Applications
For your utility heating and cooling duties the industrial plate heat exchangers of Alfa Laval can be used. These are detailed in the following product sheets.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are fixed between upper bar and lower bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

Flow principle of an M3, M6, M10 and M15 plate heat exchanger
M3

**Typical capacities**

- **Liquid flow rate**: Up to 4 kg/s (60 gpm), depending on media, permitted pressure drop and temperature program.
- **Water heating by steam**: 50 to 250 kW

**Plate types**

- M3 and M3-X, where M3 provides parallel and M3D and M6G, double wall plates.

**Frame types**

- FG

**Standard Materials**

- **Frame plate**: Mild steel, Epoxy painted
- **Nozzles**: Carbon steel Pipe: Alloy 316, Titanium
- **Plates**: Stainless steel: AISI 316 or Titanium
- **Gaskets**: M3 Nitrile, EPDM, HeatSealF™
- **M3D Nitrile, EPDM**

**Technical Data**

- Pressure vessel codes, PED, ASME, pvcALS™
- Mechanical design pressure (g) / temperature
  - FG PED, pvcALS™ 1.6 MPa / 180°C
  - FG ASME 150 psig / 350°F

**Maximum heat transfer surface**

- 3.9 m² (40 sq. ft)

**Connections**

- FG PED Size 1¼" Pipe, thread ISO-R 1¼"
- FG pvcALS™ Size 1¼" Pipe, thread ISO-G 1¼" or thread ISO-R1¼"
- FG pvcALS™ Size 1¼" Internal thread ISO-G 1¼", carbon steel
- FG ASME Size 1¼" Pipe, thread NPT 1¼"

**Dimensions**

- The number of bolts may vary depending on pressure rating.

**Particulars required for quotation**

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure
M6

Typical capacities

Liquid flow rate
Up to 16 kg/s (250 gpm), depending on media, permitted pressure drop and temperature program.

Water heating by steam
300 to 800 kW

Plate types
M6, M6M, M6MD and M6MG

Frame types
FM, FG and FD

Standard Materials

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 316 / Alloy 304
Titanium (M6M only)

Gaskets
M6: Nitrile, EPDM, HeatSeal F™
M6M: Nitrile, EPDM, HeatSeal F™

Technical Data
Pressure vessel codes, PED, ASME, pvCALS™
Mechanical design pressure (g) / temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure (MPa)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM</td>
<td>1.0</td>
<td>160</td>
</tr>
<tr>
<td>FG</td>
<td>1.6</td>
<td>180</td>
</tr>
<tr>
<td>FG</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>FG</td>
<td>1.6</td>
<td>180</td>
</tr>
<tr>
<td>FD</td>
<td>2.5</td>
<td>160</td>
</tr>
<tr>
<td>FD</td>
<td>300</td>
<td>320</td>
</tr>
</tbody>
</table>

*) Frame FG also approved for 1.2 MPa/200°C to allow use in steam systems without safety valves.

Maximum heat transfer surface
390 m² (4,200 sq. ft)

Connections

Pipe connections (not for frame type FD)

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight threaded</td>
<td>50 mm</td>
<td>ISO G2&quot;, NPT 2&quot;</td>
</tr>
<tr>
<td>Straight weld</td>
<td>50 mm</td>
<td>ISO G2</td>
</tr>
<tr>
<td>Threaded inlet port</td>
<td>50 mm</td>
<td>ISO G2</td>
</tr>
</tbody>
</table>

Flange connections

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM</td>
<td>50 mm</td>
<td>PED</td>
</tr>
<tr>
<td>FG</td>
<td>50 mm</td>
<td>ASME CI. 150</td>
</tr>
<tr>
<td>FG</td>
<td>50 mm</td>
<td>ASME CI. 150</td>
</tr>
<tr>
<td>FG</td>
<td>50 mm</td>
<td>ASME CI. 150</td>
</tr>
<tr>
<td>FD</td>
<td>50 mm</td>
<td>ASME CI. 300</td>
</tr>
<tr>
<td>FD</td>
<td>50 mm</td>
<td>ASME CI. 300</td>
</tr>
</tbody>
</table>

Dimensions

Measurements mm (inch)

<table>
<thead>
<tr>
<th>Type</th>
<th>H</th>
<th>W</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6-FM</td>
<td>920 (367/32)</td>
<td>320 (125/8)</td>
<td>140 (5½)</td>
</tr>
<tr>
<td>M6-FG</td>
<td>920 (367/32)</td>
<td>320 (125/8)</td>
<td>140 (5½)</td>
</tr>
<tr>
<td>M6-FD</td>
<td>940 (37)</td>
<td>330 (125/8)</td>
<td>150 (6)</td>
</tr>
</tbody>
</table>

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure
M10

Typical capacities

Liquid flow rate
Up to 50 kg/s, depending on media, permitted pressure drop and temperature program.

