



# IPLUS®

## Take a step forward

IPLUS dosimeter provides X, gamma rays and beta radiation monitoring with Optically Stimulated Luminescence (OSL) technology.

IPLUS can be used for occupational, area/environmental, and emergency response monitoring, in any kind of facilities. More than 2 millions people worldwide are monitored with OSL LANDAUER dosimeters.

### IPLUS, THE STATE-OF-THE-ART

- Energy range: from 15 keV to 6 MeV
- Linear deviation < 5 % from 0.05 mSv to 10 Sv
- Angular response  $\pm 60^\circ$  from 16 keV
- Robust, compact and lightweight
- Ready to use

#### Select an accredited service!

The IPLUS is part of our scope of accreditation COFRAC.

Accreditation in accordance with the recognised international standard ISO/IEC 17025.

Cofrac is signatory of the European co-operation for Accreditation (EA) Multilateral Agreement for accreditation for the activities covered by this certificate.



ACCREDITATION  
N°1-1545  
SCOPE  
AVAILABLE ON  
WWW.COFRAC.FR



IPLUS  
dosimeter



# IPLUS<sup>®</sup>, the new reference in passive dos

## More efficient, more practical, more customisable

### > A DOSIMETER THAT MAKES EVERYDAY MOVEMENTS EASY

#### Ready to use

The IPLUS dosimeter is ready to use. It requires no assembly upon receipt and no disassembly for return. Saving time everyday!

The IPLUS dosimeter is an all-in-one dosimeter. It includes an Imaging detector and can incorporate a Neutrak<sup>®</sup> neutron detector. IPLUS therefore takes up less space and is more comfortable to wear!

#### Robust, compact and lightweight

No need for an extra case: the IPLUS is robust, compact and light weight.

It adapts easily to your clothing, thanks to its ergonomic clip and small size. You can decide which way round to wear it (only possible for exposure to X- and gamma rays). It is equipped with a multi-directional clip.

Its sealed, single-use case means you can disinfect and decontaminate it easily.

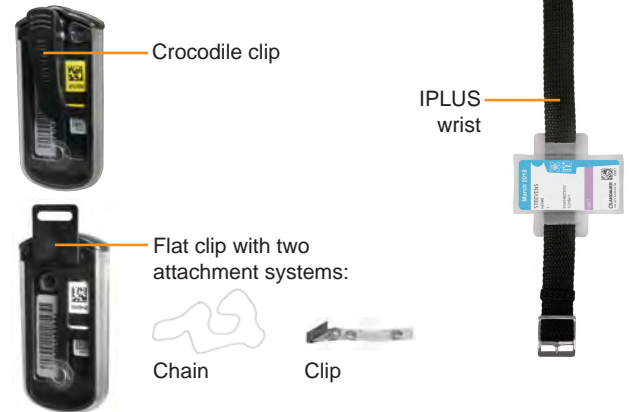
#### Fully personalised and customisable

You may not be able to see any difference, but the dosimeter casing has been entirely redesigned:

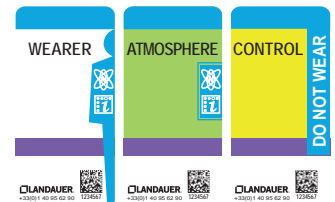
- Colour codes to differentiate months of use and your departments, and now to differentiate worker, atmospheric and control dosimeters too
- Regular or offset three-monthly periods of wear
- Pictograms to identify the dosimeters with neutron monitoring and Imaging detectors

LANDAUER proposes different types of clips depending on where you want to wear the device (chest, wrist, etc.) and your own preferences.

#### Attachment systems



#### A brand new label



Wearer, atmosphere and control dosimeters differentiated at a glance



Pictos indicating the presence of an Imaging or Neutrak<sup>®</sup> detector

#### imaging, proof in pictures

The IPLUS has an additional OSL detector, called Imaging. This detector is placed inside the IPLUS case. It enables the production of 3D graphs.

Imaging shows whether the relative position of the IPLUS has been fixed or mobile in relation to the source. It provides additional proof of whether or not the dosimeter was worn by a wearer during exposure. Imaging is analysed systematically for dosimeters whose dose equivalent  $H_p(10)$  exceeds 5 mSv.



LANDAUER, a service accredited by independent organisations for its expertise.

