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STABLISHMENT OF A QUALITY CONTROL PROGRAM TO KAP METERS

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INTRODUCTION

The method normally used for calibration and control of KAP meter (IEC 60580:2021) [1], is with cylindrical reference ionization chambers calibrated to the RQR radiation qualities recommended by the ISO 61267 standard [2]. However, these reference chambers have a very different manufacturing geometry than the PKA meters.

OBJECTIVE

In order to determine a ***calibration methodology***, ***it was carried out 3 different types of quality control tests, comparing the performance of a reference KAP meter (PDC - Radcal®) with a reference ionization chamber (Radcal® 1610)***

METHODOLOGY

The quality control tests were performed at the same distance, varying the horizontal displacement, and using measurements with the X-Ray system (PANTAK Constant Potential System) (Fig. 1a).

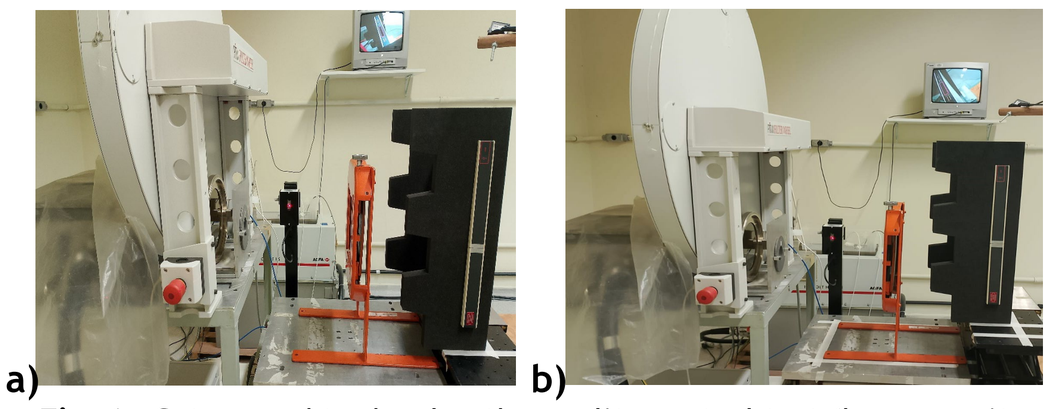

Fig. 1 - Setup used to develop the quality control test (homogeneity test).

The three tests, comparing PDC (Radcal®) against ionization chamber (Radcal), aiming to guarantee repeatability and reproducibility in the equipment tested:

homogeneity tests	PDC displaced 3,5cm and 8,5cm to right and left compare PKA at RQR 3, RQR 5, RQR 8 and RQR 10
stability over time tests	choosing the central position of PDC, it will take 10 measurements and comparing the average with the reference.
Reproducibility tests	Comparing PDC, for KAP, with the ionization chamber, at the same position, at the same aperture of field.

RESULTS

This PDC was tested against the measurements obtained with ionization chamber (Radcal® 1610) for its characterization and guarantee of quality control.

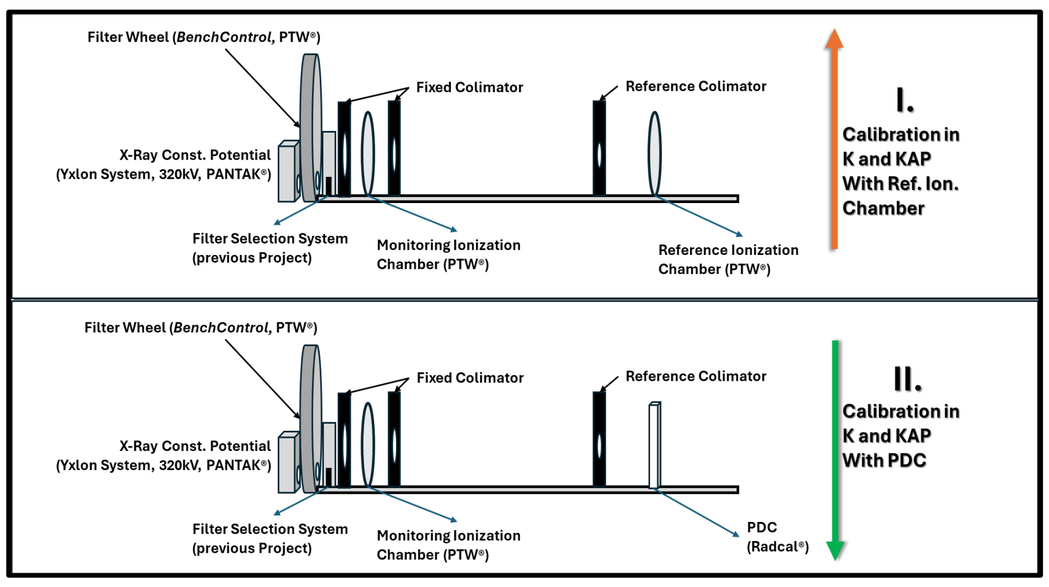

Fig. 2 - *Geometry utilized to calibrate the PDC (A) by the substitution method and (B) with PDC at the same position that reference ionization chamber.*

