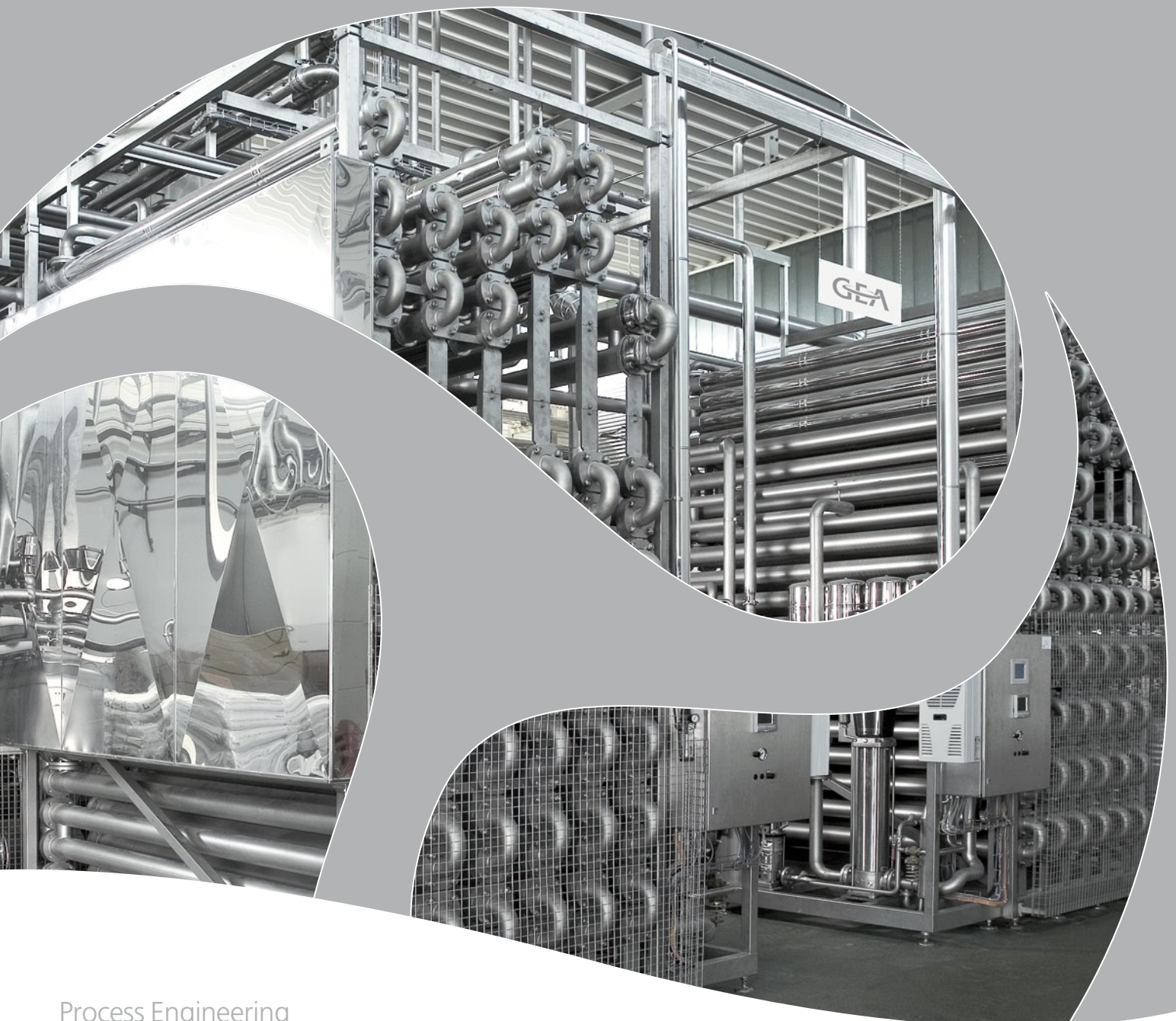


Process Technology for aseptic Product Treatment

 Innovative Engineering –
Quality in Line.



