



*The World of*

# **HOT & COLD**

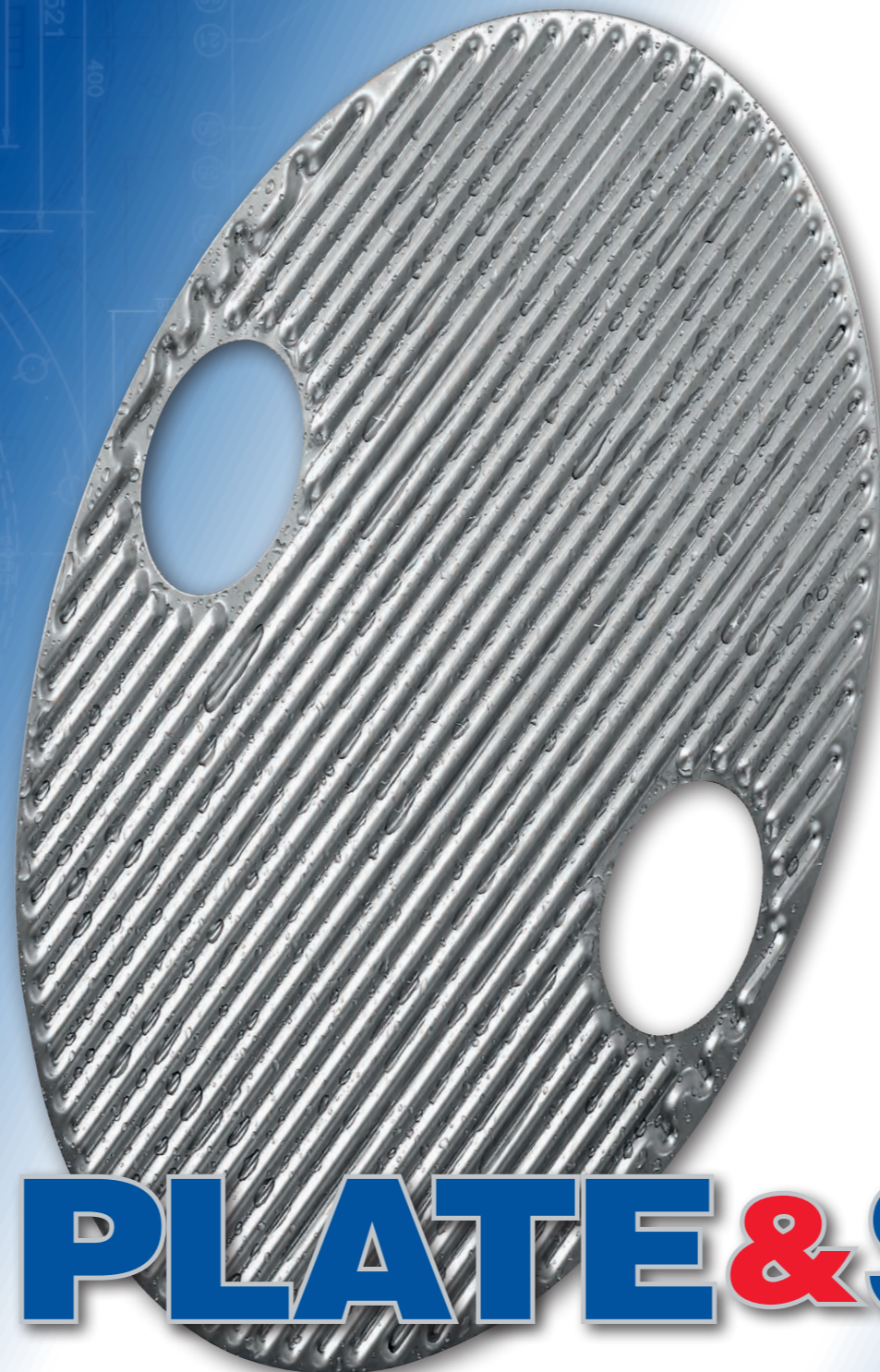
## VAHTERUS HEAT EXCHANGERS - A PROMISE OF A BETTER FUTURE

This is a heat exchanger with a story. It was designed and is produced in western Finland in a small village whose name, Vahterus, we have given to our family business. This village was a busy international marketplace as early as the Middle Ages and, in the 18th century, it had an ironworks and a distillery. Now it's our turn. Here in the middle of beautiful countryside, the highly skilled staff of Vahterus manufacture the most advanced products in the heat exchanger industry using the latest technologies.

Without heat exchangers, industries and households – i.e. our entire built environment – would come to a complete stop. Heat exchanger efficiency plays a key role in the currently ongoing process of development also known as energy revolution. Vahterus heat exchangers are a promise of a better future: they save energy, take up less space and help protect nature. Vahterus is a company known for its numerous award-winning innovations. We work hard to find better solutions to the challenges of the heat exchanging processes.

