



Calibration Certificate

Indiana Weights and Measures

Division of Weights and Measures
Metrology Laboratory
2525 N Shadeland Ave Ste D3
Indianapolis, IN 46219

Certificate Number: 22-274

Calibration Due Date: July 19, 2024

Date Received: July 18, 2022

Calibration Date: July 19, 2022

Issue Date: July 21, 2022

Issued To: Koenig Scale Company
4779 E Margaret Dr
Terre Haute, IN 47803

Calibration Authorized By: Kevin Koenig
Phone: 812-877-6121
Email: kevkoenig@koenigscale.com

Artifact Description(s)

Test Item(s): Metric Kits

Class Specification: NIST HB 105-1 (1990), Class F

Condition: Suitable for legal metrology.
Minor wear noted.

Serial No: KS-100, 2M, 8M, 4M, 2STG, 1DG7

Manufacture: Rice Lake

Material: Stainless Steel

Calibration Information

Metrologist: K Scott

Temperature: 19.83 °C to 22.28 °C

Equipment Used: MCM5004, MTAX206, MTXPR6U

Mean: 20.10 °C

Procedure: NISTIR 6969 (2019): SOP 8,
Recommended Standard Operating
Procedure for Medium Accuracy
Calibration of Mass Standards by Modified
Substitution

Pressure: 736.72 mmHg to 737.27 mmHg

Mean: 737.03 mmHg

Relative Humidity: 42.71 % to 49.01 %

Mean: 48.46 %

*Data for individual calibrations is
available upon request.*

Calibration Results

Nominal Mass	Serial No. / ID	Manufacture	Conventional Mass Correction		U ± (mg)	k factor	Assumed Density (g/cm ³)	ASTM E617-18 Class Tolerance Met		NIST HB 105-1 (1990), Class F MPE ± (mg)	Within Tolerance for NIST HB 105-1 (1990), Class F	
			As Found (mg)	As Left (mg)				As Found	As Left		As Found	As Left
5 kg	1DG7; no mark	Rice Lake	-8	-8	59	2.2549	7.95	4	4	500	Pass	Pass
5 kg	KS-100; A	Rice Lake	162	162	59	2.2549	7.95	5	5	500	Pass	Pass
5 kg	KS-100; B	Rice Lake	156	156	59	2.2549	7.95	5	5	500	Pass	Pass
5 kg	KS-100; C	Rice Lake	156	156	59	2.2549	7.95	5	5	500	Pass	Pass
5 kg	KS-100; D	Rice Lake	142	142	59	2.2549	7.95	5	5	500	Pass	Pass
5 kg	2STG; no mark	Rice Lake	210	210	59	2.2549	7.95	6	6	500	Pass	Pass
3 kg	1DG7; no mark	Rice Lake	-2	-2	36	2.8693	7.95	4	4	300	Pass	Pass
2 kg	1DG7; no mark	Rice Lake	-4	-4	24	2.133	7.95	4	4	200	Pass	Pass
2 kg	4M; no mark	Rice Lake	40	40	24	2.133	7.95	5	5	200	Pass	Pass
2 kg	8M; no mark	Rice Lake	30	30	24	2.133	7.95	5	5	200	Pass	Pass
2 kg	2M; no mark	Rice Lake	30	30	24	2.133	7.95	5	5	200	Pass	Pass
1 kg	1DG7; no mark	Rice Lake	-3	-3	12	2.1147	7.95	4	4	100	Pass	Pass
1 kg	4M; no mark	Rice Lake	34	34	12	2.1147	7.95	5	5	100	Pass	Pass
1 kg	8M; no mark	Rice Lake	27	27	12	2.1147	7.95	5	5	100	Pass	Pass
1 kg	2M; no mark	Rice Lake	10	10	12	2.1147	7.95	5	5	100	Pass	Pass
500 g	1DG7; no mark	Rice Lake	-2.1	-2.1	8.3	2.0933	7.95	5	5	70	Pass	Pass
500 g	4M; no mark	Rice Lake	24.8	24.8	8.3	2.0933	7.95	6	6	70	Pass	Pass
500 g	8M; no mark	Rice Lake	8.4	8.4	8.3	2.0933	7.95	5	5	70	Pass	Pass

