



TECHNOLOGY NOTE

B44 IONIZATION CHAMBERS FOR DOSIMETRY OF HIGH-ENERGY PARTICLE BEAMS

Use in particle beams

The equipment consists of one thin-walled and several tissue-equivalent ionization chambers with their associated electronics. It is used to control and measure the dose to biological specimens irradiated in high-energy neutron and pion beams from the accelerators.

The thin-walled ionization chamber with a total thickness of 35 mg/cm^2 is used as a beam monitor by measuring the total current produced by the passage of the whole beam through the chamber. All biological exposures are controlled by the reading of this chamber.

Construction of the chambers

The other chambers are made of a tissue-equivalent material and filled with tissue-equivalent gas. They are located inside an aluminium housing that can stand up to 10 atm pressure. The chambers have different sizes and shapes which have been chosen in order to optimize absorbed dose measurements at low dose-rates, and in rapidly varying radiation fields. They are operated in conjunction with tissue-equivalent absorbers and highly sensitive electrometers. Dose-rates in the range from 1-5 rad/h are measured within volumes of a few cubic centimetres or a few millimetres in depth.

The construction is made to correct for ion recombination by varying the pressure and high voltage.

Considerable care has been taken in the selection of tissue-equivalent materials, the size and shape of the chambers, and the insulation properties, in order to optimize the instruments.

References

The chambers have been described in the Proceedings of the First Symposium on Neutron Dosimetry in Biology and Medicine, Munich 1972, p. 729, and in the Proceedings of the Symposium on Dosimetry in Agriculture, Industry, Biology and Medicine, Vienna 1973, p. 441.

Further information can be obtained from J. Baarli, Health Physics Group, CERN, Tel. 2151.

18 March 1974