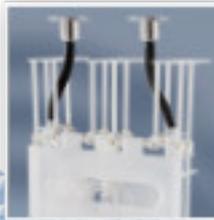
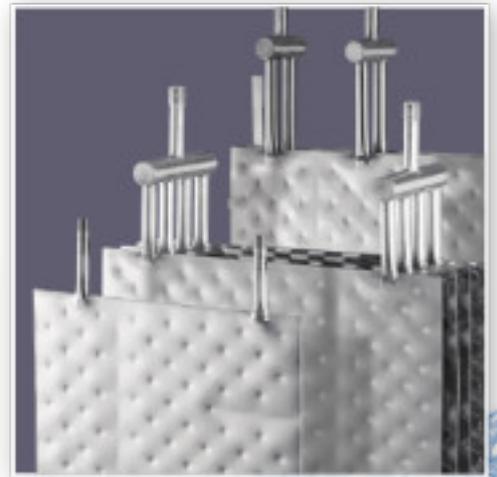
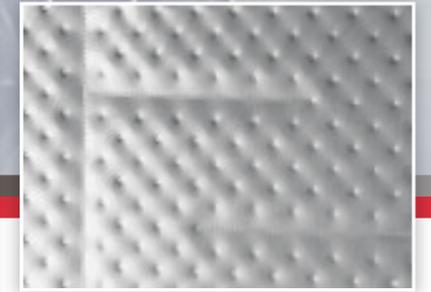
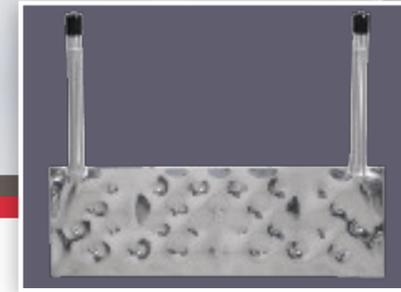
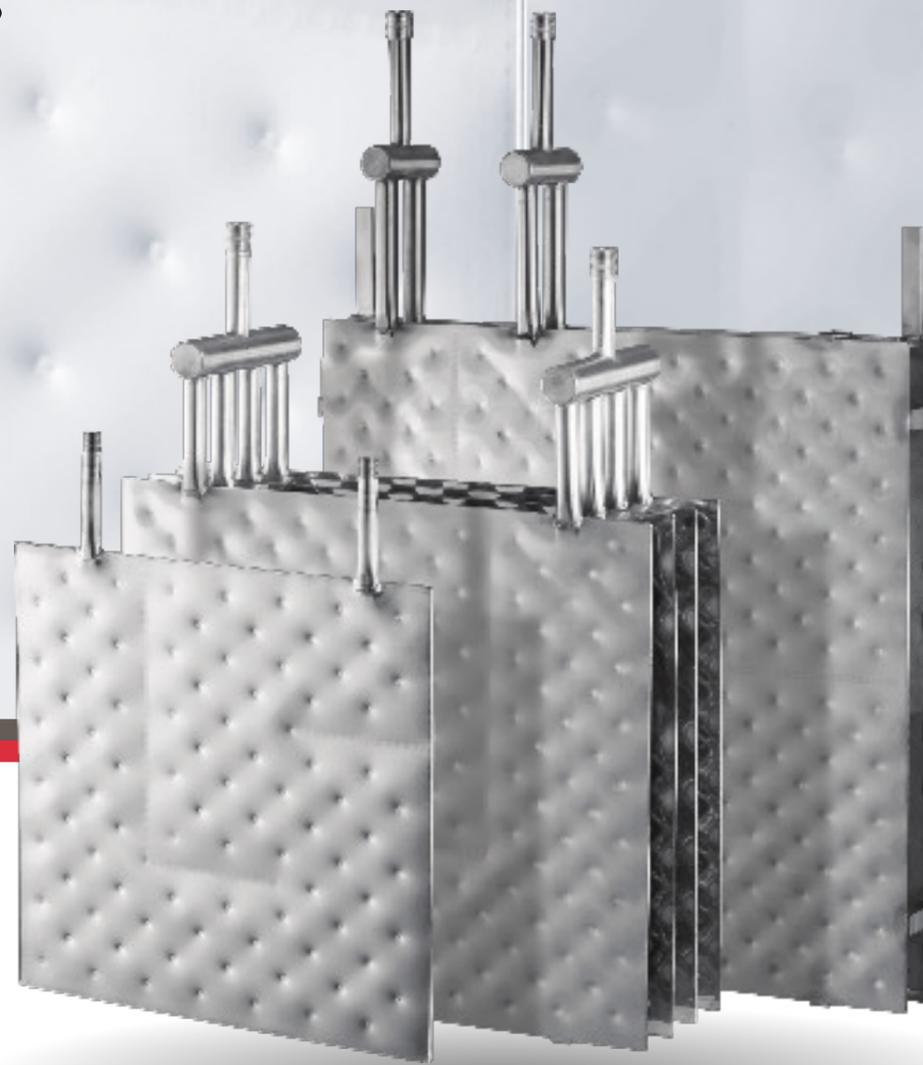
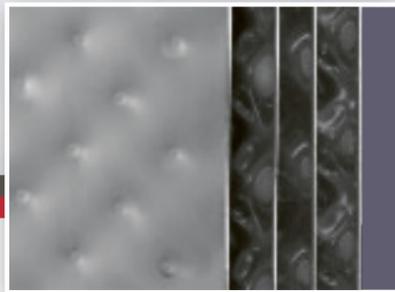
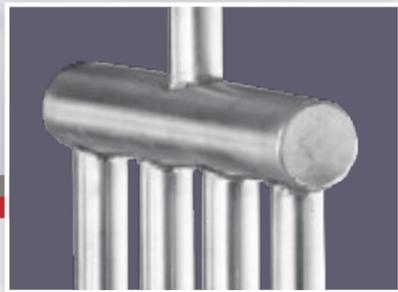


