



One example of the possibilities provided by the 'one-stop-shop-solution' from BUTTING CryoTech: electrolysers for green hydrogen production

BUTTING CryoTech: contributing to green hydrogen

With our BUTTING Group products, we have long been a contributor to the United Nations' Sustainable Development Goals. BUTTING CryoTech offers impressive evidence of this by supporting the increased use of renewable energies.

By Andrea Kiel, Head of Marketing & Communications, BUTTING

Green hydrogen

Green hydrogen is a key element when it comes to replacing fossil fuels in the future and sustainably reducing our CO₂ emissions. This is because it is produced through electrolysis, using renewable energy. As a result, no fossil fuels are required, and no carbon emissions are produced in the process. Therefore, hydrogen is indispensable for facilitating a successful energy transition and achieving international climate goals.

Whether as a raw material for industry, as a fuel for fuel cells or as a synthetic energy source – the possible applications of hydrogen are many and varied.

Since 2022, BUTTING CryoTech has been working with a global manufacturer of Proton Exchange Membrane (PEM) electrolysers. The French market leader's product portfolio includes containerised electrolyser systems in the power range between 50 kW and 10 MW.

Complex containerised systems

Our partner has been commissioned to supply a containerised solution for two large-scale projects, each involving a 1 MW electrolyser. As an expert in the actual E-modules (stacks), they provide both the basic engineering and the process technology. BUTTING CryoTech contributes its expertise to these projects in various ways. For example, the BUTTING Group company is responsible for the detailed engineering of the complete pipework. Furthermore, the production of the steel support frame for pipeline assembly and the welding of stainless steel pipelines are carried out in Burgkirchen.

Finally, BUTTING CryoTech also handles the complete installation of all components. In addition to the pipes produced in-house, the valves and fittings as well as the electrical components – such as the control cabinet for water treatment and post-purification – are provided by the customer and assembled on site.

This is only one example of the possibilities for 'one stop shop solutions', along with filling stations, valve skids, and dispensers, which are all in the range of products that will be performed from engineering to final inspection.

"This assignment was a pilot project for us. It involves a very complex system, with an extensive range of tasks for us – from engineering to production to assembly. This required a lot of coordination with our French partner. We are all the more proud that we were able to complete this project successfully and to the complete satisfaction of our French customer. We have thus set an important milestone for BUTTING CryoTech. It is a flagship project for the hydrogen industry, which has a pioneering signal effect for numerous follow-up projects. This makes us part of the future in the production of green hydrogen," explains Matthias Leber, Senior Sales Manager at BUTTING CryoTech.

Clean mobility with BUTTING CryoTech

The European Climate Law has introduced legally binding targets for the first time, aiming for Europe to achieve climate neutrality by 2050 and reduce net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.¹ The logistics industry is also under pressure from the EU to implement and comply with these binding climate protection targets. For instance, a single diesel van covering 100,000 kilometres annually emits approximately 65 tonnes of CO₂. By 2025, new models of transport vehicles are expected to emit 15% less CO₂ on average, with a target of at least 30% reduction by 2030, based on 2019/20 as the reference period.²

Hydrogen-powered vehicles represent an alternative to conventional combustion engines. They are quieter, require less maintenance, and if the hydrogen is produced from renewable sources, they are carbon neutral. The use of 5,000 hydrogen trucks, for example, could lead to an annual reduction of 325,000 tonnes of CO₂ emissions.³

Thanks to its expertise and longstanding experience, BUTTING CryoTech has recently been commissioned to develop and manufacture a hydrogen refuelling system for trucks. To achieve a range comparable to diesel-powered vehicles, long-range commercial



BUTTING CryoTech's vacuum insulated piping (VIP) valve skid



The BUTTING Group company is responsible for the development of the fuelling line, including safety equipment.

vehicles must refuel, store, and carry compressed hydrogen at cryogenic temperatures.

Dr. Bernhard Reiter, Managing Director and Head of Development at BUTTING CryoTech, explains the specific challenges this entails: “The refuelling coupling must be able to operate at extremely low, so-called cryogenic temperatures, while withstanding high pressure. At cryogenic temperatures, i. e., temperatures below -200 °C, ambient air liquefies or freezes. This places the highest demands on insulation, material selection, physical calculations, structural design as well as on the technical and high-quality implementation in the manufacturing of the products.”

