

# NEUTRAK®

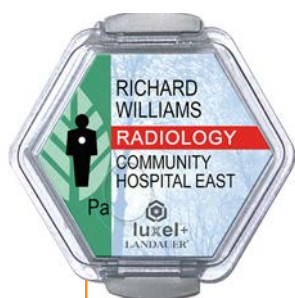
## Concentrated performance

Neutrak is a passive dosimeter for the measurement of neutron spectra, from thermal to intermediate and fast neutrons.

The Neutrak dosimeter uses a solid state track detector comprising a hard plastic plate made from PADC (poly-allyl diglycol carbonate), known as CR-39.

### CONCENTRATED PERFORMANCE

- The most compact dosimeter on the market
- Measurement of all neutron spectra
- Highly sensitive detector
- Performance complies with ISO standard 21909:2005
- High quality CR-39



Luxel+ frontview



Luxel+ backview

### LUXEL+, the reference in passive dosimetry

The Neutrak detector can be packaged specifically for neutron detection only, or as a component of another dosimeter such as Luxel+.

Luxel+® dosimeter provides X- and gamma rays, and beta radiation monitoring with Optically Stimulated Luminescence (OSL) technology.

More than 1.8 million people in the world are monitored with OSL LANDAUER dosimeters.



# NEUTRAK®, guaranteed high quality neutron monitoring

## More than 500,000 readings per year

### CONCENTRATED PERFORMANCE

#### Compact

No need for an extra case: the Neutrak dosimeter is incorporated into your whole body. Our dosimeters therefore take up less room and are more comfortable to wear!

#### Ready to use

Another advantage is that the Neutrak dosimeter requires no assembly before distribution and no disassembly for return. Saving time every day!

#### Easy to decontaminate

The Neutrak case contains no openings to ensure easy decontamination. While the Neutrak radiator can be re-used, the external elements are systematically discarded after use to ensure maximum hygiene.



As inserted in a Luxel+ dosimeter



As inserted in a vinyl pouch

### ADOPT THE MARKET REFERENCE

#### Performance superior to the requirements of the ISO neutron standard 21909:2005

The Neutrak dosimeter conforms to the requirements of ISO standard 21909:2005. Its characterisation by an independent laboratory even demonstrates metrological performance better than the requirements of the standard, with excellent response linearity (standard deviation < 8 %) and an angular response of  $\pm 60^\circ$  (report available upon request).

#### Highly sensitive CR-39

LANDAUER has chosen a material produced to its own specifications with sensitivity up to 3,500 tracks/cm<sup>2</sup>/mSv for intermediate and fast neutrons, 18,000 tracks/cm<sup>2</sup>/mSv for thermal neutrons.

Proof of their manufacturing quality and sensitivity, other certified dosimetry laboratories in Europe and abroad have chosen to use our products to monitor their employees. LANDAUER produces more than a million CR-39 detectors per year throughout the world.

#### Two dosimeters for all your requirements



##### NEUTRAK-J

Measurement of intermediate and fast neutrons

Workstations excluding moderately strong neutron beams



##### NEUTRAK-T

Measurement of thermal, intermediate and fast neutrons

All workstations

LANDAUER, the leading European laboratory for neutron monitoring.

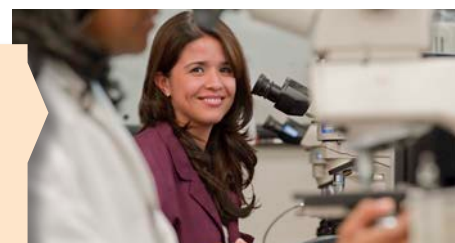
# Neutron monitoring

## HOW DO YOU ASSESS THE PERFORMANCE OF NEUTRON MEASUREMENT?

The performance of a dosimetric measurement system depends on the detector design, the efficiency of the reading systems and the quality of detector manufacture and the operating processes.

For low dose measurement, CR-39 performance is mainly related to the quality of the measured signal and the level of noise inherent to the detector. LANDAUER uses a very highly sensitive material with no other products that may affect measurement. This choice, validated by strict quality inspections throughout the measurement chain, provides you with compact, efficient detectors, conform to the criteria of ISO standard ISO21909:2005 from 0.05 mSv.