'Customer orientation' is not just an empty buzzword for us; we pride ourselves on doing R&D closely with our customers. We search for and find solutions to real problems. Being a family business, corporate social responsibility is one of our key values. We take the environment, our employees and customers into consideration in all areas of our business. The steady rate of growth we have had for several years, states that we have chosen the right path.

Together we succeed!



The Plate and Shell Heat Exchanger (PSHE) developed by Vahterus has created numerous new solutions in heat transfer technology. The core of the heat exchanger is a fully welded plate pack enclosed in the strong shell structure, eliminating the need for a gasket completely. Thanks to its advanced construction, the PSHE heat exchangers combine the best features of plate & frame and shell & tube heat exchangers.

### the original plate and shell

PSHEs are the forerunners of heat exchange technologies and quality. Compact construction has numerous advantages over traditional heat exchangers: PSHEs are significantly smaller and lighter, for example. As they have no gaskets, PSHEs can withstand higher pressures and temperatures than shell & tube heat exchangers. The structural properties of PSHEs also make them durable, easy to maintain and energy-efficient.

### how the circular plates work

The Vahterus PSHE product range contains nine different plate sizes, which means that there is a suitable plate size for every application needed. Thanks to our new and advanced manufacturing technique, we can use plates of different thicknesses to better meet customer needs. The material of the plate is chosen individually for every application. After pressing and cutting, the plates are welded together, with the gaps between the plates functioning as channels for cold and heat circulation. The plate pack is then installed in a tubular shell, which will form the secondary side, or what we call the 'shell side', of the heat exchanger. Circulations run to opposite directions on each side of the plates, so every other gap has a 'plate side' circulation and every other a 'shell side' circulation. The circulation is directed into the pack of plates and out through combination pipes.

# PLATE & SHELL

Shell and Tube Exchanger



Vahterus  
Plate & Shell Heat Exchanger

## TECHNICAL

### mechanical design

- Full vacuum to 150 bar
- -196°C to +600°C

## QUALITY

### quality system

- ISO 9001:2008
- ISO 3834-2:2005
- ISO 14001:2004
- PED module B+D
- SELO China
- ASME U and R Stamp
- OHSAS 18001:2007

### design code/ classification

- AD-2000
- ASME VIII, Div.1
- EN 13445
- Lloyd's Register
- R.I.N.A.
- ABS Europe Ltd
- Bureau Veritas
- PD5500
- DNV GL Marine
- KGS South Korea
- EAC
- Others on request

## materials

### shell

- Carbon steels
- AISI 316L
- AISI 904L
- 254 SMO
- Alloy C22, C276
- Duplex
- Titanium
- Others on request

### plates

- AISI 316L
- AISI 904L
- 254 SMO
- Alloy C22, C276
- Duplex
- Titanium gr.1, gr.11
- Nickel
- Others on request

## dimensions

	Heat transfer area	Plate side nozzles, DN	Shell side nozzles, DN
<b>PSHE 2</b>	0.5m <sup>2</sup> – 5m <sup>2</sup>	25	20-80
<b>PSHE 3</b>	1m <sup>2</sup> – 50m <sup>2</sup>	50	25-250
<b>PSHE 4</b>	3m <sup>2</sup> – 100m <sup>2</sup>	80	25-300
<b>PSHE 5</b>	5m <sup>2</sup> - 200m <sup>2</sup>	100	25-350
<b>PSHE 6</b>	6m <sup>2</sup> – 350m <sup>2</sup>	125	25-500
<b>PSHE 7</b>	8m <sup>2</sup> – 550m <sup>2</sup>	150	25-500
<b>PSHE 9</b>	15m <sup>2</sup> – 1000m <sup>2</sup>	200	25-700
<b>PSHE 14</b>	30m <sup>2</sup> – 2000m <sup>2</sup>	300	25-1000

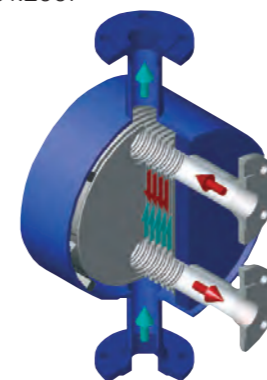


Plate & Shell Heat Exchanger

## **BENEFITS OF VAHTERUS HEAT EXCHANGERS**

### **energy efficiency**

A strong circular flow forms between the plates in a PSHE, making the heat exchange process extremely energy-efficient. Scientifically sized and practically tested circulation is also possible at higher temperatures and pressures, unlike in traditional heat exchangers. PSHEs are compatible with strict temperature programs, which is another benefit. In district heating applications, for example, every extra degree of temperature translates directly to money saved.

