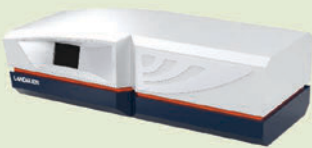


# DOSIMETRY EQUIPMENT

## All-inclusive dosimetry lab solution

LANDAUER® offers a complete dosimetry system based on Al<sub>2</sub>O<sub>3</sub>:C Optically Stimulated Luminescence (OSL). It covers all manufacturing and processing for dosimeters with a wide range of equipment such as: readers, annealers, software, badges...

### Laboratory equipment



Dosimeter readers



IMLS software



IPLUS dosimeter

### No one knows more about dosimetry equipment than LANDAUER

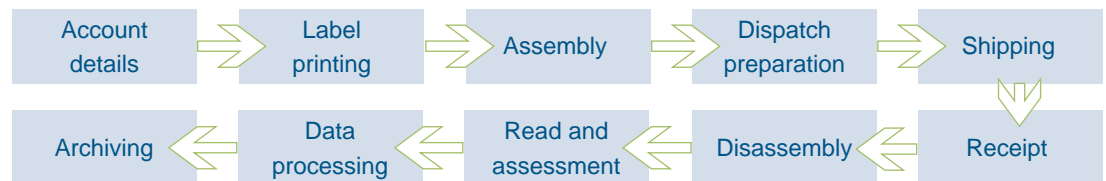
Because we use it for our own dosimetry program, we understand the equipment better than any retailer. We're in the business of radiation protection. Trust in our expertise!

OSL technology is used exclusively worldwide for radiation monitoring. The material used in our detectors is manufactured by LANDAUER according to our high standard specifications.

### Laboratory equipment "à la carte"

LANDAUER offers you a wide range of options to design a dosimetry program customised for your requirements. For example, your organisation can either choose to process its own dosimeters, or entrust all or part of the dosimetry process to LANDAUER.

Our equipment can be adapted to your specific needs. From reading a few OSL dosimeters a month to managing thousands of badges, our solution is very flexible. The equipment can be configured to match your current dosimetry program or to maintain your own approved laboratory.



### Equipment adapted to your environment and your needs

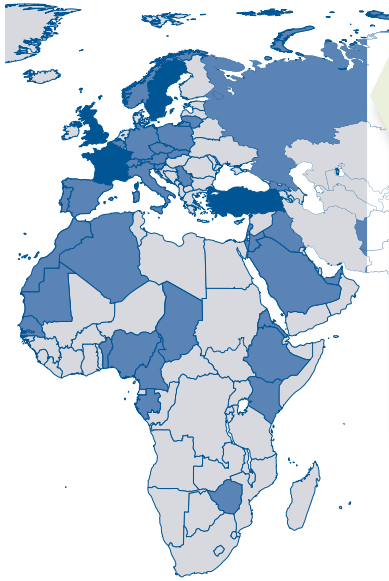
IPLUS dosimeters monitor X- and gamma rays, beta and neutron radiation (special OSLN material). LANDAUER equipment is used for a large number of applications:

- Occupational dosimetry
- Patient dosimetry
- Area monitoring
- Environmental monitoring
- On-site analysis
- Emergency response monitoring.


Our equipment can be adapted for any size organisation, be in a nuclear power station, a laboratory or a hospital.

***Our aim – To combine technologies, services and equipment to create a dosimetry program that is adapted for your environment.***





Establishment of LANDAUER laboratories in Europe, the Middle East and Africa

 Countries with LANDAUER subsidiaries

 Countries with laboratories equipped with LANDAUER technology

## OSLR READERS

LANDAUER's readers offer many advantages:

- No heating parameters to control
- No gas required
- Fast reader throughput
- Simple calibration process
- Extensive built-in automatic QC tests
- No internal radioactive source
- Ethernet connection to PC
- Remote diagnostic and maintenance
- Dose assessment algorithm embedded
- Welmeq compliant
- Operating systems: Windows 7 and 10

## More than 25 laboratories have already chosen LANDAUER

Are you looking for equipment? Or do you want to change or add to your existing equipment? Our sales and technical teams are on hand to analyse your project and suggest the most appropriate and efficient solutions.

