



Ministerie van Sociale Zaken en  
Werkgelegenheid

# Portable X-ray for Dentists

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## Description

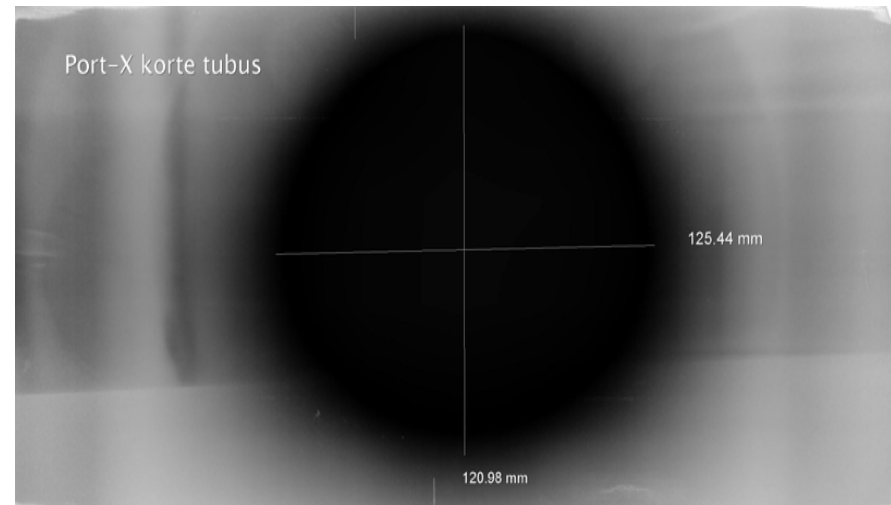
- Subject: Port-X II
- Destination: Korea
- Current: 2 mA (about 25% in relation to common fixed X-ray apparatus)
- Dose rate: 1.35 mGy/s
- Distance focus-skin: 20 cm
- Exposure time needed: 0.75 s





## Radiation field data

- Cross section of primary beam at end of short tube: 75 mm
- At end of long tube: 65 mm
- Cross section on film plane (figure): about 125 mm
- For single dental X-ray only a field of 3x4 cm<sup>2</sup> is required
- >> High exposure to patient
- >> High exposure to operator (max. distance 50 cm)





## Radiation dose

Recent study by ACTA (Academical Centre of Dentology Amsterdam, University of Amsterdam, department of dental radiology), 2008

- Dose to operator, mainly due to scattering radiation at distance 50 cm from patient: about 260 nSv per image
- Assuming 1000 images a year, this results in a yearly operator dose of **2.6 mSv**
- Calculated yearly finger dose at 20 cm distance from patient's head: 4.3 mSv



## Other aspects

- Beam positioning is more difficult, more failures expected in relation to fixed apparatus >
- More chance on blurred images due to relatively long exposure time – more make over necessary



## Recommendations by ACTA

- 2.6 mSv yearly in the dental practice is a substantial dose: use of tld dosimetry is recommended
- Create an exposure table to prevent underexposure and prevent the need to remake the X-ray
- A secondary diaphragma is required to limit the exposure field in order to minimize patient dose and scattering
- Use a sheet of leaded glass fixed around the end of the tube to shield the operator from scattered radiation
- Apply the mobile apparatus only in a room that is subject to risk analysis (e.g. not in the waiting room)



## ACTA conclusions

- Use of a fixed apparatus is highly recommended
- Mount the mobile device on a stand to
  - Keep it well fixed during exposure
  - Be able to create distance to the operator
- If not possible to use a fixed setting: carefully consider the use of a mobile apparatus and choose to accept the additional radiation risk



## Questions

- ALARA?
- Application justified?
- If so, in what cases?
- Can we make an international statement?