UHT Plants ...

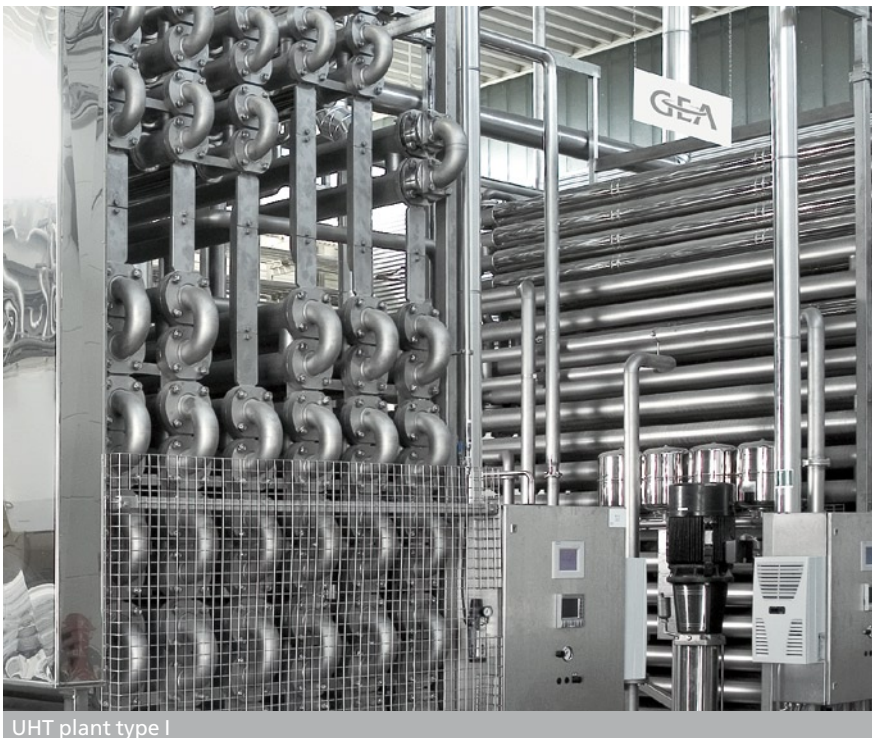
... are the basis for aseptic product treatment. The decisive factors in the selection of the appropriate UHT process (Ultra High Temperature) for thermal product treatment are the quality of the product as much as the safety and efficiency of production.

GEA TDS has long-standing experience as a manufacturer of UHT plants for dairy and other liquid products. The capacity of UHT plants ranges from 50–40,000 l/h for the treatment of low and medium-viscosity products. The UHT plants are also suitable for the thermal and aseptic treatment of products containing fibres and particles.

GEA TDS markets three different types of UHT plants – depending on the product to be treated, the product quality and efficiency:

UHT plant type I

These product treatment plants work according to the indirect heating principle. They provide a very high production safety thanks to the use of tubular heat exchanger types S and M. This process technology has proven successful in practice for many years. Due to optimised flow conditions, the UHT plants achieve a good product quality and high efficiency with heat recovery rates of up to 90 %. In addition, plant operation is reliable in every respect.



UHT plant type I



UHT plant type D

The direct heating method used in these UHT plants offers the advantage of a very high product quality. The integral steam injector and a flash cooler provide very short residence times in the temperature intensive zones. The efficiency of this treatment method, however, is not as high as achieved by the indirect heating principle. Food grade steam quality is also required.



UHT plant type D

UHT plant type P

The UHT plant type P largely uses the same process technology as the indirect UHT plant type I. The exception is the tubular heat exchanger type P, which makes the indirect heat transfer circuit between the product to be heated and that to be cooled dispensable. The advantage is that this plant type achieves an even higher efficiency and improved product quality without the need of expanding the heat exchange surface.



