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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 39427-2026

Replacing GB/T 39427-2020

**Non-destructive testing - Radiographic testing - Determination
of the size of industrial radiographic gamma sources**

无损检测 射线检测 工业伽马射线源尺寸测定

(English Translation)

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Foreword

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This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting is scheduled.

This document replaces GB/T 39427-2020 "Nondestructive Testing - Method for Determining the Dimensions of Industrial Ir192 Gamma Ray Sources", and is consistent with GB/T 39427-2020, aside from structural adjustments and editorial changes, the main technical changes are as follows.

- a) The scope has been changed (see Chapter 1, Chapter 1 in the 2020 edition);
- b) The term "maximum size of gamma-ray source" and its definition have been removed (see 3.1 in the 2020 edition).
- c) Added the terms "source size", "signal-to-noise ratio", "normalized signal-to-noise ratio", and "detector fundamental spatial resolution" and their definitions (see 3.1~3.4).
- d) The requirements for "Ir192 gamma-ray source", "transmission optical densitometer", "viewing lamp", and "reference sample" have been removed (see the 2020 version).
4.1~4.4).
- e) The requirements for the focal spot size of the X-ray tube for X-ray machines have been changed (see 4.1, 4.5 in the 2020 edition).
- f) The requirements for radiographic arrangement, such as minimum focal length and magnification, have been changed (see 4.1, 5.2 in the 2020 edition).
- g) The requirement for specially designed conduits and fixing devices has been removed (see 5.2 in the 2020 edition).
- h) The requirement for identification markers has been removed (see 5.3 in the 2020 version);
- i) The requirements for the measurement procedure have been changed (see 4.2, 5.4 in the 2020 edition).
- k) Added requirements for digital devices (see Chapter 5);

- l) The requirements for determining the size of gamma-ray sources using film techniques have been changed (see 6.1, Chapter 6, 2020 edition).
- m) The requirement to use digital detector technology to determine the size of gamma-ray sources has been added (see 6.2);
- n) The requirements for determining source dimensions have been changed (see 6.3, Chapter 7 of the 2020 edition).
- o) The requirements for testing reports have been changed (see Chapter 7, Chapter 8 in the 2020 edition);
- p) "A specially designed source tube" has been deleted (see Appendix A of the 2020 edition);
- q) The "Instructions for Using the Gamma Ray Source Size Calculation Formula" has been deleted (see Appendix B of the 2020 edition).
- r) The "Sample Test Report" (see Appendix C of the 2020 edition) has been removed.

This document is equivalent to ISO 32679:2024 "Nondestructive testing, radiographic testing, industrial gamma source dimensional determination".

The following minimal editorial changes have been made to this document.

--Corrected the error in the English name of ISO 19232-5 (see Chapter 2).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Nondestructive Testing (SAC/TC 56).

1 Scope

This document specifies the use of X-ray radiography to examine iridium-192, ytterbium-169, selenium-75, or cobalt-60 gamma rays with a size not less than 0.5 mm.

Procedures for determining the size of the gamma-ray source. The size of the gamma-ray source is an important factor affecting the quality of gamma-ray radiographic images.

The accuracy of gamma-ray source size measurement is $\pm 10\%$, typically not exceeding ± 0.1 mm.

The dimensions of the gamma-ray source are measurements obtained mechanically during the packaging process and are provided by the manufacturer. The gamma-ray source is then delivered for use.

Subsequently, if verification of the manufacturing process or monitoring of the usage is required, the gamma-ray source dimensions shall be determined according to the methods

specified in this document.

Measurement.

The methods specified in this document have been verified to be applicable to the determination of the size of other gamma-ray sources.

ASTM E1114 provides more information on the dimensional measurement, source shape characterization, and proper packaging of gamma-ray sources such as iridium-192.

2 Normative references

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 19232-5 Nondestructive testing-Radiographic inspection-Image quality-Part 5: Image blur and attenuation in dual-wire image quality meters this spatial resolution value was determined (Non-destructive testing - Image quality of radiographs - Part 5: Determination of) the image unsharpness and basic spatial resolution value using duplex wire-type image quality indicators) Note. GB/T 23901.5-2019 Nondestructive testing - Radiographic image quality - Part 5: Determination of image blurring by dual-wire image quality meter (ISO 19232-5:2018, IDT) ISO 16371-1 Nondestructive testing - Industrial computer-aided radiographic inspection based on stored phosphorescent imaging plates - Part 1: System components Class (Non-destructive testing-Industrial computed radiography with storage phosphor imaging plates-Part 1: Classification of systems) Note. GB/T 21355-2022 Classification of industrial computer radiographic inspection systems based on stored phosphorescent imaging plates for nondestructive testing (ISO 16371-1.

2011, IDT)

ASTM E.2002-22 Standard specification for determining total image imperfections and fundamental spatial resolution in radiographic and radiographic inspection.

(Standard Practice for Determining Total Image Unsharpness and Basic Spatial Resolution in Radiography and Radioscopy) ASTM E 2597/E2597M-22 Standard Practice for Manufacturing Characteristics of Digital Array Detectors turing Characterization of Digital Detector Arrays)

3 Terms and Definitions

The following terms and definitions apply to this document.

source size

Maximum size of a gamma-ray source.