# Heat Exchanger SYNOTHERM®



**MAZURCZAK**  
THERMOPROZESSE

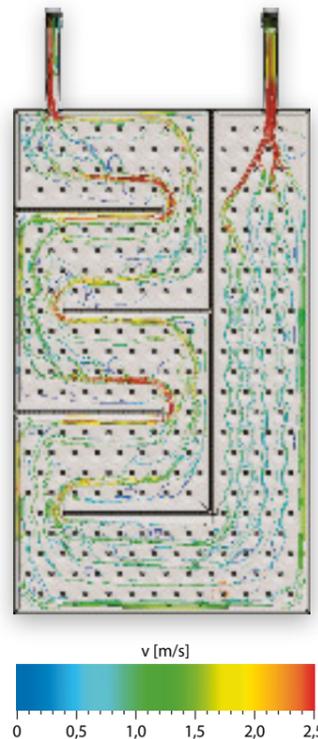
# Metallic plate heat exchanger SYNOTHERM® made of titanium and stainless steel



The SYNOTHERM® plate heat exchangers are made of titanium or stainless steel and are suited for the indirect heating and cooling of process liquids in plants or tanks. They are manufactured to meet the specific requirements and are always customized.

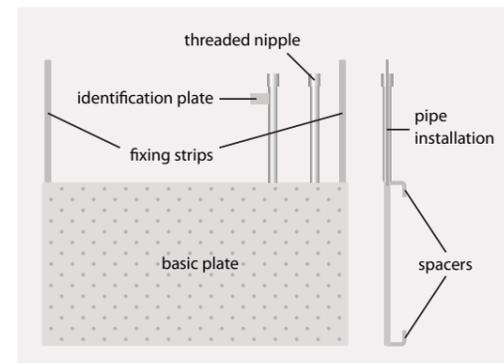
The process liquid in the container circulates around the plate heat exchanger and is heated up to the desired working temperature and maintains this temperature.

Heat losses during the production process as well as heat input during a process (heat sources e.g. ambient heat, rectifiers or exothermic reactions) are compensated using plate heat exchangers.



Hot water, steam, saturated steam and thermal oil are applicable as heat transfer medium for heating purposes. Water, salt solutions and glycol are suitable for cooling purposes.

The maintenance costs for SYNOTHERM® plate heat exchangers compared to tube heat exchangers are significantly lower. The flat and smooth surface can be cleaned easily and quickly with a steam jet or high-pressure cleaners, resulting in short downtimes in your process.



