

CERTIFICATE OF CALIBRATION

Issue:- Certificate Number: **94071B**
94071_21B Date of Issue: **06-Mar-20**
Approved Signatory: **Kim Hutchins**
Page 1 of 2 Signed: *Kim Hutchins*



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EQUIPMENT: Weights
SERIAL NUMBER: FR1 (J01 to J015), FR2 (Z)
MAKE/TYPE: N/A
STANDARDS USED: Set 12412
DATE RECEIVED: 28 February 2020
DATE CALIBRATED: 4 March 2020
DETAILS: 11 Brass, 14 Cast Iron

MEASUREMENTS:

Kent Scientific Services method used: CAL-M2, Calibration of Small Masses.

The calibrations took place in a controlled environment with the temperature held between 18°C and 22°C, and with the relative humidity held between 40% and 60%.

The measurement results obtained in the table, where each measured value given represents not the true mass, but the mass of a hypothetical weight of density $8,000 \text{ kg.m}^{-3}$, which in air of density 1.2 kg.m^{-3} would balance the corresponding weight identified in the first column at 20°C.

The method of weighing was by substitution (Borda's method). In each instance the standard weight used had been calibrated by UKAS Calibration Laboratory number 0474 or 0352 within the previous three years.

The uncertainty of measurements for each of the different denominations is listed in the last column of the table. Duplicate weights, where present, are indicated by a dot or dots.

Customer supplied information is notated with a ~, and results relate to the item calibrated.

Unless otherwise notated, samples are tested in as received condition at Kent Scientific Services.

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TABLE OF MEASUREMENT RESULTS

Identity Mark	Nominal Mass	Measured Value	Error from Nominal	Estimated Uncertainty
Z	1 g	1.000 81 g	+ 0.81 mg	± 0.20 mg
Z	2 g	2.000 60 g	+ 0.60 mg	± 0.24 mg
Z	2 g	2.000 67 g	+ 0.67 mg	± 0.24 mg
Z	5 g	5.000 87 g	+ 0.87 mg	± 0.30 mg
Z	10 g	10.001 54 g	+ 1.54 mg	± 0.40 mg
Z	20 g	20.001 88 g	+ 1.88 mg	± 0.50 mg
Z	20 g	20.001 34 g	+ 1.34 mg	± 0.50 mg
Z	50 g	50.002 78 g	+ 2.78 mg	± 0.60 mg
Z	200 g	200.005 4 g	+ 5.4 mg	± 2.0 mg
Z	200 g	200.007 5 g	+ 7.5 mg	± 2.0 mg

Identity Mark	Nominal Force	Measured Value	Error from Nominal	Estimated Uncertainty
J01	0.5 N	50.960 81 g	- 0.01 mg	± 0.61 mg
J02	1 N	101.923 0 g	+ 1.3 mg	± 1.1 mg
J03	1 N	101.920 8 g	- 0.8 mg	± 1.1 mg
J04	1 N	101.924 3 g	+ 2.6 mg	± 1.1 mg
J05	1 N	101.919 1 g	- 2.5 mg	± 1.1 mg
J06	5 N	509.625 3 g	+ 17.2 mg	± 5.1 mg
J07	10 N	1,019.236 g	+ 20 mg	± 11 mg
J08	20 N	2,038.395 g	- 38 mg	± 21 mg
J09	20 N	2,038.392 g	- 40 mg	± 21 mg
J10	50 N	5,096.004 g	- 78 mg	± 51 mg
J11	100 N	10,192.26 g	+ 100 mg	± 110 mg
J12	100 N	10,192.32 g	+ 160 mg	± 110 mg
J13	100 N	10,192.30 g	+ 140 mg	± 110 mg
J14	100 N	10,192.27 g	+ 100 mg	± 110 mg
J015	5 N	509.600 3 g	- 7.8 mg	± 5.1 mg

The basis for conversion between force units and mass units is that a 1kg mass will experience a force of g newtons where g is the strength of the local gravitational field. At Kent Scientific Services the estimated local $g = 9.81146 \text{ ms}^{-2}$.

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