UHT plant type P

UHT Plants

GEA TDS' UHT programme also includes the pilot plant type L. It is a compact unit which allows easy transport to the desired location of use.

This model also uses tubular heat exchangers. Both UHT methods, i.e. the indirect and the direct heating principles, can be applied. The pilot plant is designed for very small capacity ranges from 50–200 l/h and stands out by its extraordinary flexibility. Depending on the specific application, different units such as heaters, coolers, heat holding sections and homogenisation stages can be connected to the pilot plant by easy-to-handle hose connections.

The advantages of UHT plants at one glance:

Production safety

All UHT plants ensure bacteriological safety by selecting appropriate heating parameters, such as temperature and time, as well as by sterilisation of the complete UHT process plant prior to production start. All UHT plants have in common effective CIP cleaning monitored via a conductivity measuring system.



Product quality

The selected UHT technology ensures that the necessary product related parameters and variables such as temperature range, heat holding sections and homogenisation stages are met so that the specific UHT process achieves optimal product quality. In this regard, special attention is paid to specifically short product heating and cooling phases.

Efficiency

Heat recovery, low consumption of primary energy, low product loss by short mixing phases as well as short and efficient CIP cycles, long production times, low maintenance and investment costs are the milestones for operational and economic efficiency of the UHT plant we are always striving for.

Complete pre-assembly

UHT plants are pre-assembled on a base frame ready for connection. The complete pre-assembly minimises the assembly work on site. The modular design of the UHT plants facilitates later extension or modification work.



UHT pilot plant type L

Sterile Tank Units ...

... are the link between UHT plant and packaging line. As an aseptic tank unit, the sterile tank is the link between process and packaging.

The sterile tank ensures a consistent product quality over the entire production time, since multiple heating of the product due to production stop or capacity failure on the filler lines is ruled out. Another advantage is that the sterile intermediate storage of the aseptic product ensures non-stop production of the filler lines even during CIP operations carried out on the process equipment.

Depending on the production volume, tank capacities from 200 l to 100,000 l are available.

Sterile tank units allow for aseptic, flexible connections of one or more process lines and packaging lines, so that different products can be filled at the same time without manual coupling.



Sterile tank units



Production safety

Sterile tank units from GEA TDS provide highest possible production safety by permanent pressure and temperature control. Monitoring of steam barriers on all interfaces to the peripheral equipment of the sterile tank units is a standard of a sterile tank. Consistent sterility of the aseptic products is thus achieved.

Pre-assembly

Sterile air and steam generators are factory pre-assembled on a base frame as a unit ready for connection, minimising assembly work on site. The standardised design of the pre-assembled units also prevents any risks with regard to sterility.



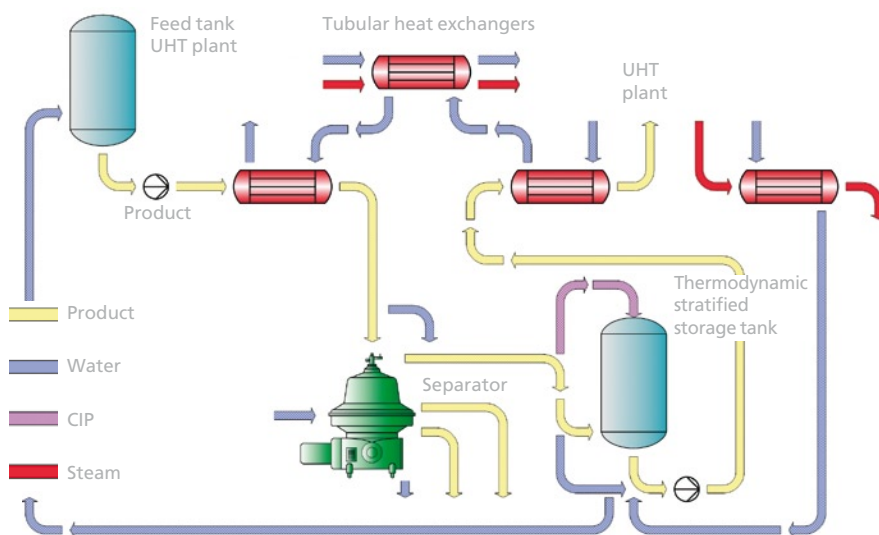
In-line Separation as an integral Part of the UHT Plant

GEA TDS offers the possibility to combine the traditional UHT process with an automatic separator integrated in the heating process.