Water heating by steam
0.7 to 3.0 MW

Plate Types
M10B, M10M and M10MD

Frame Types
FM, FG and FD

Standard Materials

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Lined: Stainless steel, Rubber, Titanium

Plates
Stainless steel AISI 316/AISI 304, Titanium, Alloy 20/18/6

Gaskets
M10B Nitrile, EPDM
M10M Nitrile, EPDM, HeatSeal F™, HNBR, EPDMF, Viton®G

Technical data

Mechanical design pressure (g) / temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>FM</th>
<th>1.0 MPa / 160°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>1.6 MPa / 180°C</td>
<td></td>
</tr>
<tr>
<td>FG ASME</td>
<td>150 psig / 350°F</td>
<td></td>
</tr>
<tr>
<td>FD</td>
<td>2.5 MPa / 160°C</td>
<td></td>
</tr>
<tr>
<td>FD ASME</td>
<td>300 psig / 320°F</td>
<td></td>
</tr>
</tbody>
</table>

*) Frame FG also approved for 1.2 MPa / 200°C to allow use in steam systems without safety valves.

Maximum heat transfer surface
M10B: 90 m² (970 sq. ft)
M10M: 60 m² (650 sq. ft)

Connections

FM – Size 100 mm DIN 2501 PN10 or ANSI 150
FG – Size 100 mm DIN 2501 PN16 or ANSI 150
FD – Size 100 mm DIN 2501 PN25 or ANSI 150
FD – Size 100 mm DIN 2501 PN25 or ANSI 300 (ASME)

Dimensions

Measurements (mm)

<table>
<thead>
<tr>
<th>Type</th>
<th>H</th>
<th>W</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10-FM</td>
<td>1,084</td>
<td>470</td>
<td>215</td>
</tr>
<tr>
<td>M10-FG</td>
<td>1,084</td>
<td>470</td>
<td>215</td>
</tr>
<tr>
<td>M10-FD</td>
<td>981</td>
<td>470</td>
<td>131</td>
</tr>
<tr>
<td>M10-FD ASME</td>
<td>1,084</td>
<td>470</td>
<td>215</td>
</tr>
</tbody>
</table>

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure
M15
Typical Capacities
Liquid flow rate
Up to 80 kg/s (1,300 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
M15B, M15E and M15M

Frame types
FL, FM, FG and FD

Standard Materials
Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316
Titanium
Alloy C-276
Alloy 254 SMO

Gaskets (Clip-on/Tape-on, Glued)
Nitrile
EPDM
AL-EPDM

Technical Data
Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>FL</th>
<th>FM</th>
<th>FG</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>1.815 (71½)</td>
<td>610 (24)</td>
<td>610 (24)</td>
<td>650 (25½)</td>
</tr>
<tr>
<td>W</td>
<td>610 (24)</td>
<td>610 (24)</td>
<td>650 (25½)</td>
<td>650 (25½)</td>
</tr>
<tr>
<td>h</td>
<td>275 (10¾)</td>
<td>275 (10¾)</td>
<td>275 (10¾)</td>
<td>370 (14½)</td>
</tr>
</tbody>
</table>

Maximum heat transfer surface
390 m² (4,200 sq. ft)

Connections

<table>
<thead>
<tr>
<th>Type</th>
<th>FL</th>
<th>FM</th>
<th>FG</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 150 mm</td>
<td>150 mm</td>
<td>150 mm</td>
<td>150 mm</td>
<td></td>
</tr>
<tr>
<td>DIN/GB/GOST PN10,</td>
<td>DIN/GB/GOST PN10,</td>
<td>DIN/GB/GOST PN10,</td>
<td>DIN/GB/GOST PN10,</td>
<td></td>
</tr>
<tr>
<td>ASME CI. 150, JIS 10K</td>
<td>ASME CI. 150, JIS 10K</td>
<td>ASME CI. 150, JIS 10K</td>
<td>ASME CI. 150, JIS 16K</td>
<td></td>
</tr>
<tr>
<td>Size 6&quot;</td>
<td>Size 6&quot;</td>
<td>Size 6&quot;</td>
<td>Size 6&quot;</td>
<td></td>
</tr>
<tr>
<td>ASME CI. 150</td>
<td>ASME CI. 150</td>
<td>ASME CI. 150</td>
<td>ASME CI. 300</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>Measurements mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>M15-FL</td>
</tr>
<tr>
<td>M15-FM</td>
</tr>
<tr>
<td>M15-FG</td>
</tr>
<tr>
<td>M15-FD</td>
</tr>
</tbody>
</table>

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure