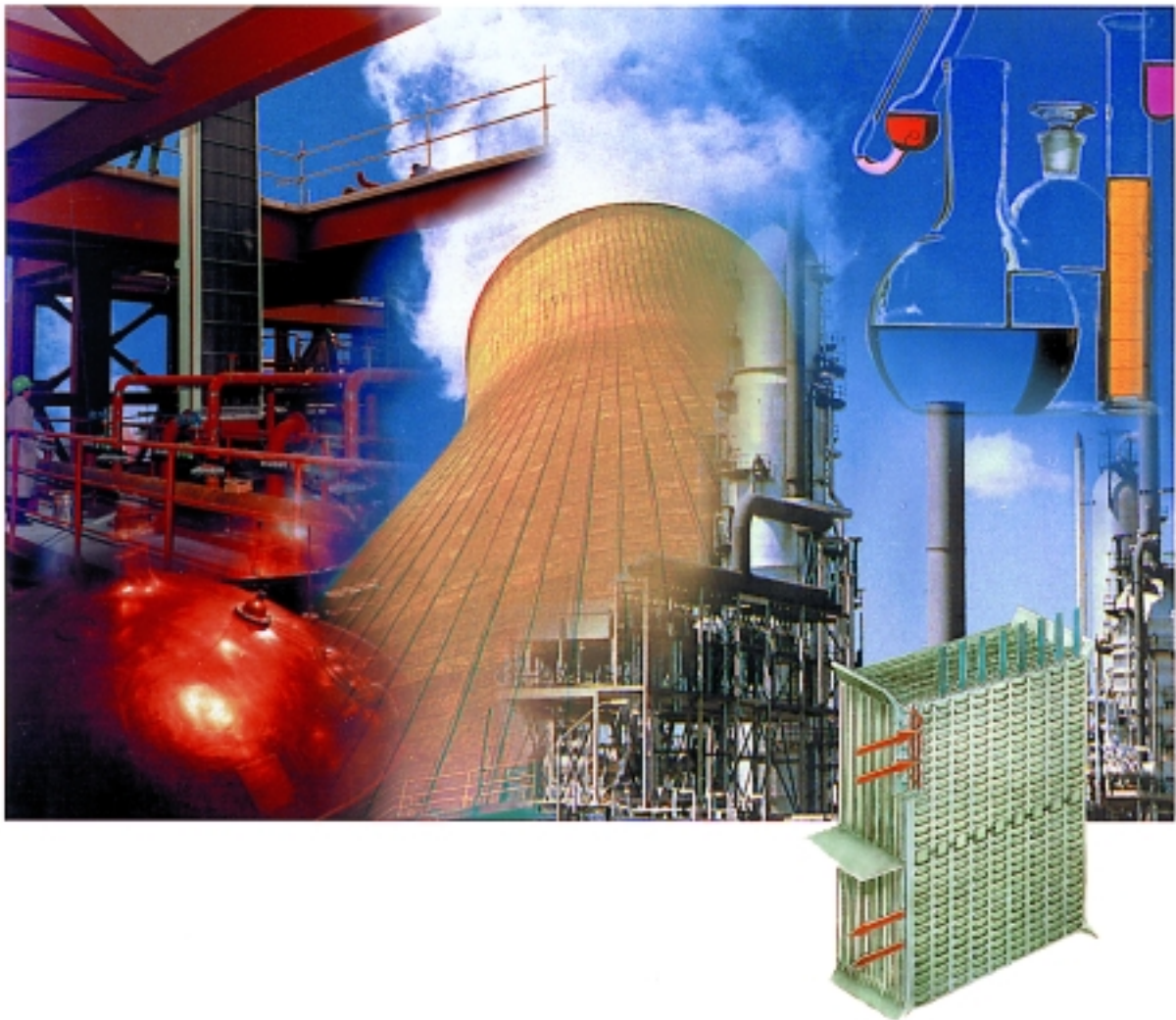
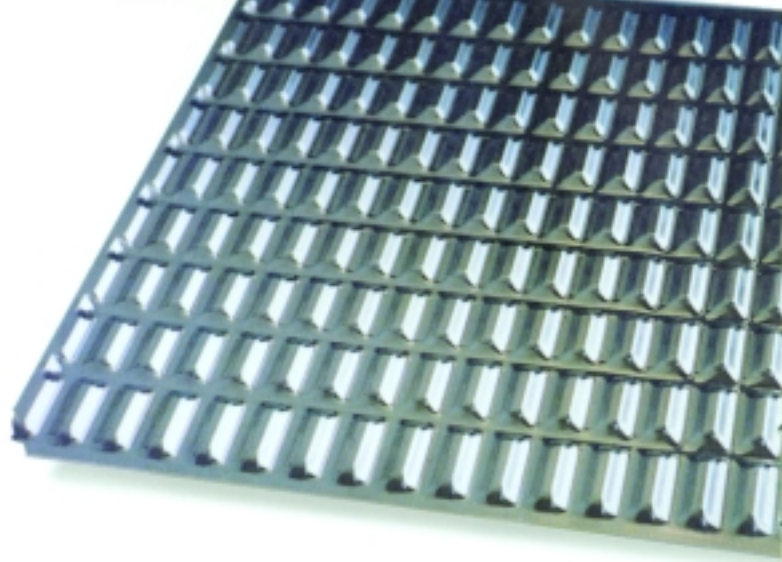


