

The calibration of a scintillator detector for measurements in beta-particle fields is described. This detector is intended by the manufacturer to be used to determine the absorbed-dose rate at 2 mm in water from a beta-particle intravascular brachytherapy source. The scintillator has a nominal diameter and nominal thickness both of 1 mm and is covered by light-tight material with an approximate thickness of 0.3 mm. The object of the calibration is to determine three unknowns: the actual mass thickness of the covering material, the actual mass thickness of the scintillator, and the calibration factor which relates the scintillator reading to the absorbed dose averaged over the volume of the scintillator. To determine these three unknowns, measurements of scintillator response as a function of depth were made in three different beta-particle fields in which the absorbed dose as a function of depth is well known. Two of the fields are reference beta-particle radiation fields specified by the International Organization for Standardization (ISO). These employ the sources $^{90}\text{Sr}/\text{Y}$ and ^{85}Kr at a distance of 30 cm in air from the surface of a tissue equivalent phantom in which the scintillator probe is placed. The third field used is from a NIST calibrated ophthalmic applicator with the scintillator probe surface placed at various depths in water equivalent plastic. Integrations of the known absorbed dose versus depth functions for these three fields were used to determine the values of the three unknowns to best fit the measured depth doses with the scintillator probe.