

# Angular Dependence of an Intercomparison System in Low and Medium Energies of X-Rays Beams

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Body of Abstract: Ionization chambers are radiation detectors widely used for X-rays measurements and quality control tests in diagnostic radiology. In radiotherapy, the ionization chambers are used for determining the absorbed dose delivered to the patient. An ionization chamber can take many forms, but the principle of operation is similar for all chambers. It is based on the collection of charges created by the passage of radiation, with a proper voltage maintained between the wall of the chamber and the central electrode. In this work, the dependence of detector response on angle of incident radiation was evaluated for three ionization chambers used as an intercomparison standard system in low and medium x-ray beams. The ionization chambers tested are Victoreen guarded electrode with an approximately air equivalent wall, models 415, 415A and 415B. The guarded electrode construction permits direct current measurement with a minimum amount of drift. The irradiations were carried out using two different systems: a) Rigaku Denki generator, model Geigerflex, with a Philips tube model PW/2184/00 (tungsten target and beryllium window, 60 kV), and b) Pantak model HF 320 (tungsten target and beryllium window, 320 kV). All measurements were carried out in reference conditions. The variation of the response for the chamber model 415A, was verified in function of the plane of the entrance window tilted by  $\pm 5^\circ$  from its reference position, perpendicular to the axis of the radiation beam, according to international recommendations. The tests were performed measuring the chamber response, at tilt angles of  $1^\circ$  apart. For models 415 and 415B respectively, the chambers were rotated around their central axis from  $-180^\circ$  to  $+180^\circ$  in steps of  $30^\circ$ . The responses of the chambers were normalized to the reference position ( $0^\circ$ ), and the results obtained meet the international recommendations, i.e., the limits of variation of response are within  $\pm 1.0\%$ .