# APV Hybrid Welded Plate Heat Exchanger



# The Technology



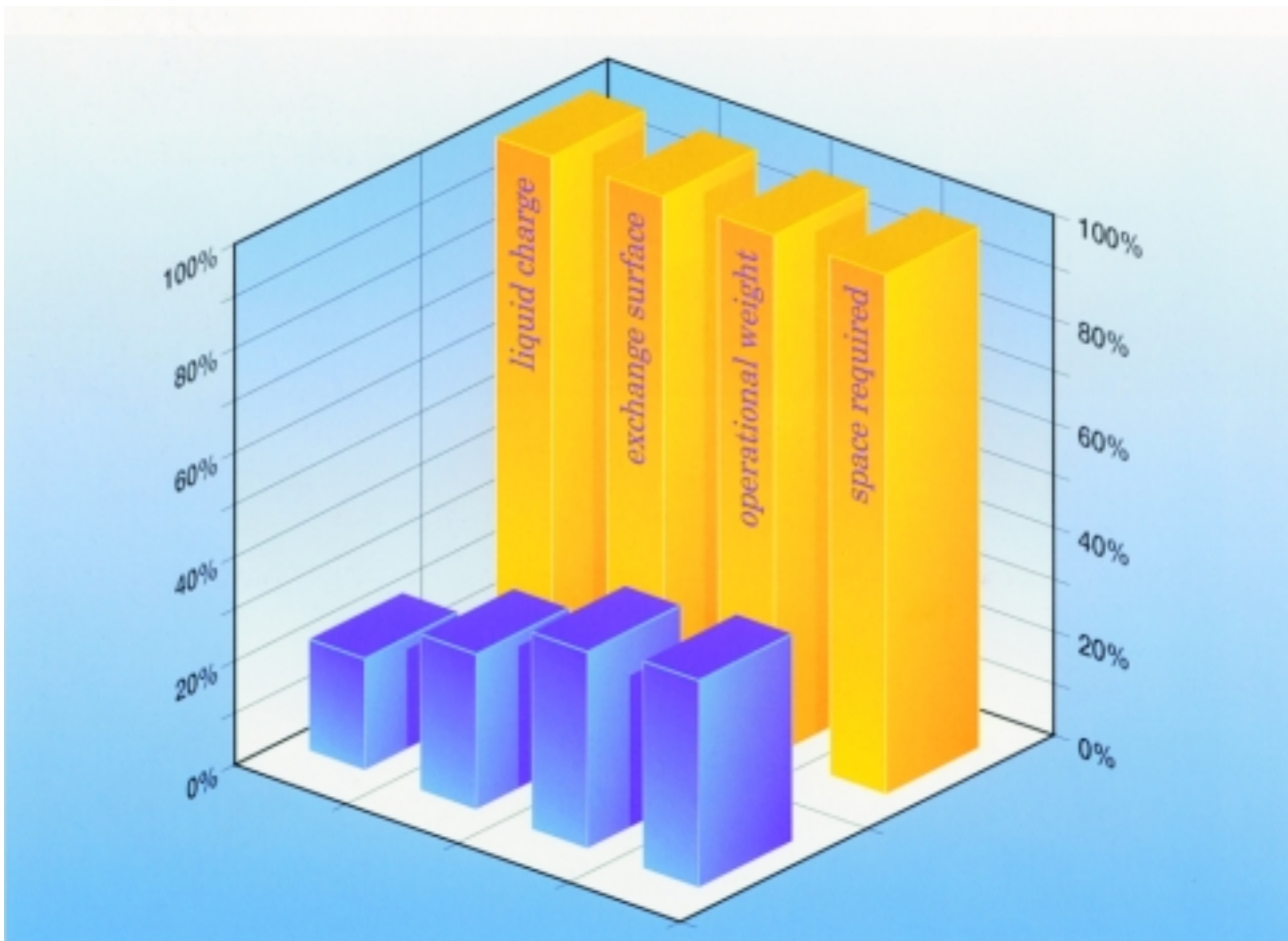
Since 1981, the APV HYBRID HEAT EXCHANGER has been firmly established in industry. The broad range of possible construction forms for the hybrid system allows to find the best possible solutions for given thermal, physical and geometrical conditions. The fully welded APV HYBRID PLATE HEAT EXCHANGER ensures that different media are safely kept separate - even when higher pressures and temperatures are applied. This means that there is a wider range of

possible applications than where the gasketed plate heat exchangers can be applied.

