



Calorimeters

*B6001 5 MeV Polystyrene B6002 10 MeV Polystyrene
B6004 10 MeV Graphite*
Technical and Usage Information

Calorimeters are used for measurement of dose by irradiation in electron accelerators. Dose is calculated based on the temperature rise and a calibration function that represents the specific heat of the calorimetric body.

Installing CALDOSE:

Create a new directory on your computer. Simply copy all of the files on the CALDOSE diskette to this directory. Refer to the enclosed documentation from Risø HDRL for any recent program usage notes.

Calibration:

This device was manufactured and calibrated by Risø High Dose Reference Laboratory. The calibration factors have been verified by measurement at Risø High Dose Reference Laboratory. Verification by irradiation at the user's facility should be carried out, and corrections for possible local environmental influences should be evaluated. See the enclosed copy of HDRL-I-08.

Verification of calibration should also be performed annually, after accumulated doses of 2000 kGy, or after any suspected damage (for example, hard impacts to the device).

Usage:

The B6001 polystyrene calorimeter is used only in 5 MeV electron accelerators. Its usable dose range is 3.0 to 40 kGy per irradiation cycle.

The B6002 polystyrene calorimeter may be used in 6-10 MeV electron accelerators. Its usable dose range is 3.0 to 40 kGy per irradiation cycle.

The B6004 graphite calorimeter may be used in 6-10 MeV electron accelerators. Its usable dose range is 1.5 to 15 kGy per irradiation cycle.

The calorimeter should be perpendicular to the electron beam during irradiation. The scan width/height of the electron beam should be at least as large the calorimeter body in order to avoid dose gradients in the calorimeter.

A measurement procedure must be established that specifies time of measurement after irradiation. Recommended times are less than 5 minutes before and less than 5 minutes after irradiation. Longer time intervals may be acceptable, but the limits depend on local conditions, and the user must verify that the temperature variations are acceptable. Therefore, while learning to use the calorimeter, make several measurements over 5 to 20 minutes after irradiation in order to establish the thermal decay characteristics of the calorimeter. See ISO/ASTM 51631 "Standard Practice for Use of Calorimetric Dosimetry Systems for Electron Beam Dose Measurements and Dosimeter Calibrations" for details of this characterization.

Measure and record the temperature of the calorimeter before irradiation at a specified time. Use an ohm-meter with a measuring current that does not exceed 100 μ A, such as the Fluke™ 287 True-rms digital multimeter. (Reference to this instrument is for example only and does not imply endorsement by GEX Corporation of the supplier or the product.)

Measure and record the temperature of the calorimeter after irradiation at a specified time. Use the enclosed CALDOSE program to calculate the dose.

Allow the calorimeter to cool slowly to room temperature before additional dose measurements.

Cautions:

Do not disassemble the calorimeter.

Do not attempt repairs to the calorimeter.

Do not remove the foam cover or place the calorimeter in a refrigerator to accelerate cooling.