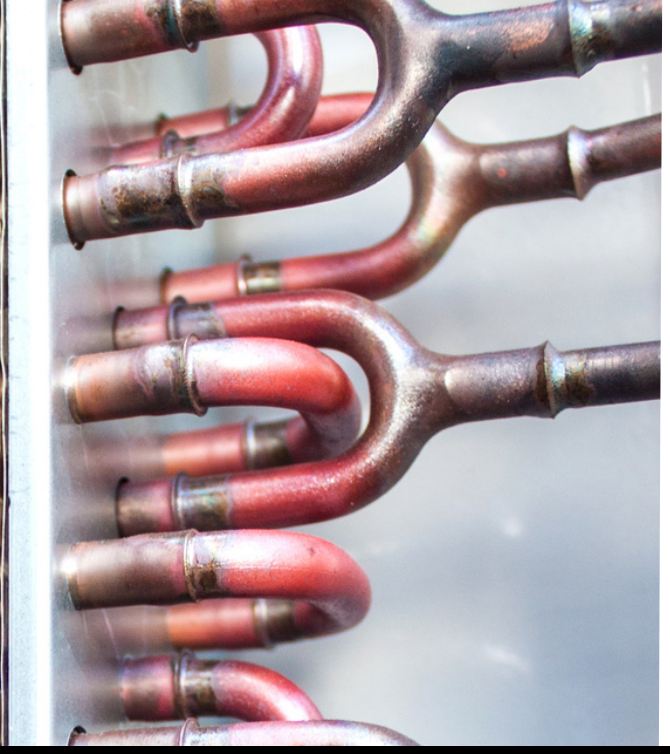
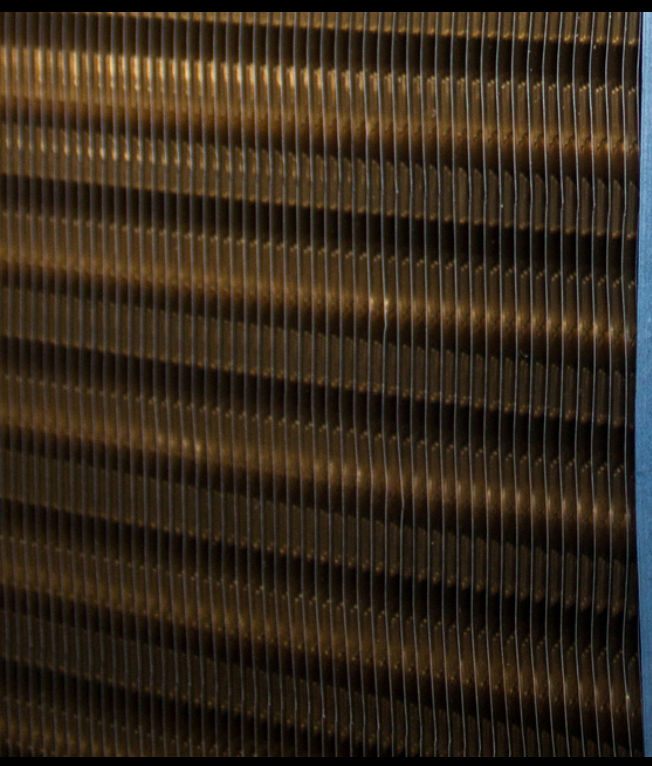
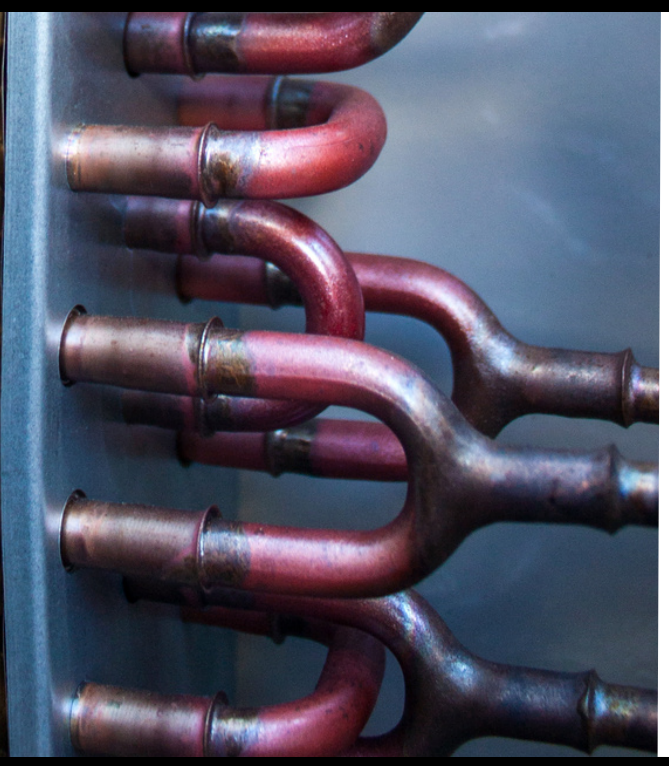