The characteristic pillow structure of the SYNOTHERM® plate heat exchangers enables turbulences in the heat transfer medium, therefore increasing the heat transfer coefficient  $k$ .

As the following basic formula [1] shows, at a constant temperature difference  $\Delta\vartheta_{ln}$ , less heat transfer area  $A$  is required to achieve the same power  $Q$  to be transmitted.

$$Q = k \times A \times \Delta\vartheta_{ln}$$

The energy efficiency of plate heat exchangers is up to 33% higher than with coil heat exchangers, and in addition lower space is required. Sizes and costs of the tanks are reduced or there is more space for other components of the container or the plant.

Consequently the SYNOTHERM® plate heat exchangers save space, weight, material and costs.

Literature:

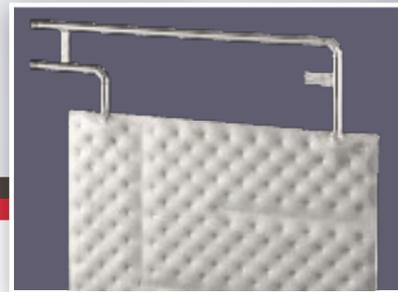
[1] von Böckh, P./Wetzel T. (Hrsg.) (2015): Wärmeübertragung, Grundlagen und Praxis, 6. Auflage, Karlsruhe, S.9

## Standard working materials specification

### code letter

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

## Coated plate heat exchanger SYNOTHERM®



Certificate: DIN EN ISO 3834-3 for compliance with quality requirements for welding production companies



Certificate for manufacture of pressure equipment according to directive 2014/68/EU

All plate heat exchangers are designed, manufactured and tested in compliance with the Pressure Equipment Directive 2014/68/EU. Overpressure tests and leakage tests are carried out on each heat exchanger. We are a welding company certified according to DIN EN ISO 3834-3 and meet all the technical welding requirements for the manufacture of pressure equipment according to pressure equipment directive 2014/68/EU.

The SYNOTHERM® plate heat exchangers are manufactured using two metal sheets to form the basic plate. The metal sheets are cut to the required dimensions by a sheet shear before a fully automatic, retraceable spot and edge welding process. The inlet and outlet consist of piping with appropriate fittings.

Either a flange or a threaded nipple can be welded onto the pipes. The pillow structure of the plate heat exchangers is generated by high pressure forming. The compact, lightweight and pressure-tight design ensures a long and safe working life of your plant.

The compact design of SYNOTHERM® plate heat exchangers significantly reduces the risk of mechanical damage or misshaping compared to coil heat exchangers, therefore reducing the risk of a plant breakdown with the associated costs. The plate heat exchangers are fixed to the tanks with fixing strips and spacers.

SYNOTHERM® coated plate heat exchangers also have metallic base bodies.

In accordance with our certification to DIN EN ISO 3834-3, they can be manufactured and used as pressure equipment.

In a multi-stage coating process, a fluoropolymer coating is applied to the metallic surface. Adequate coating thickness and porosity of the coating are verified via a 100% test.

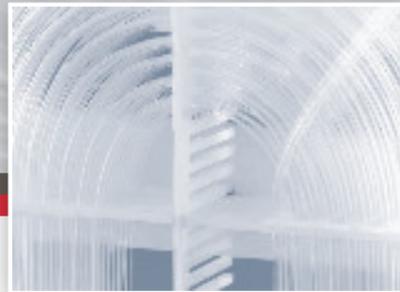
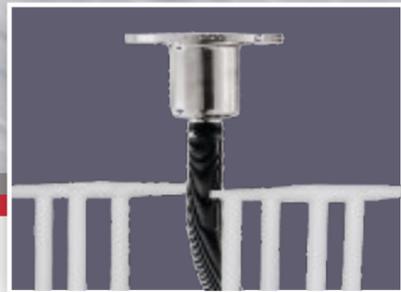
Due to the coating, SYNOTHERM® coated plate heat exchangers feature very high chemical resistance and excellent anti-adhesion properties, thus fulfilling two key requirements of chemical process equipment. They are suitable for heating and cooling of highly acidic process liquids.

The anti-adhesive fluoropolymer coating ensures homogeneous heat transfer and constant process conditions when fouling, incrustations and deposits restrict the heat transfer capacity of plain heat exchangers.

