

**Non-destructive testing -
Characteristics of focal spot 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**

Non-destructive testing - Characteristics of focal spot 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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 12543-5:2000 sisaldab Euroopa standardi EN 12543-5:1999 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 12543-5:2000 consists of the English text of the European standard EN 12543-5:1999.</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>Käsitlusala:</p> <p>This standard describes the measurement of focal spot dimensions within the range of 5 µm to 300 µm of X-ray systems up to and including 225 kV tube voltage, by means of radiographs of sharp edges.</p>	<p>Scope:</p> <p>This standard describes the measurement of focal spot dimensions within the range of 5 µm to 300 µm of X-ray systems up to and including 225 kV tube voltage, by means of radiographs of sharp edges.</p>
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ICS 19.100

Võtmesõnad:

ICS 19.100

English version

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**

Essais non destructifs – Caractéristiques des foyers émissifs des tubes radiogènes industriels utilisés dans les essais non destructifs – Partie 5: Mesure de la dimension du foyer émissif de tubes radiogènes à mini et micro foyer

Zerstörungsfreie Prüfung – Charakterisierung von Brennflecken in Industrie-Röntgenanlagen für die zerstörungsfreie Prüfung – Teil 5: Messung der effektiven Brennfleckgröße von Mini- und Mikrofokus-Röntgenröhren

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

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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 12543-5, *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.*

EN 12543-5 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 12543-4, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 4: Edge method.*

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 sizes 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 application 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 a method for the measurement of focal spot dimensions within the range of 5 μm to 300 μm of X-ray systems up to and including 225 kV tube voltage, by means of radiographs of sharp edges.

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

For certification purposes the radiographic technique is used.

NOTE The same procedure can be used at higher kilovoltages by agreement but the accuracy of the measurement may be poorer.

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

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 sharp edges are imaged either on a film or by means of a radiosopic device using a relatively high geometric magnification.

The following equipment is required for the measurement if using a film:

- a test object as described below,
- films, min. 10 cm x 10 cm without screens,
- film cassettes made of low absorbing material (e.g. polyethylene),
- a film holder,
- a film processing unit,
- a microdensitometer capable of reading densities of $D \geq 3,0$ and having an input diaphragm d_i of 10 μm or smaller.