heatsystems
Elektrowärme-Technik

Produktseite

Plate heat exchangers



Plate heat exchangers transfer the thermal energy of a fluid to another one. Therefore, their name is plate heat exchanger. The fluids involved are mainly liquid but can also be gaseous. The type and properties of the fluids, pressures and temperatures as well as the desired operating points in the process are important for the design.

One fluid in the plate heat exchangers transfers the energy, and this energy is transferred to the other fluid through a metallic plate. Here, it is important that the design be matched to the general conditions, for each fluid has its specific properties.

The advantage of plate heat exchangers over tubular heat exchangers is the smaller design at the same thermal power and a better possibility of cleaning (in case of screwed plate heat exchangers); the lower pressure stability is a disadvantage.

Anwendungsbereiche:

Fluids

For example, these fluids are heated in electrical flow-type heaters:

I. Water

- Drinking water, max. surface load depending on the water hardness 4 – 6 W/cm²
- Circulating and/or heating water, max. surface load approx. 10 W/cm²
- Softened water; observe the maximally admissible chloride content, max. surface load approx. 19.0 W/cm²
- Ultra-pure water; here, a low-pocket or pocket-free design with a defined surface quality is useful in most cases.
- Fully desalted water; here, non-ferrous heavy metals should not be used, maximum surface load approx. 10 W/cm²

II. Oil

- Heavy oil, not pumpable in a cold condition, maximum surface load between 1 and 2 W/cm² depending on the quality
- Hydraulics oil, maximum surface load approx. 0.6 – 1.2 W/cm²
- Lubricating oil, steam turbine oil, max. surface load approx. 1 W/cm²
- Insulating oil, maximum surface load approx. 0.3 – 0.6 W/cm²
- Heat transfer oil, film temperature calculation acc. to DIN 4754 required, maximum surface load approx. 10 W/cm²depending on the flow velocity and oil
- Fuel oil, diesel, heating to max. 40 °C, max. surface load approx. 4 W/cm²

III. Gases

- Air
- Natural gas
- Flue gas
- Nitrogen
- Steam for overheating

Materials

The fluid to be heated and the application temperature mainly define the materials which can be used for the unheated and/or heated surfaces. Otherwise, corrosion may quickly result in a failure of the flow-type heater, for example.

Materials of the wetted and unheated components:

- Carbon steel
- Corrosion-resistant stainless steel
- Heat-resistant stainless steel
- Titanium, Hastelloy, special materials
- Brass

Materials of the heating surface:

- Carbon steel
- Corrosion-resistant stainless steel
- Heat-resistant stainless steel
- Titanium, Hastelloy, special materials

Heating elements

Miscellaneous heating elements can be used for electrical flow-type heaters. Depending on the application, they will be selected by us.

I. Heating elements

- Tubular heaters, diameter 8.5 or 16 mm
- Cartridge-type heaters, diameter 16, 18 or 25 mm
- Exchangeable heating elements, including a protective tube, diameter 25, 42 or 65 mm

Control equipment

Electrical flow-type heaters can both be equipped with a built-in control system (for low power) or an external switchgear cabinet or for load switching by customer-provided switchgear and control gear. The electrical heating power can be divided into one or several heating stages. This division can individually be adjusted to match the control equipment.

I. Controllers

- Electronic ON-OFF control or PID control. (-> ON-OFF control switches off the heater if the temperature is exceeded, and switches it on again when the temperature falls below its lowest value. Thus, the temperature will always oscillate around the setpoint. The algorithm of the PID controller will optimally compensate the control fluctuations.)

- Load switching by contactors or wear-free semiconductors (thyristors). (-> contactors are wearing parts and must be replaced after approx. 100,000 make/break operations; thyristors switch quickly and without any wear but generate more heat losses than contactors.)
- Electromechanical control.
  Thermostats installed in the electrical flow-type heater are price-efficient controllers whose accuracy is sufficient for many applications.

II. Sensors

- Thermal protectors and limiters as capillary thermostats (as a safety design as well).
- Temperature sensors for the fluid and heating rod temperature.
- Overheating protection for the heater or electrical terminal compartment.

Switching devices

The switching devices as required for the operation of the flow-type heater can optimally be matched to the process and the heating element; they can be ordered from heatsystems.

I. Switching devices

- Flow-monitoring device
- Low-water level protection
- Min. and max. pressure limiter
- Thermometer for indicating the temperature on site

Insulation

The electrical flow-type heaters can be delivered without insulation (for a customer-provided insulation) or with insulation. The insulation can be designed as follows:

I. Insulation material

- Mineral wool with a galvanized or aluminium-coated metal jacket
- Diffusion-tight or gas-tight insulation
- Insulation for indoor or outdoor installation

Fluid connections

We are prepared to agree with you on the type and position of the fluid connections.. The following connections are available:

I. Fluid connections

- Standard flanges (DIN, ASME, SAE etc.)
- Female or male thread connections
- Clamp flanges
- Sterile flanges
- Dairy-type pipe connections

Design models

The following designs are available for the electrical equipment and control of the flow-type heater:

I. Design models

- Indoor or outdoor installation
- Hazardous area (zone 1 or 2, 21 or 22)
- Non-harzardous area
- Type of protection IP54 or better
- Switchgear cabinet for wall or floor mounting
- Steel sheet connection housing, powder-coated or stainless steel
- Electronic or electromechanical control
- Communication with higher-level control system by floating contacts, standardized signal or bus