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

GB/T 11927-2025

Replacing GB/T 11927-1989

**Determination of density and volume fraction of open porosity
in uranium dioxide pellets - Penetration immersion method**

二氧化铀芯块密度和开口孔隙度的测定 液体浸渍法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document supersedes GB/T 11927-1989, "Determination of Density and Open Porosity of Uranium Dioxide Pellets-Liquid Immersion Method". Compared with GB/T 11927-1989, apart from structural adjustments and editorial changes, the main technical changes are as follows:

---The boiling water method has been removed (see

5.1 in the 1989 edition);

---The impregnation liquid has been changed (see 5.1,

3.1 of the 1989 edition);

---The content related to closed porosity calculation has been deleted (see Chapter 6 of the 1989 edition);

---A new chapter on "Samples" has been added (see Chapter 7);

---The experimental procedures have been modified (see Chapter 8, 5.2 of the 1989 edition);

---The drying conditions have been changed (see 8.1,

5.1.1 of the 1989 edition);

---The vacuum parameter has been changed (see 8.2,

5.2.2.1 of the 1989 version);

1 Scope

GB/T 11927-2025 is the Chinese national standard on determination of density and volume fraction of open porosity in uranium dioxide pellets - penetration immersion method, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 5 October 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 5 October 2025.

Classification: ICS 27.120, CCS F46. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes the reagents, materials, instruments, and samples used in the liquid immersion method for determining the bulk density and open porosity of uranium dioxide pellets. The content includes the product, test procedures, test data processing, precision and recording. This document applies to the determination of bulk density and open porosity of uranium dioxide pellets. It also applies to other nuclear fuel sintered bodies, such as UO₂-PuO₂ cores. For reference use of blocks and UO₂-Gd₂O₃ core blocks.

2 Normative references

This document has no normative references.

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4.Method Principles The mass of the dried pellet in air was determined using a balance. Air was expelled from the openings on the pellet surface by evacuation, and then impregnation was added. The impregnating liquid was applied to fill the opening. The mass of the core block in the impregnating liquid and in air were measured separately after the opening was filled with the impregnating liquid. (Based on Aki...) Mead's Law is used to calculate the bulk density and open porosity of a core.

5 Reagents and Materials

5.1 Impregnation solution. distilled water or deionized water, or analytical grade anhydrous ethanol, polyethylene glycol, and carbon tetrachloride, etc.

5.2 Linenia or other similar fabrics without lint.

6.1 Density measuring balance. graduation value

0.1 mg, including density measuring kit and glass container, structural schematic diagram is shown in Figure A.1 of Appendix A.

6.2 Drying oven. The usable temperature is not lower than 150°C, and the temperature control accuracy is $\pm 5^{\circ}\text{C}$.

6.4 Vacuum device. vacuum degree better than 10Pa, accuracy $\pm 2\text{Pa}$, structural schematic diagram is shown in Figure A.2.

6.5 Thermometer. Scale division 0.1°C .

The sample should be a uranium dioxide pellet with a volume not less than

0.4 cm^3 . If the sample volume is less than

0.4 cm^3 , several samples can be combined together.