

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radiation protection instrumentation – X-ray systems for the screening of persons for security and the carrying of illicit items

Instrumentation pour la radioprotection – Systèmes radiographiques aux rayons X pour le contrôle des individus dans le cadre de la sécurité et du transport d'objets illicites





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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RADIATION PROTECTION INSTRUMENTATION –
X-RAY SYSTEMS FOR THE SCREENING OF PERSONS
FOR SECURITY AND THE CARRYING OF ILLICIT ITEMS**

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International Standard IEC 62463 has been prepared by subcommittee 45B: Radiation protection instrumentation, of IEC technical committee 45: Nuclear instrumentation.

The text of this standard is based on the following documents:

FDIS	Report on voting
45B/642/FDIS	45B/658/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The existence of this standard does not indicate approval of the use of the relevant equipments. However these equipments exist and are used in some countries and are likely to be used to scan persons of all nationalities including nationals of those countries which ban their use. If other international organisations ban their use, this standard could be withdrawn. Meanwhile it is considered valuable to have this standard to reduce the radiation doses to members of the public and others likely to have to use the equipments. Personnel X-ray screening assemblies are used to examine persons in order to detect objects such as: weapons, explosives, smuggled or stolen items such as drugs or diamonds. The screening devices can be divided into three types: one type using the Compton backscattered X-rays (Backscatter system) for the image creation, one using the transmitted X-rays (Transmission system) for the image creation, and a third type as a combination of the two types (Backscatter + Transmission).

All three types consist of an X-ray unit and a detector unit, and take about 10 s to perform a scan.

The systems are operated by and the image is viewed on an external computer. Sophisticated software is used to evaluate the complex images and to enable the detection of hidden objects.

The main difference between the system types is the position of the detectors. Usually, they also differ in the tube voltage range used.

Backscatter X-ray systems, (B), use a narrow pencil shaped beam that scans the subject at high speed in a horizontal and vertical direction. Large detectors are installed on the same side of the subject as the X-ray source. The person stands in front of the enclosure and is scanned by the X-ray beam having a typical cross-sectional area of approximately 25 mm²; this of course is the quantity limiting the spatial resolution of the system. Usually the person is scanned twice, once from the front and then from the back. Sometimes lateral scans are also performed. Typical systems use fixed peak voltage (kV) and current (mA) settings for the X-ray source. These are typically 50 kV and 5 mA. The total aluminium equivalent filtration is in the range of 1 mm to 7 mm.

Transmission X-ray systems, (T), often use a vertical fan-shaped beam of X-rays and a linear array of detectors. The person stands between the X-ray tube and the detector array and is scanned by the X-ray beam having a typical width of approximately 2 mm. The limiting quantity for the spatial resolution is the size of the detector elements. Typical systems use a fixed peak voltage (kV) and current (mA). Settings are in the range of about 140 kV to 220 kV and 0,1 mA to about 4 mA. The total aluminium equivalent thickness is in the range of about 1 mm to about 16 mm. The systems are capable of detecting objects within the body.

Backscatter plus transmission X-ray systems, (BT), are systems that use both backscattered and transmitted X-rays, during the same scan procedure.