

Certificate of Calibration

Submitted for:
Sample
Denver Instrument Co
6542 Fig Street
Arvada CO 80004

Test #: 08-000000
Serial #: 08-000000
Range: 100g -1mg
Date of Report ^{Note 1:} 08/19/08
Manufacturer: Denver Instrument Co

Test Conditions: 20.5 °C 627.23 mmHg 50.6 %RH Grams Weights are Type: 1

Nominal Value	Conventional Mass Correction (mg)	Uncertainty in mg @ K=2	Bal ID	As Found ^{Note 2} value in mg	Density g/cm ³	Magnetism Gauss ^{Note 3}	Volume cm ³	Coefficient of expansion	True Mass Correction	Condition Notes
100 g	0.0000	±0.0249	21		7.85 SS	0.000	12.7389	0.000045	0.2867	
50 g	0.0000	±0.0168	21		7.85 SS	0.000	6.3694	0.000045	0.1433	
20 g	0.0000	±0.0103	21		7.85 SS	0.000	2.5478	0.000045	0.0573	
20 g*	0.0000	±0.0103	21		7.85 SS	0.000	2.5478	0.000045	0.0573	
10 g	0.0000	±0.0087	21		7.85 SS	0.000	1.2739	0.000045	0.0287	
5 g	0.0000	±0.0055	123		7.85 SS	0.000	0.6369	0.000045	0.0143	
2 g	0.0000	±0.0053	123		7.85 SS	0.000	0.2548	0.000045	0.0057	
2 g*	0.0000	±0.0053	123		7.85 SS	0.000	0.2548	0.000045	0.0057	
1 g	0.0000	±0.0052	123		7.85 SS	0.000	0.1274	0.000045	0.0029	
500 mg	0.0000	±0.0016	64		7.85 SS	0.000	0.06369	0.000045	0.0014	
200 mg	0.0000	±0.0014	64		7.85 SS	0.000	0.02548	0.000045	0.0006	
200 mg*	0.0000	±0.0014	64		7.85 SS	0.000	0.02548	0.000045	0.0006	
100 mg	0.0000	±0.0014	64		7.85 SS	0.000	0.01274	0.000045	0.0003	
50 mg	0.0000	±0.0014	64		7.85 SS	0.000	0.00637	0.000045	0.0001	
20 mg	0.0000	±0.0014	111		7.85 SS	0.000	0.00255	0.000045	0.0001	
20 mg*	0.0000	±0.0014	111		7.85 SS	0.000	0.00255	0.000045	0.0001	
10 mg	0.0000	±0.0014	111		7.85 SS	0.000	0.00127	0.000045	0.0000	
5 mg	0.0000	±0.0014	111		2.70 Al	0.000	0.00185	0.000069	0.0015	
2 mg	0.0000	±0.0014	111		2.70 Al	0.000	0.00074	0.000069	0.0006	
2 mg*	0.0000	±0.0014	111		2.70 Al	0.000	0.00074	0.000069	0.0006	
1 mg	0.0000	±0.0014	111		2.70 Al	0.000	0.00037	0.000069	0.0003	

Notes:

- For weights shipped from inventory actual test date may vary.
- In accordance with ANSI/ISO/IEC 17025:2005 as found values only reported on weights which have been adjusted or replaced.
- Magnetism in Gauss No uncertainty assigned to this component.
- Weights are cleaned by wiping with alcohol.

Procedures and Traceability information

This report pertains to the above listed artifacts and parameters only. The values reported were found at the time of test by using one of the following: Standard denomination metric weights are calibrated using weighing designs A.1.1, A.2.1 or A.2.3 described in NBS Tech note 952 data reduction uses the NIST masscode software. Non-standard metric and non-metric weights are calibrated using double substitution as described in NISTR 6969 SOP 4. Using the NIST provided masscode software we propagate mass values from our primary standards MT57, which are calibrated every five years, and use the values reported under NIST test #822/275197-07 dated 07/18/07. Our working standards MT7, MT50 and MT53 are calibrated every 9 months the last Calibration was on 08/04/08 under test number 06-091206. **Therefore the reported values are traceable to the International Prototype Kilogram through NIST** and comply with ANSI/NCCL Z540 and ANSI/ISO/IEC 17025:2005.

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Authorized Signature
P/N 800505.1 Rev D

