DOSIMETRY SERVICES

A MIRION MEDICAL COMPANY

DOSIMETER COMPARISON CHART

	Instadose®VUE Dosimeter	Instadose®+ Dosimeter	TLD Dosimeter	OSL Dosimeter	EPD or APD Dosimeter
Cost	$	$	$	$	$$$$
Measurements	**Photon Beta Neutron** DEEP - Hp(10) SHALLOW - Hp(0.07)	**Photon** DEEP - Hp(10) SHALLOW - Hp(0.07)	**Photon Beta Neutron** DEEP - Hp(10) SHALLOW - Hp(0.07) EYE - Hp(3)	**Photon Beta Neutron** DEEP - Hp(10) SHALLOW - Hp(0.07) EYE - Hp(3)	**Photon Neutron** DEEP - Hp(10) SHALLOW - Hp(0.07)
Read Out	**Accumulated (On-Demand)**	**Accumulated (On-Demand)**	**Accumulated (Lab Processing)**	**Accumulated (Lab Processing)**	**Accumulated & Dose Rate**
Electronic Display Screen for Operational Feedback	✓	✗	✗	✗	✗
Compliance Indicator to Validate Wear/Use	✓	✗	✗	✗	✗
Label Type	**Electronic Display**	**Printed Label**	**Printed Label**	**Printed Label**	**Printed Label**
Unlimited On-Demand Dose Reads	✓	✓	✗	✗	✓
Re-Calibration Required	✗	✗	✓	✓	✓
Wearer Engagement	**High**	**Medium**	**Low**	**Low**	**High**
Online Management Portal	✓	✓	✓	✓	✓ *Provider Dependent*
NVLAP Accreditation	✓	✓	✓	✓	**Highly manual process**
Immediate Online Badge Reassignment	✓	✓	✗	✗	✓ *Provider Dependent*
Fulfills Legal Dose of Record Regulations	✓	✓	✓	✓	**Highly manual process for meeting accreditation**
Eliminates Collecting/ Redistribution	✓	✓	✗	✗	**Must be collected to meet legal dose of record requirements**
Read/View Dose Data on Your Smart Device	✓	✓	✗	✗	✗
Calendar-Set Dose Reads	✓	✓	✗	✗	✗
Wireless Transmission of Dose Data	✓	✓	✗	✗	**Radio Communication**
Immediate High Dose Alerts	✓ *Upon Successful Communication*	✓ *Upon Successful Communication*	✗	✗	✓
Descriptions	**Instadose Dosimeters** use DIS (Direct Ion Storage) technology to measure ionizing radiation by creating an electric charge through interactions in a gas-filled ion chamber.		**TLD** (Thermo luminescent Dosimeter) gauges radiation exposure by assessing visible light emitted when heating a crystal inside the detector, with light intensity correlating to radiation exposure.	**OSL** (Optically Stimulated Luminescence Dosimeter) measures radiation exposure by counting trapped electrons in a material due to energy deposition. Light exposure then calculates the dose.	**EPDs** (Electronic Personal Dosimeters) or **APDs** (Active Personal Dosimeters) use diodes to detect charges induced by ionizing radiation, measuring it as electric current for dose rate determination.

IONIZING RADIATION & PERSONAL DOSIMETRY MONITORING

What Does It All Mean & Why Should I Care?

WHAT IS IONIZING RADIATION?

Ionizing radiation is used in a wide variety of fields such as medicine (to diagnose and treat diseases), nuclear power (to produce energy), research (to understand and harness its power), manufacturing (of consumer products), construction (of buildings and bridges), oil and gas (to generate energy/power), and many other areas.

While the benefits of using and harnessing the power of ionizing radiation may be numerous, so are the risks. Exposure to ionizing radiation causes damage to living tissue, and can result in radiation burns, cell damage, sickness, cancer, and in severe or long-term exposure cases even death.[1-6] Because ionizing radiation is not detectable by human senses (see, smell, hear, taste, touch), radiation detection devices must be used to indicate its presence and measure its power/potential hazard.

Occupational exposure to ionizing radiation can be safe when proper measures against undesired exposure are followed. Safeguarding occupationally exposed staff from the health hazards associated with unintended radiation exposure begins with knowing when and how much exposure they receive, on a cumulative basis.

WHAT IS A DOSIMETER? WHY DO SOME PEOPLE NEED TO WEAR THEM?

Personal radiation monitoring devices (or badges) are dosimeters that detect and measure an individual's cumulative dose of exposure to various forms of radiation (x-ray, gamma, neutron and beta).

Due to the potential health consequences associated with too much exposure to ionizing radiation,[1-6] industry regulations and guidelines[7-13] often require that:

- Employers provide employees exposed to radiation as part of their occupation with an appropriate and approved dosimeter when using radioactive substances and radiation equipment.
- Employers record and monitor all occupationally exposed persons in their employ who are involved in the use of ionizing radiation to ensure that the employee's work practices result in exposures well below their effective dose limits.
- Employees issued a dosimeter by their employer are required to wear the dosimeter while at work.
- The accredited dosimetry service provider must validate the dose results then report them to the employer.

WHAT'S THE DIFFERENCE BETWEEN A PASSIVE, ON-DEMAND & AN ACTIVE DOSIMETER?

A passive dosimeter (like a TLD or OSL) detects/measures radiation dose information for a specified wear period (typically 1-6 months) and must be returned to the dosimetry service provider for processing (to read, record, and archive the dose data in the individual wearer's record). In addition to processing the dosimeter, the dosimetry service provider also quality checks and validates the dose data before issuing the dose report. And, because its ability to capture dose is independent of a power source (like a battery), a passive dosimeter offers high reliability and immunity against operator errors like forgetting to turn it on. However, passive dosimeters can only report out the accumulated dose for that wear period, which makes it difficult to pinpoint (or alert the wearer or employer) exactly when a high or abnormal dose was received.

An on-demand dosimeter (like the Instadose dosimeter) detects and measures radiation dose information in the same way that a passive dosimeter does, but employs innovative SmartMonitoring™ and Bluetooth technology that enable onsite readings with the push of a button, remote/online processing (including quality checks and dose validations) and electronic transmission (also recording and archiving) of dose data. This eliminates the need to return dosimeters to the provider for processing and reporting, as well as the time-consuming task of collecting and redistributing dosimeters every wear period. Wearers keep their dosimeters and have the ability to manually read their dosimeter (with the push of a button) any time they want, as much as they want—resulting in a richer dose data stream offering more dose data points and insights. Additionally, on-demand Instadose® Wireless dosimeters offer automatic dose reads according to a set calendar schedule, which ensures dose reads are captured and transmitted on a regular schedule without wearers having to perform manual dose reads.

An electronic personal dosimeter (EPD) or active personal dosimeter (APD) is a direct reading dosimeter that has a digital display for viewing realtime dose results. Typically offered as stand-alone systems (devices, displays, software), some EPDs or APDs may lack the quality and dose validation checks and balances (performed in-house or online by the dosimetry service provider) that are part of the passive and on-demand dosimetry models. Unlike passive and on-demand dosimeters, some EPDs and APDs may require a principal power supply to detect and store dose. Loss of the principal power supply (wired or battery), in some cases, renders them unable to function/operate and data may be lost. Currently, there are no EPDs and APDs accredited for legal dose of record radiation monitoring "off-the-shelf" by the manufacturer and the end user facility must obtain accreditation.

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