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

GB/T 8995-2026

Replacing GB/T 8995-2008

**In-core instrumentation for neutron fluence rate measurements
important to safety for nuclear power plants**

核电厂安全重要仪表系统堆芯中子注量率测量仪表

(English Translation)

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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 8995-2008 "Core Instruments for Neutron Flux Rate Measurement in Nuclear Reactors" and is consistent with GB/T 8995-2008.

Compared to previous versions, aside from structural adjustments and editorial changes, the main technical changes are as follows.

- a) The term "nuclear reactor" has been changed to "nuclear power plant," and the description of its scope of application has been altered (see Chapter 1, Chapter 1 of the 2008 edition);
- b) Terms such as "reactor cladding" and "power density" have been removed, and terms such as "self-powered neutron detector assembly," "beta decay," and "fission ionization" have been added.

Terms and definitions for "room" and "response time" (see Chapter 3, 2008 edition);

c) The functional descriptions of some core neutron flux rate instruments have been revised, and the requirements for verification and calibration have been refined (see 4.3, 4.6, 2008).

Versions 4.3 and 4.5);

d) Requirements for core neutron flux measurement instruments under low-power reactor operation conditions have been added (see 4.5);

e) Change "core" to "shell" (see 4.4, 4.8, 4.9, and 4.4, 4.7, 4.8 in the 2008 edition);

The instrument requirements and standard GB/T 4083 (see 5.1, 5.3, 5.4, 5.6 and 5.8, and 5.1, 5.3, 5.4, and 5.6 of the 2008 edition) shall apply.

and 5.8);

g) Added a description of the detector calibration method, changed the response time requirements, and added provisions for reactor protection and reactor monitoring.

The signal-to-noise ratio requirements have been revised, with some textual descriptions changed (see 5.9, 5.10, 5.13, 5.14, and 5.15; 5.9 and 5.10 in the 2008 edition).

5.13, 5.14 and 5.15);

h) The commonly used detector type has been removed, and "Additional Output" has been changed to "Additional Signal" (see 6.1 and 6.2 in the 2008 version);

i) The description of considerations for activation effects during detector servicing and replacement has been revised (see 6.4, 2008 edition of 6.4);

j) The descriptions of detector sensitivity design and calibration have been changed (see 6.10, 2008 edition of 6.10);

k) Change "25°C" to "the temperature specified by standard atmospheric conditions for measurement and testing in GB/T 2421" (see Chapter 8, 2008).

Chapter 8 of the edition);

l) A new chapter on "Signal Processing Equipment" has been added (see Chapter 10);

m) Added type approval testing requirements for signal processing equipment (see 11.3);

n) Added standards for the inspection methods of self-powered neutron detectors and welding quality, removed the impact resistance requirement, and changed "25°C".

For "Temperature specified under standard atmospheric conditions for measurement and testing in GB/T 2421", change "Insulation resistance at the output terminal" to "Electrical resistance".

The term "gas performance" was changed from "spent fuel spectrum" to "core gamma spectrum," and experimental methods for thermal neutron sensitivity and consistency, as

well as gamma sensitivity, were added.

The law, and the footnotes were changed into the main text (see Chapter 12, Chapter 11 of the 2008 edition);

o) Added requirements for periodic testing during operation and revised some textual descriptions (see 13.2, 13.3, 13.4, 13.5, 2008 version).

12.2, 12.3);

p) Added requirements for assessing the activation level at the end of the detector's lifespan and for handling high-level waste (see 14.2).

Compared with IEC 60568:2006, this document has undergone the following structural adjustments.

---Sections 4.1 to 4.4 and 4.6 to 4.9 correspond to sections a) to d) and e) to h) of Chapter 4 of IEC 60568:2006, respectively, and section 4.5 has been added;

---Sections 6.1 to 6.4 and 6.6 to 6.10 correspond to sections a) to d) and e) to i) of Chapter 6 of IEC 60568:2006, respectively, and section 6.5 has been added;

---Chapter 10 has been added, and Chapters 11 to 14 correspond to Chapters 10 to 13 of IEC 60568:2006.

The technical differences between this document and IEC 60568:2006, and the reasons therefor, are as follows.

a) The scope of application has been modified (see Chapter 1) to adapt to my country's technical conditions and increase operability;

b) Unreferenced IEC 60880:1986, IEC 60987:1989, IEC 61226:2005, and IEC 62138:2004 have been removed to suit [the following].

To enhance operability in light of my country's technological capabilities;

c) Removed "core neutron detector", "offline neutron detector", "online neutron detector", "perturbed neutron flux rate", and "neutron".

The terms and definitions for "detector sensitive material," "transformation function," and "unperturbed neutron fluence rate" have been expanded to include "self-energized neutron detector." the terms and definitions for "detector," "self-powered neutron detector assembly," "beta decay," "fission ionization chamber," and "response time" are as follows (see Chapter 3).

Adapt to my country's technological conditions and increase operability;

d) Requirements for core neutron flux measurement instruments under low-power reactor operation conditions have been added (see 4.5) to adapt to my country's technical conditions.

Add components to increase operability;

e) IEC 61513:2001 (see 5.4) has been replaced with the normatively referenced GB/T 13284 to adapt to my country's technical conditions and add [further details needed].

Operability;

f) Increased requirements for the core neutron detector to operate at high reactor power levels (see 6.5) to adapt to my country's technological conditions.

Increase operability;

g) Added normative references to GB/T 2421 (see Chapters 8 and 12), GB/T 12727 (see 11.3), and GB/T 7164 (see NB/T.20003.8 (see Chapter 12), GB/T 5204 (see 13.4) are used to adapt to my country's technical conditions and increase operability;

h) IEC 61468 (see Chapter 12) has been replaced with the normatively referenced GB/T 47843 to adapt to my country's technical conditions and increase operability.

Acting.

The following editorial changes have been made to this document.

---To align with existing standards, the standard name has been changed to "Measuring Instruments for Neutron Flux Rate in Nuclear Power Plant Cores. Safety-Important Instrumentation Systems";

---Informative references have been added to GB/T 4960.1-2010, GB/T 4960.6-2008, GB/T 41143-2021 and IEC 61468:2021.

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 Nuclear Instruments and Meters (SAC/TC30).

1 Scope

This document specifies the design principles and requirements for neutron flux measurement instruments in nuclear power plant reactor cores, including design requirements, testing requirements, and operational requirements.

Requirements, retirement, and other related content.

This document applies to core neutron flux measurement instruments designed for the protection, control, and monitoring of nuclear reactor core parameters.

This information can be used as a reference for other types of nuclear facilities.

Commonly used detectors include fission ionization chambers and self-powered neutron