Since customer support is key to achieving your goals, LANDAUER will guide you through every step when implementing your project, from delivery of the equipment right through to the certification of your laboratory. With our solutions, get easily and quickly ISO/CEI 17025 accreditation!

See your dosimetry management in a new light with LANDAUER combine technologies, services and equipment to create a program tailored to your needs.

## OSLR READERS

### All-in-one dosimeter reader

The OSLR reader works with the LANDAUER complete dosimetry system, a solution for onsite dosimetry using our OSL technology. To ensure manufacturing and processing of dosimetry monitoring, a wide range of equipment is available: readers, software, detectors, and so on.

### Simplified accreditation process

The system is scalable, and can be configured to complement your current dosimetry program, or can enable you to maintain your own in-house accredited dosimetry program. With our solution, you will get easily and quickly ISO/CEI 17025 accreditation.

### User-friendly operation

OSLR readers are designed for use with IPLUS dosimeters for whole body, environmental and emergency response monitoring.

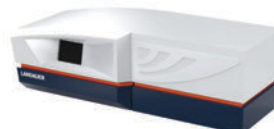
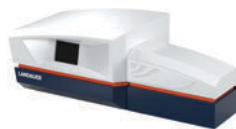
LANDAUER's reader includes an external PC with menu-driven reader software. The software automatically captures bar-coded dosimeter serial numbers, which facilitates chain of custody. The reader and the software provide control over reader setup, analysis, database maintenance, Quality Control (QC) procedures and data recording, enabling dosimeter readout, recording and the monitoring of reader performance - and providing you rapid, accurate radiation assessment that can help improve the efficiency and productivity of your program.

#### Fixed laboratory equipment

OSLR-50 Automatic Reader

OSLR-250 Automatic Reader

OSLR-700 Automatic Reader



| OSLR-50 Automatic Reader         | OSLR-250 Automatic Reader          | OSLR-700 Automatic Reader           |
|----------------------------------|------------------------------------|-------------------------------------|
| Desk-top model                   | Desk-top model                     | Desk-top model                      |
| 150 dosimeters / hour            | 300 dosimeters / hour              | 300 dosimeters / hour               |
| 1 magazine / 50 dosimeters       | Up to 5 magazines / 250 dosimeters | Up to 14 magazines / 700 dosimeters |
| 34 x 102 x 44 cm                 | 34 x 108 x 44 cm                   | 34 x 115 x 44 cm                    |
| 42 kg                            | 60 kg                              | 76 kg                               |
| 100 - 240 V - 1,5 A / 50 - 60 Hz | 100 - 240 V - 1,5 A / 50 - 60 Hz   | 100 - 240 V - 1,5 A / 50 - 60 Hz    |

## SOFTWARE AND ACCESSORIES

In addition to OSL readers and annealers, LANDAUER provides software, accessories and support for organisations that require to operate their own in-house service or for other applications:

- IMLS software (Individual Monitoring Lab Software)
- Labelling machines
- Manual and automatic pin cutters
- Barcode readers
- Training and support

## IPLUS DOSIMETER

PLUS can be used for occupational, area/environmental, and emergency response monitoring, in any kind of facilities. More than 1.8 million people in the world are monitored with OSL LANDAUER dosimeters.

### Full reanalysis of the dosimeter

The optical stimulation keeps more than 99 % of the information in the detector making possible multiple readings and the archiving of the dosimeter for later investigation.

### No calibration required

The sensitivity of IPLUS is determined during their manufacturing process by an ISO/CEI 17025 accredited laboratory. The sensitivity value engraved on the detector support is automatically considered during the reading process.