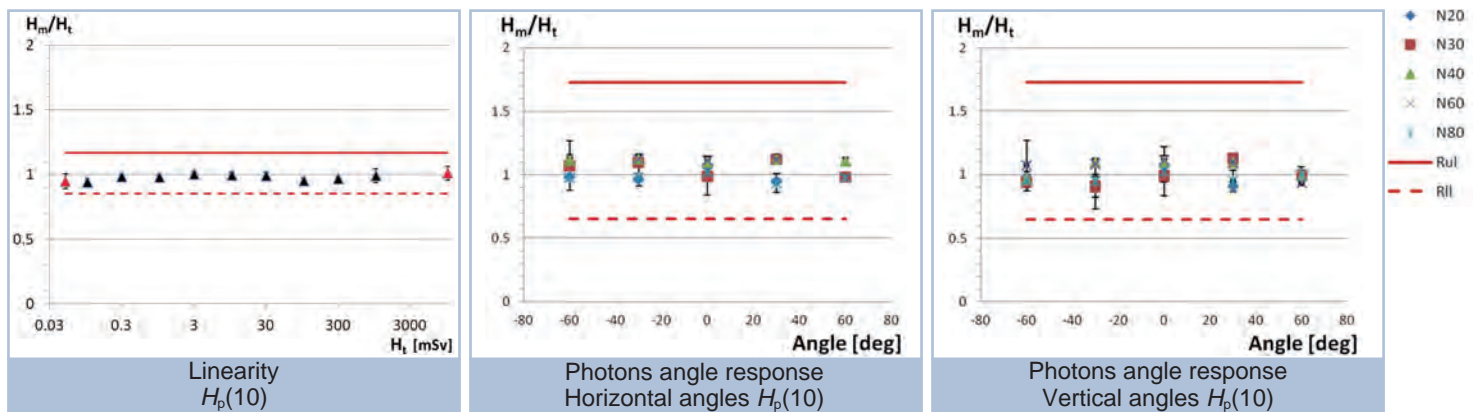
## IPLUS, SIMPLY MORE EFFICIENT

### A new detection system

Developed by our R&D team in France, the dosimeter IPLUS is based on a new dosimeter design and a new generation of dose equivalent estimation algorithm. With IPLUS, you get a more accurate estimation of the dose equivalent at low doses.

### Higher performances

IPLUS complies with all of the IEC 62387-1: 2012 standard. Its characterisation by an independent laboratory (LNHB) shows metrological performances higher than the standard requirements: linearity deviation < 5 % from 0.05 mSv to 10 Sv, energy dependency < 11 % from 16 keV to 18 MeV, angle dependency < 13 % for the photon and < 14 % for the beta. Then IPLUS has an excellent angular response to  $\pm 60^\circ$  for the photons.



Rul et Rll : acceptable limits defined in the IEC 62387-1: 2012 standard.  $H_m$  : measured value.  $H_t$  : conventional value (true value)

## TECHNICAL PERFORMANCE

Type of measured radiation	Result of the IPLUS dosimeter	
	Photons	Beta
Personal dose equivalent	$H_p(10)$ and $H_p(0.07)$	$H_p(0.07)$
Dose range	0.05 mSv to 10 Sv	
Linearity response	0.05 mSv to 10 Sv - Standard deviation < to 5 %	
Measurement reproducibility	< 5 %	
Energy response (mean energy)	$H_p(10)$ : 15 keV to 6 MeV ( $E_{max} = 18$ MeV) $H_p(0.07)$ : 15 keV à 1,33 MeV	250 keV to 1 MeV ( $E_{max} = 2.2$ MeV)
Energy dependency	Weak, < 11 % of 16 keV at 6 MeV	
Angular response (horizontal and vertical angles)	$\pm 60^\circ$ from 15 keV	$\pm 45^\circ$ from 250 keV
Angular dependency	Excellent - Average deviation < 6 %*	
Fading	< 1.5 % / month	
Neutrons detection	Insensitive to neutrons	

\* Average gap beside the true response

## ENVIRONMENTAL RESISTANCE CHARACTERISTICS

Operating and storage temperature	-10 °C to 40 °C
Humidity	0 % to 90 %
Light exposure	Tested up to 1,000 W/m <sup>2</sup>

## GENERAL CHARACTERISTICS

<b>Manufacturer</b>	LANDAUER
<b>Types of measured radiation</b>	Photons (X- and gamma rays) and beta
<b>Detector</b>	GN, new detector
<b>Materials</b>	Aluminium oxide. doped with carbone, Al <sub>2</sub> O <sub>3</sub> :C
<b>Filters</b>	Open window, aluminium, titanium, tin
<b>Dimensions without clip</b>	35 mm x 74 mm x 10 mm
<b>Weight</b>	17 g



GN detector

Detector different filters

- Open window
- Aluminium
- Titanium
- Tin



## MEASUREMENT METHOD

The read out process uses a LED (Light Emitting Diode) to stimulate the detectors. The light emitted by the OSL material is measured by a photomultiplier tube (PMT) using a high sensitivity photon counting system. The amount of light released during optical stimulation is directly proportional to the radiation dose. A dose equivalent estimation algorithm is then applied to the measurement.

## COMPLIANCE WITH STANDARDS

EN 62387-1:2012 - Passive integrating dosimetry systems for personal and environmental monitoring of photons and beta radiation - Radiation protection instrumentation.

## QUALIFICATIONS OF OUR LABORATORY

- Participation in national and international inter-comparisons
- Characterisation of dosimeters carried out by an independent referenced laboratory : The French National Laboratory Henri Becquerel (LNHB) - CEA.
- Quality management system under NF ISO 17025