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

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 12543-1:2000 sisaldab Euroopa standardi EN 12543-1:1999 ingliskeelset teksti. Käesolev dokument on jõustatud 18.02.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 12543-1:2000 consists of the English text of the European standard EN 12543-1:1999. This document is endorsed on 18.02.2000 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot, in particular the size and the two-dimensional intensity distribution.	**Scope:** The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot, in particular the size and the two-dimensional intensity distribution.

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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 1: Scanning method

Essais non destructifs – Caractéristiques des foyers émissifs des tubes radiogènes industriels utilisés dans les essais non destructifs – Partie 1: Méthode par balayage

Zerstörungsfreie Prüfung – Charakterisierung von Brennflecken in Industrie-Röntgenanlagen für die zerstörungsfreie Prüfung – Teil 1: Scan-Verfahren

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

CEN

European Committee for Standardization
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Contents

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of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by March 2000.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 12543-1, *Non-destructive testing - Characteristics of focal spots in industrial X-ray systems for use in non-destructive testing - Part 1: Scanning method.*

EN 12543-1 is a part of series of European Standards with the same number; the other parts are the following:

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.*

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 measurement of focal spot dimensions of industrial X-ray systems up to and including 500 kV tube voltage. It describes a method of direct mechanical scanning of focal spots above 0,1 mm with a highly collimated receiver.

The image quality and the resolution of X-ray images depend highly on the characteristics of the focal spot, in particular the size and the two-dimensional intensity distribution.

For the characterization of commercial X-ray tube types (i.e. for advertising or trade) the specific maximum values given in annex A should be preferred.

2 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.

3 Test method

3.1 Principle and equipment

This clause deals with the production of focal spot scans to be used for the determination of the focal spot intensity distribution and dimensions. The coarsely precollimated central beam of the X-ray tube is measured by a scintillation counter through a double slit collimator. The collimator forms a hole with the dimensions h x h. The width h depends on the spot size d and shall be selected corresponding to table 1:

Table – 1 Collimator hole dimension h in relation to the focal spot size d

d mm	h
0,1 to 0,2	≤ 10 µm
0,2 to 0,3	≤ 15 µm
0,3 to 1,0	≤ 20 µm
> 1,0	≤ 0,025 x d

The precollimator, double slit collimator and radiation detector shall be mounted as one unit on a x-y scanning table. The output signal of the detector shall be registered by a data acquisition facility (figures 1, 2). The data acquisition shall be well synchronized with the x-y scanning table. The data acquisition is done in the way that at certain step widths a line scan is registered (figure 3). The step width depends on the required resolution, but it shall not exceed 0,1 mm.

The precollimator shall be made of lead containing a hole of approximately 5 mm diameter. The thickness depends on the maximum X-ray voltage. It shall correspond to a hundredth value layer at least.