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

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**Technical requirements of proton exchange membrane
electrolyzer**

PEM电解槽技术要求

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1 Scope

This document specifies the naming rules, general requirements, technical requirements, inspection rules, marking, and factory documentation requirements for proton exchange membrane electrolyzers (hereinafter referred to as "PEM electrolyzers").

This document applies to the design and manufacture of PEM electrolyzers with a rated hydrogen generation pressure of less than or equal to 10 MPa and a single-cell rated hydrogen generation rate of 1 m³/h to 500 m³/h. For PEM electrolyzers with a rated hydrogen generation pressure greater than 10 MPa and a rated hydrogen generation rate less than 1 m³/h or greater than 500 m³/h, this document can be a reference.

NOTE. Unless otherwise specified, all pressures refer to gauge pressure. The standard state in this document is a temperature of 0 °C and a pressure of 101.325 kPa (absolute pressure). The volumes of hydrogen and oxygen in this document refer to their volumes under standard state.

2 Normative references

GB/T 3098.6-2023

GB/T 3512

GB 3836.14

GB/T 5563

GB/T 15329

GB/T 24343

GB/T 24499

GB/T 29411

GB/T 29729

GB/T 37562

GB 50156

GB 50177

GB 50516

3 Terms and definitions

The terms and definitions defined in GB/T 24499, as well as the following terms and definitions, apply to this document.

3.1 Proton exchange membrane electrolyzer

An electrochemical device that uses a proton exchange membrane as the electrolyte and pure water as the reactant, and electrolyzes water with direct current to produce hydrogen and oxygen at the cathode electrode and anode electrode, respectively.

NOTE. A PEM electrolyzer includes components such as a proton exchange membrane, a catalyst layer, a porous transport layer, bipolar plates, and seals. It is usually composed of several sets of the above components connected in series or in series-parallel.

3.2 Proton exchange membrane; PEM

A polymer electrolyte membrane in which protons are used as conductive charge.

3.3 Membrane electrode assembly; MEA

An assembly consisting of a proton exchange membrane, and an anode catalyst layer and a cathode catalyst layer respectively placed on either side of the membrane.

3.4 Porous transport layer

A porous substrate that is placed between the catalyst layer and the electrode plate to

3.21 Variable load speed

The percentage of the current value loaded between the anode and cathode of the electrolyzer within a unit of time to the rated current value.

3.22 Current density

The current passing through a unit of active area of an electrode.

NOTE. Active area refers to the effective reaction area covered by the membrane electrode catalyst.

When the anode and cathode areas are inconsistent, the smaller area shall prevail.

3.23 Rated current density

The current density of a PEM electrolyzer operating continuously under rated working

conditions.

3.24 Rated hydrogen generation rate

The nominal hourly hydrogen production volume under standard state of the electrolyzer.

NOTE. It is also known as the nominal hydrogen production rate.

3.25 Maximum single cell voltage value difference

The difference between the highest and lowest voltage values in each individual electrolyte cell of the electrolyzer.

NOTE. It is abbreviated as single-cell voltage range. A single electrolyte cell is also called a single cell or electrolytic chamber.

3.26 Direct current power consumption

The amount of DC electricity consumed to produce one unit volume of hydrogen.

4 Naming rules

The product name of a PEM electrolyzer shall include at least the product type, rated hydrogen generation rate, and rated hydrogen generation pressure.

Rated hydrogen generation pressure, in MPa Rated hydrogen generation rate, in m³/h
Product type, PEM stands for "Proton Exchange Membrane".

5.1.1 The structure and operating parameters of the PEM electrolyzer shall be capable

of producing hydrogen by electrolyzing water with direct current and producing gas that meets the requirements.

5.1.2 The design of PEM electrolyzers shall meet the requirements of voltage resistance,

insulation, prevention of out-leakage/internal infiltration, and adaptability to environmental conditions.

5.1.3 The pressure resistance of the PEM electrolyzer shall meet the requirements of

the rated hydrogen generation pressure.

5.1.4 The ambient temperature of the PEM electrolyzer should be 5 °C~45 °C.

5.1.5 The operating temperature of the PEM electrolyzer should be less than or equal to 90