

In this study we compare two reentrant chambers that are introduced for brachytherapy source calibrations and QA tests. The characteristics of the SNC 1008¹ reentrant chamber have been previously presented. The newly introduced NA #34-070-5² will be compared with the SNC chamber for axial response, long term stability and reproducibility. The approximately 4π geometry of both chambers offer a simple, reproducible and reliable means to calibrate a wide variety of γ (above energy of 20 KeV) and β sources. Both chambers are sealed and filled with pressurized argon. Axial response is measured by the precise movement of HDR/LDR sources in steps of 0.25 cm. Axial response curves with an HDR ¹⁹²Ir source show 2.0 cm and 2.5 cm wide flat region ($\pm 0.1\%$) for SNC and Victoreen chambers respectively. The NA chamber has a conventional parabolic response curve whereas SNC chamber curve is asymmetric in shape. Long-term (over a period of 6 months) observations of a single source decay using both chambers show excellent stability ($\pm 0.2\%$). Reproducibility is checked for multiple insertions of HDR ¹⁹²Ir source using both chambers. The nominal response values of the calibrated LDR ¹⁹²Ir, ¹⁰³Pd and ¹²⁵I sources with respect to ¹³⁷Cs for both chambers will be presented which are useful in planning and evaluating the chambers.

In addition, innovative approach will be presented to reduce the signal strength from the NA chamber so that it can be used for HDR source constancy checks with electrometers of limited range.

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