NEBRASKA
Good Life. Great Roots.
DEPARTMENT OF AGRICULTURE

Nebraska Standards Laboratory
3721 West Cuming St.
Lincoln, NE 68524
(402)-471-2087

Director of Agriculture
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Calibration Certificate of Mass

Calibration Date: November 4, 2021 | **Certificate Number:** 2021-155-1

Submitted By: FSCP Area 10
3721 West Cuming St.
Lincoln, NE 68524

Point of Contact: Gene Haase
Ph. 402-471-3422
email: *gene.haase@nebraska.gov*
PO Number: N/A

Test Item(s): Cast iron weights
ID / Asset Number: Area 10
Manufacture: Various
Material: Cast Iron

Artifact(s) Description:

Date Received: November 1, 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 XP 604
Mettler XPR32003

Environmental Cond. **Temp:** 19.4 °C **Pressure:** 736.35 mmHg **Relative Humidity:** 49.2 %

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 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	D36	-2.06	Y	-0.35	0.14	2	1.1	7.2
25 lb	WM-D51	-0.27	N	-0.27	0.14	2	1.1	7.2
25 lb	WM-D52	-0.30	N	-0.30	0.14	2	1.1	7.2
25 lb	WM-D53	0.07	N	0.07	0.14	2	1.1	7.2
25 lb	WM-D54	1.86	Y	0.72	0.14	2	1.1	7.2
25 lb	WM-D55	-0.03	N	-0.03	0.14	2	1.1	7.2
25 lb	WM-D56	-0.89	N	-0.89	0.14	2	1.1	7.2
25 lb	WM-D57	0.08	N	0.08	0.14	2	1.1	7.2
25 lb	WM-D58	-0.91	N	-0.91	0.14	2	1.1	7.2
25 lb	WM-D59	-0.85	N	-0.85	0.14	2	1.1	7.2
25 lb	WM-D60	0.12	N	0.12	0.14	2	1.1	7.2
25 lb	WM-D61	-0.09	N	-0.09	0.14	2	1.1	7.2
50 lb	A5C5	2.66	Y	1.20	0.28	2	2.3	7.2
50 lb	C-13	0.06	N	0.06	0.28	2	2.3	7.2
50 lb	C-C1	-1.98	Y	0.31	0.28	2	2.3	7.2
50 lb	C-C2	2.28	Y	1.30	0.28	2	2.3	7.2
50 lb	C-C3	2.46	Y	0.41	0.28	2	2.3	7.2
50 lb	C-C4	2.92	Y	0.81	0.28	2	2.3	7.2
50 lb	C-C6	2.74	Y	1.17	0.28	2	2.3	7.2
50 lb	C-C8	1.10	N	1.10	0.28	2	2.3	7.2
50 lb	C-C10	2.59	Y	0.86	0.28	2	2.3	7.2
50 lb	C-C14	2.67	Y	0.86	0.28	2	2.3	7.2
50 lb	C-C15	1.54	N	1.54	0.28	2	2.3	7.2
50 lb	C-C16	2.50	Y	0.77	0.28	2	2.3	7.2
50 lb	C-C18	1.20	N	1.20	0.28	2	2.3	7.2
50 lb	C-C19	0.62	N	0.62	0.28	2	2.3	7.2
1000 lb	WME1	96.6	Y	-3.6	5.8	2.019	45	7.2
1000 lb	WME2	12.5	N	12.5	5.8	2.019	45	7.2
1000 lb	WME3	2.5	N	2.5	5.8	2.019	45	7.2
1000 lb	WME4	86.2	Y	-0.7	5.8	2.019	45	7.2
1000 lb	WME5	13.6	N	13.6	5.8	2.019	45	7.2
1000 lb	WME6	-57.6	Y	9.6	5.8	2.019	45	7.2
1000 lb	WME7	-31.2	N	-31.2	5.8	2.019	45	7.2
1000 lb	WME9	-40.0	Y	-1.4	5.8	2.019	45	7.2
1000 lb	WME10	-43.2	Y	4.8	5.8	2.019	45	7.2
1000 lb	WME11	10.0	N	10.0	5.8	2.019	45	7.2
1000 lb	WME12	-31.1	N	-31.1	5.8	2.019	45	7.2
1000 lb	WME13	-25.9	N	-25.9	5.8	2.019	45	7.2
1000 lb	WME14	-54.7	Y	-3.5	5.8	2.019	45	7.2
1000 lb	WME15	10.0	N	10.0	5.8	2.019	45	7.2
1000 lb	WME17	-40.1	Y	5.0	5.8	2.019	45	7.2
1000 lb	WME19	41.9	Y	-1.5	5.8	2.019	45	7.2
1000 lb	WME20	13.3	N	13.3	5.8	2.019	45	7.2
1000 lb	WME21	-8.0	N	-8.0	5.8	2.019	45	7.2
1000 lb	WME22	-4.1	N	-4.1	5.8	2.019	45	7.2
1000 lb	WME23	-56.7	Y	5.8	5.8	2.019	45	7.2
1000 lb	WME24	-18.8	N	-18.8	5.8	2.019	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*

11/15/2021
Date of Issue