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

GB/T 12727-2023

**Qualification of electrical equipment important to safety for
nuclear power plants**

核电厂安全重要电气设备鉴定

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Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules for Standardization Documents" drafting: This document replaces GB/T 12727-2017 "Appraisal of Safety-level Electrical Equipment in Nuclear Power Plants": Compared with GB/T 12727-2017, except not in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) Changed the "Definition of terms" (see Chapter 3, Chapter 3 of the:2017 edition);
- b) Changed "identification target" to "identification purpose", and changed some descriptions (see 4:1, 4:1 of the:2017 edition);
- c) Changed the description of "certification life and certification status" (see 4:2, 4:2 of the:2017 edition);
- d) Added instructions that the equipment contains software (see 5:2:1, 5:4, 6:4:1:2, 6:4:1:8, 6:4:4, 7:2);
- e) Changed "extending identification life" to "re-evaluation of identification life", and added a method for evaluating identification life (see 5:3, 5:3 of the:2017 edition);
- f) Changed the description of condition monitoring (see 5:4, 5:4 of the:2017 edition);
- g) Added "General Provisions" (see 6:1);
- h) Changed "identification" to "equipment identification" and modified its content (see 6:2:2, 6:1:2 of the:2017 edition);
- i) Added "Design extension condition" (see 6:2:6:3);
- j) Added "electromagnetic environment conditions" (see 6:2:6:4);
- k) Change "appraisal margin" to "service condition margin" (see 6:3:5, 6:2:4 of the:2017 edition);

l) The requirements for documents have been changed (see Chapter 7, Chapter 7 of the:2017 edition): This document is modified to adopt IEC /IEEE60780-323:2016 "Identification of Electrical Equipment Important to Safety of Nuclear Facilities": Compared with IEC /IEEE60780-323:2016, this document has made the following structural adjustments:

--- Delete the abbreviations in Chapter 4 of IEC /IEEE60780-323:2016, and the subsequent chapter numbers are extended;

1 Scope

GB/T 12727-2023 sets the qualification of electrical equipment important to safety in nuclear power plants. Qualification here means something stronger than type testing: the equipment must be shown to work not in normal service but in the conditions of the accident it exists to mitigate - after ageing to the end of its qualified life, then through seismic loading, then in the steam, temperature, pressure and radiation of a design basis accident, in that order, because the sequence matters. The standard sets the qualification principles, including the qualified life and qualified status, the qualification elements and the documentation, the selection of the qualification method and the initial qualification, the qualification programme with the equipment specification and plan, and the maintenance of qualification through the plant's life. It replaces GB/T 12727-2017 and took effect on 1 December 2023.

This document specifies the relevant requirements for the appraisal principles, appraisal methods, appraisal program and appraisal documents of electrical equipment important to safety in nuclear power plants: This document is applicable to the initial identification, maintenance of identification status and extension of identification life of electrical equipment important to safety in nuclear power plants and their interfaces: It is used for the qualification of updating according to requirements after equipment changes:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document:

GB/T 13625 Seismic Appraisal of Safety-level Electrical Equipment in Nuclear Power Plants

3 Terms and Definitions

The following terms and definitions apply to this document: 3:

1 Aging treatment ageconditioning The sample equipment is exposed for a period of time under simulated environmental, operating and system conditions (excluding design basis accident conditions) to make the equipment performance It can be degraded to the state where design basis accident simulation test is allowed: [Source: GB/T 41143-2021, 7:2:11, modified] 3:2 status indicator condition indicator A characteristic of a structure, system, or component that can be observed, measured, or exhibits a tendency to infer or directly indicate that the structure, system, or component The current and future ability of a system or component to operate within acceptance criteria: [Source: GB/T 41143-2021, 7:1:17, modified] 3:3 design basis events designbasisevents; DBE A hypothetical initiating event used in the design to determine the acceptable performance requirements of a structure, system or component: [Source: GB/T 41143-2021, 3:6] 3:

4 Accident conditions that are not considered in the scope of design basis accidents are considered in the design process according to the best estimate method, and the accident conditions The release of radioactive material is within acceptable limits:

Note: Design extension conditions include conditions that do not cause significant damage to the core and core melting (severe accident) conditions: [Source: HAF102-2016, explanation of terms, with revisions]