

Quality Control of Flat Ionization Chambers Used as Monitors in X-Ray Beams

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Body of Abstract: Flat ionization chambers are, originally, designed to be used with patient equivalent filtering (dose measurements behind phantoms), but at the Calibration Laboratory of IPEN two flat ionization chambers are being used as monitor chambers considering their good performance in the standard X radiation qualities, including filtering corresponding to a position in front of a patient (total filtration of 2.5 mmAl). These qualities (IEC 61267) were established in the Medicor Mövek Röntgengyara X-rays generator, model Neo-Diagnomax (125 kV), from 50 to 90 kV, in order to calibrate instruments used in diagnostic radiology measurements. The reference dosimetric system is composed by a parallel plate ionization chamber, PTW, model 77334, 1 cm³ volume, traceable to the German Primary Dosimetry Laboratory (Physikalisch-Technische Bundesanstalt - PTB), connected to a PTW electrometer, model UNIDOS. In this work a study of the behaviour of the two flat ionization chambers (PTW-112 cm³) was carried out by the following tests: repeatability, long term stability, leakage current, energy and angular dependence and radiation sensibility. They were connected to a PTW electrometer, model UNIDOS, and a check source of C-14 was used. A special set-up to position the check source was designed. The angular dependence was determined using the X-rays beams, varying the radiation incidence angle from 0 to +/- 90 degrees. For the energy dependence test, besides X radiation, measurements using gamma radiation of Co-60 were taken. The repeatability test presented a maximum variation of 3.0 %. For the long term stability the values obtained presented a variation in relation to the reference value within the recommended value (2%). During the period of tests the leakage current of the system was negligible.