

INTERNATIONAL
STANDARD

ISO
9236-1

First edition
1996-11-01

**Photography — Sensitometry of
screen/film systems for medical
radiography —**

Part 1:

Determination of sensitometric curve shape,
speed and average gradient

*Photographie — Sensitométrie des ensembles film/écran pour la
radiographie médicale —*

*Partie 1: Détermination de la forme de la courbe sensitométrique, de la
sensibilité et du contraste moyen*



Reference number
ISO 9236-1:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9236-1 was prepared by Technical Committee ISO/TC 42, *Photography*.

ISO 9236 consists of the following parts, under the general title *Photography — Sensitometry of screen/film systems for medical radiography*.

- *Part 1: Determination of sensitometric curve shape, speed and average gradient*
- *Part 2: Determination of the modulation transfer function (MTF)*
- *Part 3: Mammography*

Annex A of this part of ISO 9236 is for information only.

© ISO 1996

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

This part of ISO 9236 provides methods for determining the sensitometric curve shape, the average gradient and the speed of radiographic screen/film/filmholder/processing systems used in medical radiography, except in mammography and dental radiography.

The sensitometric curve, which is also needed for the determination of other properties (as, for example, the modulation transfer function) is measured under low scatter conditions via intensity scale X-ray sensitometry, preferably using an inverse square sensitometer. Since it is unlikely that the curve shape will be energy dependent within the kilovolt range covered by this part of ISO 9236, any one of the four beam qualities corresponding to those used for speed determination may be used for determining curve shape. For the determination of the sensitometric curve shape, the irradiation of the screen/film/filmholder combination need be measured only in relative units.

While the average gradient is determined from the sensitometric curve shape, speed must be measured in a separate way, since the exposure conditions should simulate as closely as possible those which are used in practice. Therefore, scattered radiation is included, accompanied by a slight change of beam quality compared to the beam quality used for intensity scale sensitometry. The exposure is simulated by using appropriate phantoms and tube voltages. The screen/film/filmholder combination is exposed behind the phantom. The exposure is measured in absolute units (gray, Gy) in order to determine the speed.

Speed is generally dependent on X-ray energy and the amount of scattered radiation emerging from the patient. Therefore, a wide variety of speed values may be expected under practical conditions. The four measurement conditions described in this part of ISO 9236 provide values for speed and average gradient which are representative of those found under practical conditions.

Four different techniques are offered, differing in beam quality and fraction of scattered radiation. These techniques simulate four different scenarios of the practice: imaging extremities; skull; lumbar spine and colon; and chest. Speed may be measured for each technique of interest.

This document is a preview generated by EVS

This page intentionally left blank

Photography — Sensitometry of screen/film systems for medical radiography —

Part 1:

Determination of sensitometric curve shape, speed and average gradient

1 Scope

This part of ISO 9236 specifies methods for determination of the sensitometric curve shape, average gradient and speed of a single sample of a screen/film/filmholder/processing system in medical radiography. Special radiographic applications such as mammography, dental radiography and direct-exposing medical radiographic systems (see for example ISO 5799) are excluded.

The filmholder may be any means which ensures close screen/film contact and prevents the film from being exposed to ambient light. In particular, the filmholder may be a light-tight vacuum bag, as often used in the laboratory, or a radiographic cassette as used in medical radiography.

NOTE — Hereafter, screen/film/filmholder combinations will be referred to as "combinations" and will be referred to as "systems" when the processing is included.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9236. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9236 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions.*

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

3 Definitions

For the purposes of this part of ISO 9236, the following definitions apply.

3.1 air kerma, K : That energy which is transferred by ionizing radiation (for instance X-rays) to air molecules divided by the mass of air in that volume where the energy is released. The unit is the gray (Gy).

3.2 sensitometric curve: Plot of the density of a processed photographic film as a function of the logarithm of the exposure.