



热量剂量测量系统

技术和使用信息

热量计用于电子加速器辐照的剂量测量，剂量的计算基于温度的上升和代表了量热主体的比热的校准方程。

安装CALDOSE:

在您的计算机上创建一个新的目录，简单的将CALDOSE盘上的所有文件拷贝到该目录下，参考当中包含的来自RisøHDRL文档以获取最新程序使用说明。

校准:

该装置由Risø高剂量参考实验室制造并校准，校准因子经Risø高剂量参考实验室的测量验证，于用户工厂的辐照确认应该被执行，对可能的当地环境的影响的修正应该被评估，参考包含的HDRL-I-08拷贝件。

校准的确认应该每年执行，或在累计剂量达到2000 kGy之后，或在任何怀疑的损坏之后（比如：对装置的猛烈冲击）。

使用:

B6001聚苯乙烯热量计仅用于5 MeV的电子加速器，它的可用剂量范围为每个辐照循环3.0 to 40 kGy。

B6002聚苯乙烯热量计可以用于6-10 MeV的电子加速器，它的可用剂量范围为每个辐照循环3.0 to 40 kGy。

B6004石墨热量计可以用于6-10 MeV的电子加速器，它的可用剂量范围为每个辐照循环1.5 to 15 kGy。

辐照过程中，热量计应该与电子束垂直，电子束的扫描宽度/高度应该至少与热量计主体一样大，以避免热量计中的剂量梯度。

必须建立定义辐照后的测量时间的测量程序，推荐辐照前、后测量时间均小于5分钟。更长的时间间隔也是可以接受的，时间限定取决于当地条件，用户必须确认温度变化是可以接受的。所以，在学习使用热量计的时候，在辐照后超过5-20分钟做数次测量，以建立热量计热量衰退的特性。该特性的详细描述请参见《ISO/ASTM 51631 将热量剂量测量系统用于电子束剂量测量和剂量及校准的标准实践》。

在辐照前规定的时间内测量并记录热量计的温度。使用一个测量电流不超过100 μ A的欧姆表，比如Fluke™ 287 True-rms数字万用表（该仪器的提及只是为了举例，并不意味着GEX公司认可该供应商或该产品）。

在辐照后规定的时间内测量并记录热量计的温度，使用附带的CALDOSE程序计算剂量。

在再次使用之前允许热量计慢慢冷却至室温。

注意:

不要解体热量计。

不要试图维修热量计

不要移去泡沫盖或将热量计放在冰箱里以加速冷却。



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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 as 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.