TECHNICAL SPECIFICATION

PEM ELECTROLYZER STACK

English edition | For technical evaluation and project integration

50 Nm3/h

DOCUMENT IDENTIFIER: RATED HYDROGEN PRODUCTION

Rated hydrogen production	**50 Nm3/h**
Rated current	**2646 A**
DC energy consumption	**<= 4.5 kWh/m3**
Hydrogen-side working pressure	**<= 1.6 MPa**

Identification note: no independent sales model number is stated in the supplied source specification.

The rated production capacity is used as the document identifier. Values above match the body parameter table.

1. Scope

This specification describes the principle, technical requirements, testing and inspection, and safety requirements of the PEM electrolyzer stack. It applies to PEM water electrolyzer stacks for hydrogen/oxygen mixed-gas generation capacities from 0.1 to 100 m3/h.

2. Operating Principle

2.1 Water electrolysis and oxygen evolution

At the anode, water (2H2O) undergoes an electrochemical reaction under the electric field and catalyst, producing protons (4H+), electrons (4e-), and gaseous oxygen (O2):

$$2H2O = 4H+ + 4e- + O2$$

2.2 Proton exchange

The 4H+ protons pass through the solid PEM containing sulfonic-acid functional groups and migrate to the cathode under the electric field.

2.3 Electron conduction

The 4e- electrons are transferred from the anode to the cathode through the external circuit.

2.4 Hydrogen evolution

At the cathode, 4H+ combine with 4e- to form 2H2.

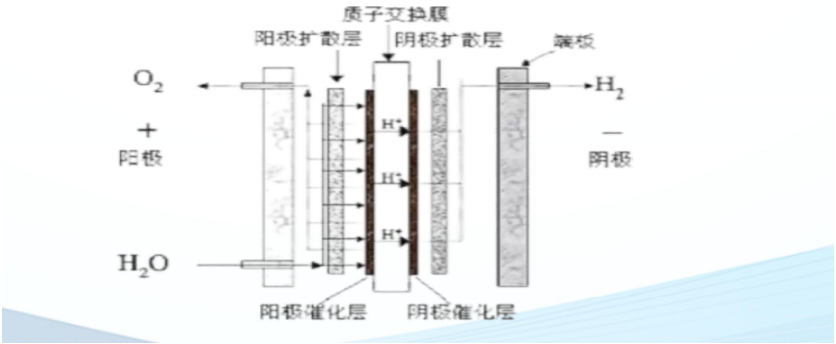
$$4H+ + 4e- = 2H2$$

Overall reaction: 2H2O = 2H2 + O2 (with electrical power)

$4H^{+}+4e^{-}=2H_2$ （2）

反应方程式：

$2H_2O=2H_2\uparrow+O_2\uparrow$（通电）



3. Basic Parameters

Item	Specification
Hydrogen production	50 Nm3/h
Oxygen production	25 Nm3/h
Rated current	2646 A
Voltage range	86.4-120 V
Effective area per MEA	1764 cm2
Number of cells	48
Platinum plating	Yes
Terminal lug	With
Water pump flow	>= 186 L/min
Energy consumption	<= 4.5 kWh/m3
Operating temperature	40-45 C (recommended: 40 C)
Oxygen-side working pressure	<= 0.5 MPa
Hydrogen-side working pressure	<= 1.6 MPa
Water quality / resistivity	>= 15 Mohm.cm
Oxygen-side water inlet	77.5 clamp connection
Oxygen-side water outlet	77.5 clamp connection
Hydrogen outlet	3/4 in x 2
Single-stack dimensions (excl. bolts/piping)	746 x 860 x 494 mm
Weight	1142 kg

4. Operating Conditions and Precautions

• Ambient air temperature: 5-40 C; maximum relative humidity: 90%.

• The installation site shall be free from gas vapors, chemical deposits, dust, mold, explosive or corrosive media that could seriously affect operation. Severe vibration and shock shall be avoided. The source specification references GB 4962 and GB 9448.

• Input supply voltage shall be determined by the user; recommended AC voltage levels are 220 V or 380 V. Voltage fluctuation shall be less than +/-10%.

• Cooling-water pressure is recommended at 0.2-0.4 MPa.

• Instrument or pneumatic compressed-air supply pressure shall be determined according to applicable requirements; the source specification references GB/T 4830 for air quality.

