


CERTIFICATE OF CALIBRATION

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|---------------------|---------------------|-----------------------------------------------------------------------------------|
| Issue:- | Certificate Number: | 96505 |
| 96505_21 | Date of Issue: | 12-Apr-23 |
| Approved Signatory: | Mark Norfolk | |
| Page 1 of 2 | Signed: |  |



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| | |
|-------------------------|--------------------------|
| EQUIPMENT: | Weights FR1 |
| SERIAL NUMBER: | J01 - J14, Z |
| MAKE/TYPE: | N/A |
| STANDARDS USED: | Set 12412 |
| DATE RECEIVED: | 21 March 2023 |
| DATE CALIBRATED: | 28 March 2023 |
| DETAILS: | 14 Cast Iron, 11 Brass # |

MEASUREMENTS:

Kent Scientific Services method used: CAL SMALL, 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, 0260 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 only to the item(s) calibrated.

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

TABLE OF MEASUREMENT RESULTS

| Identity Mark | Nominal Force | Measured Value | Error from Nominal | Estimated Uncertainty |
|---------------|---------------|----------------|--------------------|-----------------------|
| J01 | 0.5 N | 50.951 66 g | - 9.16 mg | ± 1.61 mg |
| J02 | 1 N | 101.903 0 g | - 18.6 mg | ± 1.1 mg |
| J03 | 1 N | 101.914 4 g | - 7.2 mg | ± 1.1 mg |
| J04 | 1 N | 101.916 4 g | - 5.2 mg | ± 1.1 mg |
| J05 | 1 N | 101.913 7 g | - 8.0 mg | ± 1.1 mg |
| J06 | 5 N | 509.588 2 g | - 19.9 mg | ± 5.1 mg |
| J07 | 10 N | 1019.218 g | + 1 mg | ± 11 mg |
| J08 | 20 N | 2038.370 g | - 62 mg | ± 21 mg |
| J09 | 20 N | 2038.427 g | - 6 mg | ± 21 mg |
| J10 | 50 N | 5096.025 g | - 57 mg | ± 51 mg |
| J11 | 100 N | 10192.09 g | - 70 mg | ± 110 mg |
| J12 | 100 N | 10192.14 g | - 20 mg | ± 110 mg |
| J13 | 100 N | 10192.07 g | - 90 mg | ± 110 mg |
| J14 | 100 N | 10192.12 g | - 40 mg | ± 110 mg |
| J02 * | 1 N | 101.923 9 g | + 2.2 mg | ± 1.1 mg |
| J03 * | 1 N | 101.919 4 g | - 2.2 mg | ± 1.1 mg |
| J05 * | 1 N | 101.923 3 g | + 1.7 mg | ± 1.1 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 $g = 9.81146 \text{ ms}^{-2}$.

| Identity Mark | Nominal Mass | Measured Value | Error from Nominal | Estimated Uncertainty |
|---------------|--------------------|----------------|--------------------|-----------------------|
| Z | 100 g | 100.000 4 g | + 0.4 mg | ± 1.0 mg |
| Z | 100 g ^o | 100.001 9 g | + 1.9 mg | ± 1.0 mg |
| Z | 50 g | 50.000 62 g | + 0.63 mg | ± 0.60 mg |
| Z | 20 g | 20.001 45 g | + 1.45 mg | ± 0.50 mg |
| Z | 20 g ^o | 20.001 59 g | + 1.59 mg | ± 0.50 mg |
| Z | 10 g | 10.001 41 g | + 1.42 mg | ± 0.40 mg |
| Z | 5 g | 5.000 89 g | + 0.89 mg | ± 0.30 mg |
| Z | 2 g | 2.000 60 g | + 0.60 mg | ± 0.24 mg |
| Z | 2 g ^o | 2.000 65 g | + 0.65 mg | ± 0.24 mg |
| Z | 1 g | 1.000 79 g | + 0.79 mg | ± 0.20 mg |

* Denotes post adjustment calibration

Denotes correction to number of Cast Iron

END OF RESULTS