The APV HYBRID HEAT EXCHANGER also proves superior in any respect when compared to shell & tube heat exchangers with the usual construction design and identical conditions for process engineering.

Its compact design allows a heating surface density of  $250 \text{ m}^2/\text{m}^3$ . The special construction of the flow pattern ensures that the heat transfer

for gases as well as for liquids is extremely enhanced. A further advantage in comparison with shell & tube heat exchangers is the high economic efficiency of the APV HYBRID HEAT EXCHANGER. The use of less material means considerable cost reduction potential when high-grade alloys are required.



Hybrid



Shell & tube exchanger





# Functionality

The schematic diagrams of the flow regime show that almost the entire surface of the metal plates are used for heat exchange, so that full advantage is taken from the material used. The APV HYBRID PLATE HEAT EXCHANGER design has no dead spots and provides very efficient heat transfer at low pressure drop values, which enables very close temperature approach.

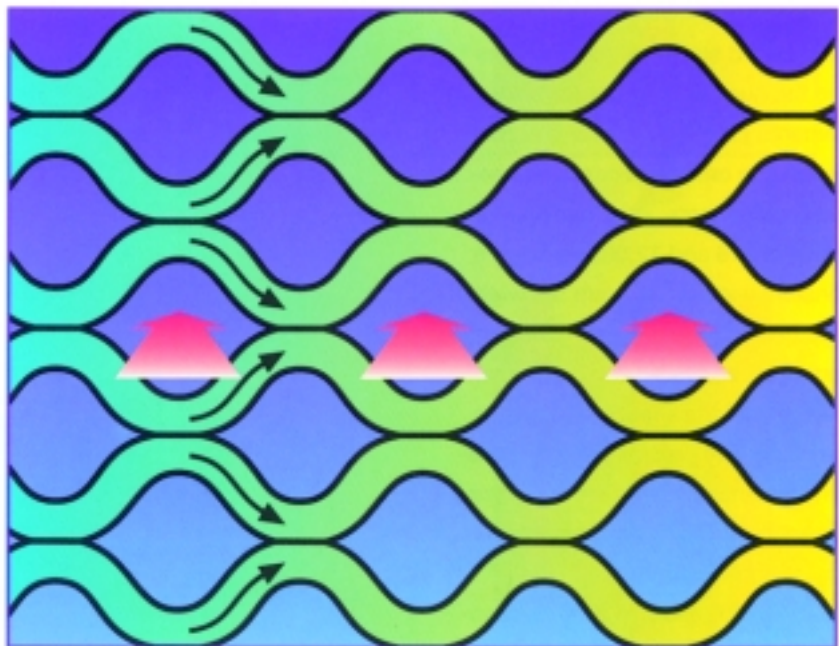
The plate side flow and the tube side flow are arranged in cross flow configuration in one or multiple passes over the plates.

The plate pattern forms elliptical tube channels on the tube flow side and wave flow passage on the plate side.

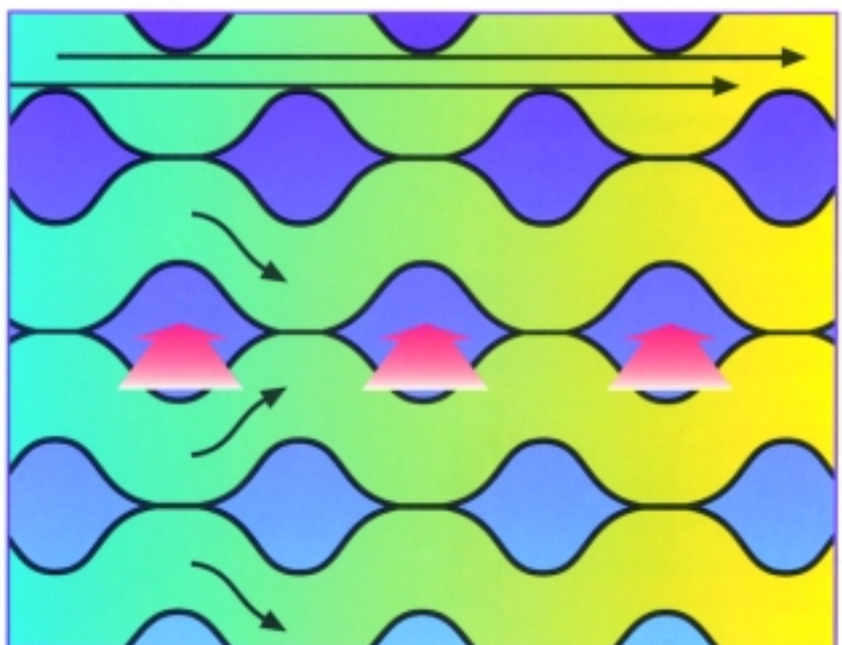
The depth of the plate pressing can optionally be increased in order to allow larger flow rates or reduced pressure drop or the passage of larger particles. This provides possibilities of optimal design to process requirements and is achieved by enlarging diameters of the elliptical tube channels, while maintaining the plate distance on the plate flow side. It is also possible to achieve a wide-gap condition on the plate flow side by welding the plates at expanded distance.

