



NATIONAL PHYSICAL LABORATORY

Teddington Middlesex UK TW11 0LW Telephone +44 20 8977 3222

Certificate of Calibration

Determination of the shielding properties of Lead vinyl samples

This certificate provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, unless permission for the publication of an approved extract has been obtained in writing from the Managing Director. It does not of itself impute to the subject of calibration any attributes beyond those shown by the data contained herein.

FOR: Kemmetech Ltd
Unit 4 Arnold Business Park
Branbridges Road
East Peckham
Kent
TN12 5HE

DESCRIPTION: Determination of Lead equivalence of Lead vinyl samples in accordance with BS EN 61331-1:2002

DATE OF MEASUREMENTS: 4 June 2013

Reference: 2013070243-2

Date of Issue: 15 July 2013

Checked by: *msl*

DSM

Signed: *[Signature]*

Name: G A Bass

Page 1 of 3

(Authorised signatory)

on behalf of NPLML

NATIONAL PHYSICAL LABORATORY

Continuation Sheet

CONDITIONS:

Distance from x-ray tube to target sample: 0.5m
Distance from x-ray tube to detector: 1.1m
Ionisation chamber used: TS100M

All equipment associated with the measurements performed in this report has direct traceability to UK national standards or UKAS accredited calibration facilities. The samples were circular in cross section with a diameter of approximately 110mm.

Table I
61331-1:2002 X-ray beam qualities

<u>X-ray Tube Voltage</u> kV	<u>Additional filtration</u> mmCu
80	0.15
100	0.25

Reference: 2013070243-2

Checked by: *Mully*

0577

Page 2 of 3

NATIONAL PHYSICAL LABORATORY

Continuation Sheet

RESULTS:

Table II

Standard Lead vinyl sheet, 0.25mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.2931	91.9
100	0.2938	83.1

Table III

Standard Lead vinyl sheet, 0.35mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.4027	95.7
100	0.4024	89.7

Table IV

Standard Lead vinyl sheet, 0.50mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.5733	98.1
100	0.5741	94.6

Attenuation = $1 - \text{attenuated/un-attenuated} \times 100$

UNCERTAINTIES

The uncertainty in the Lead equivalence is 5%. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

Reference: 2013070243-2

Checked by: *Handwritten signature*

Handwritten initials

Page 3 of 3