LANDAUER has opted to read all detector measurement ranges systematically. This approach ensures a constant level of performance even at low doses. LANDAUER has therefore been accredited for CR-39s for more than 20 years.



## TECHNICAL PERFORMANCE

Types of radiation measured	Result of the Neutrak dosimeter	
	Thermal neutrons	Intermediate and fast neutrons
Personal dose equivalent	$H_p(10)$ whole body	
Dose range	0.20 mSv to 250 mSv	0.20 mSv to 250 mSv
Energy response (average energy)	$H_p(10)$ : thermal range	$H_p(10)$ : 40 keV to 40 MeV
Response to other types of radiation	Insensitive to photons	

## ENVIRONMENTAL RESISTANCE CHARACTERISTICS

Operating and storage temperature	No effect on detector sensitivity up to 40 °C
Hygrometry	No effect on detector sensitivity up to 90 % humidity
Exposure to light	No effect on detector sensitivity

## GENERAL CHARACTERISTICS

<b>Manufacturer</b>	Dosimeter manufactured according to LANDAUER's own specifications.
<b>Types of radiation measured</b>	Neutrak-J: intermediate and fast neutrons Neutrak-T: thermal, intermediate and fast neutrons
<b>Detector</b>	CR-39, solid state nuclear track detector (SSNTD)
<b>Material</b>	PADC (poly-allyl diglycol carbonate)
<b>CR-39 sensitivity</b>	Intermediate and fast, 3,500 tracks/cm <sup>2</sup> for a dose equivalent of 1 mSv Thermal, 18,000 tracks/cm <sup>2</sup> for a dose equivalent of 1 mSv
<b>Maximum surface read systematically</b>	For intermediate and fast neutrons, 15 fields x 2 mm <sup>2</sup> For thermal neutrons, 3 fields x 2 mm <sup>2</sup> (not to be confused with the total surface area of the detector)
<b>Radiator</b>	Neutrak-J: 100% polyethylene Neutrak-T: one part made from polyethylene, one part made from Teflon® loaded with boron 10
<b>Mechanical properties</b>	Weight: 0.44 g Total surface area of the detector: 9 x 19 mm <sup>2</sup>



## MEASUREMENT METHOD

Measurement of intermediate and fast neutrons - Use of a polyethylene radiator

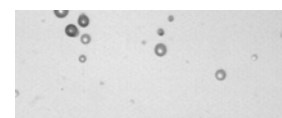
The neutrons interact with the hydrogen nuclei contained in this radiator causing the emission of recoil protons which leave tracks in the CR-39.

Measurement of thermal neutrons - Use of the left part of a polyethylene radiator, right part of a boron-loaded Teflon® radiator

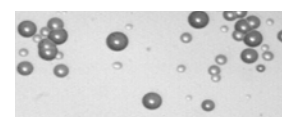
The thermal neutrons interact with the boron causing the emission of alpha particles which leave tracks in the CR-39.

The CR-39 is analysed after immersion in a sodium hydroxide (NaOH) bath. This process reveals the tracks produced in the material.

Reading method: the tracks left on a specified surface of the detector are counted.



Fast and intermediate  
neutron tracks



Thermal neutron  
tracks

## COMPLIANCE WITH STANDARDS

- ISO 21909:2005 - Passive personal dosimeters for neutrons - Performance and test requirements
- Requirements for the Approval of Dosimetry Services (RADS) Parts 1, 2, and 3
- Radiation Emergency Preparedness and Public Information Regulations (REPIR)
- NVLAP
- S106

## QUALIFICATIONS OF OUR LABORATORY

- Participation in national and international inter-comparisons.
- In the UK: HSE Approved Dosimetry Services (ADS) for whole body, extremity and skin dose assessment and record keeping under the Ionising Radiations Regulations 1999 (IRR99).
- In Ireland: Office of Radiological Protection (formerly RPII) Approved Dosimetry Services (ADS) in pursuance of S.I. 125/2000.