



TEST LINE #2

Anion Exchange
Membrane electrolysis

Technical data sheet
July 2025

H₂shift



Test Line 2: Anion Exchange Membrane electrolysis

Test Line #2 at the University of South Wales Hydrogen Centre in Baglan in Wales comprises three test stations:

- Large-scale test station for electrolyser systems up to 100kW
- Medium-scale test station for electrolyser systems of approximately 10kW
- Small-scale test station for electrolyser systems of approximately 1kW

Operating conditions		Notes
<i>Power</i>	<i>Value</i>	
Indicative maximum power	i. 100 kW ii. Nominally 10kW but can accommodate up to 30kW iii. Nominally 1kW but can accommodate up to 10kW	The 100kW AEM test line currently hosts Showcase #2 with Protium Green Solutions, Pioneer 1 AEM electrolyser, using the full 100kW capacity. The medium-scale and small-scale AEM test lines are currently under development at the USW Hydrogen Centre.
<i>Temperature</i>	<i>Value</i>	
Maximum process temperature [°C]	Existing 100kW system: Actual operating 55 °C. Nominal Maximum 80°C.	External chiller cooling cycle maintains target maximum temperature on the existing 100kW AEM test line. Operating and cooling options can be accommodated for small and medium-scale lines.
Minimum process temperature [°C]	Existing 100kW system: Actual operating 45 °C. Minimum effective during start up 6°C	On the existing 100kW system the anti-freezing routine automatically activates if the internal electrolyte tank temperature is below 6°C. It switches off once the electrolyte reaches 10°C. Frost protection on small and medium-scale lines can be accommodated.
Ambient temperature range [°C]	Operating Conditions: 5°C to 45 °C, up to 90% humidity.	Site ambient minimum of -15°C and maximum of +35°C. Frost protection systems (and draining routines) in place to prevent freeze damage of water bearing equipment.
<i>Pressure</i>	<i>Value</i>	
Maximum process pressure [bar(g)]	Existing 100kW system: Maximum hydrogen output pressure is up to 35 barg	Current system maximum 38.5bar (g) at relief set pressure. Small and medium-scale systems have a similar upper pressure limit, but higher pressure systems may be incorporated by design.
Minimum process pressure [bar(g)]	Existing 100kW system: Minimum operating hydrogen output pressure of 29 bar(g) controlled	System operating pressure is configurable for all three test stations, subject to adequate system design and protection against air ingress.
Water input pressure range	1 – 4 bar(g).	Mains water pressure. Existing 100kW system has integral demineralization. Small and medium-scale test stations have existing water demineralization available.
Hydrogen vents	System specific	Medium and large-scale test stations can incorporate further hydrogen compression and storage, or product vent to atmosphere. Small-scale test station will vent hydrogen to atmosphere only.
Oxygen vents	System specific	All test stations currently vent oxygen to atmosphere only.
Chamber layout, reactor configuration, samples, and similar		Notes
	<i>Value</i>	
AEM Stack layout	System specific	Layouts of individual modules, or multiple modules can be accommodated as required by all three test lines.
Hydrogen product sampling	System specific	System design incorporates product sampling points. On-site hydrogen analysis is available. Some impurity analyses will also require off-site analysis
Fluids		Notes
<i>Inlet</i>	<i>Value</i>	
Water	System specific	Adequate water flow is available for all envisaged operating scenarios. Systems on 100kW test line will require integral water purification, but demineralization is available on site for small and medium test stations.
Water (quality)		Existing systems meet ASTM D1193-06 Type III standards as a minimum. Specific limits include: Total Organic Carbon below 1000 ppb, Total Silica below 500 ppb, Acidity under 0.1 meq/L, and Conductivity less than 5 µS/cm.
<i>Gas/steam output</i>	<i>Value</i>	
Hydrogen (product)	Notional production flows: Large station up to 20 Nm ³ /h (43.14kg/day) Medium station 2 Nm ³ /h (4.31kg/day) Small station 0.2 Nm ³ /h (0.43kg/day)	Note the power provision may allow for larger small and medium systems to be tested.
Oxygen (vented)	System specific	Existing 100kW system vents 10 Nm ³ /h O ₂ . Vent Outlet Output: up to 58 °C with 1.5kg/h max water (H ₂ O) and trace H ₂ .
Gas analysis		Notes
<i>Instruments</i>	<i>Value</i>	
Mass spectrometer	Yes	Available on site
Gas chromatography	Yes	Available off site for samples
Hydrogen Purity specification	System specific	Hydrogen product purity will be system specific. Typical systems will meet or exceed ISO 14687:2025 -Hydrogen fuel quality — Product specification.



Control and acquisition system		Notes
<i>Control system</i>	<i>Value</i>	
Programmable control system [yes/no]	System specific	Control configuration of the existing 100kW system is confidential, but system control configurations will form part of the system design and integration at all levels.
Remote control [yes/no]	System specific	Potential for remote control subject to confirmation of safe system design.