

CHARACTERIZATION TESTS OF A HOMEMADE IONIZATION CHAMBER IN MAMMOGRAPHY STANDARD RADIATION BEAMS

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An ionization chamber was developed to be a standard system for the calibration of mammography ionization chambers. This chamber has an acrylic body and a graphite coated collecting electrode. The entrance window is made of aluminized polyester and the distance between the electrodes is 4 mm, with a sensitive volume of 6.0 cm³. The objective of this work is to characterize the new ionization chamber in terms of saturation current, linearity, medium-term stability and directional response. The readings were obtained by connecting the ionization chamber to a PTW UNIDOS E electrometer that provides the polarization voltage for the chamber too. The irradiation systems utilized in this work were a Pantak Seifert Isovolt 160HS X-ray equipment (with a tungsten target), which operates from 5 to 160 kV, and a ⁹⁰Sr + ⁹⁰Y PTW check device. The tests of saturation current and stability were performed both for X-rays beams and for beta radiation from the ⁹⁰Sr + ⁹⁰Y check device. The linearity and directional response were obtained for the X-ray reference quality WMV 28. The results showed agreement with the recommendations of international standards. The saturation current had a flat response over ± 50 V that was constant until ± 400 V, the electrometer limit. The medium-term stability was within 3% and the correlation factor was 0.9999 for the linearity curve. This ionization chamber presents metrological characteristics for use as a reference instrument for the calibration of ionization chambers in mammography beams.