

**Non-destructive testing -  
Characteristics of focal spots in  
industrial X-ray systems for use in non-  
destructive testing - Part 4: Edge  
method**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 12543-4:2000 sisaldab Euroopa standardi EN 12543-4:1999 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.02.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 12543-4:2000 consists of the English text of the European standard EN 12543-4:1999.</p> <p>This document is endorsed on 18.02.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot. The imaging qualities of a focal spot are based on the twodimensional intensity distribution in the object plane. This standard describes the measurement of focal spot dimensions above 0,3 mm of X-rays systems up to and including 500 kV, by means of radiographs of sharp edges.</p>	<p><b>Scope:</b></p> <p>The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot. The imaging qualities of a focal spot are based on the twodimensional intensity distribution in the object plane. This standard describes the measurement of focal spot dimensions above 0,3 mm of X-rays systems up to and including 500 kV, by means of radiographs of sharp edges.</p>
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Võtmesõnad:

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**English version**

Non-destructive testing

**Characteristics of focal spots in industrial X-ray  
systems for use in non-destructive testing**

Part 4: Edge method

Essais non destructifs – Caractéristiques des foyers émissifs des tubes radiogènes industriels utilisés dans les essais non destructifs – Partie 4: Méthode par effet de bord

Zerstörungsfreie Prüfung – Charakterisierung von Brennflecken in Industrie-Röntgenanlagen für die zerstörungsfreie Prüfung – Teil 4: Kanten-Verfahren

This European Standard was approved by CEN on 1999-08-16.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by March 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

In the framework of its scope, Technical Committee CEN/TC 138 entrusted CEN/TC 138/WG 1 "Ionizing Radiation" with preparing the following standard:

EN 12543-4, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 4: Edge method.*

EN 12543-4 is a part of series of European Standards with the same number; the other Parts are the following:

EN 12543-1, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 1: Scanning method.*

EN 12543-2, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 2: Pinhole camera radiographic method.*

EN 12543-3, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 3: Slit camera radiographic method.*

EN 12543-5, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 5: Measurement of the effective focal spot size of mini and micro focus X-ray tubes.*

## Introduction

In order to cover the different requirements for focal spot size measurement, five different methods are described in EN 12543-1 to EN 12543-5.

The scanning method (EN 12543-1) is dedicated to those applications where quantitative values for the intensity distribution and spot size are needed, i. e. calibration and image processing purposes.

The radiographic methods (EN 12543-2 and EN 12543-3) describe the traditional techniques and are dedicated for certification purposes and for field applications up to 200 kV.

Where no pinhole or slit cameras are available in the field, the edge method (EN 12543-4) may be applied. It represents a very simple method for field application.

In order to cover also the micro focus systems, a specific method is presented in EN 12543-5.

## 1 Scope

This European standard specifies the checking of focal spot dimensions above 0,5 mm of X-ray systems up to and including 500 kV tube voltage, by means of radiographs of sharp edges.

The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot. The imaging qualities of a focal spot are based on the two dimensional intensity distribution in the object plane.

The edge method is especially useful for the checking of focal spots under field conditions in order to find changes of the focal spot. It cannot be used for an absolute measurement of the focal spot. For absolute measurements the method according to Annex A is applied.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12543-1, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 1: Scanning method.*

EN 584-1, *Non-destructive testing - Industrial radiographic film - Part 1: Classification of film systems for industrial radiography.*

EN 25580, *Non-destructive testing - Industrial radiographic illuminators - Minimum requirements (ISO 5580:1985).*

## 3 Terms and definitions

For the purposes of this standard, the following definition applies:

Focal spot: the X-ray emitting area on the anode of the X-ray tube as seen from the measuring device [EN 12543-1].

## 4 Test method

### 4.1 Principle and equipment

This method is based on indirect measurement of the focal spot size by measuring the geometric unsharpness. For this purpose a sharp edge is imaged on a film using a relatively high geometric magnification.

The following equipment is required for the measurement:

- films with a minimum length of 24 cm without screens,
- film cassettes made of thin plastic material or aluminium,
- lead letters L and W,
- a collimating diaphragm in front of the tube window compatible with the size of the film,
- a steel cylinder or a thick walled pipe of 50 mm to 100 mm diameter and about 100 mm length,
- a support (tripod) to carry the steel cylinder,
- a sheet of lead approximately 200 mm x 100 mm, 1 mm thick or thicker,