In addition to trucks, CryoTech is also investing significant engineering and prototyping efforts in ships, airplanes, and trains to make these forms of transport clean and ready for the future.

A crucial feature is the vacuum insulation from BUTTING CryoTech. The refuelling coupling is enclosed in a vacuum envelope, similar to a thermos flask, preventing any cold parts from coming into contact with the environment during and after the refuelling process. This allows the user to touch everything without any protective precautions.

The BUTTING Group company is responsible for developing the fuelling line, including safety equipment. The Managing Director proudly reports: “In being entrusted with this project, BUTTING CryoTech has taken on a great responsibility. We handle the material selection and testing as well as the strength analyses, we define the geometries based on the flow parameters, we define the refuelling protocol and thus the sequence of process steps and the development of the test scenarios.” The specification is clear: the hydrogen must remain highly pure – without air mixing. To this end, intensive underway to develop a cavity-free concept, which includes valve flushing.

“The schedule agreed with the customer is to complete prototypes of the fuelling system in the summer of 2023. At the same time, we are setting up a cryogenic high-pressure test stand in Burgkirchen, with the first tests planned for the summer. Our common goal is to quickly and continuously raise the level of maturity to meet the high standards of the vehicle industry by the time it is marketed,” states Dr. Reiter. “With this development achievement and end product, we at BUTTING CryoTech are making a significant and active contribution to the energy transition.”

Dr. Reiter concludes: “The technology solutions from BUTTING CryoTech play a key role in the transition towards hydrogen as a sustainable and clean energy source. Cryogenic and high-pressure storage of hydrogen is essential for many applications to ensure high energy densities. These energy densities are crucial if hydrogen is to be used as a fuel in zero-emission trucks.”

References

- ¹ *Fit for 55*. (July 14, 2021). European Council.
- ² *Daimlers Wasserstoff-Lkw: Bis zur Serienreife dauert es noch*. (June 27, 2022). DVZ.
- ³ *5 000 Wasserstoff-LKW: Norddeutschland zündet H₂-Turbo*. (August 10, 2022). EFAHRER.com.

About BUTTING CryoTech

Founded in 1899, BUTTING CryoTech (formerly Schwanner) has evolved into one of the globally leading MSEs specialising in cryogenic technology. Since 1984, the family-owned business has been manufacturing vacuum insulated transfer systems and valves for cryogenic gases. In 2021, Schwanner GmbH became a full member of the BUTTING Group and has been operating under the name BUTTING CryoTech since 2023. Located in the Upper Bavarian rural district of Altötting, the company primarily offers the following production and engineering services:

- Vacuum insulated piping (VIP)
- Skid solutions
- Valves and couplings for cryogenic applications
- Apparatus construction in accordance with EN 1090 and WHG (German Federal Water Act)

Standardised vacuum insulated piping (VIP)

Transfer lines combine vacuum and multi-layer insulation for minimum heat ingress and maximum efficiency when transporting cryogenic fluids. Integrated compensators, absorption material and spacers with the lowest thermal conductivity ensure safety and durability. In addition to standard lines, the company's areas of expertise include:

- Transfer systems for trailers (LH₂, LN₂, LOx, LHe, LAr)
- Hydrogen systems for the automotive industry
- Refuelling systems for the aircraft and aerospace industries (H₂ and O₂)
- Special components (e.g., neon tanks)

BUTTING products

- Transfer lines for LH₂, LN₂, LOx, LHe, LAr
- Inner pipe diameter from 1/2" (DN10) to 32" (DN1000)
- Pressure grades: PN 10/25/40/63/83 (bar)
- Standard configurations include inside compensators
- High-pressure systems feature outside compensators
- Rigid pipes and flexible hoses
- Plug-in Johnston couplings or welded spool connections

Customer benefits

- Minimum heat impact of around 3 W/m² for rigid lines
- Each prefabricated spool is fully vacuum insulated (high vacuum of 10⁻⁵ mbar)
- VIP spools with He-leak test 10 x 10⁻⁸ mbar and gas pressure test
- Individual spools can be connected via two different coupling types:
 - Johnston – plug-in coupling
 - Welding coupling
- Manufacturing code compliant with PED and ASME regulations