• Components in contact with corrosive media shall have valid quality certificates and shall be verified before use.

• Electrical component temperature rise shall meet continuous-duty requirements.

• With electrolyte present, insulation resistance between the electrolyzer and frame, electrolyzer and ground, and between gas/liquid vessels and frame shall be not less than 5 Mohm. Insulation resistance between the rectifier control circuit and frame shall be not less than 200 Mohm.

• Instrument indication accuracy of the water-electrolysis hydrogen/oxygen generator shall be Class 2.5 or better.

Feed-water quality requirements

Parameter	Unit	Requirement
Resistivity	Mohm.cm	>= 15
Iron ion content	mg/L	< 1
Chloride ion content	mg/L	< 2
Suspended solids	mg/L	< 1

5. Performance Calculations

5.1 Hydrogen production calculation

$$Q = I \times n \times \eta / 2390$$

Where Q is hydrogen production (m3/h), I is DC operating current (A), n is the number of cells, and eta is current efficiency. Under standard conditions, the source document uses 22.43 x 10^-3 m3 as the standard volume of 1 mol H2, giving a theoretical charge requirement of 2390 A.h/m3.

For I = 2646 A and n = 48: Q = 2646 x 48 / 2390 = 53.1 m3/h.

5.2 DC power consumption per unit hydrogen

$$W_{H2} = I \times U \times T / (Q_{H2} \times 10^3)$$

For I = 2646 A, U = 86.4 V, Q_H2 = 53.1 m3/h and T = 1 h: W_H2 = 4.31 kWh/m3.

6. Testing and Inspection

6.1 Pressure test

After the manufacturing appearance inspection is passed, introduce nitrogen at 3.5 MPa sequentially into the cathode and anode inlets. Hold at test pressure for 10 minutes, then reduce to design pressure and inspect all connections for leakage. The test is passed if no leakage is found.

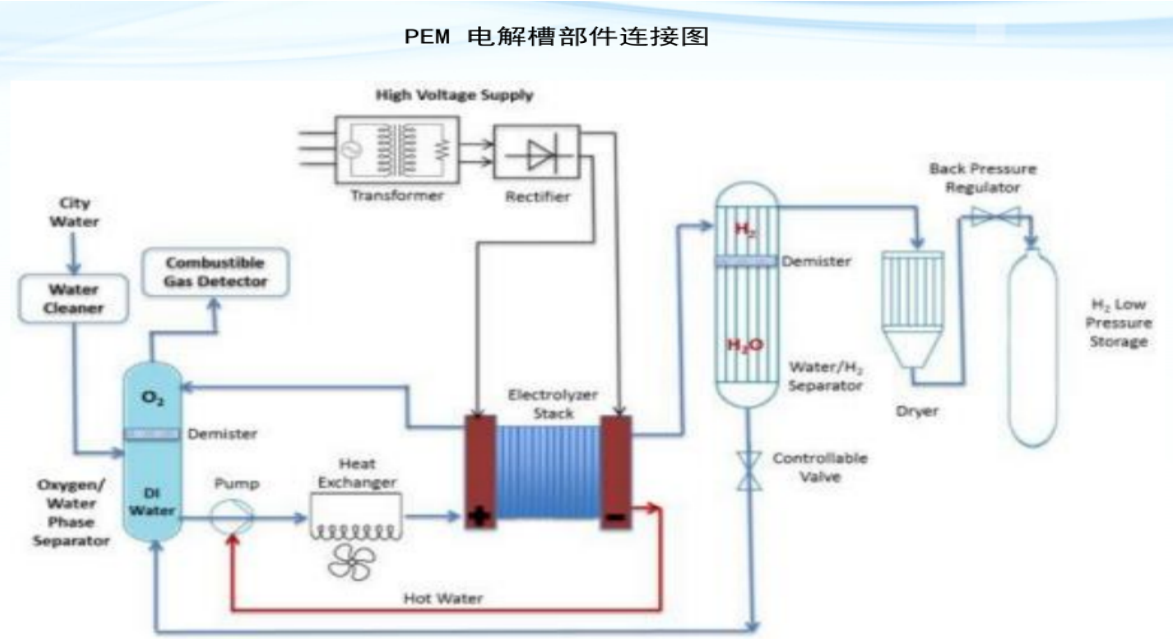
6.2 Gas-tightness test

After passing the pressure test, perform a nitrogen gas-tightness test at 3 MPa. Increase pressure slowly, hold for 30 minutes after reaching test pressure, and inspect all connections. The test is passed if no leakage is found.