### Stable sensitivity over time

Another advantage of the OSL dosimeters is that their sensitivity is defined forever.

The stability of the material under any environment condition makes unchanged this sensitivity during all dosimeter's life.

### No fading

IPLUS dosimeters make extended wear period possible without corrections for fade.

### Robust, compact and lightweight dosimeter

### Fully personalised and customisable



## General characteristics

|                                    |  |
|------------------------------------|--|
| <b>Manufacturer</b>                | LANDAUER   |
| <b>Types of measured radiation</b> | Photons (X- and gamma rays) and beta             |
| <b>Detector</b>                    | New detector, GA or GN type                      |
| <b>Materials</b>                   | Aluminium oxide. doped with carbone, $Al_2O_3:C$ |
| <b>Filters</b>                     | Open window, aluminium, titanium, tin            |
| <b>Dimensions without clip</b>     | 35 mm × 74 mm × 10 mm                            |
| <b>Weight</b>                      | 17 g   |
| <b>Dosimeter identification</b>    | 1D / 2D barcode                                  |
| <b>Operational dose quantities</b> | $H_p(10)$ , $H_p(0.07)$ , $H'(10)$               |



Detector different filters

- Open window
- Aluminium
- Titanium
- Tin



## Compliance with standards

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

Characterisation of dosimeters carried out by an independent referenced laboratory : The French National Laboratory Henri Becquerel (LNHB) - CEA.

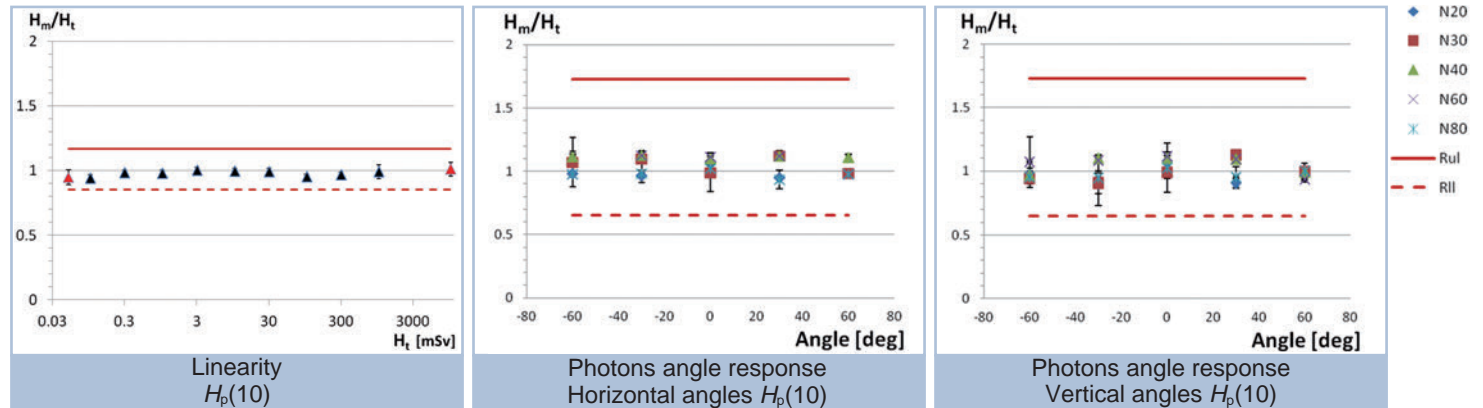
## Technical characteristics

### A new detection system

The dosimeter IPLUS is based on a new detector and a new generation of dose equivalent estimation algorithm. With IPLUS, you get a more accurate estimation of the dose equivalent at very 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: linear 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)

## Specifications

| 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)                     | 6 keV to 6 MeV ( $E_{max} = 18$ 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 16 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 % à 90 %<br>Our laboratory reads regular dosimeters after a shift in the washing machine |
| Light exposure                    | Tested up to 1,000 W/m <sup>2</sup> - Compliant with the standard requirements.            |