In-line separation avoids double heat treatment of the product and in this way achieves high product quality.

The combined function of the thermodynamic stratified storage tank as well as the additional, separate heater provided for start and shutdown operations of the separator allow the continuous operation of the separator during the UHT process. By use of thermodynamic stratified storage tank, UHT heating can be maintained without interruption during the automated solids discharge of the separator.

In-line separation is completely integrated in a thermal heating plant and therefore automatically controlled.



Principle flow chart for in-line separation



Thermodynamic stratified Storage Tank

The thermodynamic stratified storage tank is a buffer tank between a separator operating at high temperature and the process plant.

This thermodynamic stratified storage tank fulfils two functions as an intermediate storage facility: Firstly, it enables continuous integrated operation of the hot separator in a UHT or ESL process, even with automated discharge of solids from the separator.

Secondly, the gases contained in the product are efficiently removed through special product guidance. The product is fed from underneath into the tank where it is distributed via a large mushroom in thin layers over a large area. The gases contained in the product are then able to leave the tank at a corresponding temperature without the use of a vacuum pump.

A further positive feature is the reduction of air in the product. As a result of a lower build-up of deposits in the heating section, production time of the process plant is extended and product quality is increased.

Thanks to the modular design, the plant can be installed and set into operation within a very short time.

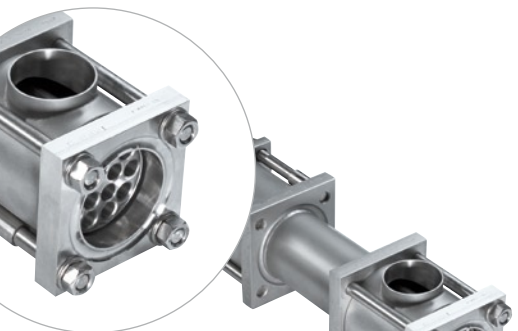


Stratified storage tank

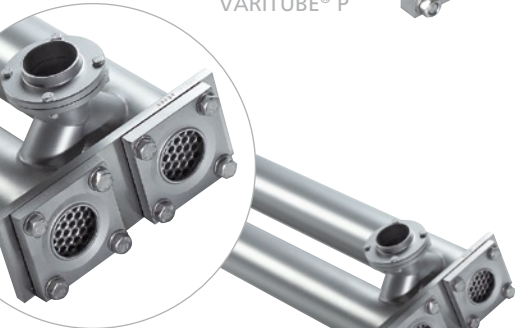
VARITUBE® Tubular Heat Exchange



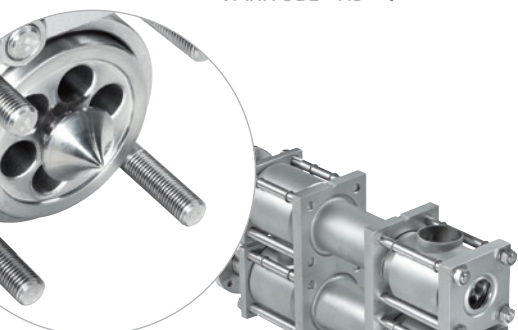
VARITUBE® M and S, plain and corrugated inner tubes



VARITUBE® P



VARITUBE® HS



VARITUBE® SK

... the basic units for process engineering. There are many models of tubular heat exchangers available for the thermal treatment of low to medium viscosity fluid products. They are also suitable for fluids containing particles or fibres.

The following different types of tubular heat exchangers are available:

VARITUBE® M

A tubular heat exchanger where the product is introduced in one or more straight internal tubes and is surrounded by the flow of a heat transfer medium in a tubular jacket.

