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

无损检测 X 射线管电压的测量和评价 第 2 部分：厚板滤波法稳定性核查

(ISO 16526-2:2011, IDT)

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

1 Scope

This document specifies the method for checking the constancy of the X-ray system, mainly to check the constancy of the X-ray tube voltage and tube current, AND to check and evaluate the X-ray tube voltage and tube current changes, that may be caused by the aging of the X-ray tube anode target.

The method, which is specified in this document, is to measure the dose rate, after defining a filter plate of certain thickness, based on the determined X-ray tube, the filter plate and the measuring device and the distance.

The method, which is specified in this document, is very sensitive to tube voltage changes, BUT it cannot measure the absolute value of the X-ray tube voltage. Therefore, a reference value needs to be given and confirmed, for example in an acceptance test of an X-ray system.

This document is intended for periodic constancy checks of X-ray systems, by testers using the thick plate filter method, which is a relatively convenient technique.

This document applies to the constancy check of the X-ray system, after replacement of components, that may affect the voltage of the X-ray tube.

This document applies to all types of X-ray systems, such as potentiostatic, half-wave rectified and pulsed, high-voltage generators, which have a tube current greater than 1 mA.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

There are no terms and definitions, that need to be defined in this document.

L_V - Leverage factor;

D_{95} - 95% of the test voltage value, in kilovolts (kV);

D_{100} - 100% of the test voltage value, in kilovolts (kV).

5.2 Constancy check

At a given voltage, the constancy check of the tube shall be repeated periodically. Constancy checks are performed, using the same collimator, filter plate (thickness and material), calibrated dosimeter, through the arrangement corresponding to Figure 1. If the measured dose value or dose rate value is within the range of the required deviation T (expressed in %), the constancy check of the ray tube voltage is confirmed; the deviation T is determined, through calculation by formula (2).

$$T = 100 \times \frac{|(D_{100\text{measured}} - D_{100\text{nomina}})|}{(D_{100\text{nomina}} \times L_V)} \dots\dots\dots (2)$$

Where:

T - Deviation;

L_V - Leverage factor;

$D_{100\text{measured}}$ - Measured value at 100% of the given test voltage;

$D_{100\text{nomina}}$ - Nominal value at 100% of the given test voltage.

In the reference measurement, all basic parameters (distances D_1 and D_2 , filter material and thickness, dosimeter or dose rate meter model) shall be recorded; their arrangement shall remain unchanged, during all subsequent measurements.

Appendix A gives examples.

6 Measurement report

The measurement report shall contain at least the following information:

- a) The number of this document, that is, GB/T 41105.2-2021;
- b) Model and serial number of the X-ray system;
- c) The working conditions of the X-ray system, such as tube voltage (kV), tube current (mA) and selected focus size, preferably nominal tube voltage and maximum tube current;
- d) Collimator type and size;

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