

AbstractID: 2992 Title: Custom-made Ion Chamber for Daily QA in RT

Purpose: A computerized dosimetric system with air-tight ion chambers and on-board electrometer has been devised to measure daily output checks of 4/6/10/15 MV X-ray of linear accelerators. It can be inserted into the blocking tray or can be setup on the treatment table of the linear accelerators.

Method and Materials: The dosimetric systems consists of three parts : (1) air-tight plane-parallel ionization chamber, (2) on-board electrometer, (3) computer interface. The ionization chambers (10mm diameter * 2mm width) are implemented on printed circuit boards (PCB) with acrylic plates. Three electrodes are fabricated using approximately 100um thick gold/lead/copper coating on the PCB board. The buildup plates ranging from 1cm to 3cm depending upon x-ray or electrons. The electrometer is designed using a typical current-to-voltage converter (ACF2101, Burbrown, USA) with 20-bit ADC circuits (ADC1210, Burbrown, USA) . (3) The ADC output is transmitted via RS-232 interface to a personal computer. The power from rechargeable battery is supplied all the time to the electrometer, thus eliminating warm-up time.

Results: The short and long term stabilities of the ion chamber are found to be less than 0.2% (one standard deviation) with reference of standard dosimetric system. Also, it is extended to be a 9-channel dosimetric system as a QA device of implementing transit dosimetry (+/-3% agreements between expected and measured values) to determine the overall performances of radiation therapy for the head/neck and breast treatments.

Conclusion: The daily QA devices of measuring the output of linear accelerators (6EX and 21EX of Varian linear accelerators) are proven to be very effective. It will be modified to measure the output and the PDD (in a step of 1cm) of the electron beams as a weekly QA.