Investigation of Small Electron Beams with a PTW-Markus Chamber

It is well known that the Markus chamber has a superior resolution to most cylindrical chambers. A comparison is presented of electron measurements in water made with a Markus chamber and with various cylindrical chambers. The Markus chamber used has an ADCL Co-60 calibration of N_k = 4.670 X 10^8 Gy/C. An in-depth comparison study will be presented comparing the Markus with a .125 cm^3 cylindrical chamber of 5.5 mm inner diameter. Although both the Markus and the cylindrical chamber have about the same diameter, the axial length of the cylindrical chamber, 13 mm, lowers its resolution significantly. Because the cylindrical chamber has lower resolution, its corresponding PDI measurements can exhibit a larger sensitivity to variations in the radius of the beam. The comparison study involves beam radii as small as 3 cm. The differences in sensitivity can be influential in output factor measurements for electron "cut-out" blocks. The differences can also influence virtual source distance measurements for smaller electron beams. Measurements of beam radii less than 3 cm will also be presented, where the Markus will be compared to measurements made with film and with TLDs. Results will be presented for both Siemens and Varian accelerators.