Fluoropolymers have significantly better heat transfer properties than other coating materials. The incrustation tendency in media usually causing heavy incrustation, such as zinc phosphates, is reduced considerably.

Easy cleaning and extended maintenance intervals reduce your maintenance costs and ensure the operational performance of your plant in the long term. You can profit from these savings potential, too!

# Polymer heat exchangers SYNOTHERM®



Polymer heat exchangers are suitable for heating and cooling a variety of media where metallic plate heat exchangers cannot be used.

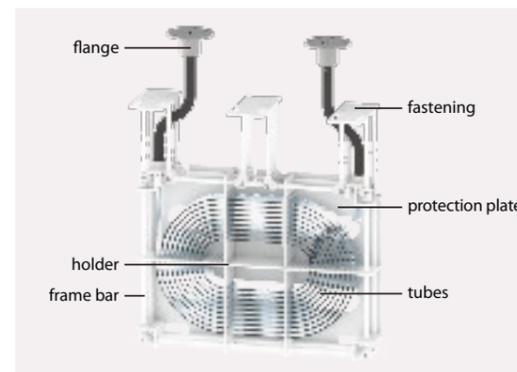
The required size can be selected according to the desired thermal output and the container dimensions.

The heat exchangers are integrated in the container via either factory-fitted attachments, or via a mount on the frame. Alternatively, rods that protrude from the heat exchanger are available for fitting at the customer's site.

The tube design implicates a large heat transfer area. The transfer area is even larger than with plate heat exchangers at the same displaced volume.

This means that an adequate thermal output can be achieved despite the lower heat transfer properties of polymers.

Polymer heat exchangers have PFA tubes which are wound onto supports. Spacers between the tubes ensure an adequate through flow with process media. The supports are stabilised with frame rods which are covered with a protective plate.



The distance between mounts and heat exchanger body, or the protruding rod length, can be selected according to the customer's needs.

The tubes are bundled via flanges to form inlet and outlet. The dimensions of the flange required at the customer's site corresponds to standard EN 1092-1, type 5.

The polymer heat exchanger is suitable for heat transfer media with inlet flow temperatures of - 10°C to 110°C. It should be noted that the maximum operating pressure depends on the operating temperature. At an inlet flow temperature of 70°C, for example, it is 6 bar.

The maximum possible temperature of the process media is determined by the material of the polymer heat exchanger. For PP it is 60°C, and for PVDF, 90°C.

The heat transition coefficient  $k$  depends on various application-specific influencing factors, for example the heat transfer from the heat transfer medium to the PFA-tube. This effect varies in magnitude depending on the flow speed of the medium.

The heat transfer coefficient in SYNOTHERM® polymer heat exchangers is calculated based on the operating parameters, meaning the size is optimally adjusted for the application.

The SYNOTHERM® polymer heat exchangers have been designed with the PFA tube being the single pressurised polymer component.

The tube material features outstanding temperature resistance, even at elevated pressures. The tube wall thickness has been selected in order to achieve significant stability with simultaneously high thermal conductivity.

The other components are not pressurised and serve solely to support the tubes so that materials such as PP and PVDF are sufficiently stable. This creates a combination of components optimised in terms of materials which is suitable for a wide range of operating parameters.

The SYNOTHERM® polymer heat exchangers are pressure-tested and are in compliance with Pressure Equipment Directive 2014/68/EU.

# SYNOTHERM®

## HEAT EXCHANGER

Our SYNOTHERM® heat exchangers are designed and produced individually according to the customer's needs. Due to various dimensions and connection options, we are able to fit our heat exchangers even to the most difficult installation situations. Our 3D-CAD-drawings allow for a perfect integration into the process system.

After your order, you may receive the drawings for approval, which can be provided in various CAD formats.

For efficient planning of your application we offer our computerized heat demand calculation. Through this we can calculate the necessary determine energy requirements.

With our heat exchanger software, which we developed exclusively for our products, we design the heat exchanger SYNOTHERM® according to your requirements and provide detailed information like the thermal power, the required flow rates and the pressure loss, so that you can go forward and design your plants, tanks or peripheral structures.



Trust in our tested, high-quality products and contact us.

You can also find us at [www.synotherm.de](http://www.synotherm.de)

02.2020.en



SYNOTHERM



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