MIRION TECHNOLOGIES Dosimetry Services

# Personal dosimetry

## Information sheet

Mirion Dosimetry Services in Arnhem provides dosemeters to its customers on the basis of the approval granted by the Autoriteit Nucleaire Veiligheid en Stralingsbescherming. The dosemeters are intended for use as a personal dose control device as described in het Besluit basisveiligheidsnormen stralingsbescherming. Different types of dosemeters are available. This information sheet covers the whole body photon and beta/photon dosemeter.

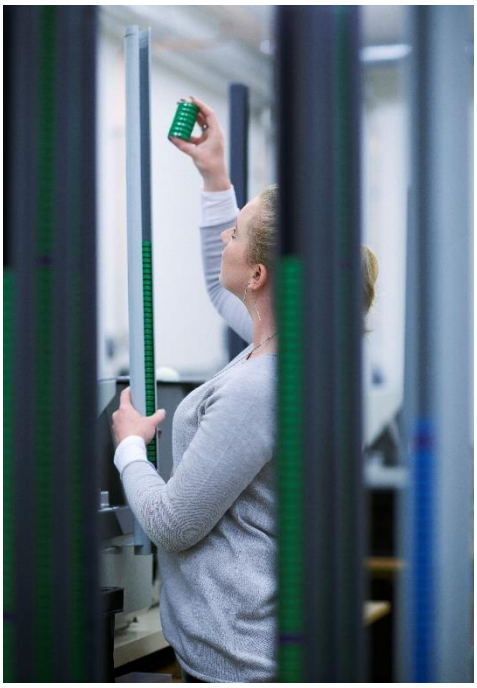
**Dose quantities**
In accordance with the recommendations of the International Commission on Radiation Units and Measurements (ICRU), the European Recommendation RP160 and the Radiation Protection Basic Safety Standards Decree, the dosemeters provided by Mirion Dosimetry Services are designed to measure the dose quantity personal dose equivalent. This dose equivalent is determined at a depth of 10 mm in soft tissue, the so-called deep dose $H_p(10)$, and at a depth of 0.07 mm, the so-called shallow dose $H_p(0.07)$.

**Thermoluminescence dosemeter**
In the green photon dosemeter, two lithium fluoride detectors doped with magnesium and titanium are used; one measures the shallow dose, the other the deep dose. The grey beta/photon dosemeter (Figure 1) is suitable for measuring both photon and beta radiation. This dosemeter contains a third thin LiF:Mg,Ti detector placed behind a very thin lightproof film for the determination of beta radiation exposure. The detailed drawing in Figure 2 gives an overview of the components that make up the dosemeters.

*Figure 1: The grey beta/photon dosemeter seen from the inside: above the beta detector and to the left and right the photon detectors, as they are also present in the (green) photon dosemeter.*

Ionizing radiation brings electrons to a higher energy level in the crystal lattice of the detector and captures them there. The number of electrons stored in the higher energy level is proportional to the radiation dose absorbed by the detector. When the detector heats up to about 200°C, these electrons fall back to their original level. The stored energy is released as light (thermoluminescence). The amount of light emitted by the detector during heating is measured and is directly proportional to the absorbed dose of ionizing radiation. After this heating in the reader, the detector has returned to its original state and can be used again.
Important features of the dosemeter are:

- Meets the technical recommendations described in the EU publication RP160
- Each detector is individually calibrated
- Automated processing guarantees a high degree of reliability
- Good mechanical properties and drip water tight
- Different fixing methods



**Dose registration and privacy protection**
In accordance with legal regulations, the measured deep dose is recorded in the NDRIS, the Nationaal Dosisregistratie- en Informatiesysteem. In addition, the personal data, including the dose results, are exclusively disclosed to the client and, if requested, to the Inspectie-SZW. For more information please refer to the general terms and conditions available at the website www.dosimetrie.nl.

**Periodic dose reporting**
The measurement results are reported periodically. The dose is reported in units of millisievert (mSv). If the set warning level per reading is exceeded, the result is reported immediately by e-mail. By default, this level is set to 1 mSv. However, the settings of this level can be customized using our customer web application. If the annual dose limit is exceeded, a prominent warning is printed on the dose report. An overview of the individual dose data for the past year will be sent around the beginning of April.

**Managing dosemeter subscriptions**
Using the customer web application at www.dosimetrie.nl simplifies the management of dosemeter subscriptions. Access to the customer web application can be requested at dosimetrie-nl@mirion.com.

**Periodicity**
Mirion Dosimetry Services offers subscriptions with 26, 13 and 4 dosemeter changes per year. At the highest periodicity (bi-weekly subscription), the measurement result is the fastest

available; therefore, the two-weekly subscription is most suitable when exposure or its variation is relatively high. For persons classified as exposed workers, both two-weekly and four-weekly subscriptions meet the legal requirements in terms of periodicity. Quarterly subscriptions are only suitable if a risk analysis has shown that classification as an exposed employee is not mandatory.

