FINNISH COMPANY

- Established in 1990
- Privately owned
- Subsidiary companies in UK, Germany, USA and China
- Global distributor network in over 50 countries
- Over 95% products exported from Finland
How it all started 1990

- The first Plate&Shell heat exchangers under production
27 years and 45,000 heat exchangers later

- 12,000 m² production & 2,500 m² office space
- All automatec welding
- Lazer cutting
VAHTERUS R & D

- Steam test laboratory
- Refrigeration test lab with ammonia and CO$_2$
- Liquid/liquid performance test
- Metallurgical Lab
- Thermal chock testing with N$_2$
- Burst test
- In house CFD simulations
INVENTOR OF PLATE & SHELL HEAT EXCHANGER

**Plate and Frame HE**
- Compact
- Low fouling
- Close approach temperatures
- Low pressure
- Low temperature
- Gasket

**Shell & Tube HE**
- High pressure
- High temperatures
- No gaskets
- Large size & weight
- High fouling

**Vahterus PSHE**
- High pressure
- High temperatures
- No gaskets
- Compact
- Low fouling
- Close approach temps
PLATE PACK CONSTRUCTION

### Table: Plate Pack Specifications

<table>
<thead>
<tr>
<th></th>
<th>Area/plate m²</th>
<th>Plate Ø</th>
<th>Plate side nozzles, DN</th>
<th>Shell side nozzles, DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSHE 2</td>
<td>0,032</td>
<td>190</td>
<td>25</td>
<td>20-80</td>
</tr>
<tr>
<td>PSHE 3</td>
<td>0,076</td>
<td>300</td>
<td>50</td>
<td>25-250</td>
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<tr>
<td>PSHE 4</td>
<td>0,15</td>
<td>440</td>
<td>80</td>
<td>25-300</td>
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<td>PSHE 5</td>
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<td>556</td>
<td>100</td>
<td>25-350</td>
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<td>PSHE 6</td>
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<td>PSHE 7</td>
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<td>740</td>
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<td>25-500</td>
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<td>PSHE 9</td>
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<td>998</td>
<td>200</td>
<td>25-700</td>
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<td>PSHE 12</td>
<td>1,00</td>
<td>1214</td>
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<td>600</td>
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<tr>
<td>PSHE 14</td>
<td>1,55</td>
<td>1358</td>
<td>300</td>
<td>25-1000</td>
</tr>
</tbody>
</table>
RESISTANCE AGAINST THERMAL & MECHANICAL STRESS

SECTION AA

Single plates
Plate pair welded around port
Plate pairs welded around circumference

Equal stress distribution

Stress Concentration at Corners
BURSTING PRESSURE WITH 316L

P/bar

1,5 mm
1,0 mm
0,8 mm
0,7 mm

Plate size

PSHE 2
PSHE 3
PSHE 4
PSHE 5
PSHE 6
PSHE 7
PSHE 9
COST & SPACE SAVING

- PSHE 9HH-348/1/1
- S&T 4MW -> PSHE 8 MW steam condenser
- Steam 0,9 barg / District heating water 64/110°C
Vahterus Plate&Shell in ORC systems

130 units delivered

- Condensers
- Recuperators
- Evaporators
- Pre heaters
- Exhaust gas economizers
Power Plants
Fed Water pre heater

Oil & Gas
Gas Cooler

Refrigeration
Flooded NH3 evaporators

LNG
Vent Gas Heater

Marine
Dumping Condensers

Chemical & Process
Feed Water pre heater
What is new?

- Thicker plate materials due to improved manufacturing technology
- New materials available FDX Duplex
- Inline weld testing
- CFD is speeding up the development for new plate types
Thank You!