



The UK Health Security Agency's (UKHSA) Personal Dosimetry Service provides standard dosimetry for photon (X- and gamma) and beta radiations by means of thermoluminescent dosimeters (TLDs).

The dosimeters measure doses to the whole body and to the skin in terms of the radiation quantities Hp(10) and Hp(0.07) as required by the Health & Safety Executive (HSE). They are also capable of assessing the dose to the lens of the eye from photons, in terms of the quantity Hp(3).

## Specification overview

The UKHSA TLD dosimetry service is approved by the HSE under Regulation 36 of the Ionising Radiations Regulations 2017.

The body TLD comprises a TLD card, wrapper and holder, as shown below.

The TLD card is of Harshaw™ design and contains two pellets of specially doped lithium fluoride (LiF:Mg,Cu,P).

The thicker element is used for the assessment of the dose from strongly penetrating radiation and the thinner one for the assessment of the dose from both weakly- and strongly-penetrating radiation. These are covered front and back with a thin retaining layer of PTFE. The cards are individually bar coded.

The wrapper protects the dosimeter from contamination by chemicals, dirt or radioactive materials and is made of aluminised polyester. It carries printed wearer and identifier information, in text and bar-code formats.

The holder is a UKHSA design and comprises a polypropylene case with:

- a thick filter of PTFE and polypropylene – this covers the thick TLD element, for the assessment of Hp(10)
- a circular open window – this is positioned over the thin TLD element, which is therefore only covered by the retaining layer of PTFE and the thin wrapper, for the assessment of Hp(0.07)
- a rectangular open window for viewing the wearer information text

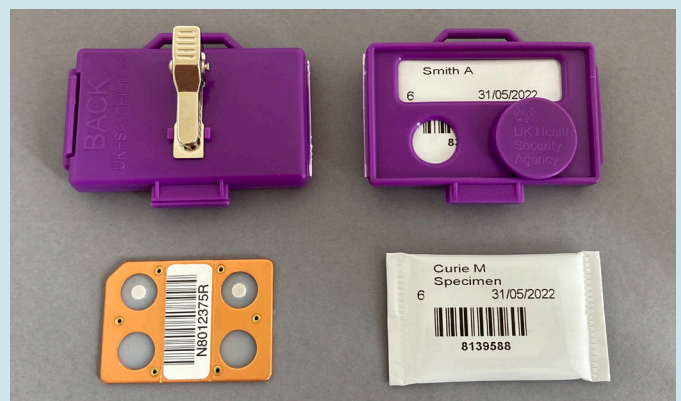
The printed wearer information includes the wearer's name (or a serial number), the customer identifier, the change date and an optional personal identifier - for example, department name or a work number.

TLDs operate by storing the energy they receive from ionising radiation until they are heated, to approximately 250°C, when the energy is released in the form of light. The light is collected and measured, the amount of light being proportional to the radiation dose. The results are provided to the customer through our fully automated system.

Dosemeters are re-usable; on completion of the read process, the stored signal is 'cleared' and the TLD can be issued again.



Assembled TLD



Components of the TLD

The body thermoluminescent dosimeter service is just one of the approved dosimetry services offered by the UK Health Security Agency and can be linked to our dose record keeping service via an automated system. The processing laboratory is based at our centre in Oxfordshire.

For further information or to place an order please contact:

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[www.ukhsa-protectionservices.org.uk/pds](http://www.ukhsa-protectionservices.org.uk/pds)

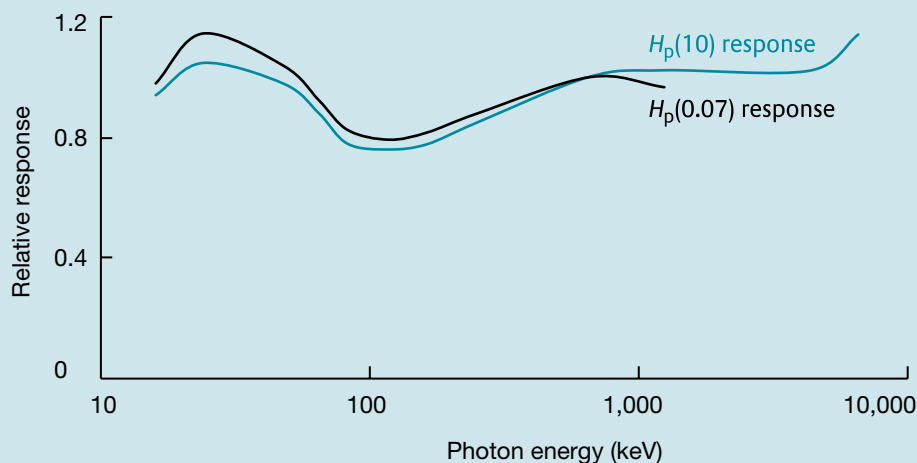
## Technical specification

<b>Material</b>	$^7\text{LiF}$ (Mg,Cu,P)
<b>Dose range</b>	0.02 mSv to 10 Sv
<b>Change interval</b>	Standard periods of 1, 2 or 3 months Periods of 2, 4, 8 or 13 weeks also available

## Energy response

Dose quantity	Energy ranges (keV)			
	Photons		Betas ( $E_{\text{max}}$ )	
	from	to	from	to
$H_p(10)$	16	6610	—	—
$H_p(0.07)$	16	1250	690	2280
$H_p(3)$	16	1250	—	—

The response per unit dose varies smoothly with radiation energy.



Variation of TLD response with photon energy

## Measurement uncertainties

Our TLDs are subject to measurement uncertainties which comply with the recommendations given in European Commission report Radiation Protection 160: Technical Recommendations for Monitoring Individuals Occupationally Exposed to External Radiation.

In HSE performance tests, our TLD overall relative standard deviation and overall bias are typically 5%, well within the permitted values of 10% and 20% respectively.

## Special features

### Detection limit

The detection limit for the dosimeter, under laboratory conditions, is less than 10 microsieverts ( $\mu\text{Sv}$ ), better than other passive dosimeters. However, owing to uncertainties arising from natural background, the minimum reporting level for monthly issue is 20  $\mu\text{Sv}$ .

### Tissue equivalence

The detectors absorb radiation energy in the same way and to the same extent as human tissue, as does the holder material. This allows us to evaluate doses from complex mixtures of radiations in a simple manner, minimising uncertainties.

### Life span

Our TLDs will retain the stored dose information for extended periods before assessment, with no measurable changes in response over at least six months. The dosimeter can withstand exposure to high temperature (40°C) and relative humidity (over 90%) for continuous periods of over 48 hours, enabling issue periods of up to 13 weeks, reducing the cost of monitoring.

### Re-assessment of TLD

Thermoluminescence glow curves of all dosimeter readings are kept for at least five years, allowing retrospective investigation if required. The glow curves for dosimeters with assessments  $>15 \mu\text{Sv}$  are all checked. For higher doses, it is possible to verify the original assessment from the remaining signal after read-out.