

NEUTRON RPL DOSIMETER



A SINGLE DEVICE
FOR DETECTING THERMAL,
INTERMEDIATE AND FAST NEUTRONS

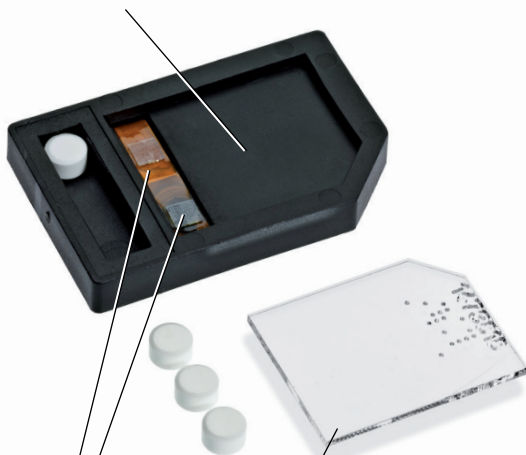
The Neutron RPL is the solution for precisely measuring the dose received by workers in mixed photon/neutron radiation fields.

It is suitable for all neutron spectra: thermal, intermediate and fast, encountered in industry, research or the medical sector.

DETECTION PRINCIPLE

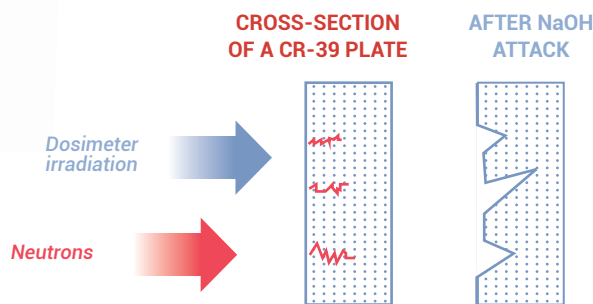
- ⊙ The neutron dosimeter is composed of a **polycarbonate detector (CR-39)** placed in a polypropylene shell used as a converter to detect fast neutrons. **Two additional lithium-6 fluoride converters** (one bare and one covered with cadmium) are used to check that the dosimeter has been properly irradiated and to determine the «thermal neutron» dose equivalent.
- ⊙ The interaction of neutrons with the CR-39 produces irreversible damage trails called latent tracks. These tracks are revealed by the corrosive properties of an alkaline sodium hydroxide (NaOH) solution.
- ⊙ They are then quantified using an optical microscope and the dose equivalent is calculated using an algorithm which takes into account the number of tracks and their diameter.

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

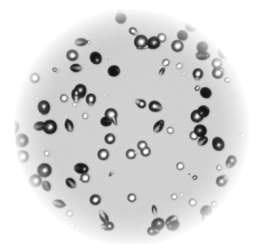


> Détecteur neutron en CR39

> CR-39 neutron detector



Principle for revealing latent tracks



Track quantification using a microscope

BENEFITS OF IRSN'S NEUTRON RPL DOSIMETER

- ⊕ A **robust** dosimeter with a **modular design** with three types of attachments: clip, lanyard, crocodile clip.
- ⊕ Measurement of thermal, intermediate and fast neutrons in the standard version **at no additional cost.**
- ⊕ A detector with a **larger surface area** than most systems on the market for **increased sensitivity.**
- ⊕ **No need for energy correction**, whatever the installation, workstation or working environment (dosimeter independent from the neutron field spectra).
- ⊕ A Neutron RPL Criticality version **integrating detection elements for strong doses of neutrons and photons.**



NEUTRON RPL DOSIMETER PERFORMANCE

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

(A) - **IMPORTANT:** These values are in no way operating limits, but correspond to the minimum and maximum energies available in the reference facilities which enabled the tests to be conducted.

Dosimetry laboratory calibration methods

IRSN has reference facilities that are unique in France for calibrating neutron dosimeters

IRSN Cadarache :

- ⊕ AMANDE facilities, monoenergetic neutrons,
- ⊕ CEZANE facilities, californium and moderated californium.

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