



Leak testing for hydrogen technology

Green hydrogen stands for innovation and sustainability in the energy sector of the future. The leak tightness of the components used plays a decisive role. MACEAS is at the forefront of this movement, providing innovative leak testing solutions for a wide range of applications and components. These start with the bipolar plate of the fuel cell and the electrolyser through to the high-pressure components of the storage system.

Bipolar plates of fuel cell and electrolyser

Green hydrogen is emerging as a central force in the energy and mobility transition and is particularly relevant for industry, the transport sector and energy storage. While batteries are the number one choice for cars, in the transport sector in particular, hydrogen and fuel cell drives are gaining in importance for heavy-duty applications and for public transport due to fast refuelling options and their long ranges. Fuel cells, which supply the required electricity, rely on the integrity of bipolar plates and other components. Electrolysis is the only way to produce the required hydrogen in a climate-neutral manner.

MACEAS offers innovative and reliable leak tests and leak testers for the bipolar plates of fuel cells and electrolyzers. The different circuits of the bipolar plates are tested for leakage against one another within a test cycle.



PRACTICAL EXAMPLE

Helium leak testing of bipolar plates:

- Effective cycle time: 12 s
- Capacity: 300 parts / h
- Test gas: 10 % helium / 90 % air
- Leakage rate: $4,8 \cdot 10^{-5}$ mbar · l/s (with 10 % helium)



Cryogenic hydrogen containers (LH₂)

Cryogenic hydrogen containers enable the safe storage of hydrogen in liquid form at extremely low temperatures. The insulation and tight sealing of these containers are essential for storage stability, which is why MACEAS uses helium leak testing to ensure minimum leakage rates.

The cryogenic tank testing device designed by MACEAS allows precise leak tests and evacuation studies to ensure the highest hydrogen storage standards.

High pressure leak tests

The components of the tank and storage system such as valves and piping in particular must be able to withstand high pressures and at the same time be sealed very tightly. MACEAS supplies innovative leak testing solutions for this application with test pressures of up to 1,000 bar using different test gases.

MACEAS testing service

Ensure the highest quality and safety for your products! Our testing service checks your products for leaks and defects before they are launched on the market. With our modern measurement technology and specialised leak tests, we guarantee precision and detect even the smallest leaks. Place your trust in our expertise – from prototypes to small series – for reliable products without unwanted errors.

H₂

Leak testing for battery technology

In the age of electric systems, the integrity of batteries is crucial. Our state-of-the-art leak testing systems and leak testers ensure that every battery used in an electric vehicle, for example, meets the highest quality requirements.

Our leak testing systems enable the detection of very low leakage rates – both in the battery cell housings and covers as well as during end-of-line testing of the finished battery cell. Various methods such as helium-vacuum leak testing of battery cells and thermal management cooling elements are available. Another option is automatic and robot-controlled sniffing of battery packs with helium as a test gas. Alternatively, the unique ultrasonic gas bubble detection in a water bath can also be used.

Suitable for leak tests of

- Battery cells
- Battery cell housings
- Battery cell covers
- Battery packs
- Thermal management components

End-of-line leak test

A battery cell that has been filled with the electrolyte and fully sealed is difficult to test for leaks at the end of the manufacturing process with the helium-vacuum method. The end-of-line leak test minimises this quality risk; the battery cell is tested for leaks in a vacuum chamber. This is performed by direct detection of solvent that escapes from a possible leak in a gaseous aggregate state.

Your advantages at a glance:

- Objective and reliable leak testing in a vacuum
- Detection of very low leakage rates
- Single or multi-chamber testing system
- Fully automated testing process
- Short cycle times
- Helium recovery or gas mixing systems
- Article holders for other product variants
- Cycle time reduction with additional test chambers

Your benefits of end-of-line leak testing at a glance:

- Detection of the most common solvents: DMC, DEC, EMC and PP
- Lowest detectable leakage rate = $1 \cdot 10^{-6}$ mbar · l/s (as helium equivalence)
- Short cycle times
- Fully automated process solutions
- Traceable and reliable test results
- High battery cell safety and service life

Customised battery cell leak testing



Fully automated and customised end-of-line leak tests for battery cells.

We look forward to hearing from you:

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