

AbstractID: 1580 Title: Measurement of S_c Using Various Caps and Detectors

Various methods have been suggested for the measurement of that dosimetric quantity describing the variation of the fluence-rate with field size for linear accelerators, often represented by S_c . For field sizes larger than $(5 \text{ cm})^2$, the current accepted measurement technique uses an ionization chamber in a plastic cylinder coaxial with the beam, about 4 cm in diameter. The diameter of the cylinder is set to provide lateral electronic equilibrium at the chamber. Field sizes smaller than that diameter require some other approach, one suggestion being the use of high density, high atomic-number materials for the cylinder, condensing the radius needed for equilibrium, and possibly using diode detectors. This experiment studied the S_c curves resulting from measurements using cylinders of various materials and detector types. The results show that: 1). The diodes, regardless of shielding, give the same results as the chamber; 2). For 6-MV photons, all the Jursinic-style caps (chamber coaxial) yield values slightly less than the van Gasteren (chamber perpendicular), independent of the material; 3). For 20-MV photons, the plastic van Gasteren and Jursinic caps give the same results, but the brass and lead fall about 1% below the plastic (a value greater than the 0.5% reported in ESTRO Booklet 3 for fields less than $(30 \text{ cm})^2$). For the 20-MV photons, values for small fields could be obtained using high-Z caps below $(4 \text{ cm})^2$, normalized to $(4 \text{ cm})^2$, and then times the value of S_c in plastic for the $(4 \text{ cm})^2$ field.