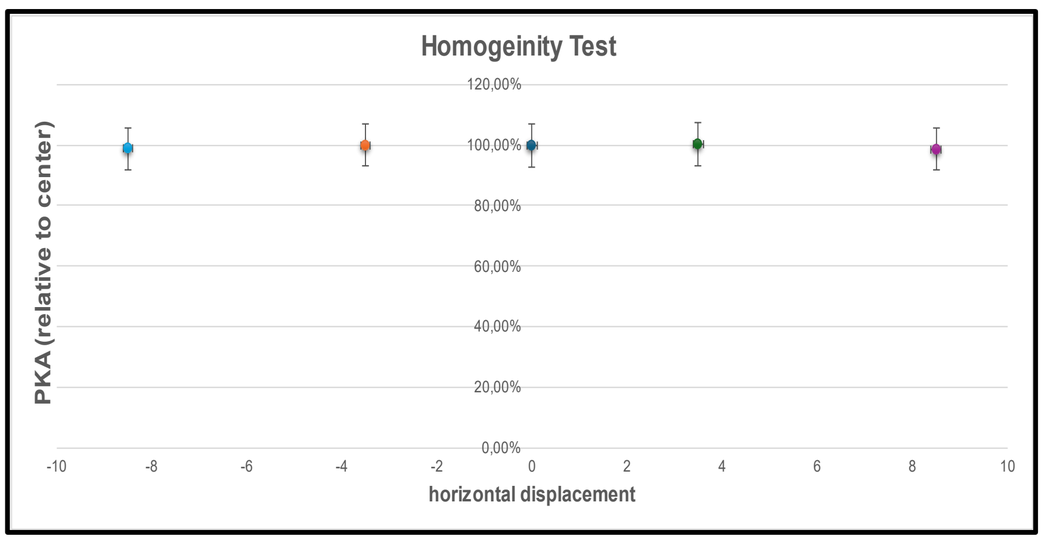

Fig. 3 - *homogeneity test (for PDC), corrected for temperature and pressure.*

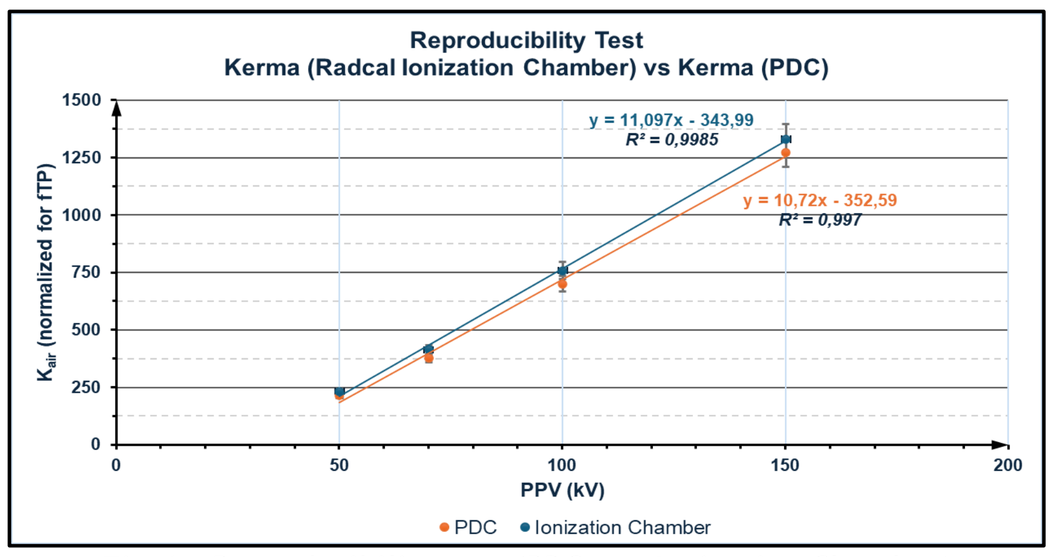

Fig.4 - *Reproducibility test (PDC® vs Ionization Chamber)*

CONCLUSION

It was verified the traceability of the system, with a good correlation in reproducibility and homogeneity, with ionization chamber and PDC, within the uncertainty, being possible the application of calibration method of KAP meter in practical situation.

In future, the laboratory's experimental arrangements will be simulated using the TOPAS code, to evaluate the energy dependence of PDC.

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