Thermoluminescent dosimeter for neutrons

Thermoluminescence dosimetry (TLD) is a modern and highly accurate method for equivalent dose rating. The thermoluminescent dosimeter for mixed neutron-gamma fields is an albedo dosimeter, used to measure the individual dose equivalent at a depth of 10 mm Hp(10) in the tissue. Dosimeters are worn on the belt, for a month.

Four lithium fluoride TLD detectors are fixed between two PTFE foils (Teflon) in an aluminum card. This card is uniquely identified by a bar code.

Two of the detectors contain Lithium-6 isotope, sensitive to neutrons and photons, the other two detectors contain Lithium-7 isotope, sensitive only to photons. The detectors store energy under the action of the ionizing radiations. By heating, this energy is released as light. The quantity of light released is a measure of the dose recorded.

The TLD cassette is made of a plastic material (ABS), with two windows for neutrons, one at the front for neutrons coming directly from the radiation source and the second one at the back for albedo neutrons. These neutrons come from backscattering in the body of the individual who wears the dosimeter. There is a cadmium filter in the TLD cassette that differentiates between thermal neutrons coming directly from the radiation source and those backscattered in the body of the occupationally exposed individual, called albedo neutrons.

Harshaw 6600 reader is used to rate the dose.

Harshaw thermoluminescent dosimetric system is authorized by C.N.C.A.N. (Designation certificate no. ODA 1711/2011)

Characteristics:

- individual dosimeter (“whole body”) for photons and neutrons

- dosimetric system authorized by C.N.C.A.N.

- detector: 2 TLD detectors – 600 (6LiF : Mg, Ti) + 2 TLD detectors – 700 (7LiF : Mg, Ti)

- rating of the equivalent dose using calculation algorithms

- rating of the dose by measuring the light issued by the LTD detectors

Technical specifications

- detector sizes: 3.2 x 3.2 x 0.38 mm

- TLD dosimeter sizes: 68 x 42 x 10 mm

- type of radiations detected: photons and neutrons

- reported size: Hp(10)

- measurement domain: 0,1 mSv – 10 Sv

- photon energy domain: 25 keV – 7 MeV
- neutron energy domain: 0.025 eV – 7 MeV
- angle of incidence: 0° ± 60°