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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 41105.3-2021

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

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Table of Contents

foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents"

drafted:

This document is part 3 of GB/T 41105 "Measurement and Evaluation of X-ray Tube Voltage for Nondestructive Testing": GB/T 41105 has

The following sections were published:

--- Part 1: Partial pressure method;

--- Part 2: Stability verification of thick plate filtering method;

--- Part 3: Spectroscopy:

This document is identical to ISO 16526-3:2011 "Measurement and evaluation of X-ray tube voltage for non-destructive testing - Part 3: Energy spectrometry":

This document adds a chapter "Normative References":

Please note that some content of this document may be patented: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

In order to meet the different requirements of X-ray tube voltage measurement, GB/T 41105 consists of three parts, and three different tubes are given respectively:

Voltage measurement method:

--- Part 1: Partial pressure method: Direct and absolute measurement of the average of the constant-potential X-ray system through the secondary side of the high-voltage generator

high pressure:

--- Part 2: Thick plate filtering method stability verification: Recommended for periodic stability checks of X-ray systems:

--- Part 3: Spectroscopy: Using X-ray energy spectroscopy, non-invasive measurement of X-ray tube voltage: This method applies to all X-rays

Line system, it is recommended to use when the voltage dividing method is not applicable, for example, the voltage dividing device cannot be connected in the high-voltage box unit:

Measurement and Evaluation of X-ray Tube Voltage for Nondestructive Testing

Part 3: Spectroscopy

1 Scope

This document specifies a method for measuring X-ray tube voltage using X-ray energy spectroscopy (spectroscopy): The measuring voltage range is

10kV~500kV:

The method specified in this document checks the consistency of the actual voltage with the voltage displayed by the X-ray system controller, measuring only the maximum energy, not

is to measure the complete X-ray energy spectrum:

This document applies to high voltage box and potentiostatic X-ray systems:

2 Normative references

There are no normative references in this document:

3 Terms and Definitions

The following terms and definitions apply to this document:

3:1

energydispersivephotondetector

Detectors that characterize incident photons by electrical pulses and whose amplitude is used to measure photon energy, such as germanium sheet detectors:

3:2

Multichannel analyzer multichannelanalyser

An electronic device that classifies incoming electrical pulses according to their amplitudes:

Note: The pulses are stored in the register or signal channel by classification, so when the pulse appears with the corresponding amplitude, the information of the register or channel is increased by 1:

3:3

energyspectrum

The corresponding relationship between channel signal and energy represents the graph:

3:4

pile up pile-up

Two or more pulses are too close to each other causing their amplitudes to form a superimposed effect in the spectrum:

4 Measurement methods

4:1 Principle

The energy dispersive photon detector is located in the direct beam collimated by the X-ray tube under test (see Figure 1):

The output pulses of the detector are counted and analyzed by a multi-channel analyzer: