

H2ESK

ECO-GREEN CREATOR

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Contents

1. Company Introduction

- About Us
- Company Value
- Company History
- Company Organization

2. Products

- Hydrogen Generator (AWE/PEM)
- PEM Water Electrolysis Stack
- MEA
- H2 Generator test kit



About Us



Company : H2ESK Co.,Ltd.

Representative : Peter (Y.B) Song

Date of Company
Founded : August 2021

Headquarters
Address : 316 Venture Bldg. 61 Kumoh
Institute of Technology Daehak-ro,
Gumi, Gyeongbuk, 39177, South
Korea

Seoul Office : A-504, Halla One&One Tower, 101,
Gasam digital 2-ro, Geumcheon-gu,
Seoul, 08505, South Korea

Website : www.h2esk.com

I Company Value

1. Mission : Contribute to eco-friendliness by creating value with the best products

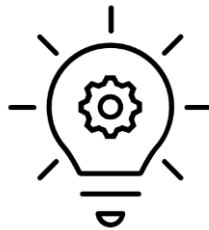
2. Vision : Generate Green Energy, Contribute Green World

3. Core Values :



Honesty

*Open mind based on
honesty and trust*



Differentiation

*Value Adding through
differentiation*



Teamwork

*Development and new
creation through
teamwork*

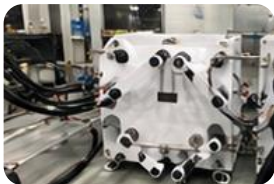
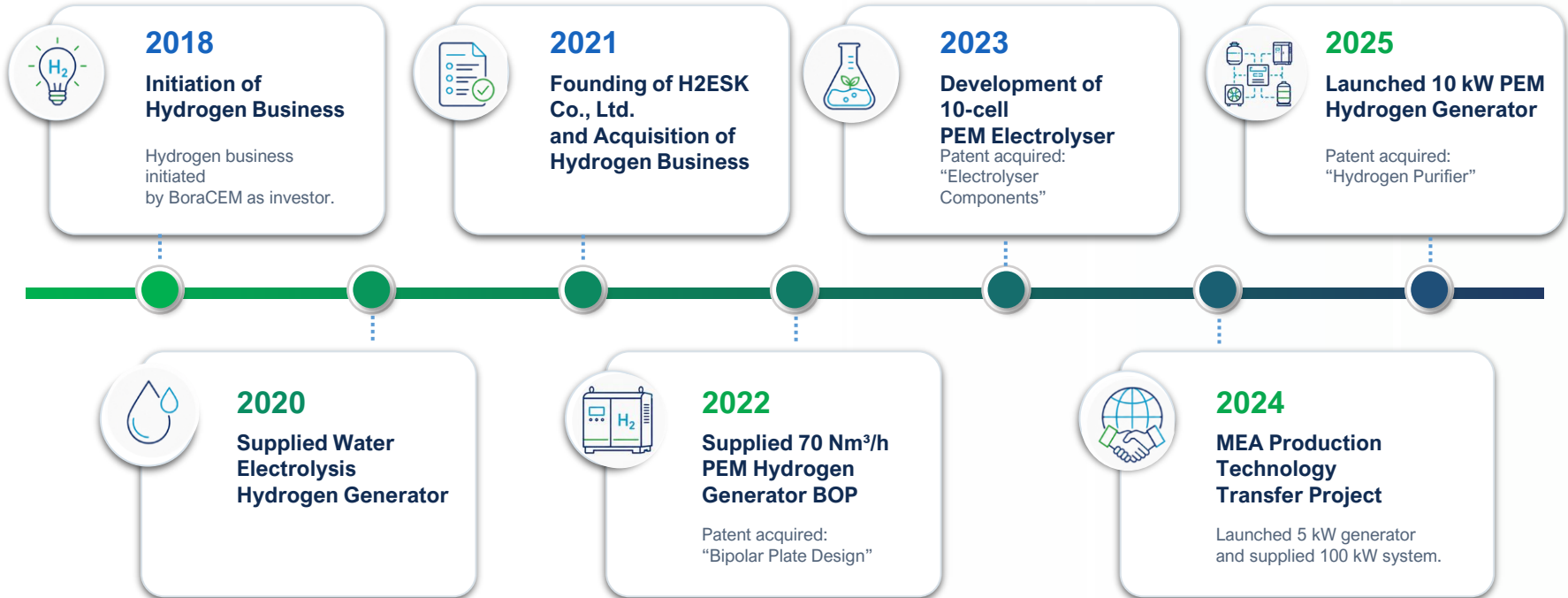
4. Strategy :

- Customer : Partnership Project On time
- Networking : Eco friendly technology
- Products : Water Electrolysis Hydrogen Generator



I Company History

Building the Future of Green Hydrogen with Innovation and Continuous Growth



R&D & Prototype

Continuous research and technology development



Stack & BOP Solutions

High-performance and reliable product solutions



System Integration

Optimized integration for various applications



Future Innovation

Expanding technology for a sustainable hydrogen future

I Company Organization

Customer Requirement

Application

Environment

Specification

Commercialization

- Competitive Price
- Reliability
- Infrastructure



Government Institution

Codes & Standards



Performance



Safety

Research,
Industry,
Public / Society



Regulations

- Ministry of Trade, Industry & Energy
- Korea Gas Safety
- Korea Hydrogen Law



Why H2ESK?

Advanced PEM Electrolyser Solutions for Hydrogen System Manufacturers

Technology Edge



High Efficiency

Optimized electrolysis efficiency for lower energy consumption



High Current Density

Higher hydrogen output from a compact active area



Reliable Operation

Stable performance operation with strict stack testing



Scalable Design

From R&D units to industrial hydrogen application

H2ESK PEM Electrolyser Stack



Customer Value



Easy Integration

Designed for BOP and hydrogen generator platforms



OEM Customization

Flexible cell number, active area, pressure and capacity



Engineering Support

Technical collaboration from design review to commissioning



Global Partnership

Supporting international customers with stack supply and know-hows



**Your Success
is Our Value**



**Faster
Time-to-Market**
Shorten your development
and commercialization time



**Lower
Development Cost**
Reduce cost and risks
with proven technology



**Proven
Technology**
Field-proven performance
and reliability



**Flexible
Solutions**
Tailored solutions for diverse
applications and markets



**Long-Term
Partnership**
Beyond supply, we grow
together with you

Products

- Hydrogen Generator (AWE/PEM type)
- PEM Water Electrolysis Stack
- MEA
- Parts & Tools
- H2 Generator test kit

Hydrogen Generator



PEM Stack & MEA



Test Equipment



Hydrogen Generator



Item	Specification	
Capacity	5KW	10KW
Electrolyser Type	PEM Water Electrolysis Type	
Operating Method	Automatic or Manual Selection (Touch Screen)	
Input Power	380VAC, 3-phase, 50/60Hz (Option: 220V Single-phase)	
Power Consumption	< 5 kW	< 10kW
Hydrogen Gas Production	1 Nm ³ /h (1,000 L/h), approx. 2 kg/day	2 Nm ³ /h (2,000 L/h), approx. 4 kg/day
Operating Pressure	Max. 5 bar	
Operating Temperature	10 ~ 60°C	
Hydrogen Purity	Hydrogen gas 99.97% ~ 99.99% (with condenser)	
	Option: Hydrogen gas + ambient humidity (without condenser)	
	Option: 99.999% purity (with Purifier)	
Feed Water	Ultrapure water or DI water (can be used by connecting suction hose)	
	If tap water is supplied, the system produces its own pure water	

Hydrogen Generator



Features

- AWE (Alkaline Water Electrolysis) type / PEM (Polymer Electrolyte Membrane) type
- Manufacture / Modify according to Customer request
- Able to control the production of hydrogen within the maximum production
- No electrolyte management is required using a solid polymer electrolyte (PEM) method
- No corrosion as only pure water is used

AWE Type Hydrogen Generator

	Unit	Hydrogen Gas Generator Model				
		HG-15MS	HG-50MS	HG-200MS	HG-500MS	HG-1000MS
I. Hydrogen Gas Production						
Flow Rate	Nm³	15	50	200	500	1000
Operating Pressure	MPa	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8
Production Temperature	°C	32	32	32	32	32
Hydrogen Purity	%	99.995~99.999	99.995~99.999	99.995~99.999	99.995~99.999	99.995~99.999
Operating Range	%	15-100	15-100	15-100	15-100	30-100
II. Oxygen Gas Production						
Flow Rate	Nm³	7.5	25	100	250	500
Operating Pressure	Mpa	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8	0.3 - 0.8
Oxygen Purity	%	99.7	99.7	99.7	99.7	99.7
Operating Range	%	15-100	15-100	15-100	15-100	30-100
III. Power Supply						
Voltage	Factory Configured, 380-480 VAC, 3-Phase					
Frequency	50-60 Hz					
IV. Performance Guaranty						
Stack P/W Consumption	kWh/Nm³	5.0	5.0	4.7	4.6	4.6
Efficiency Of Rectifier	%	90~93	90~93	90~93	90~93	90~93
BOP P/W Consumption						
- KOH Circul. Pump	kWh	-	1.9	4.5	7	15
- Demi Water Pump	kWh	-	2.2	3	3	8
- Elec. Heater	kWh	-	5	8	10	15
V. Dimension & Weight						
Length for Stack	mm	-	2060	4010	5400	6000
Weight for Stack	kg	-	8000	25000	35000	50000
Dim. for Gas Liquid Separating Sys.	mm	N/A	2800×1800×3650	3300×1900×4500	4000×2500×4500	4700×3200×4500
Dim. for Gas Purification Sys.	mm	N/A	2700×1800×2700	3000×1800×4500	3800×2200×4500	4300×2700×4500
VI. Type	-	Case	Case/Container			

*Above specifications are based on our standard models and can be customized according to the customer's requirements upon discussion

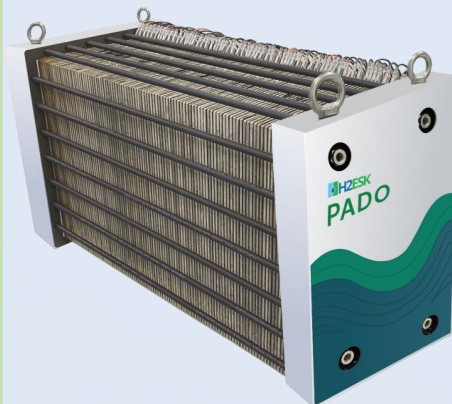
PEM Water Electrolysis Stack



Active Area 25cm²
24 -cell Stack



Active Area 100cm²
4 -cell Stack



Active Area 330cm²
100 -cell Stack

Features

- Achieving Cost-effectiveness through Development of Flat Plate Flow Channels
- Efficient and Compact Design
- Optimal Stack Selection Tailored to Customer Needs
- Various Electrode Areas (Current) and Number of Cells (Voltage)

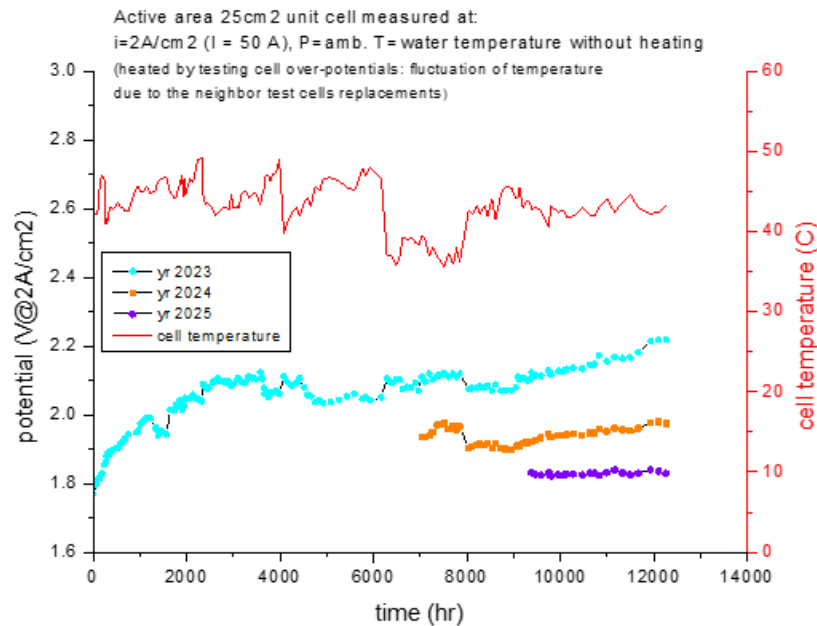
PEM Water Electrolysis Stack

Test result of PEM Electrolyser Long-term

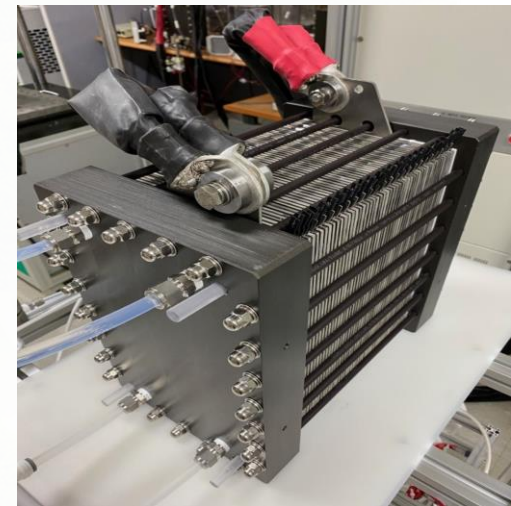
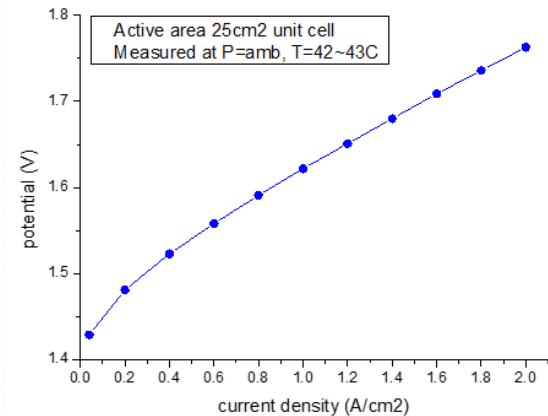
- Current density: 2A/cm² (50A)
- Pressure: ambient
- Temperature: without heating

* Some peaks result from the environmental changes and on-off processes.

Long-term stability (on-going now)



V I Curve



PEM Water Electrolysis Stack

- Active area 25cm² stack

Number of Cells	4	12	24
Hydrogen Generation Rate (NL/hr)	70	220	440
H2 Purity	Higher than 99.99 % (except humidity)		
H2 Pressure	~ 3 bar		
Stack Operation Temperature	Recommend 60 ~ 70 °C (5 ~ 90 °C possible)		
Oxygen Generation Rate (NL/hr)	35	110	220
Maximum Applying Current (A)	40	40	40
Maximum Applying Voltage (V)	8	24	48
Maximum Power Consumption (W)	320	960	1920
Water Consumption (cc/hr) (assumed recycling water in H2 chamber)	60	180	360
Water Quality	Distilled or Deionized Water (lower than 1μS/cm)		
Fluid inlet & outlet connection	1/4 inch NPT fitting		
Stack Dimension (W x H x D)mm (exclude bolt tips)	100x90x55	100x90x95	100x90x155
Weight (kg)	1.5	2.1	3



Active area 25cm² 24-cell Stack

Hydrogen production rate can be calculated proportionally based on the number of cells.

PEM Water Electrolysis Stack

- Active area 100cm² stack

Number of Cells	4	12	24
Hydrogen Generation Rate (NL/hr)	270	820	1640
H2 Purity	Higher than 99.99 % (except humidity)		
H2 Pressure	~ 7 bar		
Stack Operation Temperature	Recommend 60 ~ 70 °C (5 ~ 90 °C possible)		
Oxygen Generation Rate (NL/hr)	135	410	820
Maximum Applying Current (A)	150	150	150
Maximum Applying Voltage (V)	8	24	48
Maximum Power Consumption (kW)	1.2	3.6	7.2
Water Consumption (cc/hr) (assumed recycling water in H2 chamber)	230	750	1500
Water Quality	Distilled or Deionized Water (lower than 1μS/cm)		
Fluid inlet & outlet connection	1/4 inch NPT fitting		
Stack Dimension (W x H x D)mm (exclude bolt tips)	160x175x107	160x175x147	160x175x205
Weight (kg)	8.8	11.4	15.4



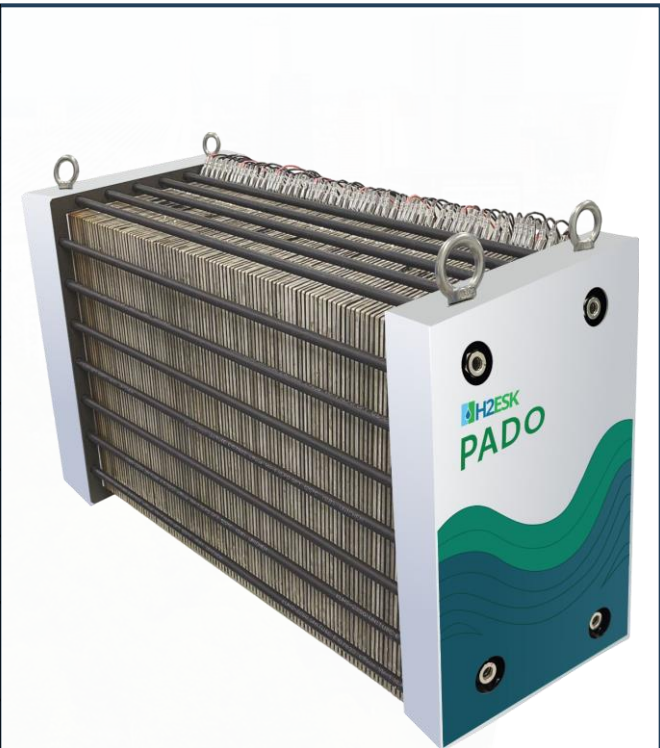
Active area 100cm² 4-cell Stack

Hydrogen production rate can be calculated proportionally based on the number of cells.

PEM Water Electrolysis Stack

- Active area 330cm² stack

Number of Cells	24	50	100
Hydrogen Generation Rate (Nm ³ /hr)	5.5	11.4	22.8
H ₂ Purity	Higher than 99.99 % (except humidity)		
H ₂ Pressure	~ 10 bar		
Stack Operation Temperature	Recommend 60 ~ 70 °C (5 ~ 90 °C possible)		
Oxygen Generation Rate (Nm ³ /hr)	2.7	5.7	11.4
Maximum Applying Current (A)	500	500	500
Maximum Applying Voltage (V)	48	100	200
Maximum Power Consumption (kW)	24	50	100
Water Consumption (L/hr) (assumed recycling water in H ₂ chamber)	5	10	20
Water Quality	Distilled or Deionized Water (lower than 1μS/cm)		
Fluid inlet & outlet connection	3/8 inch NPT fitting		
Stack Dimension (W x H x D)mm (exclude bolt tips)	218x385x225	218x385x350	218x385x590
Weight (kg)	50	70	110



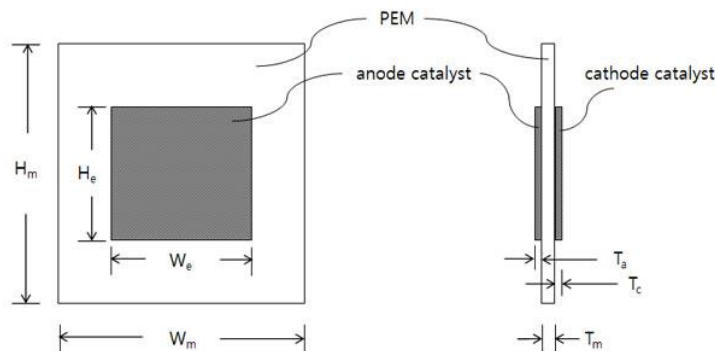
Active area 330cm²
100-cell Stack

Hydrogen production rate can be calculated proportionally based on the number of cells.

Membrane Electrodes Assembly

Features

- World-class performance and durability
- Size Optimization : Standard and Custom
- Fast manufacturing & Delivery
- World-class performance and durability verified for over 10,000 hours.
- Maximum Active Area: 40 × 40 cm (1,600 cm²)

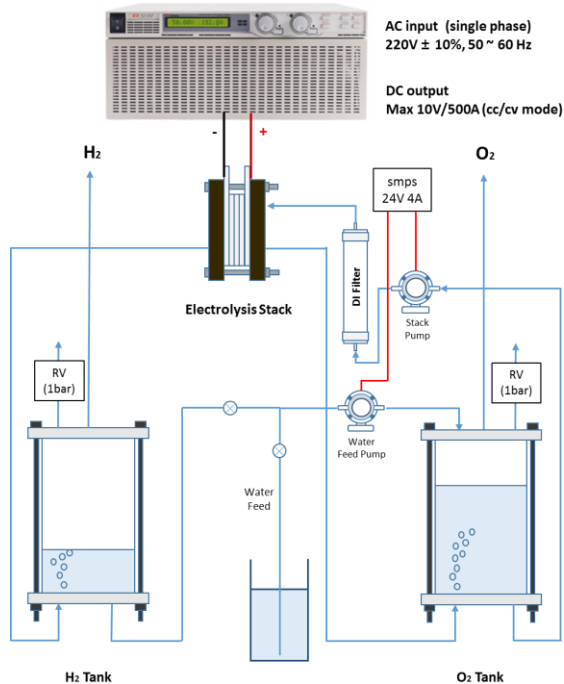


Standard Specification

	Electrolyte(PEM)	Anode Catalyst	Cathode Catalyst
Composition	Gore-Select	Ir + Ru	Pt/C
Thickness	0.08 mm (Tm)	0.02 mm (Ta)	0.02 mm (Tc)

	Electrode (We x He)	Membrane (Wm x Hm)
Area	5 cm x 5 cm(25cm ²)	6 cm x 8 cm(48cm ²)
	10 cm x 10 cm(100cm ²)	13 cm x 17 cm(221cm ²)
	15 cm x 22 cm(330cm ²)	18 cm x 30 cm(540cm ²)

Water electrolysis Evaluation Equipment



(Basic concept)

Power Supply

Max Power	5KW (125V/ 40A, 40V/83A)
Full Scale Voltage Range	40/60 V
Voltage Resolution	±0.1 of Full Scale
Power Source	380~400VAC, 50/60 Hz
Power Supply Option (1.7kW)	6V/220A, 8V/200A, 12V/140A

Water Handling

Material	SUS316L, PFA
Water Tank Volume	5L (Water Level 3L), Auto-Water Supply
Circulation Pump*	0.15~3L/min, Software Controlled
Operating Temperature Range	Ambient to 70°C
Liquid / Gas Separator	H ₂ Condenser, Heat Exchanger Water trap
Purge Gas (N ₂)	Software Controlled

Stack Instrumentation

EIS	0.1~10kHz
Cell Voltage Measurement	24 cell
Leakage Current Measurement	0~5A, Accuracy 3%
Pressure Sensor*	0~10 bar. g
Temperature Sensor*	K-Type
Purity Sensor	O ₂ In Product H ₂ , H ₂ O In Product H ₂
Mass Flow Meter*	0~50L/min

Physical and Environment

Operating Temperature	5~40°C
Size (WDH)	840mm1,300mm1,900mm
Power Source	220~240VAC, 50/60Hz
Weight	250kg

Remarks : Basic design concept is same but the Power supply,etc. can be changed by the Electrolyser and customer's

Hydrogen components (BOP)

System design and manufacturing



Capabilities in the engineering and production of hydrogen components and Balance of Plant (BOP) systems.

- Skilled Professionals
- Extensive Product Development Experience
- Integrated Design & Manufacturing Competence
- Strong Industry Networking
- Hydrogen-Related Product Sourcing Services in Korea

Hydrogen components (BOP)

Performance Evaluation Equipment



PEMFC



PEMEC



SOEC

The equipment is manufactured by our partner company in response to the requirements of a hydrogen research institute.

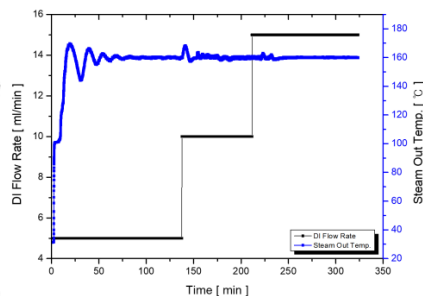
Hydrogen components (BOP)

Equipment Technology

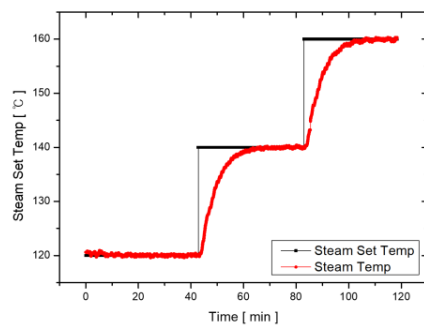
Steam Generator



Steam Generator (components)



Steam Generator (System)



Operation Features

Other Tools



MEA Spray JIG



Hot Press



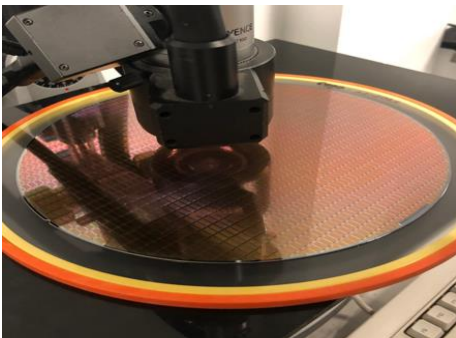
Stack assembly eqpt



Unit cell JIG



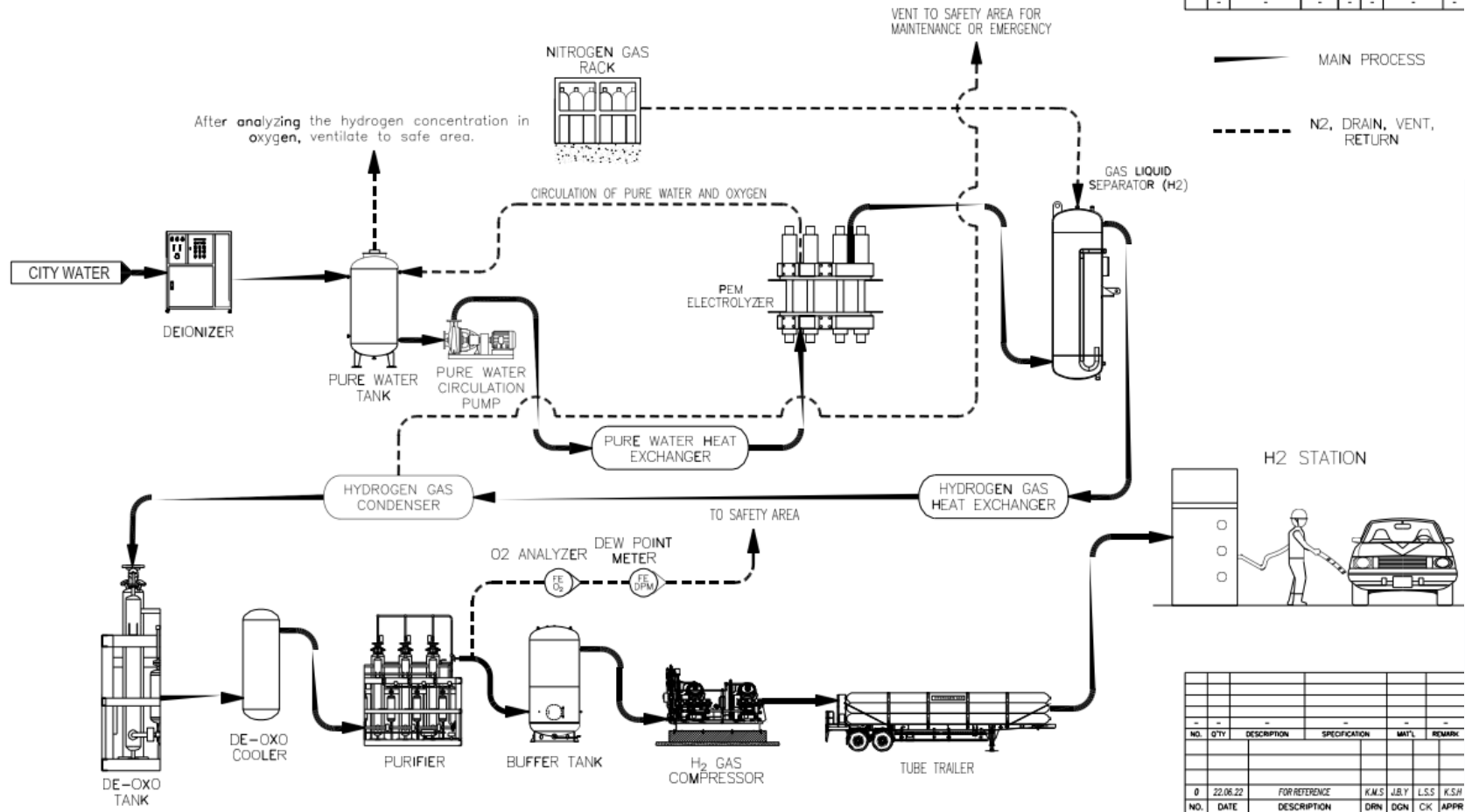
Application



1. Metal Product Processing
 - Heat treatment
2. Powerplant Cooling
 - Turbine cooling
3. Glass(Bottle) Manufacturing process
 - Prevent oxidation
4. Hydrogen tank supply replacement
 - Bomb, Tube Trailer
5. Semiconductor process
 - Thin -film deposition
 - Circuit generation
6. Petroleum plant process
 - For Methanol, Ammonia, etc.
7. Energy
 - Hydrogen Station, Fuel Cell

Hydrogen Refueling Station

PEM (Proton Exchange Membrane) PROCESS FLOW DIAGRAM



* A Hydrogen Refuel Station Turn Key project member

Hydrogen Refueling Station

H2ESK : Hydrogen Refuel Station engineering service and specialist



Compressor Package



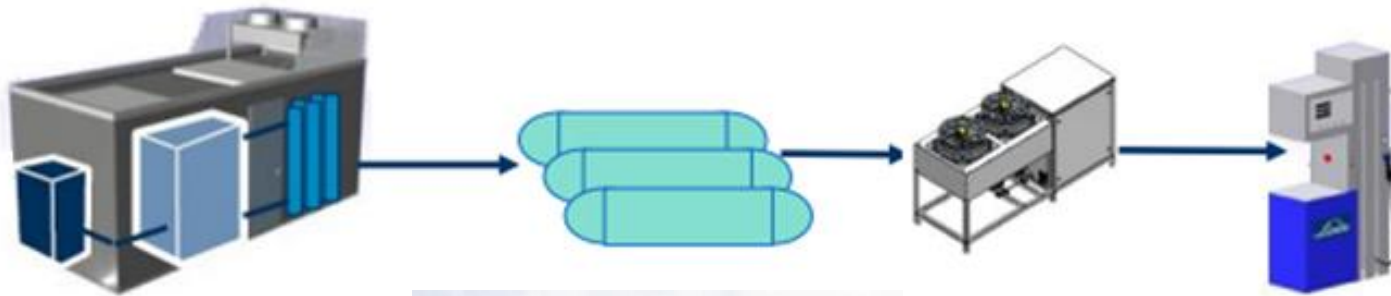
Storage Vessel



Pre-cooling Unit



Dispenser



Nexo Car (700 bar)

* A Hydrogen Refuel Station Turn Key project member



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