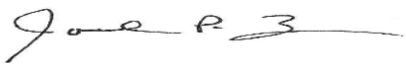
1 pound (avoirdupois) (lb) = 453.592 37 g exactly



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