

Instruction HDRL-I-08

Ref: HDRL Quality Manual, Procedure HDRL-P-02

Verification of calorimeter response.

Purpose: To describe conditions for verification of calorimeter response by irradiation at the users facility

Background: The Risø HDRL calorimeters (graphite, water, polystyrene) are calibrated by comparison with alanine reference dosimeters. Calorimeters and alanine reference dosimeters were irradiated at a 10 MeV electron accelerator, and the agreement between calorimeter and reference dosimeter was found to be better than 2%.

For use at another electron accelerator facility the calibration must be verified due to possible changes in measurement conditions, e.g. heating from the accelerator structure or excessive cooling caused by strong ventilation.

Verification of the calibration should be carried out at defined intervals, e.g. annually or after accumulated doses of 2000 kGy.

Procedure:

- 1 Place the alanine reference dosimeters e.g. in a Risø HRDL standard absorber (see HDRL-I-39) that ensures that the calorimeters and the alanine reference dosimeters will be irradiated with the same average dose.
- 2 The calorimeters must be in thermal stability before irradiation. They should be kept in the similar environment before irradiation as the one prevailing during irradiation.
- 3 Record the starting temperature of the calorimeter and of the absorber for the reference dosimeters.
- 4 Irradiate calorimeters and alanine reference dosimeters simultaneously or in close succession in order to ensure that they are irradiated with the same dose.

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- 5 Record the temperature after irradiation of the calorimeters and of the absorber.
- 6 Calculate dose for the calorimeters and return the alanine reference dosimeters to Risø HDRL.
- 7 The alanine dosimeters will be measured at Risø HDRL and the measured doses will be communicated to the facility in the form of a measurement certificate.
- 8 Subject to agreement with the facility the following action will be initiated:
 - 8.1 Risø HDRL will calculate ratios of the calorimeter doses to the reference dosimeter doses.
 - 8.2 Risø HDRL will supply new calibration factors for the calorimeters the response of which show deviations larger than an agreed-upon value, e.g. 2%. New data files will be sent to the facility.