The APV HYBRID PLATE HEAT EXCHANGER can be designed for a pressure range from full vacuum to 60 bar.

"Plate" side flow indicated by black arrows.



"Tube" side flow indicated by red arrows.



"Plate" side expanded.

# The Construction

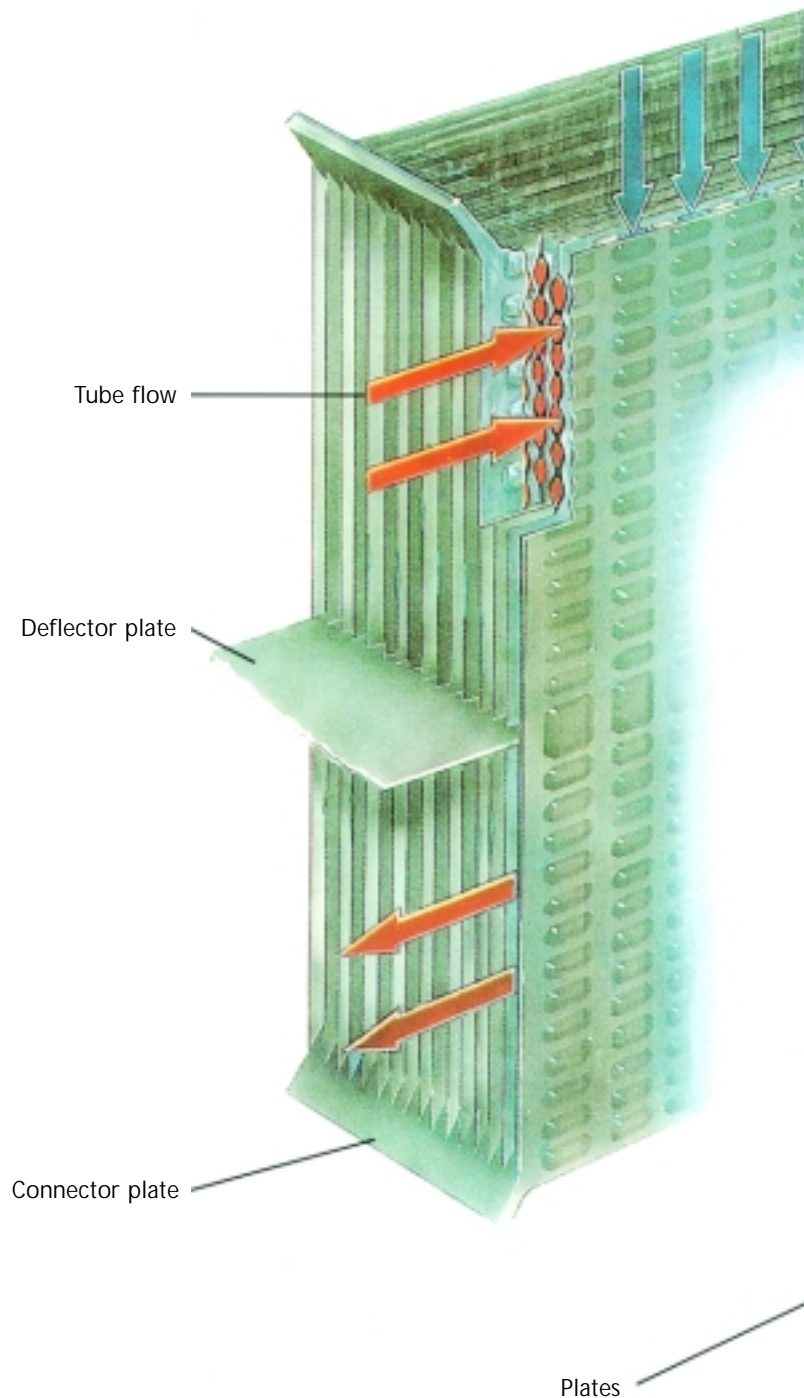
The dimensions of the heat exchanger block are determined by the length and number of plates piled on top of each other.

