

# NATIONAL PHYSICAL LABORATORY

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## Certificate of Calibration

### Determination of the shielding properties of Lead vinyl samples

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**FOR:**

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Unit 4 Arnold Business Park  
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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:** 2013070243-3

**Date of Issue:** 15 July 2013

**Checked by:**   
DSM

**Signed:** 

**Name:** G A Bass

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(Authorised signatory)

on behalf of NPLML

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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: 2013070243-3

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## RESULTS:

**Table II**

Lightweight Lead vinyl sheet, 0.125mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.1420	78.7
100	0.1444	64.5

**Table III**

Lightweight Lead vinyl sheet, 0.175mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.1978	85.7
100	0.1990	73.5

**Table IV**

Lightweight Lead vinyl sheet, 0.25mm nominal Lead equivalent

<u>kV</u>	<u>Equivalent Lead thickness</u> mm	<u>Attenuation</u> %
80	0.2814	91.4
100	0.2815	82.2

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%.

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