



Certificate of Calibration

Teddington Middlesex TW11 0JZ
Tel: +44 20 8943 7222

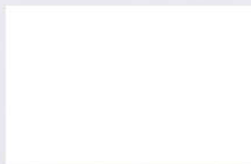


Laboratory Manager: M. Panesar
Date of Issue: 29 September 2017
Certificate No. 09124

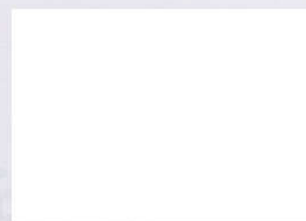
Issued under Section 6 of the
Weights and Measures Act 1985

Approved Signatories:
M. Panesar
J. Pain

Client:



On Behalf of:



Acceptance date:

22 September 2017

Equipment:

A 20 metre composite dipping tape

Description:

A cylindrical brass weight and flexible steel tape assembly. The brass weight is engraved with a scale which is sub-divided into millimetres, the zero being the straight edge of the weight furthest from the connecting hole. The tape has a brass hook, with locking ring, which connects it to the weight through this hole. The tape is graduated in metres which are further subdivided into decimetres, centimetres, half centimetres and millimetres. It is numbered every metre, decimetre and centimetre.

Markings:

The brass weight is marked with the following:

Richter IPM10 0.7 kg 21546 SUP/35/DT 6417

The steel tape is marked with the following:

20m 20°C 15N IP M8 Richter MADE IN GERMANY

SUP/35/DT 6417

The reel is marked with the following:

Richter Metri
Messwerkzeuge qualitat
Measuring Tools Made in Germany
<< seit 1920 >>

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Calibrated by: A. Tuck
Date of Calibration: 25 September 2017

Department Number: 21546
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Continuation Sheet

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Calibration method:

The brass weight and tape was supported throughout its length on a flat surface and loaded with a 1.5 kg tensioning weight. The calibrated intervals were measured interferometrically using a frequency stabilised helium-neon laser. Traceability has been provided by comparison of the optical frequency of this laser with that of a reference laser, which was operated in accordance with the 1983 recommendations of the International Committee for Weights and Measures for the practical realisation of the metre.

Table of Results:

Interval in metres	Length at 20°C in millimetres	Uncertainty of Measurement in millimetres
0 - 0.30 ⁽¹⁾	299.90	± 0.10
0 - 10	9 999.67	± 0.24
0 - 20	19 999.58	± 0.44

⁽¹⁾ Note - Measured value of the Sinker weight terminal plane (reference edge) to first requested point on tape

The lengths quoted above refer to intervals as measured from the reference edge to the centre of each graduation along the edge of the measure. Each observation was made at a recorded temperature within the range of 19.58 °C to 19.87 °C. The lengths at 20 °C were calculated using a coefficient of linear thermal expansion of $17.5 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$ for the brass sinker weight and $11.5 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$ for the carbon steel tape.

Length devices such as tapes, rules, dipping tapes, and other similar artefacts are calibrated on the NMO length calibration facility. This facility enables the calibration of these artefacts whilst they are positioned horizontally. If the artefacts are to be used in a vertical position, the end user must take into account of the variance of tensioning force which can potentially effect the calibration results.

This uncertainty makes no assessment of the quality of the individual uncalibrated graduations.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

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