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500 g	2M; no mark	Rice Lake	34	34	8.3	2.0933	7.95	6	6	70	Pass	Pass
200 g	1DG7; no dot	Rice Lake	-0.2	-0.2	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	1DG7; dot	Rice Lake	-0.4	-0.4	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	4M; no dot	Rice Lake	6	6	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	4M; dot	Rice Lake	7.1	7.1	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	8M; no dot	Rice Lake	6.8	6.8	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	8M; dot	Rice Lake	16.2	16.2	4.7	2.0719	7.95	7	7	40	Pass	Pass
200 g	2M; no dot	Rice Lake	6.7	6.7	4.7	2.0719	7.95	5	5	40	Pass	Pass
200 g	2M; dot	Rice Lake	7.2	7.2	4.7	2.0719	7.95	5	5	40	Pass	Pass
100 g	4M; no mark	Rice Lake	3.6	3.6	2.4	2.0584	7.95	5	5	20	Pass	Pass
100 g	8M; no mark	Rice Lake	7.2	7.2	2.4	2.0584	7.95	6	6	20	Pass	Pass
50 g	4M; no mark	Rice Lake	5.3	5.3	1.2	2.0613	7.95	6	6	10	Pass	Pass
50 g	8M; no mark	Rice Lake	5.9	5.9	1.2	2.0613	7.95	7	7	10	Pass	Pass
50 g	2M; no mark	Rice Lake	2.6	2.6	1.2	2.0613	7.95	5	5	10	Pass	Pass
20 g	4M; no dot	Rice Lake	2.34	2.34	0.48	2.0613	7.95	5	5	4	Pass	Pass
20 g	4M; dot	Rice Lake	2.91	2.91	0.48	2.0613	7.95	7	7	4	Pass	Pass
20 g	8M; no mark	Rice Lake	1.26	1.26	0.48	2.0613	7.95	5	5	4	Pass	Pass
20 g	2M; no dot	Rice Lake	1.68	1.68	0.48	2.0613	7.95	5	5	4	Pass	Pass
20 g	2M; dot	Rice Lake	0.59	0.59	0.48	2.0613	7.95	5	5	4	Pass	Pass
10 g	4M; no mark	Rice Lake	0.51	0.51	0.25	2.0613	7.95	5	5	2	Pass	Pass
10 g	8M; no mark	Rice Lake	0.98	0.98	0.25	2.0613	7.95	5	5	2	Pass	Pass
10 g	2M; no mark	Rice Lake	0.54	0.54	0.25	2.0613	7.95	5	5	2	Pass	Pass
5 g	4M; no mark	Rice Lake	0.65	0.65	0.18	2.068	7.95	5	5	1.5	Pass	Pass
5 g	8M; no mark	Rice Lake	0.6	0.6	0.18	2.068	7.95	5	5	1.5	Pass	Pass
5 g	2M; no mark	Rice Lake	-0.11	-0.11	0.18	2.068	7.95	4	4	1.5	Pass	Pass
2 g	4M; no dot	Rice Lake	0.55	0.55	0.13	2.0699	7.95	5	5	1.1	Pass	Pass
2 g	4M; dot	Rice Lake	0.5	0.5	0.13	2.0699	7.95	5	5	1.1	Pass	Pass
2 g	2M; no dot	Rice Lake	0.55	0.55	0.13	2.0699	7.95	5	5	1.1	Pass	Pass
2 g	2M; dot	Rice Lake	0.43	0.43	0.13	2.0699	7.95	5	5	1.1	Pass	Pass
1 g	4M; no mark	Rice Lake	0.26	0.26	0.11	2.1051	7.95	5	5	0.9	Pass	Pass
1 g	2M; no mark	Rice Lake	0.15	0.15	0.11	2.1051	7.95	5	5	0.9	Pass	Pass