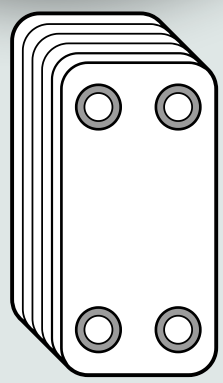
HEAT EXCHANGERS





Equipemnt designed to transfer heat between two or more fluids

A heat exchanger is an equipment that facilitates heat exchange between two fluids of different temperatures.

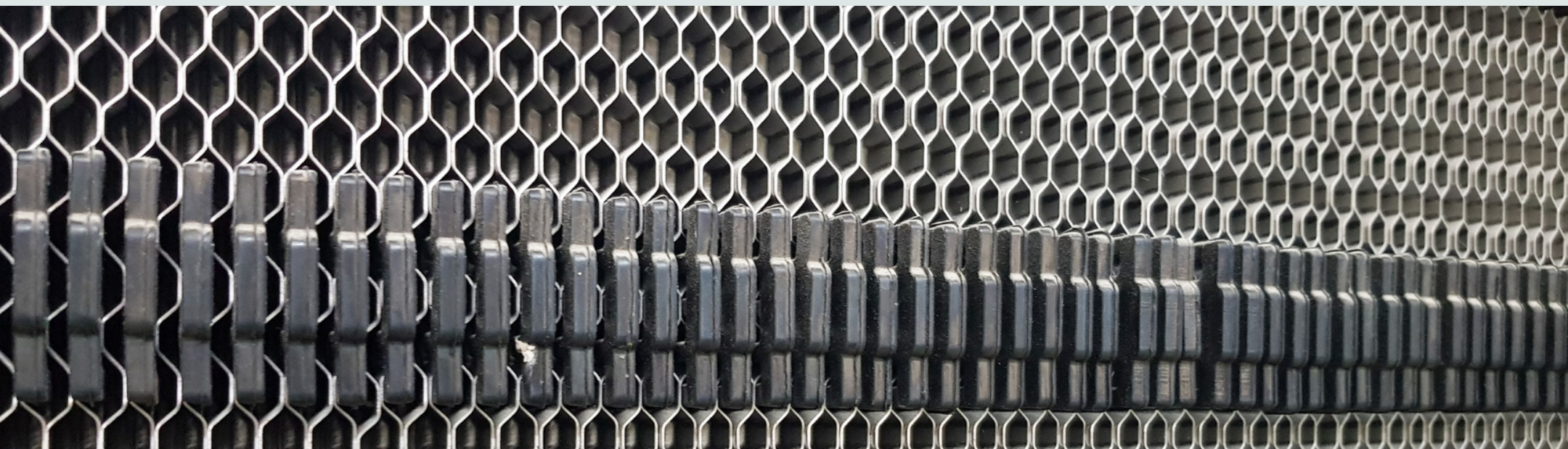


Use In Food Industry:

