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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 31036-2025

Proton exchange membrane fuel cell backup power systems - Safety

质子交换膜燃料电池备用电源系统 安全

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Standardization Administration of the PRC

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Foreword

This document was issued on 28 February 2025 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 September 2025.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies.

The document runs to 28 pages in translation. The identification, the dates, the table of contents and the clauses reproduced on this page are taken from the standard itself.

Proton exchange membrane fuel cell backup power system - Safety

This document defines the terms and definitions for proton exchange membrane fuel cell backup power systems, specifies safety requirements and protective measures, and describes the type test methods.

This document is applicable to the proton exchange membrane fuel cell backup power system (hereinafter referred to as "PEMFC backup power systems") which shall simultaneously meet the following conditions:

--The rated electrical output power of the system shall be <=10 kW;

--The system shall output alternating current or direct current;

--The system shall not be intended as a primary power source and shall operate continuously for <=72h.

PEMFC backup power systems with a rated power exceeding 10 kW shall refer to this document for use.

See Annex A for a typical proton exchange membrane fuel cell backup power system.

This document is applicable to the PEMFC backup power system for commercial, industrial, and domestic use in the non-hazardous (unclassified) areas around the equipment. This document does not cover safety requirements for installation sites.

Note: This document only considers the dangerous situations that may cause harm to people, objects, or the environment outside the PEMFC backup power system, and puts forward the safety requirements for such dangerous situations, excluding the safety measures that shall be taken when damage may be caused to the PEMFC backup power system itself. The prerequisites in this document are not intended to limit innovation. Materials, designs, or manufacturing different from this document, when used, shall be of equivalent safety and performance specified in this document.

The following documents contain provisions which, through reference in this text, constitute provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 755 Rotating electrical machines - Rating and performance

GB/T 2423.5-2019 Environmental testing - Part 2: Test methods - Test Ea and guidance: Shock

GB/T 2423.56-2023 Environmental testing - Part 2: Test methods - Test Fh: Vibration, broadband random and guidance

GB/T 3512 Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests - Air-oven method

GB/T 3836.1 Explosive atmospheres - Part 1: Equipment - General requirements

GB/T 3836.5 Explosive atmospheres - Part 5: Equipment protection by pressurized enclosure "p"

GB 3836.14 Explosive atmospheres - Part 14: Classification of areas - Explosive gas atmosphere

GB/T 4208 Degrees of protection provided by enclosure (IP code)

GB/T 4706.1 Household and similar electrical appliances - Safety - Part 1: General requirements

GB 4943.1 Audio/video, information and communication technology equipment - Part 1: Safety requirements

GB 4962-2008 Technical safety regulation for gaseous hydrogen use

GB/T 5169 (all parts) Fire hazard testing for electric and electronic products

GB/T 5226.1 Electrical safety of machinery - Electrical equipment of machines - Part 1: General requirements

GB/T 5563 Rubber and plastics hoses and hose assemblies - Hydrostatic testing

GB/T 7260.1 Uninterruptible power systems (UPS) - Part 1: Safety requirements

GB/T 7826 Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)

GB/T 12459 Steel buttwelding pipe fittings - Types and parameter

For the purposes of this document, the terms and definitions given in GB/T 20042.1-2017 and GB/T 28816-2020 as well as the following apply.

power system that may be used to maintain the function of an electrical installation or part of it in the event of a normal power supply interruption, excluding considerations of safety factors

temperature at which materials, components, modules, or equipment can operate safely and stably under normal operating conditions and achieve the expected performance

state where the temperature is maintained relatively constant

Note: This state is determined by the temperature change not exceeding 3K and not more than 1% of the absolute operating temperature (K) within 15 min.

reaction products, as well as excess air and hydrogen discharged from the PEMFC backup power system

device where fuel cell modules and their auxiliary devices are installed

control mode that monitors whether specified conditions are met and ensures that related control devices perform interrelated safety actions

minimum concentration (volume fraction) at which a flammable gas or vapor can be ignited and propagate flame in a uniform mixture formed with a combustion-supporting gas

For unavoidable safety risks, safety prompt signs and treatment instructions shall be provided, including auditory and/or visual alerts, as well as automatic and manual treatment measures.

The PEMFC backup power system and its protective devices, when designed and manufactured, shall be enabled to achieve the set functions under the physical environment and operating conditions specified by the manufacturer. Proton exchange membrane fuel cell backup power system - Safety

1 Scope

GB/T 31036-2025 is the Chinese safety standard for PEM fuel cell backup power systems: the units that keep a telecom base station, a data centre or a control room running when the grid fails, and that are replacing lead-acid batteries in that role because they hold energy in a tank rather than in a plate. The safety questions are correspondingly different: there is hydrogen stored on site, often indoors, and the system starts itself unattended. The standard addresses that directly, covering the protection against hydrogen accumulation, the ventilation and gas detection requirements, the leak tightness and the purge sequences at start-up and shutdown, the electrical safety of the stack and the power conditioning including insulation and protection against shock, the thermal and mechanical hazards, the control and protection functions and their behaviour on fault, the requirements on the enclosure and on installation and marking, together with the test methods for each. The 2025 edition takes effect on 1 September 2025. For a system maker, a telecom operator or an installer in China, this is the text an installation is judged safe against.

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This document is applicable to the proton exchange membrane fuel cell backup power system (hereinafter referred to as "PEMFC backup power systems") which shall simultaneously meet the following conditions:

--The rated electrical output power of the system shall be <=10 kW;

--The system shall output alternating current or direct current;

--The system shall use hydrogen as fuel;

--The system shall not be intended as a primary power source and shall operate continuously for <=72h.

PEMFC backup power systems with a rated power exceeding 10 kW shall refer to this document for use.

See Annex A for a typical proton exchange membrane fuel cell backup power system.

This document is applicable to the PEMFC backup power system for commercial, industrial, and domestic use in the non-hazardous (unclassified) areas around the equipment. This document does not cover safety requirements for installation sites.

Note: This document only considers the dangerous situations that may cause harm to people, objects, or the environment outside the PEMFC backup power system, and puts forward the safety requirements for such dangerous situations, excluding the safety measures that shall be taken when damage may be caused to the PEMFC backup power