The SYNOTHERM® plate heat exchangers are made of titanium or stainless steel and are ideal for the indirect heating and cooling of process liquids in plants or tanks. They are manufactured to the specific requirements of each customer. They transfer the thermal energy between the heat exchanger medium that flows through the heat exchanger and the process liquid.

The process liquid in the container circulates around the plate heat exchanger and is heated up to the desired working temperature and maintained. If heat is generated in a process (for example by a rectifier or an exothermic reaction), this can be cooled down by the heat exchangers.

For heating applications hot water, steam, saturated steam and thermal oil can be used as a heat exchanger medium. Water, salt solutions and glycol are suitable for cooling.

The characteristic pillow structure of the SYNOTHERM® plate heat exchanger allows for a strong flow of the medium through the exchanger and leads to a high heat transfer coefficient $h$.

As Figure 1 shows, Pillow Plate heat exchangers have a higher heat transfer coefficient $h$ (in W/m²K) depending on the flow rate (in kg/m²s) than tube coil heat exchangers. This causes a higher heat transfer coefficient.

The VDI heat atlas\(^2\) indicates an overall heat transfer coefficient of 150 - 1200 W/m²K for tube bundle heat exchangers.

For double-tube heat exchangers, this coefficient is only between 300 - 1400 W/m²K, whereas plate heat exchangers have an overall heat transfer coefficient of 1000 - 4000 W/m²K.

As the following basic formula\(^3\) shows, less heat transfer area $A$ is required to transfer the same power $Q$. Consequently, the SYNOTHERM® plate heat exchangers save space, weight, material and costs.

\[ Q = k \times A \times \Delta \theta \]
Manufacturing Process and Construction

Production Process and Setup

We manufacture the SYNOTHERM® plate heat exchangers at our premises in Schwabach, Germany, and monitor the production process within the scope of DIN EN ISO 9001. The latest welding technologies produce nearly no annealing colors to the surface during the welding process and pickling of the surface is not necessary. The surface is smooth and can be electroplated for applications with high hygiene requirements.

The SYNOTHERM® plate heat exchangers are manufactured using two metal sheets to form the basic plate.

The substantial quality of the metal sheets used ensures the high quality of our plate heat exchangers.

The metal sheets are cut to the required dimensions by a sheet shear, then a fully automatic spot and edge welding is achieved by a retraceable welding process. The inlet and outlet consists of piping with the appropriate quality connection technology.

As a connection technique, either a flange or a threaded nipple can be welded onto the pipes. This allows us to easily solve your complicated installation situations.

The pillow structure of the plate heat exchangers is generated by high pressure forming. The expansion is effected with an inflation pressure, which is far above the working or operating pressure.

The compact, lightweight and pressure-tight design ensures a long and safe working life of your line. The strength of SYNOTHERM® plate heat exchangers significantly reduces the risk of mechanical damage or misshaping compared to coil heat exchangers.

This reduces the risk of a line breakdown with the associated costs. The plate heat exchangers are fixed to the tanks by the fixing strips.

The spacers guarantee a defined distance to the tank wall, that the entire heat exchanger surface is immersed and the process liquid is able to flow round the exchanger. This ensures optimum heat transfer.

The type designation (article number and device number) and technical data are engraved on an identification plate, which is permanently legible.

Standard working materials specification

code letter
KA Stainless steel (Material no. 1.4301 / AISI 304)
KI Stainless steel (Material no. 1.4404 / AISI 316L)
KB Stainless steel (Material no. 1.4571 / AISI 316Ti)
TI Titanium (Material no. 3.7035 / ASTM grade 2)

The long-lasting use and high quality of our products is our aim from development to production to distribution.
Design and Conception
For an efficient and bespoke design for your application, we offer our computer-aided heat demand calculation. With this information, we can determine the energy requirements. With our own, in-house heat exchanger software, we can provide the most suitable SYNOTHERM® plate heat exchanger for your application, giving you the exact information on the required flow rate and the pressure loss.

The SYNOTHERM® plate heat exchangers are individually designed and made according to your requirements. The numerous dimensions and the various connection possibilities provide a variety of installation options, resulting in a solution to even the most difficult installation situation. Our 3D-CAD drawings illustrate precisely the position of the exchanger in the tank. After ordering, you will receive the production drawings for approval, which are available in various CAD formats. Based on this information, you can design and construct your line and tank.

Due to our extensive experience in using high-quality metallic materials in aggressive liquids, we are able to select the best material for your application. This guarantees a long life of the heat exchanger as well as a trouble free and safe operation.

To find the best and most cost-effective plate heat exchanger solution for you, please use the questionnaires you find on our homepage.

Safety and Quality
All plate heat exchangers are designed, manufactured and final-tested in compliance with the Pressure Equipment Directive 2014/68/EU. Accordingly, we perform the overpressure test and the leakage test.

We have been tested as a manufacturer in accordance with DIN EN ISO 3834-3 and have demonstrated all the welding requirements for the manufacture of pressure equipment in accordance with the Pressure Equipment Directive 2014/68/EU.

Our production facilities ensure appropriate and state-of-the-art production and testing of the heat exchangers SYNOTHERM®. For pressure vessels of category 1 and 2, CE conformity is ensured. Our welding specialists are certified according to EN ISO 9606.

Please note that all the details in this brochure are up to date with current technology requirements. We cannot take responsibility or liability for any incorrect or incomplete information in this brochure. We reserve the right to make alterations should they be of a technical advantage or necessity. We are not liable for any problems resulting from improper use by the customer. Trust our high quality products and have a chat with us!

Visit our heat exchanger homepage: www.synotherm.de

Literature
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Have confidence in our tested, high-quality products and contact us.
You can also find us at www.synotherm.de – We look forward to hearing you.