1. Control fluid temperatures in processing systems to meet , filling, pasteurisation and food safety requirements.

2. Reduce or eliminate microbes to make products safe for consumption and to prevent spoilage.

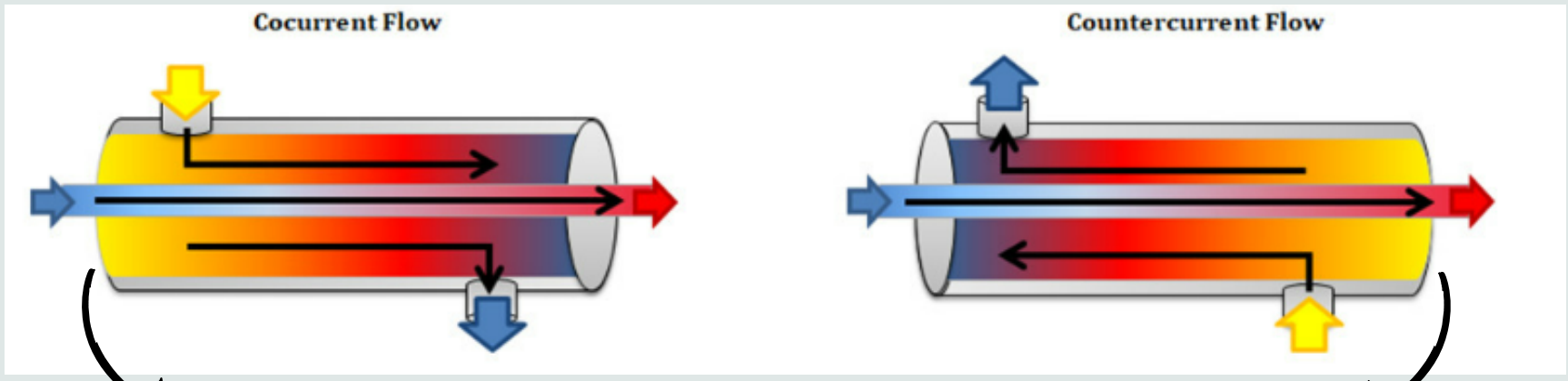
3. They provide the precise temperature and holding time combination while processing.



Design Characteristics

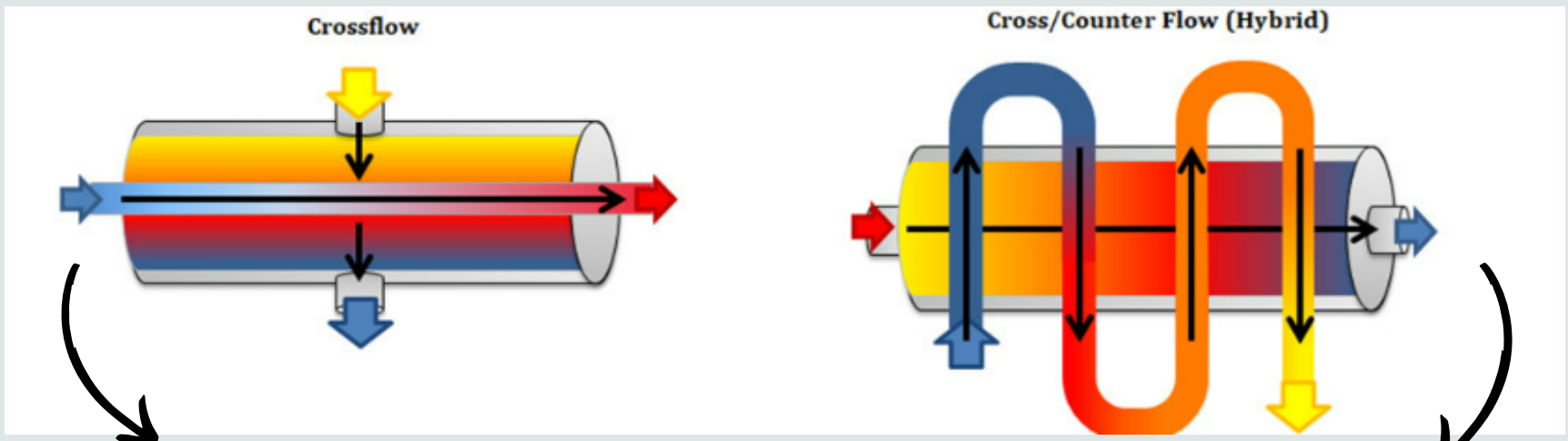
1. Flow configuration

- **Direction of fluid movement within the heat exchanger in relation to each other.**



Parallel flow

Antiparallel



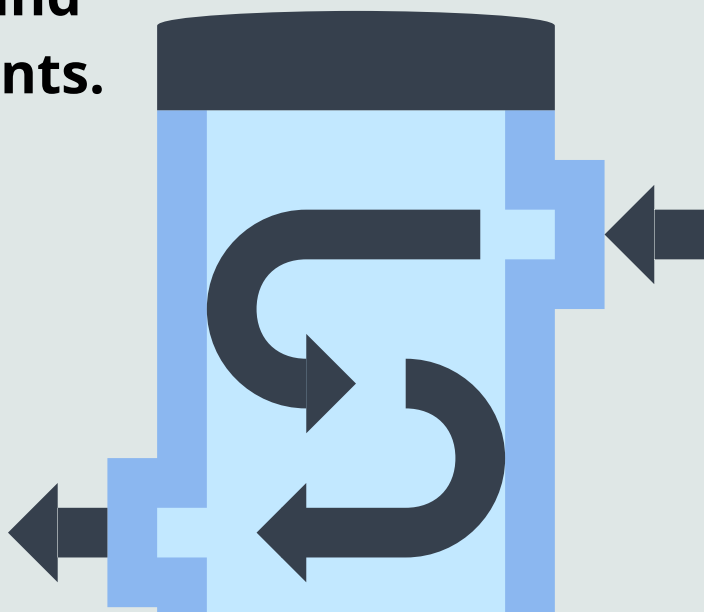
Perpendicular

Combination of above

2. Construction method

- **Shells, tubes, spiral tubes (coils), plates, fins, and adiabatic wheels are most common components.**

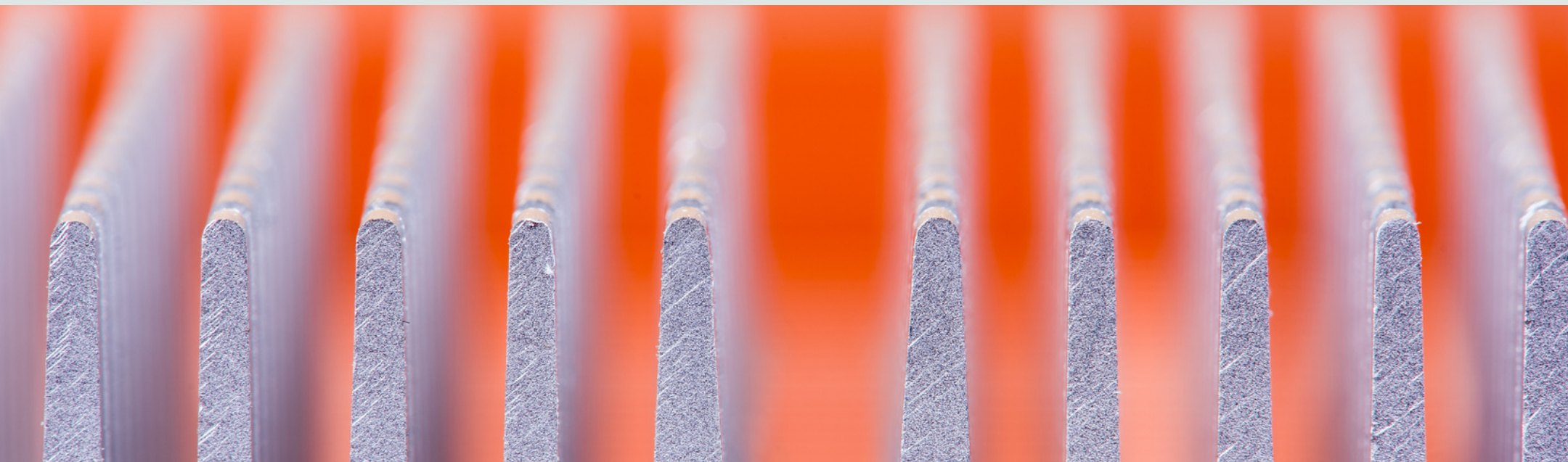
- **Direct contact or indirect contact transfer processes to exchange heat.**



3. Heat transfer mechanism

- **Single-phase heat exchangers: The fluids do not undergo any phase change throughout the heat transfer process.**

- **Two-phase heat exchangers: The phase change can occur in either or both of the fluids involved.**



Types

1. Shell and tube heat exchangers

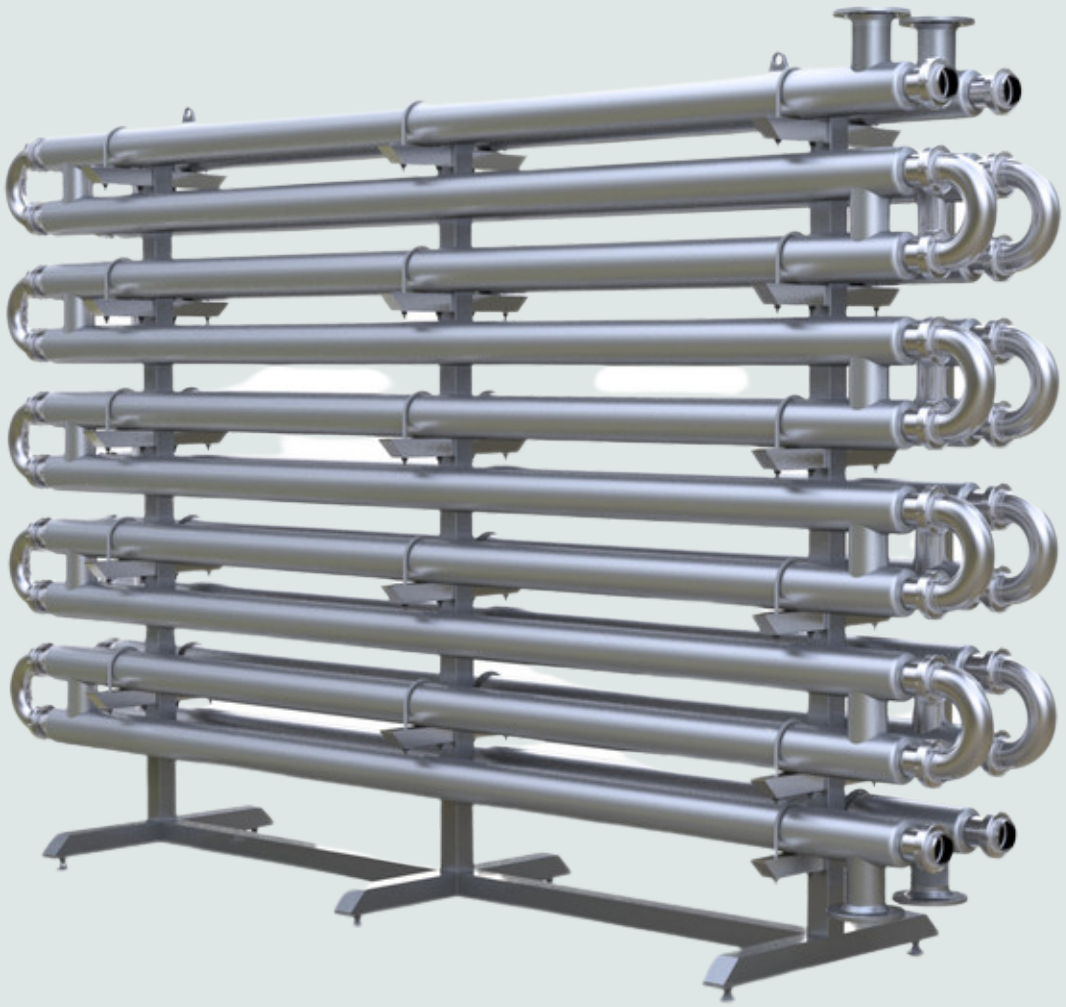
- **Built from a single tube or a series of parallel tubes (encased within a sealed, cylindrical pressure vessel).**
- **One fluid flows through the smaller tube(s), and the other fluid flows around the outside(s) and between them within the sealed shell.**
- **Used in: Viscous products with particulates in food, dairy, and beverage markets, pharmaceutical.**

- **Low-maintenance in-line heating option**
- **Preferred where complete drainability is required**

Source: https://www.alfalaval.com/products/heat-transfer/tubular-heat-exchangers/shell-and-tube-heat-exchanger/

2. Double Pipe Heat Exchangers

- **Consists of two or more concentric, cylindrical pipes or tubes.**
- **One fluid flows through the smaller tube(s), while the other fluid circulates within the larger tube around the smaller tube(s).**
- **This type of exchanger is suitable for high-pressure applications because of their smaller diameters.**

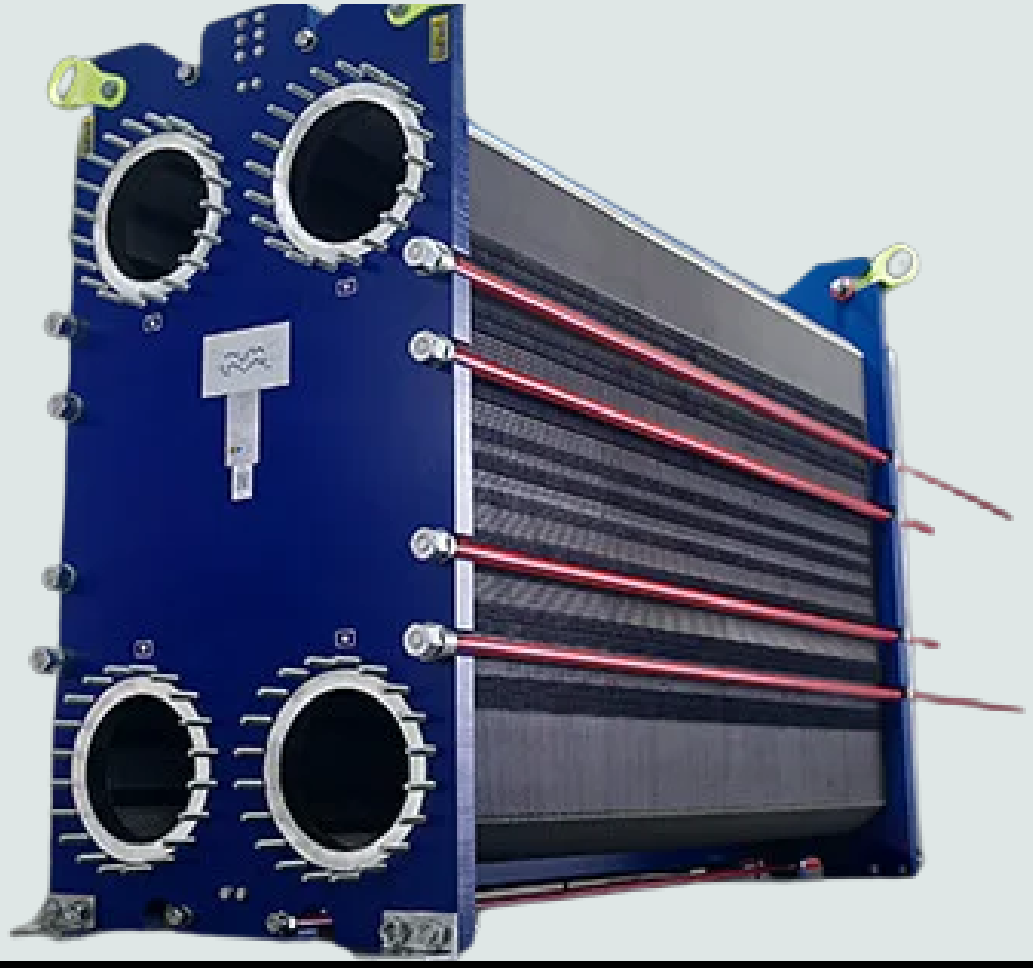


- **Low efficiency**
- **Cheap for both design and maintenance, making them a good choice for small industries**

Source: https://www.thomasnet.com/articles/process-equipment/understanding-heat-exchangers/

3. Plate-and-Frame Heat Exchangers

- **Constructed of several thin, corrugated plates bundled together.**
- **Each pair of plates forms a channel through which one fluid can flow, and the pairs are stacked and joined to form a second passage through which the other fluid can flow.**
- **Because of their low steam temperature requirement, they are an attractive option for CIP systems.**



- **Extensively used in food industry.**
- **Highly efficient and typically have a small footprint**

Source:https://www.alfalaval.com/products/heat-transfer/plate-heat-exchangers/gasketed-plate-and-frame-heat-exchangers/

4. Condensers, Evaporators, and Boilers

- **Employ a two-phase heat transfer mechanism.**

- **During the heat transfer, one or more fluids in two-phase heat exchangers change phases, either from liquid to gas or from gas to liquid.**

- **Used in : Distillation and refinement processes, HVAC, Refrigeration, etc.**

CONDENSOR

EVAPORATORS

Source:https://www.thomasnet.com/articles/process-equipment/understanding-heat-exchangers/

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