

# Department HEATEC Heat Transfer Systems

## Theory and basic knowledge

### PRACTICAL SYSTEMS FOR EFFICIENT HEAT TRANSFER

Numerous chemical and process engineering processes are dependent on the supply of heat or cold. The so-called heat transfer systems are used worldwide for the safe transfer of process heat, especially in the chemical and petrochemical industry. These plants are used for the production of synthetic fibres, synthetic resins (melamine), caustic soda, in the production of aluminium oxide or paint, but also in the textile and food industries.

In most cases, indirect heat transfer is required, in which the heat is transported from the heater to the reactor (end product) via a special heat transfer medium (e.g. mineral oil). Due to this principle, a flammable end product cannot come into direct contact with the heater. In addition, the end product is brought to the desired process temperature of up to 600°C without local heating.

### FULL-SERVICE PROVIDER

We offer all components and services from a single source: from the first exchange of ideas to the development, construction and commissioning of the completed plant.

In this way, all specialist disciplines can be optimally networked with each other. There is a contact person for each project who knows without detours what is being developed, produced and installed. Our experts develop – always in partnership with the customer – complete solutions that correspond to what our customer needs down to the last detail. It goes without saying that as few standardised components as possible are used.

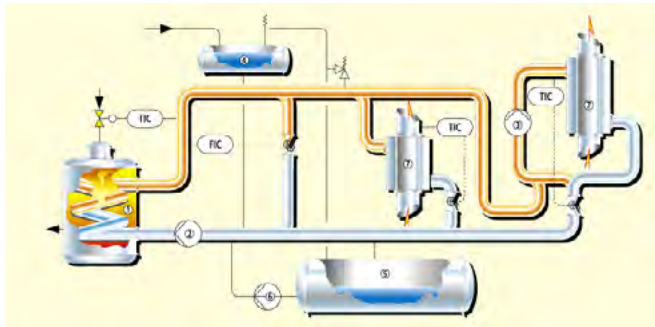
Our systems are fully thought out, not only in economic but also in ecological terms. Thanks to clever environmental technology, they consume little energy, reduce air pollution to a minimum and conserve resources.

### MARKET LEADER IN THE AREA OF PROCESS HEAT TRANSFER

Europe's first heat transfer plant was supplied by Bertrams. Since then some 3000 more have been added around the globe, underlining our leading market position. The company emerged from the former «Bertrams AG» group. In this way we combine a 120-year history with the flexibility of the smaller, young and independently operating department within Apaco AG of today.

## HEAT TRANSFER WITH ORGANIC MEDIA IN THE LIQUID PHASE

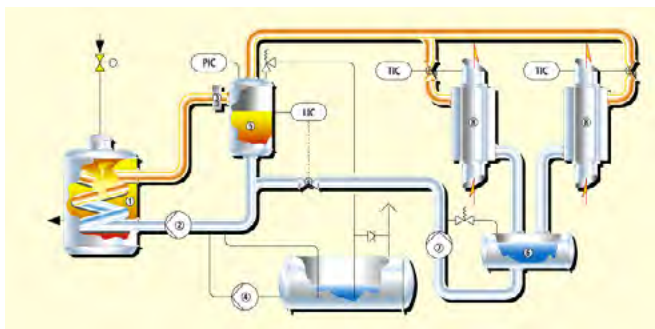
Mineral or synthetic oils are the focus of heat transfer with organic media. The maximum temperature values of synthetic heat transfer oils are about 410°C. Systems with these heat transfer media offer an ideal basis for heat utilisation in a wide range of production processes.



- |                                |                    |
|--------------------------------|--------------------|
| 1   Heater with burner         | 5   Storage tank   |
| 2   Primary circulating pump   | 6   Feed pump      |
| 3   Secondary circulating pump | 7   Heat consumers |
| 4   Expansion vessel           |                    |

## HEAT TRANSFER WITH ORGANIC MEDIA IN THE VAPOUR PHASE

The process heating with heat carriers in vapour phase (flash system) allows an even distribution of constant heat to several consumers. The power spectrum of our plants ranges from 100 kW to approx. 45 MW per heater and can therefore meet the most diverse requirements. Larger outputs are achieved by interconnecting several units, which can simultaneously increase availability.



- |                              |                     |
|------------------------------|---------------------|
| 1   Heater with burner       | 5   Flash tank      |
| 2   Primary circulating pump | 6   Condensate tank |
| 3   Flash orifice            | 7   Condensate pump |
| 4   Feed pump                | 8   Heat consumers  |

## SOME OF OUR PRODUCTS AND CUSTOMERS

- PTA | «Purified Terephthalic Acid» = terephthalic acid (Lurgi, Amoco)
- PET | «polyethylene terephthalate» (Lurgi/Zimmer, Uhde Inventa Fischer, Barmag, Dupont, Chemtex, Indorama Synthetics)
- Petrochemicals (Petrochina, Sinopec, UOP, BP, Petronas)
- Chemical products (BASF, Bayer)



| A bottom-fired heater 32 MW for Petro in DE



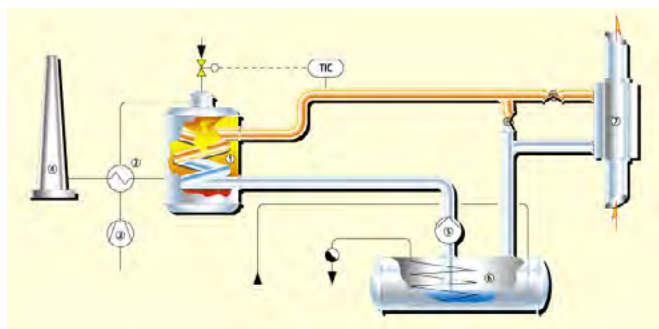
| A bottom-fired heater 26 MW for PET in NL

## HEAT TRANSFER WITH MOLTEN SALTS

With temperatures of well over 500°C, molten salts are suitable as heat transfer media in various chemical processes. However, they are mainly used where work is carried out at high temperatures, for example in the production of melamine or aluminium oxide as well as in the evaporation of caustic soda or potash lye.

Salt mixtures with a melting point of 142°C (when new) are used. Under operating conditions they are liquid and are operated without pressure.





- |                        |                      |
|------------------------|----------------------|
| 1   Heater with burner | 5   Molten salt pump |
| 2   Air preheaters     | 6   Salt tank        |
| 3   Fan                | 7   Heat consumers   |
| 4   Fireplace          |                      |

**SOME OF OUR CUSTOMERS AND PRODUCTS FOR MOLTEN SALT SYSTEMS**

- Melamine (OCI/DSM, BASF, AMI, ETCE, GSFC)
- Aluminium oxides (AOS, Alcoa, Chinalco)
- Caustic soda (BCAG)
- Fertilizers (SQM, Cosayach, Haifa)
- Solar systems, thermal storage, back-up heaters



| A boiler plant 8 MW for melamine in PL

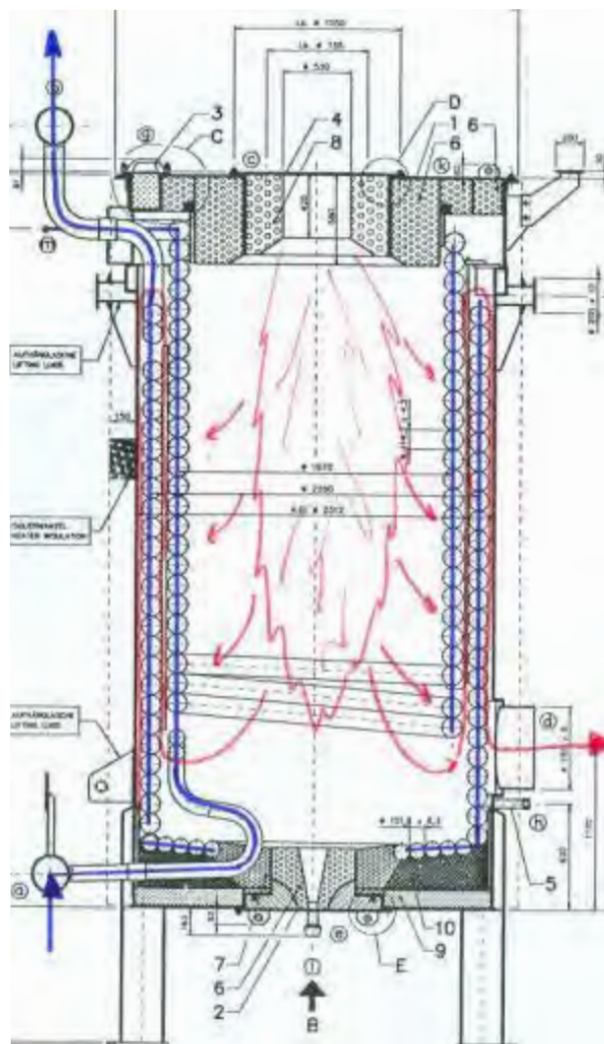


| Two boiler plants 9.5 MW for melamine in DE

**ORDER 425057 MELIN-3 IN INDIA**

This new 40'000 TPA melamine plant, located in Vadodara, Gujarat Province, India, is being built for Gujarat State Fertilizers & Chemicals Ltd. (GSFC). GSFC is the only melamine producer in India and currently operates 2 melamine plants. The two salt-melting plants required for this were developed and supplied by Bertrams Heatec.

The process provider is CASALE, based in Lugano. The EPC contractor and our client (Engineering, Procurement and Construction) is Larsen & Toubro Engineering in Vadodara, India. Our contract includes the engineering and delivery of a salt melting plant.



| Operating principle of a 3-pass heater (red=flue gas, blue=salt)

The plant essentially consists of a bottom-fired heater, a natural gas low-NOx burner system for preheated combustion air, special instrumentation, engineering documentation for air preheaters, fans, chimney, switchgear, etc. for local procurement. The plant is built for installation in Ex zone 1. Also included are two spare parts packages as well as the seaworthy packing, delivery to FOB North Sea port and commissioning in 2 operations.

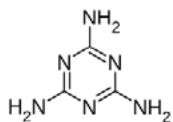
This order is processed in the Heatec department. The project manager, Joachim Fechtig who is supported by Adrian Hostettler and Lutz Müller, is responsible for the costs and deadlines and is also the only contact person towards the customer L&T.

The necessary material and plant components are designed, calculated, constructed, specified internally and procured by our purchasing department Hanspeter Fasler externally from our long-standing partners.

Kick-off and hazop meetings take place during the project execution. Before delivery, the entire scope of supply is checked and approved by Lloyds- Register before we pack the material and transport it to the North Sea port.

## WHAT IS MELAMINE?

Melamine is a colourless substance, a heterocyclic aromatic compound with nitrogen. Melamine is the starting material for the production of melamine resins which are used as glues and adhesives or are converted to thermosets.



## WHAT IS A SOLAR THERMAL SYSTEM?

Solar thermal systems are solar thermal systems that use heat from solar radiation (solar thermal energy). The heat is made usable in process technology or building services engineering or is used in thermal solar power plants to generate electricity. A liquid salt mixture consisting of sodium nitrate (NaNO<sub>3</sub>) and potassium



| Molten salt heater system for initial melting of the salt but also as back-up heater up to 560°C flow for thermal solar systems



nitrate (KNO<sub>3</sub>) is very often used as storage medium for thermal solar power plants.

To ensure that the power plant also supplies energy at night, the heat transfer oil can be passed through a salt storage tank. The salt mixture is stored in two tanks with different temperatures. In heat exchangers, the heat transfer oil transfers its heat to the molten salt. The heated liquid salt can then be used to heat the heat transfer oil again via the same heat exchangers if required. The hot heat transfer oil is used to generate steam, which drives a turbo generator set as in a thermal power plant.

For these thermal solar power plants we supply the initial salt melting plants but also the so-called back-up heating plants up to a flow temperature of 560°C.