P1050
5 MeV E-Beam Phantom

DESCRIPTION

A fixture which is used for the arrangement of discs containing alanine transfer dosimeters and pouches of B3 film dosimeters, in proper geometry, to ensure that the dosimeters receive the same absorbed dose from nominal 5 MeV electron beam irradiation.

APPLICATION(S)

Designed for use with an electron beam with an approximate average energy near 5 MeV, when the radiation source is located perpendicular to the phantom, and only irradiated from that side (single-sided). Not to be used with double-sided irradiation.

SPECIFICATIONS

Physical Specifications:

GEX Part No.	Product Description	Product Dimensions	Packaging Dimensions	Product Weight
P1050	5 MeV E-Beam Phantom	41cm (L) x 20cm (W) x 1.2cm (H) (16.1”L x 7.9”W x 0.47”H)	48.3cm x 22.9cm x 5.1cm (19.0” x 9.0” x 2.0”)	1.13 kg (2.5 lb.)
Material	High-Impact Polystyrene (HIPS)			
Color	White			
Packaging	Cardboard box with bubble wrap to provide protection and prevent movement inside the product box during transport.			

Storage:
Under any relative humidity conditions at less than 50°C.

Shelf Life:
The HIPS material can withstand approximately 10,000 kGy of total accumulated dose before the material degrades beyond the point of usability.

PRODUCT PHOTO

USAGE

The product is ready to use out of the box.

Preparing the phantom for irradiation:

1. Place the film dosimeter samples into the large well of the phantom. The pouches may be placed edge to edge or overlapped, but should never cover the dosimeter in the pouch that it overlaps. See Figures 1 and 2.

FIGURE 1: B3 dosimeters spaced edge to edge

FIGURE 2: B3 dosimeters overlapping edges (with alanine dosimeter)

2. Secure the dosimeters and the cover plate into position with masking tape. The cover plate should be flush. The pouches may stick out of one side, and should be taped flat and securely.
3. Place an alanine transfer dosimeter and secure into place with masking tape. If a well is not used, then insert and secure the dummy plug with masking tape. Do not leave the circular well open, if possible.
4. It is essential to measure the maximum temperature during irradiation as accurately as possible when calibrating dosimeters using Alanine Transfer-Standard Dosimeters for in-plant calibration. The calibration laboratory will correct the alanine for the temperature effect on the response of the alanine using this data.

   Two methods of measuring maximum temperature are acceptable when using this phantom:

a. *Temperature label* – Using masking tape, secure an irreversible temperature label (GEX Part No. P8003 or equivalent) to the body of the phantom, away from, and not covering any dosimeter.

b. Calorimeter – Alternatively use GEX Part No. B6001 or B6002 Risø Polystyrene Calorimeter to determine the maximum irradiation temperature. This method will very closely approximate the temperature to the dosimeters, and is as good as, or better than the temperature labels.

5. All materials should be secure with no possibility of movement during irradiation. See Figure 3.

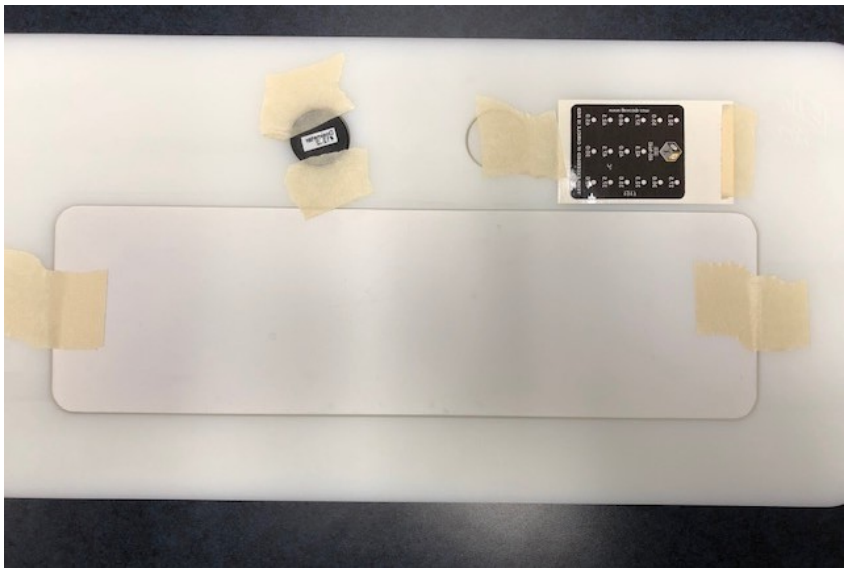

FIGURE 3: All materials prepared and ready

Irradiation Instructions:

The phantom should be perpendicular to the incident angle of the electron beam during irradiation. Refer to the precautions below, and develop a reproducible procedure for the handling and irradiation of the phantom in the specific e-beam design in which the dosimeters will be calibrated.

PRECAUTIONS

1. Do not use overly aggressive or permanent adhesive tapes, as the adhesives may leave a residue on the phantom.
2. Do not attach GEX Part No. P8003 Irreversible Temperature Labels directly to the phantom; the adhesive is permanent!
3. Do not place the phantom directly on a metal carrier, cart, or rolling conveyor system. A material of some type must be placed between the phantom and the conveyor/carrier to prevent ambient heating of the phantom as it moves into the beam zone; failure to do so may pose an inaccuracy of the start temperature that is required to be known and recorded during the calibration. It is recommended to use piece of polyethylene foam or a couple of layers of cardboard to insulate the phantom from the conveyor system.
4. Do not irradiate to a dose greater than 50 kGy in a single pass through the electron beam. For doses above 50 kGy, fractionate the dose. For example, 80 kGy = 50 kGy + 30 kGy (always with the highest dose first).
5. Allow to cool completely to room temperature before using again. The temperature must be stable at the time the phantom is placed onto the beam conveyor and not continuing to cool down.

WARRANTY/GUARANTEE

1-year GEX satisfaction guarantee. May be returned with or without reason within one year from the date of delivery.

REFERENCES

References:

- GEX Doc # 100-263, Performing a Dosimeter Batch Calibration
- ISO/ASTM 51261: Standard Practice for Calibration of Routine Dosimetry Systems for Radiation Processing
- NPL Report CIRM 29; Guidelines for the Calibration of Routine Dosimetry Systems for Use in Radiation Processing

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