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

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**Fuel cell modules - Part 1: Safety
(English Translation)**

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1 Scope

This document specifies the safety requirements for the structure, normal and abnormal operation, and testing of fuel cell modules.

This document applies to fuel cell modules with the following electrolytes.

- Alkaline;
- Polymer electrolytes (including direct methanol fuel cells) 1);
- Phosphoric acid;
- Molten carbonate;
- Solid oxides;
- Saltwater solution.

Fuel cell modules, with or without a casing, are capable of operating under significantly pressurized or near ambient pressure conditions.

This document pertains to the conditions that can cause harm to individuals and damage to the exterior of fuel cell modules. It does not involve protection against internal damage to fuel cell modules, as long as such damage does not pose a hazard to the exterior of the module.

For the needs of special applications, these requirements have been replaced by other standards for devices equipped with fuel cell modules.

This document does not involve fuel cells for road vehicles.

This document does not limit or inhibit technological progress. If the electrical materials or structural forms are different from those described in this document, inspection and testing shall be carried out according to the required purpose. If substantially equivalent, it shall be deemed to comply with this document.

The fuel cell module is a component of the final product. Conduct a security assessment on the final product to meet the security requirements of the terminal application scenario.

1) Also known as proton exchange membrane fuel cell.

This document only pertains to fuel cell modules with DC output.

This document does not involve the peripheral devices shown in Figure 1.

This document does not involve the storage and transportation of fuel and oxidizer in fuel cell modules.

2 Normative references

The following referenced documents are indispensable for the application 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 4208, Degrees of protection provided by enclosure (IP code) (GB/T 4208-2017, IEC 60529:2013, IDT)

GB/T 5169 (all parts), Fire hazard testing for electric and electronic products [IEC 60695 (all parts)]

GB/T 5169.11-2017, Fire hazard testing for electric and electronic products -- Part 11. Glowing/hot-wire based test methods -- Glow-wire flammability test method for end-products (GWEPT) (IEC 60695-2-11:2014, IDT)

GB/T 5226.1, Electrical safety of machinery -- Electrical equipment of machines -- Part 1. General requirements (GB/T 5226.1-2019, IEC 60204-1:2016, IDT)

GB/T 16855.1, Safety of machinery -- Safety-related parts of control systems -- Part 1. General principles for design (GB/T 16855.1-2018, ISO 13849-1:2015, IDT)

IEC 62040-1, Uninterruptible power systems (UPS) -- Part 1. Safety requirements

NOTE: GB/T 7260.1-xxxx, Uninterruptible power supply equipment (UPS) -- Part 1. Safety requirements (IEC 62040-1:2022, IDT)

IEC 62061, Safety of machinery -- Functional safety of safety-related control systems

NOTE: GB 28526-2012, Electrical safety of machinery -- Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005, IDT)

IEC 62282-4-101, Fuel cell technologies -- Part 4-101. Fuel cell power systems for electrically powered industrial trucks -- Safety

NOTE: GB/T 41134.1-2021, Fuel cell power systems for industrial electric trucks - Part 1. Safety (IEC 62282-4-101:2014, MOD)

IEC 62368-1, Audio/video, information and communication technology equipment - Part 1. Safety requirements

NOTE: GB 4943.1-2022, Audio/video, information and communication technology equipment - Part 1. Safety requirements (IEC 62368-1:2018, MOD)

IEC 62477-1:2022, Safety requirements for power electronic converter systems and

equipment -- Part 1.General

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

fuel cell module

A collection of one or more fuel cell stacks, which may include appropriate additional components if applicable, for assembly into a power generation device or a vehicle.

NOTE: A fuel cell module consists of the following main components. one or more fuel cell stacks, piping systems for transporting fuel, oxidizer, and exhaust gas, circuit connections for power transmission of the fuel cell stack, monitoring and/or control means. In addition, fuel cell modules also include devices for transporting additional fluids (such as cooling media, inert gases), devices for detecting normal or abnormal operating conditions, ventilation systems for the casing or pressure vessel and module, and electronic components required for module operation and power regulation.

[Source. IEC 60050-485.2020, 485-09-03]

3.2

acceptance test

The tests specified in the contract are conducted to demonstrate to the customer that the product meets its technical specifications.

using a higher safety factor may be limited in design.

NOTE 4: The module manufacturer shall provide at least the following information to the end user.

- a) PRD/PRV type used;
- b) Setting of PRD/PRV opening pressure;
- c) Pressure relief capability;
- d) End users should study the effectiveness of module PRD/PRV in the final product.

3.29

stack terminal bus bar

The output end that supplies electricity from the fuel cell stack to the outside.

[Source. IEC 60050-485.2020, 485-06-08]