Rashid Maqbool
Metrologist

Table of Weight Tolerances

Nominal Value	ASTM E617					NBS Circular 547				OIML R-111			
	Class 0(U*)	Class 1	Class 2	Class 3	Class 4	Class M	Class S	Class S1	Class P	Class E1	Class E2	Class F1	Class F2
5 kg	6.00	12.0	25.0	50	100	25.0	12.0	50	100	2.5	8.0	25	80
3 kg	3.75	7.5	15.0	30	60	15.0	7.5	30	60				
2 kg	2.50	5.0	10.0	20	40	10.0	5.0	20	40	1.0	3.0	10	30
1 kg	1.25	2.5	5.0	10	20	5.0	2.5	10	20	0.5	1.6	5	16
500 g	0.600	1.20	2.50	5.0	10.0	2.50	1.20	5.0	10.0	0.25	0.80	2.5	8.0
300 g	0.380	0.75	1.50	3.0	6.0	1.50	0.75	3.0	6.0				
200 g	0.250	0.50	1.00	2.0	4.0	1.00	0.50	2.0	4.0	0.10	0.30	1.0	3.0
100 g	0.125	0.25	0.50	1.0	2.0	0.50	0.25	1.0	2.0	0.05	0.16	0.5	1.6
50 g	0.060	0.120	0.250	0.60	1.20	0.250	0.120	0.60	1.20	0.030	0.10	0.30	1.0
30 g	0.037	0.074	0.150	0.45	0.90	0.150	0.074	0.45	0.90				
20 g	0.037	0.074	0.100	0.35	0.70	0.100	0.074	0.35	0.70	0.025	0.080	0.25	0.8
10 g	0.025	0.050	0.074	0.25	0.50	0.050	0.074	0.25	0.50	0.020	0.060	0.20	0.6
5 g	0.017	0.034	0.054	0.18	0.36	0.034	0.054	0.18	0.36	0.016	0.050	0.16	0.5
3 g	0.017	0.034	0.054	0.15	0.30	0.034	0.054	0.15	0.30				
2 g	0.017	0.034	0.054	0.13	0.26	0.034	0.054	0.13	0.26	0.012	0.040	0.12	0.4
1 g	0.017	0.034	0.054	0.10	0.20	0.034	0.054	0.10	0.20	0.010	0.030	0.10	0.3
500 mg	0.005	0.010	0.025	0.080	0.16	0.010	0.025	0.080	0.16	0.008	0.025	0.08	0.25
300 mg	0.005	0.010	0.025	0.070	0.14	0.010	0.025	0.070	0.14				
200 mg	0.005	0.010	0.025	0.060	0.12	0.010	0.025	0.060	0.12	0.006	0.020	0.06	0.20
100 mg	0.005	0.010	0.025	0.050	0.10	0.010	0.025	0.050	0.10	0.005	0.016	0.05	0.16
50 mg	0.005	0.010	0.014	0.042	0.085	0.010	0.014	0.042	0.085	0.004	0.012	0.04	0.12
30 mg	0.005	0.010	0.014	0.038	0.075	0.010	0.014	0.038	0.075				
20 mg	0.005	0.010	0.014	0.035	0.070	0.010	0.014	0.035	0.070	0.003	0.010	0.030	0.10
10 mg	0.005	0.010	0.014	0.030	0.060	0.010	0.014	0.030	0.060	0.003	0.008	0.025	0.08
5 mg	0.005	0.010	0.014	0.028	0.055	0.010	0.014	0.028	0.055	0.003	0.006	0.020	0.06
3 mg	0.005	0.010	0.014	0.026	0.052	0.010	0.014	0.026	0.052				
2 mg	0.005	0.010	0.014	0.025	0.050	0.010	0.014	0.025	0.050	0.003	0.006	0.020	0.06
1 mg	0.005	0.010	0.014	0.025	0.050	0.010	0.014	0.025	0.050	0.003	0.006	0.020	0.06

For values between those shown on the chart use the value of the weight which would fall below it on the chart. For non-metric weights convert to metric and follow the same procedure. For example: If using a 400 gram or a 1 lb (453.6g) weight use the tolerance for 300 grams. For classes not shown contact Denver Instrument Company for tolerances. * Class U is a Denver Instrument classification in which the weights are adjusted to class zero tolerances but meet class 1 specifications for markings and density.

Uncertainty

The combined uncertainty includes: Type A components: The standard deviation of the balance. Type B components: Uncertainty of the Air Density Calculation, Uncertainty of the Standard, Uncertainty of the Standard's Density, and the Uncertainty of the Density of the mass under test. The combined uncertainty is multiplied by a coverage factor of 2 to give the expanded uncertainty at the 95 percent confidence level. The expanded uncertainty presented in this report is consistent with the ISO Guide to the Expression of Uncertainty in Measurement. The expanded uncertainty should not be used as a tolerance limit by the user during application.

When to Recertify Mass Standards

ISO/IEC 17025 paragraph 5.10.4.4 states: "A calibration certificate (or calibration label) shall not contain any recommendation on the calibration interval except where this has been agreed with the client." Therefore, Denver Instrument Company does not provide a calibration due date. Setting calibration intervals is the responsibility of the end user. As a general guideline the following calibration intervals may be appropriate:

1. Normal usage; One year
2. Heavy daily use; Three – six months
3. Light usage; Two – three years

Normal usage can be daily but only one or two times a day. Heavy usage is daily use in excess of ten or more times a day. Light usage would be two or three times in a three-month period. Weights should also be recertified if they become contaminated with foreign material or are subjected to dropping, abrasion, scratching or denting. If the user experiences significant changes in mass between calibrations a reduction in the calibration interval should be considered. If you would like to discuss your specific requirements please give us a call.