

DIABON® Plate heat exchanger - electrified

Concept study – current development

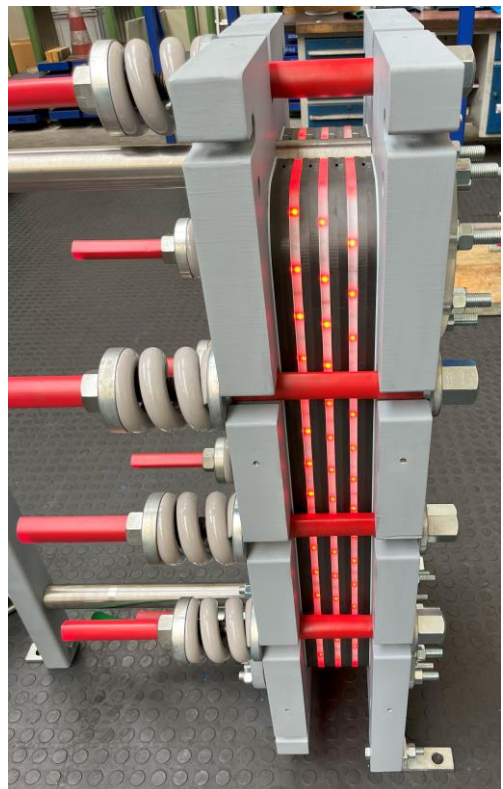
Heating is one of the most frequently used standard operations in chemical industry. Currently, fossil fuels provide the required energy in most cases (e.g. for steam generation), making a significant contribution to the carbon footprint of the final product.

In order to replace these CO₂-intensive heating processes with a reliable and **sustainable technology**, we created the concept of an **electrical heater based on the design of our plate heat exchangers**.

DIABON® plate heat exchangers by SGL Carbon are the most modern and efficient heat exchange technology on the market for heating or heat exchange of corrosive media, with more than 3,000 references worldwide.

Prototype testing successful

After design and erection, a prototype of an electrical heater was extensively tested under various load conditions. During this test phase (boundary conditions of this bench scale unit on next page) we could prove the basic working principle along with excellent system efficiency.



↑ DIABON electrical heater – demo version

Synergy between

Plate heat exchanger

- Modular design
- Serial and parallel operation possible
- Customer requirements define setup

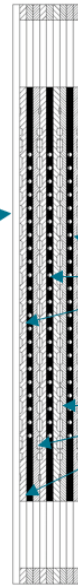
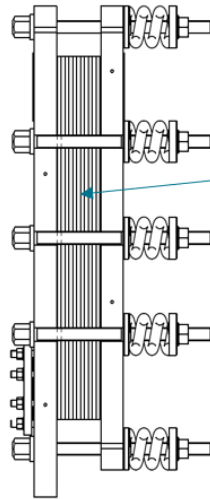
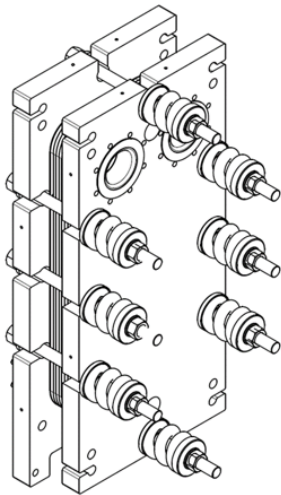
and electrical heating

- Plate heating elements replace heating medium
- Each heating element generates defined heating power

Advantages

- **No steam required**
 - ➔ No steam production and related piping
 - ➔ No steam hammering which may damage heat exchanger
- Replacement of fossil fuels (**no CO₂ emissions** in operation when using green electricity)
- **Fast start-up and shutdowns possible**
- **Batch operation possible**
- **Mobile equipment**

Concept



Setup:

Alternating heating plates and plates for conducting media

Heating elements

Plates for conducting media

* Patent application submitted

Prototype / bench scale operation

Operation conditions

- Up to 20kW heating power
- Throughput from ~500l/h to ~2,000l/h

Efficiency

- Transfer of electric power to medium >90%
 - Efficiency electrical heating unit >80%
- ➔ **Overall efficiency (grid to medium) >72%**

Outlook

- Heating power of several 100kW
- Design dependent on required temperature increase, throughput and heating power – analogous to plate heat exchangers
- Heating of corrosive media possible, based on DIABON graphite and SICABON silicon carbide plates
- Upscaling and optimization activities are in preparation



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