6.3 Performance test

1. Connect the test bench, power supply, and related components as shown in the system diagram.
2. Confirm normal tank water level and reliable connections with no leakage or looseness.
3. Start tank heating and water circulation, adjust pump flow, and heat to rated operating temperature.
4. Switch on the power supply. Set the initial voltage and constant-current mode; initial current is 264.6 A.
5. After stack voltage stabilizes and all components are confirmed normal, increase current gradually at 10% of rated current per minute until rated operating current is reached.
6. Measure total stack voltage and individual-cell voltage once every hour and record the data.
7. Conduct a 16-hour aging test.
8. At shutdown, decrease operating current at a rate of 10% of rated current until 0 A, then switch off the power supply.
9. Purge both hydrogen and oxygen sides with nitrogen at 10 L/min for 5 minutes.

7. PEM Electrolyzer Component Connection



六、售后服务

8. After-Sales Service

• One-year warranty for the PEM electrolyzer stack. Failures caused by product quality issues during the warranty period are eligible for free repair or replacement.

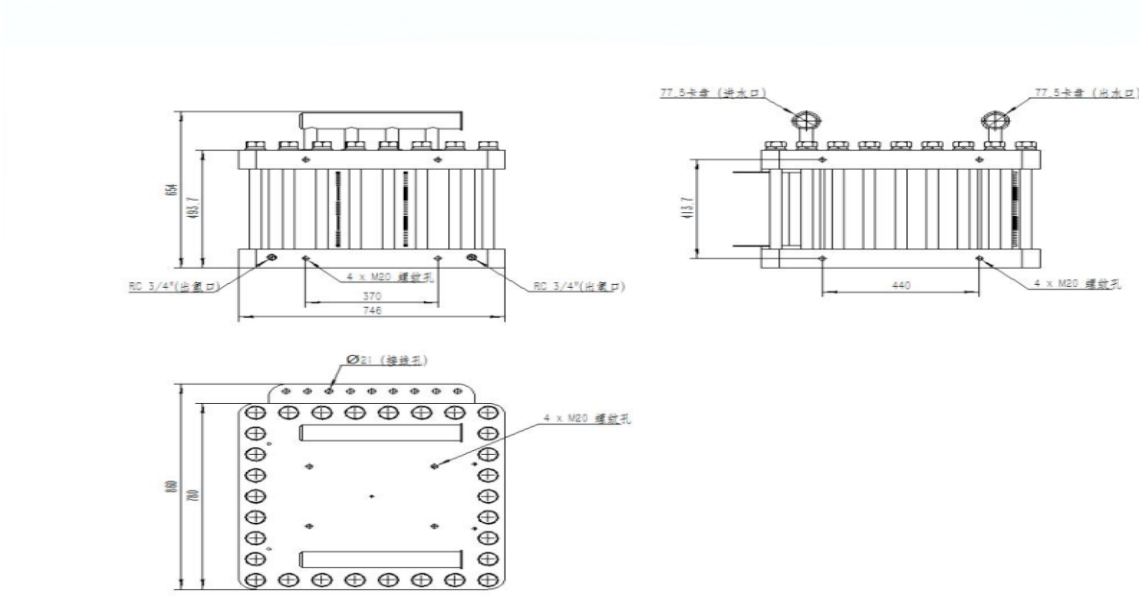
• 24-hour technical support service for after-sales needs.

• Periodic customer follow-up to review operating conditions, collect feedback, and improve service quality.

• Rapid fault-response service and original spare-parts support when necessary.

• If an equipment fault cannot be resolved online, an on-site service plan will be discussed and confirmed with the customer before dispatch.

9. 50 Nm3/h Stack Structure Drawing



10. Service Commitments

• Compliance and service quality: services shall be provided in accordance with applicable laws, regulations, and industry standards.

• Professional technical service system: dedicated technical personnel and adequate resources shall support timely and effective service.

• Full-life-cycle support: long-term after-sales support is provided for sold PEM electrolyzer stacks throughout their service life.

• Confidentiality: customer business secrets and technical information shall be strictly protected and shall not be disclosed to third parties without customer authorization.

GreenMaker OEM

English OEM Technical Specification