Non-destructive testing - Measurement and evaluation of the X-ray tube voltage - Part 3: Spectrometric method

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EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 12544-3:2001 sisaldab Euroopa standardi EN 12544-3:1999 ingliskeelset teksti. Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 12544-3:2001 consists of the English text of the European standard EN 12544-3:1999. This document is endorsed on 18.06.2001 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This standard describes the procedure for a non-invasive measurement of X-ray tube voltages using the energy spectrum of X-rays (spectrometric method). It covers the voltage range from 10 kV to 500 kV.	**Scope:** This standard describes the procedure for a non-invasive measurement of X-ray tube voltages using the energy spectrum of X-rays (spectrometric method). It covers the voltage range from 10 kV to 500 kV.

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Non-destructive testing – Measurement and evaluation of the X-ray tube voltage

Part 3: Spectrometric method

Essais non destructifs – Mesurage et évaluation de la tension des tubes radiogènes – Partie 3: Méthode spectrométrique

Zerstörungsfreie Prüfung – Messung und Auswertung der Röntgenröhrenspannung – Teil 3: Spektrometer-Verfahren

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

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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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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 12544-3, *Non-destructive testing - Measurement and evaluation of the X-ray tube voltage - Part 3: Spectrometric method.*

EN 12544-3 is a part of series of European Standards; the other parts are the following:

EN 12544-1, *Non-destructive testing - Measurement and evaluation of the X-ray tube voltage - Part 1: Voltage divider method.*

EN 12544-2, *Non-destructive testing - Measurement and evaluation of the X-ray tube voltage - Part 2: Constancy check by the thick filter method.*

Introduction

In order to cover the different requirements for the measurement of the X-ray tube voltage, three different methods are described in EN 12544-1 to EN 12544-3.

The voltage divider method (EN 12544-1) enables a direct and absolute measurement of the average high voltage of constant potential X-ray systems on the secondary side of the high voltage generator.

The thick filter method (EN 12544-2) describes a constancy check. This method is recommended for the regular stability check of an X-ray system.

The spectrometric method (EN 12544-3) is a procedure for non-invasive measurement of the X-ray tube voltage using the energy spectrum of the X-rays. This method can be applied for all X-ray systems and is the recommended method whenever the voltage divider method is not applicable, e. g. in case of tank units where it is not possible to connect the voltage divider device.

1 Scope

This standard specifies the test method for a non-invasive measurement of X-ray tube voltages using the energy spectrum of X-rays (spectrometric method). It covers the voltage range from 10 kV to 500 kV.

The intention is to check the correspondence of the actual voltage with the indicated value on the control panel of the X-ray unit. It is intended to measure the maximum energy only and not the complete X-ray spectrum.

The procedure is applicable for tank type and constant potential X-ray units.

2 Definitions

For the purposes of this standard, the following definitions apply:

2.1 Energy dispersive photon detector

A photon detector, e. g. Ge based detector, which responds to incident photons with electric pulses, whose amplitude are a measure for the energy of the photons.

2.2 Multi channel analyser

An electronic device which is capable of sorting incoming electric pulses according to their amplitude.

NOTE The pulses are sorted into storage registers or channels in such a way that the contents of a register or channel is increased by one if a pulse occurs with the corresponding amplitude.

2.3 Energy spectrum

The graphical representation of the contents of the channels versus the energy.

2.4 Pile-up

Effect of two or more pulses which are too close to each other and which causes their amplitude to be added in the spectrum.

3 Test method

3.1 Principle

An energy dispersive photon detector is located in the collimated direct beam of the X-ray tube under test (figure 1). The output pulses of the detector are counted and analysed by a multichannel analyzer.