



Test Report

Determination of Attenuation Properties of Materials using Diagnostic X-Radiation

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FOR: Protech Leaded Eyewear Inc.DBA Protech Medical
1360 N Killian Dr.Unit#2
Lake Park, FL 33403
United States

DESCRIPTION: Determination of attenuation properties of eye lenses according to
BS EN 61331:2014 using the Narrow Beam Geometry

DATE OF MEASUREMENTS: 11 January 2019

Reference: 2018110109_1

Date of Issue: 07 February 2019

Checked by: 

Signed: 

Name: G A Bass

Page 1 of 3

(Authorised signatory)

on behalf of NPLML

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Continuation Sheet

CONDITIONS:

Distance from x-ray tube to target sample: 1.5m
Ionisation chamber used: PTW TW34069-2.5 s/n 000231

All equipment associated with the measurements performed in this report has direct traceability to UK national standards or UKAS accredited calibration facilities.

Table I
61331-1:2014 X-ray beam qualities

<u>X-ray Tube Voltage</u> kV	<u>Added filtration</u> mmAl*
120	2.5
150	2.5

*The inherent filtration of the x-ray tube was determined to be 0.5mmAl equivalent (according to ISO 4037-1:1996), giving a total filtration of 3.0mmAl

F_{NBG} is the attenuation ratio in the Narrow beam geometry, given by:

$$F_{NBG} = \frac{\dot{K}_0 - \dot{K}_B}{\dot{K}_1 - \dot{K}_B}$$

where \dot{K}_0 = Air Kerma Rate without the test object in the beam

\dot{K}_1 = Air Kerma Rate with the test object in the beam

\dot{K}_B = Background Air Kerma Rate with the test object replaced by a sheet of material with an attenuation ratio greater than 10^5 .

The Lead equivalent value δ_{NBG} in mm using the Narrow Beam Geometry is obtained by fits to the attenuation curves F_{NBG} of Lead foils of known thicknesses and of at least 99.995% purity.

UNCERTAINTIES

The uncertainty in the Lead equivalence value δ_{NBG} is $\pm 5\%$. 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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Checked by: 

Page 2 of 3

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Continuation Sheet

RESULTS:

Table II
SOL 4B65 Main Lens, sample #72

kV	F_{NBG}	δ_{NBG}
150	51.09	0.8195

Table III
Long Kou 4B65 Main Lens, sample #73

kV	F_{NBG}	δ_{NBG}
150	20.29	0.5446

Table IV
Side shield, sample #74

kV	F_{NBG}	δ_{NBG}
150	19.06	0.5276

Table V
Sol Progressive 4B +2.5 main lens, sample #75

kV	F_{NBG}	δ_{NBG}
150	15.24	0.4689

Table VI
Lead foil side shield, sample #76

kV	F_{NBG}	δ_{NBG}
150	18.32	0.5170

Table VII
Face shield, sample #77

kV	F_{NBG}	δ_{NBG}
120	4.51	0.1545

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Page 3 of 3

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