

IRSN

INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE



THE NEUTRON RPL DOSIMETER

A SINGLE REFERENCE
FOR THE DETECTION
OF THERMAL,
INTERMEDIATE, AND
FAST NEUTRONS.

The Neutron RPL is the solution for measuring the dose received by employees in mixed photon/neutron radiation fields. In addition to the RPL dosimeter (see RPL Dosimeter product sheet), this dosimeter is equipped with a neutron detector suitable for all neutron spectra: **thermal, intermediate and fast**, encountered in industry, research and the medical sector.

PRINCIPLE OF DETECTION

> Polypropylene converter to increase sensitivity to fast neutrons. (reactions (n,p))

> CR-39 neutron detector



> Alanine chips present in the criticality version allow the measurement of high doses

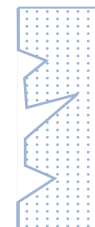
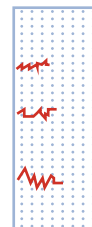
> Two ${}^6\text{Li}$ converters for the detection of thermal neutrons

Irradiation of the dosimeter

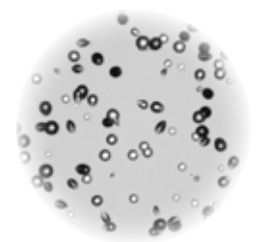
Neutrons

CROSS SECTION OF A CR-39 PLATE

AFTER NaOH ATTACK



Principle for revealing latent tracks



Quantification of tracks under the microscope

BENEFITS OF THE IRSN'S NEUTRON RPL DOSIMETER

- ➔ A **robust** dosimeter with a **modular design** with three types of attachments: **clip, lanyard, crocodile clip**.
- ➔ A photon/beta component and a neutron component in a **single compact and robust case**.
- ➔ A detector with a **larger surface area** than most systems currently on the market for **increased sensitivity**.
- ➔ **No need for energy correction**, whatever the facility, workstation or working environment (dosimeter independent of the neutron field spectrum).
- ➔ A Neutron RPL Criticality version **integrating high-dose neutron and photon** detection elements.



➤ This dosimeter is also available in a **criticality version** for the measurement of high doses in accident situations. This version can be identified by its red edge.

PERFORMANCE OF THE NEUTRON RPL DOSIMETER

	Detected energy range ^(A)	Dose equivalent range
Neutron particles	Thermal neutrons	From 0.10 mSv to 250 mSv
	Fast and intermediate neutrons from 75 keV to 14.8 MeV	

(A) - **NOTE:** These values do not represent the operational limits, but correspond to the minimum and maximum energies available in the reference facilities that allowed the tests to be conducted.

Dosimetry laboratory calibration methods

To ensure the best calibration of the neutron dosimeters, the IRSN has unique reference facilities in France:

IRSN Cadarache:

- ➔ AMANDE facility, monoenergetic neutrons.
- ➔ CEZANE facility, californium and moderated californium.

For thermal neutrons, the reference facilities used are located at the National Physical Laboratory in the UK.

LD/AMKT/PUB-01 Ind 3 - Photo credit: IRSN



LABORATOIRE DE DOSIMÉTRIE DE L'IRSN | 31, rue de l'écluse 78294 Croissy Sur Seine Cedex
dosimetre@irsn.fr | Tel.: +33 (0)2 30 15 52 22 - Fax: +33 (0)1 30 15 52 24 | dosimetrie.irsn.fr

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