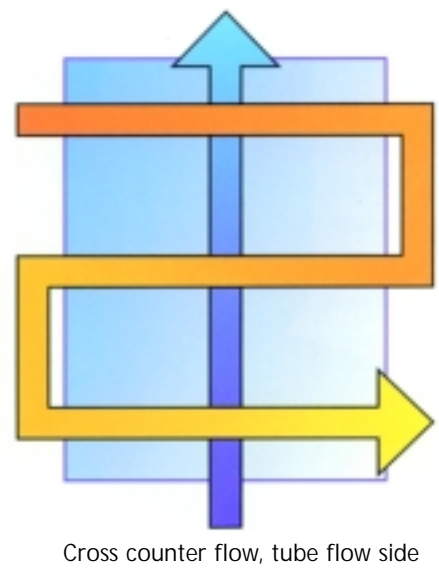
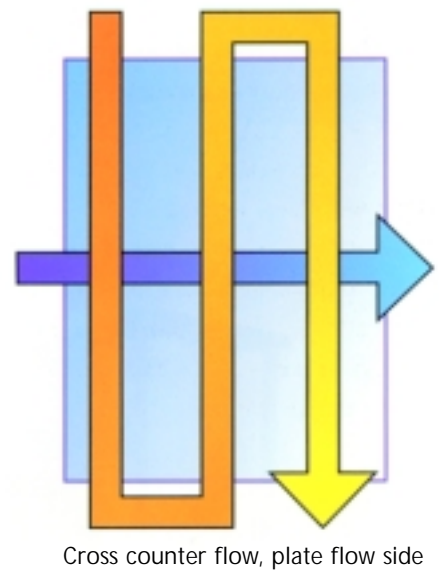
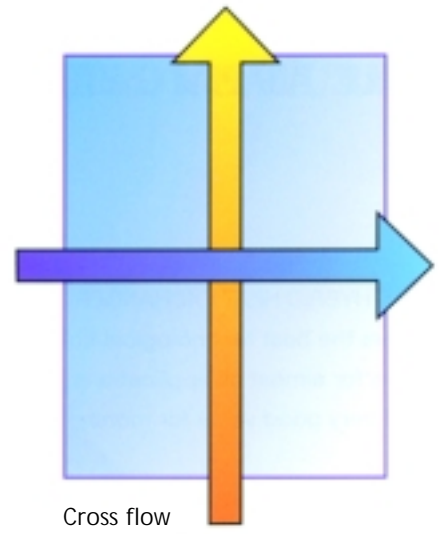
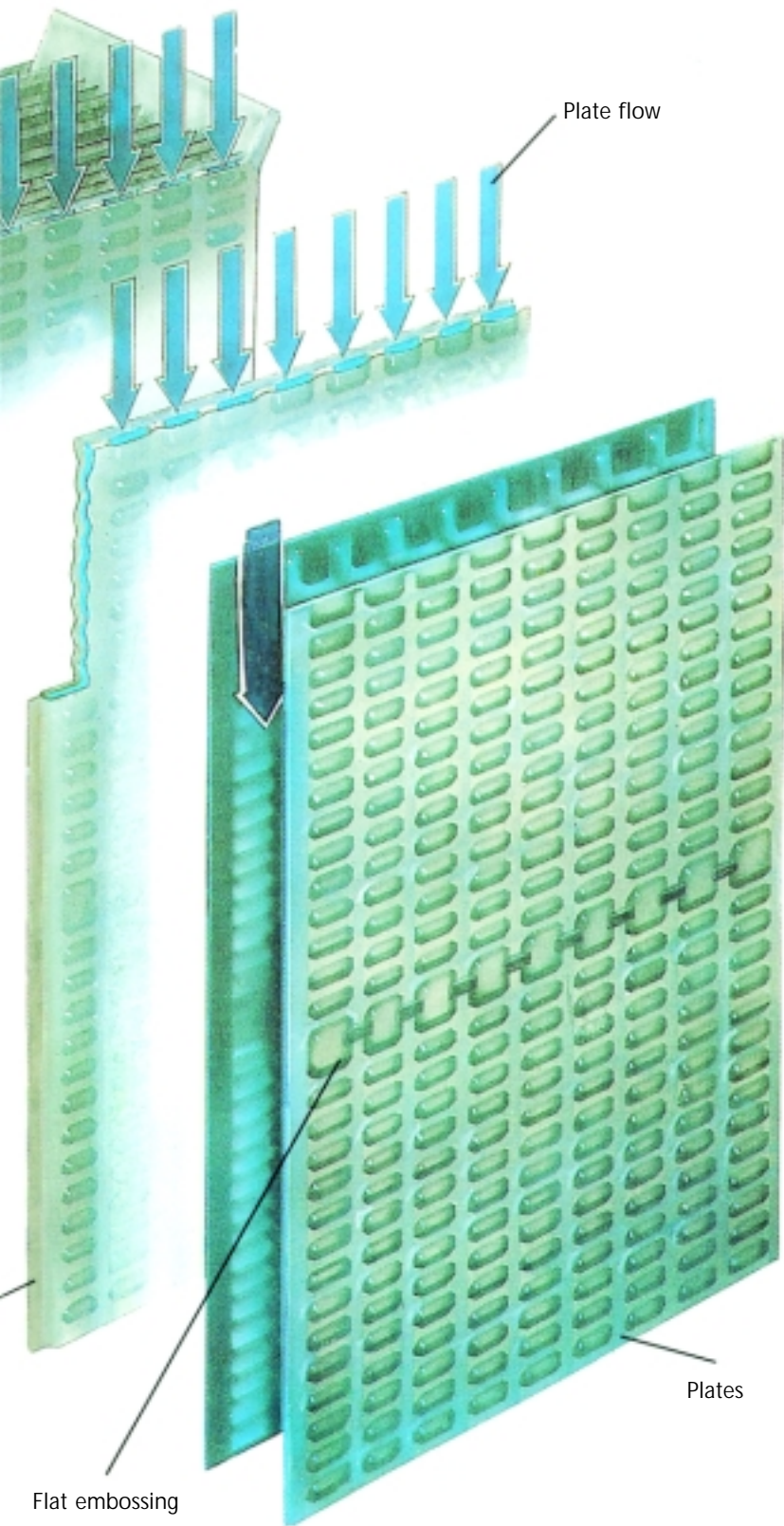
Depending on the process engineering requirements, plates of a length between 216 and 12,000 mm and a constant width of 350 mm are welded together to one or several gas-tight and pressure-resistant blocks. The thickness of the sheets depends on requirements. Generally, the sheets which are processed are between 0.5 and 0.8 mm thick.

The design of the APV HYBRID HEAT EXCHANGER allows a flexible arrangement in construction as well as in process engineering.

In addition to the wide variety of possibilities with the heat exchanger block, the construction of the cover can also be altered according to requirements. The APV HYBRID HEAT EXCHANGER can be used just as a cross flow or as a cross counter flow apparatus.

Several passes can be made both on the tube and the plate side. The flow can be diverted several times by simply installing deflector plates in the covers. Thus, heat exchangers for a wide variety of applications can be offered.







# The Applications

THE APV HYBRID PLATE HEAT EXCHANGER offers the best technological solutions for a wide number of applications, and excellent return on investment.

**APV HYBRID  
PLATE HEAT EXCHANGER  
with unaltered state of  
aggregation**

- ◆ gas-gas heat exchanger
- ◆ gas-liquid heat exchanger
- ◆ liquid-liquid heat exchanger

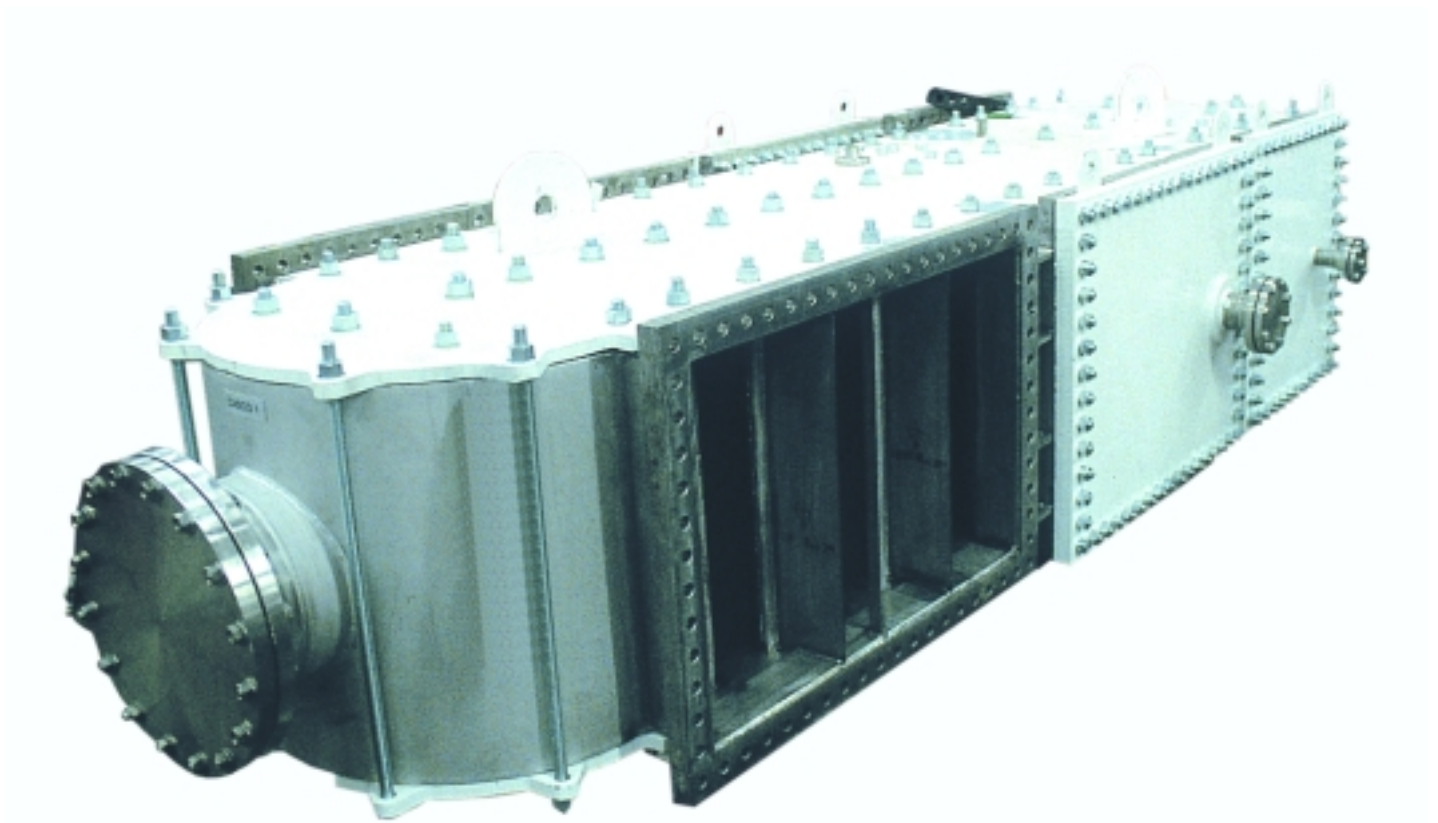
**APV HYBRID  
PLATE HEAT EXCHANGER  
with altered state of  
aggregation**

- ◆ folded film evaporator
- ◆ circulatory evaporator
- ◆ condensor

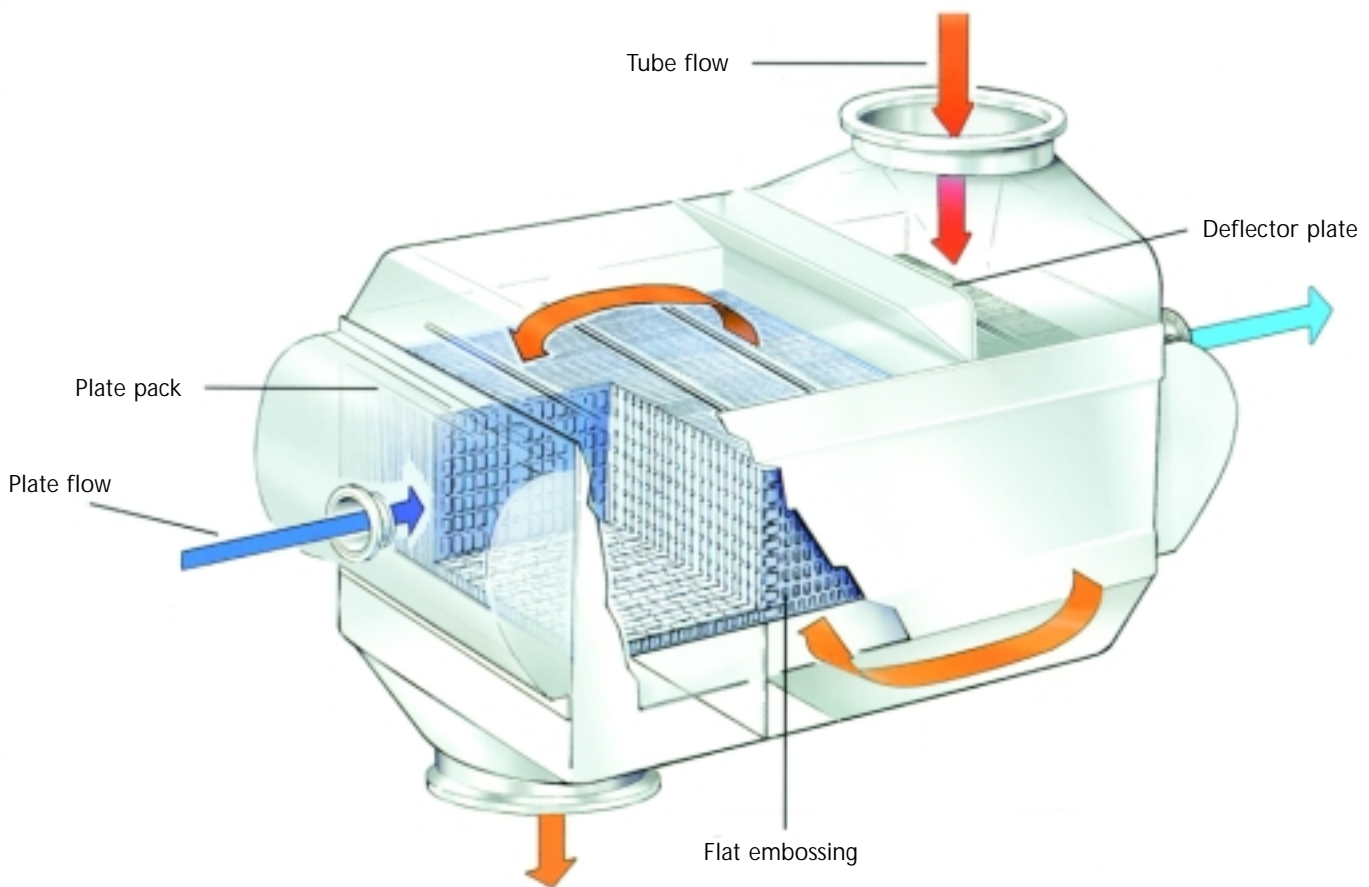
A great many problems in thermal process engineering can be solved by using THE APV HYBRID PLATE HEAT EXCHANGER.

THE APV HYBRID PLATE HEAT EXCHANGER has for years been applied successfully in the following industries:

- sugar industry
- natural gas and petrochemical industries
- heat- and power stations
- refrigeration and heating technology industry
- chemical and pharmaceutical industry



# The Features



Like all our products the APV HYBRID PLATE HEAT EXCHANGER is produced in accordance with the quality assurance norm **ISO 9000**

Further advantages:

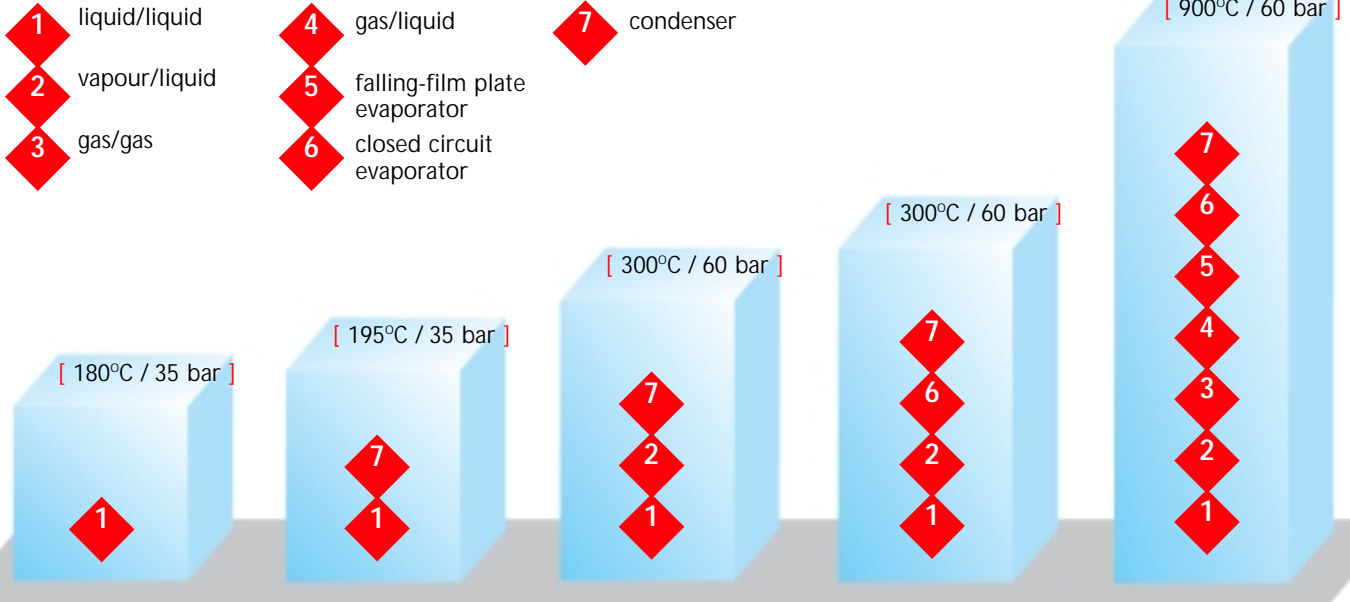
- operational temperature range between -200 °C and 900 °C
- pressure range between vacuum and 60 bar
- fully welded construction (no gaskets)
- broad range of possible construction configurations
- its compact design allows the installation of up to 6000 m<sup>2</sup> heating surface per unit
- economic use of materials and low weight
- exchange surfaces with plates of thickness between 0.5 and 1.0 mm
- available in variety of high grade alloys
- very efficient heat transfer even at low pressure drop
- self-cleaning effect by strong turbulences, no dead spots in the flow
- works as gas or liquid exchanger, condenser or evaporator
- low filling charge and short length of stay, which protects the product
- possible to achieve very close temperature approaches

# The APV Product Portfolio

## Suitability by heat exchanger technology

Applications:

Capacity: 1 kW - 150.000 kW (per unit)



**ParaFlow**  
gasketed plate heat exchanger

- ◆ district heating
- ◆ potable water heating
- ◆ industrial applications
- ◆ solar heating
- ◆ food applications
- ◆ marine applications
- ◆ power plants

**ParaBraze**  
brazed plate heat exchanger

- ◆ district heating
- ◆ heating
- ◆ air
- ◆ refrigeration
- ◆ solar heating

**ParaTube**  
shell & tube heat exchanger

- ◆ district heating
- ◆ portable water heating
- ◆ vapour condensers
- ◆ industrial applications

**ParaShell**  
welded plate heat exchanger

- ◆ district heating
- ◆ heating
- ◆ chemical industry
- ◆ refrigeration industry
- ◆ steam
- ◆ power plants

**HYBRID**  
fully welded plate heat exchanger

- ◆ sugar industry
- ◆ natural gas industry, petrochemical industry
- ◆ heating and power stations
- ◆ refrigeration
- ◆ chemical and pharmaceutical industry
- ◆ power plants

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