

AbstractID: 12965 Title: The measurement of kQ factor for the FC65-G water proof chamber in 6, 10 and 18 MV photon beams

Purpose: The beam quality conversion coefficient k_Q is one of the factors needed to determine the absorbed dose to water of a linac following the guideline prescribed by TG-51 and TRS-398. In this study k_Q values were determined for a farmer type IBA FC65-G chamber in a 6, 10 and 18 MV photon beams (beam qualities $%dd(10)_X$ of 67.5, 73.55 and 79.7 respectively) using a solid water phantom. FC65-G is a 0.65cc water proof graphite chamber for which the published measured k_Q values are not widely available.

Methods and Materials: The k_Q measurement was performed on an Elekta Synergy linear accelerator and a cobalt unit. Corrections for beam stability were performed using down stream monitoring detectors. The k_Q of five NE2571 chambers have been checked to validate the methodology, as well as the stability and the sensitivity of our system. Reproducibility of k_Q measurements for a single chamber and variability across multiple chambers of the same type were investigated.

Results: The average k_Q values measured for the five FC65-G chambers in the 6, 10 and 18 MV photon beams are 0.9928 ± 0.0006 , 0.9833 ± 0.0007 and 0.9738 ± 0.0006 respectively. These k_Q values are within $\pm 0.02\%$, $\pm 0.03\%$ and $\pm 0.04\%$ respectively of those reported in TG-51 for chambers of similar construction. The measurement reproducibility of 0.02% and 0.03% were determined for NE2571 and FC65-G chambers respectively.

Conclusion: The k_Q has been directly determined for both NE2571 and FC65-G chambers and found to be consistent with values provided in TG-51 and TRS-398. The TG-51 recommendation to use k_Q for chambers of similar construction was found to be good within measurement uncertainty in this case.