GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 19.100
N 78

GB/T 37929-2019

Non-destructive Testing Instruments - Testing Methods for Life of X-ray Tubes

无损检测仪器 X 射线管寿命试验方法

Issued on: August 30, 2019 **Implemented on: March 1, 2020**

Issued by: State Administration for Market Regulation;

Standardization Administration of the People's Republic of China.

Table of Contents

Non-destructive Testing Instruments - Testing Methods for Life of X-ray Tubes

1 Scope

This Standard stipulates testing methods for life of X-ray tubes.

This Standard is applicable to the detection and analysis of industrial X-ray tubes.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 26594-2011 *Non-destructive Testing Instruments - Properties Test Methods of Industrial X-ray Tube*

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Life of X-ray Tubes

Test the life of X-ray tubes under the rated tube voltage, rated tube current and stipulated distance and orientation. Analytical instrument uses the spectral purity of X-ray tubes, namely, the impurity line, as the assessment parameter of the life of X-ray tubes. The assessment parameter of the life of other industrial X-ray tubes is the dose rate. When dose rate is less than 90%, it signifies the end of life.

4 Test Requirements

4.1 Test Conditions

Test conditions shall comply with the requirements in Chapter 4 in GB/T 26594-2011.

4.2 Load Power

Load power shall be not lower than the rated power.

4.3 Qualification Requirements

t_K---measurement time when it is found that the assessment parameter of life no longer complies with the stipulation in the detailed specification, expressed in (h);

t_{K-1}---the previous measurement time when it is found that the assessment parameter of life no longer complies with the stipulation in the detailed specification, expressed in (h).

At this moment, when the dose rate of X-ray tube is lower than 90%, the X-ray tube shall be determined as unqualified.

c) During the process of life test, if it is found on the testing instrument that X-ray tube is obviously invalid (for example, air leakage, or, rupture), then, t_i shall be the time from the beginning of the test to the moment when such invalidation is found.

5.2 Method of Single Load Times

5.2.1 Use single load times N of X-ray tube to express the life of X-ray tube. N shall be stipulated in the detailed specification.

5.2.2 Single load power shall be not less than 90% of the maximum power under the stipulated load time. Repeated loads in a certain interval of time are allowed. The anode storage heat when each load begins and the interval time between two adjacent repeated loads shall be stipulated in the detailed specification.

5.2.3 Test procedure shall comply with the following steps:

a) In accordance with the stipulated load conditions, make the anode storage heat reach the value stipulated in the detailed specification;

b) In accordance with the single load conditions and interval time stipulated in the detailed specification, conduct repeated loads;

c) Comply with the assessment parameter of life stipulated in the detailed specification, however, after 0, (1–0.1 n) N, 0.9 N and N load, the measurement shall also be conducted.

5.2.4 Life test shall adopt average life for determination. When the average life rate A is not less than 90%, then, the X-ray tube is qualified in the life test. Average life rate A shall be calculated in accordance with Formula (3):

$$A = \frac{\sum_{i=1}^{n} N_i}{nN} \times 100\% \qquad \cdots\cdots (3)$$

Where,

n---quantity of tubes being tested;

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------