



SLOVENSKI STANDARD
oSIST prEN ISO 16526-3:2019

01-november-2019

Neporušitvene preiskave - Meritve in ugotavljanje električne napetosti na rentgenski cevi - 3. del: Spektrometrijska metoda (ISO 16526-3:2011)

Non-destructive testing - Measurement and evaluation of the X-ray tube voltage - Part 3: Spectrometric method (ISO 16526-3:2011)

Zerstörungsfreie Prüfung - Messung und Auswertung der Röntgenröhrenspannung - Teil 3: Spektrometer-Verfahren (ISO 16526-3:2011)

Essais non destructifs - Mesurage et évaluation de la tension des tubes radiogènes - Partie 3: Méthode spectrométrique (ISO 16526-3:2011)

Ta slovenski standard je istoveten z: prEN ISO 16526-3

ICS:

19.100 Neporušitveno preskušanje Non-destructive testing

oSIST prEN ISO 16526-3:2019

en,fr,de

INTERNATIONAL STANDARD

ISO
16526-3

First edition
2011-12-15

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*

[SIST EN ISO 16526-3:2020](https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020)

<https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020>



Reference number
ISO 16526-3:2011(E)

© ISO 2011

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 16526-3:2020

<https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Definitions	1
3 Test method	1
4 Test report	5
Annex A (informative) Selection of filters	6

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 16526-3:2020

<https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020>

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16526-3 was prepared by CEN (as EN 12544-3:1999) and is submitted for approval under a special “fast-track procedure”, by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 5, *Radiation methods*, in parallel with its approval by the ISO member bodies (see the *ISO/IEC Directives*, Part 1, “Fast-track procedure”).

ISO 16526 consists of the following parts, under the general title *Non-destructive testing — Measurement and evaluation of the X-ray tube voltage*:

- *Part 1: Voltage divider method* [SIST EN ISO 16526-3:2020](https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-16526-3-2020)
- *Part 2: Constancy check by the thick filter method* [16526-3-2020](https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-16526-3-2020)
- *Part 3: Spectrometric method*

Introduction

In order to cover the different requirements for the measurement of the X-ray tube voltage, three different methods are described in ISO 16526-1 to ISO 16526-3.

The voltage divider method (ISO 16526-1) 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 (ISO 16526-2) describes a constancy check. This method is recommended for the regular stability check of an X-ray system.

The spectrometric method (ISO 16526-3) 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 16526-3:2020](https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020)

<https://standards.iteh.ai/catalog/standards/sist/37f02492-ef3e-499d-94aa-f9dbc03216a4/sist-en-iso-16526-3-2020>

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

Part 3: Spectrometric method

1 Scope

This part of ISO 16526 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 part of ISO 16526, 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.

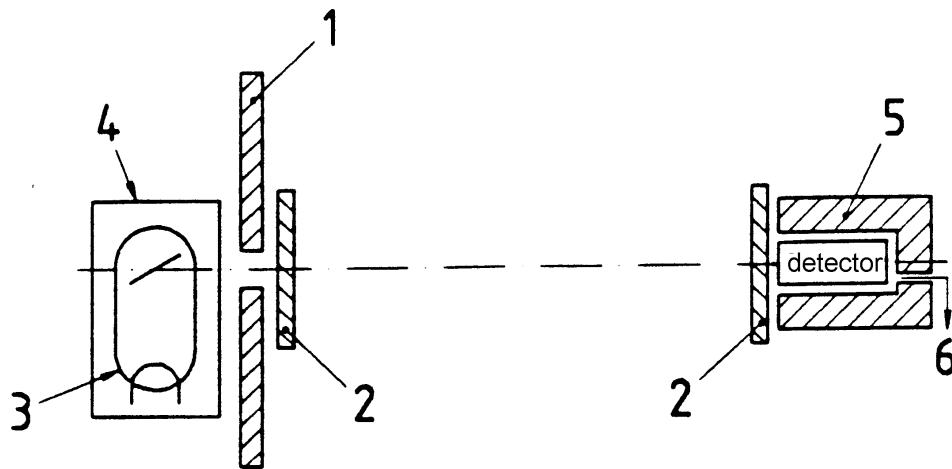
2.4 Pile-up

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.



Key

- 1 Collimator and additional lead shielding
- 2 Filter
- 3 X-ray tube
- 4 tube housing
- 5 lead shielding
- 6 pulse output to amplifier and multichannel analyser

Figure 1: Configuration for energy measurements

3.2 Equipment

The following equipment is required for the measurements:

3.2.1 Detector

Its energy range shall be at least 20% higher than the highest expected maximum energy. The energy resolution shall be about 1 keV Full Width at Half Maximum.

For ease of filtering and shielding a detector with low efficiency but with sufficient resolution shall be chosen, as X-ray tubes usually produce sufficiently high dose rate.

In order to allow as far as possible only direct radiation to hit the detector, the detector shall be carefully shielded with highly absorbing materials against leakage and scattered radiation.

3.2.2 Filters

In order to attenuate the soft radiation, filters of Al, Fe, Cu, Pb or W shall be used (see Annex A).

The measurement of the maximum energy may be disturbed by the K-edge and the characteristic lines of a filter. Therefore, filter materials above the given value U_{\min} according to table 1 shall be used: