



## Plate & Shell Heat Exchangers



### Refrigeration

Vahterus Plate & Shell Heat Exchangers (PSHE) have many benefits for advanced refrigeration applications such as evaporators, condensers, cascades, desuperheaters and oil coolers.

PSHE are effective, durable and versatile due to their unique

shell construction, together with fully welded plates. This makes PSHE ideal, also for contractors who need compact size and low refrigerant charge. Vahterus Heat Exchangers are suitable for all refrigerants, especially natural media such as ammonia and carbon dioxide.

# Main Applications



## Evaporators

The versatility of Vahterus PSHE is demonstrated particularly in evaporator applications. PSHE can be used as highly efficient Flooded, or Direct Expansion (DX) evaporators, due to low pressure drop and high heat transfer. Fully welded circular plates and a protective outer shell, guarantees safety for the end user. This construction also ensures high integrity and durability.

## Flooded Evaporators

- Refrigerants: NH<sub>3</sub>, CO<sub>2</sub>, R404, R134a, propane, methane, etc.
- Capacity Range: 5 – 20 000 kW
- Compact Size & Small Refrigerant Charge
- Low Evaporative Side Pressure Drop
- Flexible Construction
- High Efficiency
- Safe Operation



## Direct Expansion (DX) Evaporators

- Capacity Range: 5 – 1500 kW
- Can Be Used For All Refrigerants
- Compact Size
- Safe Operation



## Cascades

Cascade heat exchangers are used to transfer heat between two refrigerants. They are used especially with CO<sub>2</sub>. A cascade unit combines both condenser and evaporator (flooded or DX).

Vahterus PSHE are ideal for cascade operations, based on their high thermal efficiency. They can provide minimum temperature difference between the evaporative and condensing media, and low running costs. Using Vahterus fully welded construction ensures there is no leakage or cross-contamination.

- Refrigerants: NH<sub>3</sub>, CO<sub>2</sub>, R404, R134a, propane, methane, etc.
- Capacity Range: 5 – 10 000 kW
- Compact Size & Small Refrigerant Charge
- High Heat Transfer
- Low Pressure Drop
- Many Materials Available
- Easy to Install and Insulate

## Vahterus Systems, Flooded Evaporators + Droplet Separators

- Capacity Range: 100 – 5 000 kW
- Compact Size & Small Refrigerant Charge
- Possibility for Internal and External Circulation Systems
- Flexible and Customised Construction
- Safe Operation
- Ready to be Installed

### Combined

Combined is a new, extremely compact solution for flooded evaporators and flooded cascades. The evaporator, or cascade, and surge drum are all in one shell. Combined is especially suitable for limited spaces, such as marine applications or production facilities with very limited height. In addition to the compact size, it creates cost savings with insulation, piping and amount of refrigerant needed.

- Flooded Evaporators + Separator
- Flooded Cascade + Separator
- Multi Pass Droplet Separation
- 50 – 2000 kW
- Small Refrigerant Charge
- Round Plate

### Condensers

The construction of Vahterus PSHE is ideal for condensing applications. Key benefits include high thermal efficiency, small/reduced refrigerant charge, and low pressure drop. PSHE are suitable for all refrigerants over a wide temperature and capacity range.

- Refrigerants: NH<sub>3</sub>, CO<sub>2</sub>, R404, R134a, propane, methane, etc.
- Capacity Range: 5 – 10 000 kW
- Compact Size & Small Refrigerant Charge
- High Heat Transfer
- Low Pressure Drop
- Many Materials Available
- Easy to Install and Insulate

## Other Applications

### Desuperheaters



### Oil Coolers



### Ammonia Absorption Plant







Vahterus provides solutions for many heat transfer needs. We have considerable experience with heat transfer technology and continually invest in Research & Development

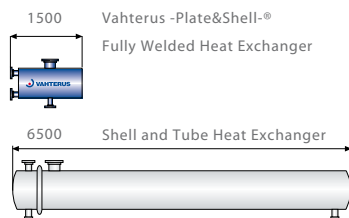
High quality, consistent and reliable products are a matter of principle to us.

## Compact & Effective

Vahterus PSHE combines the benefits of Plate & Frame and Shell & Tube heat exchangers. PSHE can either be described as a fully welded, high integrity plate heat exchanger, with no gaskets; or a generic alternative to Shell & Tube, approx. 25% of the footprint, displaying both space and weight benefits.

### Benefits of PSHE

- No Gaskets or Brazing
- High Integrity / Total Containment
- Strong and Safe Construction
- Unique Protection and Resistance to Thermal and Pressure Cycling
- Thermally Efficient
- Compact and Low Weight
- Flexible Construction
- Proven, Reliable Technology
- Low Fouling
- Minimal Maintenance Requirement
- Close Approach Temperatures



### Technical Specification

#### Maximum Heat Transfer Area

- 2000 m<sup>2</sup>/exchanger

#### Mechanical Design

- Full vacuum to 200 bar possible
- -200 to +900°C

### Quality Systems:

- ISO 9001:2000
- EN ISO 3834-2
- PED Module B+D
- ASME U Stamp
- OHSAS 18001
- ISO 14001



### Approvals:

- PED
- ASME U Stamp
- SELO, China
- AD-2000 HP0
- Germanischer Lloyd
- Lloyd's Register
- R.I.N.A
- ABS Europe Ltd.
- Bureau Veritas
- DNV

### Materials:

Shell:	Plates:
• St 35.8	• AISI 316L
• AISI 316L	• AISI 904L
• AISI 904L	• 254 SMO
• 254 SMO	• Hastelloy
• Hastelloy	• Duplex
• Duplex	• Titanium
• etc.	• Nickel
	• etc.

### Main Data:

	Area/plate, m <sup>2</sup>	Plate side nozzles, DN	Shell side nozzles, DN
PSHE 2	0.032	25	20-80
PSHE 3	0.076	50	25-250
PSHE 4	0.15	80	25-300
PSHE 5	0.26	100	25-350
PSHE 7	0.46	150	25-500
PSHE 9	0.80	200	25-700
PSHE 14	1.55	300	25-1000
PRHE 12	1.00	200	25-1000



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