**Dosemeter identification**
The dosemeter is equipped with a thin plastic cap with label. The color of the border and the Mirion logo on this label varies from period to period. The label contains the following information:

- The name of the wearer (maximum 20 positions)
- Group number and subscription number
- The periodicity (2W, 4W, KW), year number and period number
- The dosemeter number

The dosemeters do not belong to one particular person, but rotate randomly. For each issue period a link is made between the wearer and a dosemeter. This relation between person, dosemeter and issue period is recorded in the dosimetry service database.

**Mounting**
The dosemeter is pressed into the black mounting plate. This is standard equipped with a clip; other options can be found on our website. Upon receipt of a new dosemeter, the old one can be easily detached from the mounting plate with a coin (no sharp tools like to use). The mounting plate remains with the user until the subscription is terminated.

**Mounting location**
A representative wearing position on the body must be chosen. In general, a collar, breast pocket or belt around the hip is a suitable place. If a lead apron is worn, it is recommended to attach the dosemeter outside the lead apron, preferably to the collar. Because the dosemeter is not completely symmetrical, the black mounting plate should be facing the body.

**Return**
After receiving the new dosemeters, the used ones without mounting plate have to be returned to Mirion Dosimetry Services immediately. For the return, the same packaging can be used as in which the new dosemeters were received.
Please do not close the envelope using a stapler. By using the enclosed address label with the reply number of Mirion Dosimetry Services, the package can be sent unstamped within the Netherlands. Upon termination of the subscription is also the mounting plate returned.

**Loss and damage**
The dosemeters are made available on loan and remain the property of Mirion Dosimetry Services. The dosemeters are relatively expensive, especially because of the detector material. In the interest of the reliability of the dosemeter measurements and the processing of the dosemeter in the equipment, it is important that the dosemeters remain clean and undamaged. In the event of damage, contamination such as contamination by tape and felt-tip pen or loss, the replacement costs stated in the price list will be charged.

**Other dosimetry systems**
The personal dosimetry system described here is intended for monitoring the radiation doses of individuals by photon and/or beta radiation. Mirion Dosimetry Services also offers a number of other dosimetry systems, including those for use in neutron fields, ring dosemeters for measuring the dose on the hands and a headband dosemeter for determining the eye lens dose. Separate information sheets are available at www.dosimetrie.nl. Here you will also find answers to frequently asked questions and information on the uncertainty in the dose result.

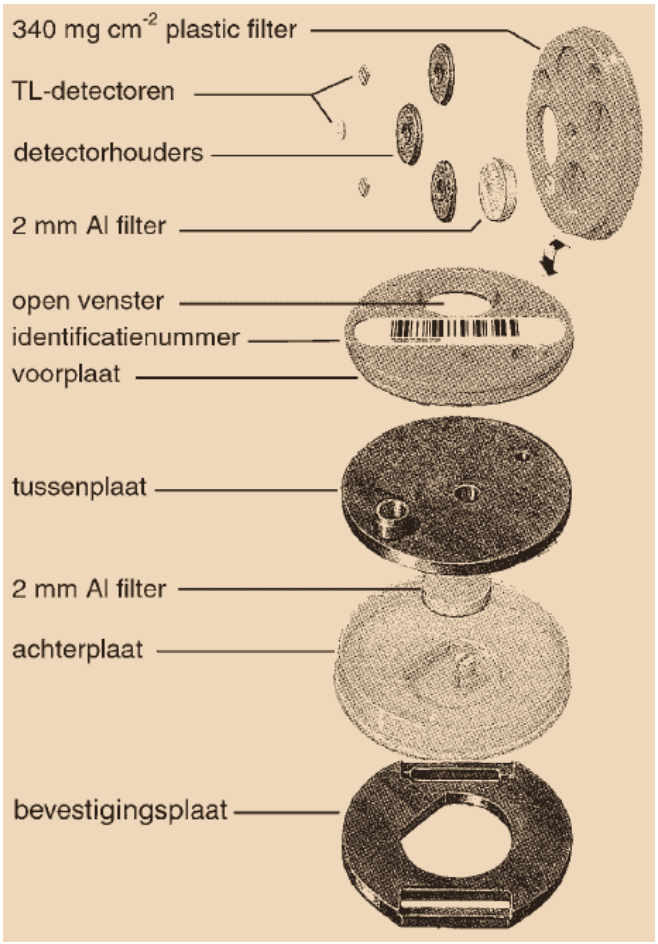


*Figure 2: The parts that make up the dosemeter.*

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