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Traceability Statement

The artifact(s) described in this calibration certificate have been compared to the Standards of the State of Indiana. The Standards of the State of Indiana 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 SI unit for mass is the kilogram (kg) (see Conversion Factors below). The certificate number for this calibration is the only unique number to be used in referencing measurement traceability for the artifact(s) described in this calibration 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 (previous similar determinations have demonstrated that the maximum permissible errors are sufficiently large that buoyancy corrections are not usually significant [i.e., corrections & their uncertainty will not change the last decimal place of the calibration value or uncertainty (with uncertainty rounded to 2 significant digits)]). 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 calibration certificate is consistent with the Bureau International des Poids et Mesures (BIPM) Guide to the Expression of Uncertainty in Measurement (2008) (GUM). For ASTM Class 4 calibrations, Magnetic Susceptibility has been tested and the results are included in the specification Pass/Fail column for each artifact, but there are no components in the Uncertainty Budget for either Magnetic Susceptibility or Surface Roughness. For all other calibrations, no Surface Roughness evaluation or Magnetic Susceptibility testing has been performed and as a result there are no components for the effects of either in the uncertainty budget.

Conformity Statement

These artifacts were evaluated using NISTIR 6969: Selected Laboratory and Measurement Practices and Procedures to Support Basic Mass Calibrations (2019), SOP 8 Recommended Standard Operating Procedure for Medium Accuracy Calibration of Mass Standards by Modified Substitution to be in compliance with NIST Handbook 105-1: Specifications and Tolerances for Reference Standards and Field Standard Weights and Measures (2019). The artifacts listed above have been found and/or left within the Maximum Permissible Error (MPE) for the specification noted in the Calibration Results section of this certificate. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. In the As Found column, bold print indicates an out-of-compliance reading with the specification noted. For ASTM Class 4 calibrations, Magnetic Susceptibility has been evaluated in accordance with the specification and results are included in the overall evaluation in the Specification Pass/Fail column. For all other calibrations, no Surface Roughness evaluation or Magnetic Susceptibility testing has been performed. Possession of this certificate does not imply this artifact meets any other requirements or statutes that may be required.

Pertinent Information

In accordance with Indiana Code (IC) 24-6-3-2, a calibration interval or recall date must be assigned to all calibrations performed by this laboratory. The results listed in this calibration certificate relate only to the artifacts described and extent of calibrations performed. All corrections stated in this calibration certificate correlate to a "Conventional Mass" (CM), also known as 'apparent mass', scale versus 8.0 g/cm^3 reference mass density and an air density of 0.0012 g/cm^3 at $20 \text{ }^\circ\text{C}$.

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Conversion Factors

From NIST Special Publication 811, *Guide for the Use of the International System of Units (SI)*

Factors in **boldface** are exact

To convert from	to	multiply by
carat, metric	to kilogram (kg)	2.0 E-04
grain (gr)	to kilogram (kg)	6.479 891 E-05
ounce (avoirdupois) (oz)	to kilogram (kg)	2.834 952 E-02
ounce (troy or apothecary) (oz)	to kilogram (kg)	3.110 348 E-02
dram (apothecary) (dr)	to kilogram (kg)	3.887 934 6 E-03
scruple (apothecary) (s)	to kilogram (kg)	1.295 978 2 E-03
pennyweight (dwt)	to kilogram (kg)	1.555 174 E-03
pound (avoirdupois) (lb)	to kilogram (kg)	4.535 923 7 E-01

I declare or certify under penalty of perjury under the laws of the State of Indiana that the foregoing is true and correct:

Signed on this 21st day of July, 2022 in the city of Indianapolis, Marion County, Indiana

Reviewed By

Christopher Gast
Metrologist, ISDH

Authorized Signatory

Howard Wickersham
Metrologist, ISDH

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