### **compact size**

When you buy a Vahterus heat exchanger, you also buy extra space: our PSHE exchangers are 60–70 % smaller than traditional shell & tube heat exchangers. Thanks to this space-saving potential, PSHEs are an excellent choice for retrofitting. PSHEs are also light, and thus easy to transport and install. It can also be used in locations where weight limits apply as they won't require additional support structures.



### **tailor made**

To achieve the best possible heat exchange solution for your needs, the heat exchanger is designed with your input from the very beginning. Our years of experience mean we know heat exchangers inside out, so you can count on us to supply heat exchangers optimised for even the most challenging conditions. Accurate thermal sizing maximises benefits while minimizing costs and material consumption.

### **fully welded and strong construction**

PSHE construction is strong, compact and safe. It stands well extremely high pressures, stress variation and thermal shocks. Like the plate pack, their surrounding shell is also fully welded.

The plate pack and shell are not, however, welded together, which allows them to expand and contract with heat expansion. The plate pack consists of round plates, which in turn guarantees even distribution of stress.

### **easy to maintain**

The welded construction makes the PSHEs reliable and easy to maintain. When there are no gaskets, there is no risk of them breaking or leaking either. In addition, PSHEs are not susceptible to fouling. Vahterus can tailor efficient heat exchanger cleaning systems for even the toughest of environments.

# chemical and process

**VAHTERUS** solutions for demanding chemical and process industry applications are reliable and efficient. The true countercurrent design, effective heat transfer and low fouling makes Plate & Shell heat exchangers ideal solution when optimizing the process energy efficiency. The recovery of process heat decreases the energy consumption and CO<sub>2</sub>-emissions. When the goal is to improve the capacity of existing process or build a new optimized plant, our tailor made heat exchangers are an ideal choice due to their compact size.

## Keep Your process running with Vahterus PSHE

Most of the chemical and process plants are working on continuous processes. Very reliable and low fouling Plate & Shell heat exchangers allow customers to operate their plants with high efficiency and reduce the need for maintenance.

Specialty chemicals and pharmaceuticals are often produced in batch processes - Plate & Shell heat exchanger withstand rapid temperature changes. Fully welded design, protective shell construction and high quality standards of Vahterus make solutions safe and easy to use.



- **Product heaters and coolers**
- **Gas heaters and coolers**
- **Heat recovery exchangers like feed/effluent exchangers**
- **Overhead condensers and gas liquefiers**
- **Thermosyphon and kettle reboilers**
- **Reactor temperature control heat exchangers**
- **Cryogenic applications**
- **Various utility applications**

REFINERY • PETROCHEMICAL • SPECIALITY AND FINE CHEMICAL • PHARMACEUTICAL • INDUSTRIAL GAS • FERTILIZER • FOOD AND BEVERAGE • PULP AND PAPER

# energy

**VAHTERUS** offers strong and heat-efficient solutions for demanding applications in the energy industry. The excellent pressure and high temperature capacities make our heat exchangers ideal for use in different power plants, oil and gas processing plants and industrial steam applications. Plate & Shell is an excellent solution for new installation, retrofittings and replacement of traditional technologies in the energy industry.



## Excellent compatibility with energy industry applications

Vahterus Plate & Shell Heat Exchangers help save space, are light and units are always designed according to the customer specific needs.

Thanks to the fully welded safe and strong construction leaks can be avoided and a long lifetime can be achieved. An efficient heat exchange capacity, resistance of high pressure (more than 200 bar) and low fouling properties make Vahterus heat exchangers an excellent solution for energy industry.



- **Steam condensers**
- **Steam generators**
- **Condensate heaters and coolers**
- **Exhaust gas recovery**
- **LNG applications**
- **Crude oil heaters and coolers**
- **Gas heaters and coolers**
- **Hydrocarbon condensers and evaporators**

# refrigeration

**VAHTERUS** has brought new innovative solutions to Refrigeration Industry and is keen to remain active in developing solutions in this field in the future too. Our focus is on applications that use natural refrigerants where Plate & Shell Heat Exchangers fits perfectly. We work closely with the world's leading chiller manufacturers and together with our customers we develop both tailor made products as well as entire product ranges to find the best solutions.

Chillers • Heat pumps • Absorbtion plants • Transcritical solutions

## Significant benefits in refrigeration technology

Vahterus heat exchangers have a fully welded construction and low refrigerant charge, which guarantees maximum safety to our customers. With a compact design you can achieve a significant space saving and because there are no gaskets, units are easy to clean and keep maintenance costs low.



- **Evaporators**
- **Droplet separators**
- **Evaporator/Droplet separator (COMBINED)**
- **Cascades**
- **Condensers**
- **Desuperheaters**
- **Oil coolers**
- **Subcoolers**

**COLD STORAGES • ICE RINKS • MARINE APPLICATIONS • AIR CONDITIONING • PROCESS COOLING • FOOD AND BEVERAGE**



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