VARITUBE® S

A tubular heat exchanger where the product is introduced in a straight internal tube and is surrounded by the flow of a heat transfer medium in a tubular jacket.

VARITUBE® P

A tubular heat exchanger where the product is introduced in one or more straight internal tubes and is surrounded by a counter flow of the same product

in the tubular jacket. In this type of heat exchanger the internal tubes can be dismantled for inspection purposes.

VARITUBE® HS

A tubular heat exchanger where the product is introduced in a number of internal tubes that are curved through 180°. The heat transfer medium flows in the surrounding tubular jacket.

When high temperature differences are present the internal tubes and the tubular jacket can expand axially, independently of each other. This prevents any possible damage caused by differences in expansion lengths despite the high temperature differences.

VARITUBE® SK

A tubular heat exchanger where the product is introduced in a number of straight internal tubes and is surrounded by the flow of a heat transfer medium in a tubular jacket. To improve the flow properties for products with a significant particulate and/or fibrous content, a special cone is fitted to the tube base plate of the tube bundle.

This effectively causes a concentration of the product content materials to impinge against the tube bundle.



Solid design

High resistance to pressure and temperature is characteristic for tubular heat exchangers. The easy-to-mount 180° pipe bends facilitate the inspection of the product flow channels. The straight product flow channels without flow impeding zones allow reliable cleaning of the tubular heat exchangers.

Simple, economical gaskets adapted to the specific process conditions considerably reduce maintenance and inspection costs.

All surfaces of the tubular heat exchangers in contact with the product are made of material no. 1.4571 (AISI 316 Ti) or better.

The tubular heat exchangers are manufactured and tested according to the Pressure Equipment Directive (PED) 97/23 EC.

Application-oriented technology

In accordance with the specific capacity range as well as the physical properties of the product, the optimal version can

be selected from the wide range of tubular heat exchangers. Corrugated inner tubes, generating increased turbulences as well as higher surface qualities are available on request.

Combined modules of one or more heat exchangers are mounted on a base frame ready for connection.

The modular design facilitates subsequent extension or modification work.

High Performance Modules

... are suitable as high efficiency, indirect heating systems for the UHT or ESL process.

The system combines the improvements in the flow and surface properties of the heat exchanger. By increasing the product velocities in the tubular heat exchanger as well as the degree of turning in the product tubes, a significantly higher turbulence is achieved in the product, which results in a faster production time. This is supported by electro-polishing of the internal surfaces of the product tubes. The reduced lam-

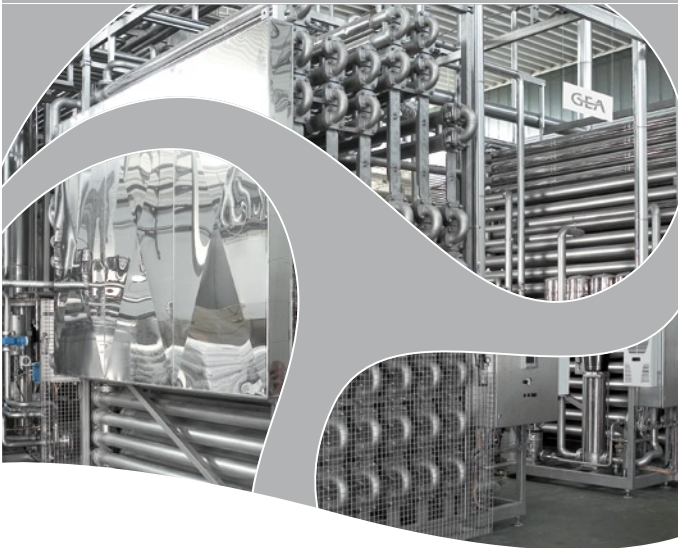
inar boundary layer that is formed diminishes the build-up of deposits in the heat exchanger. As a result of the increased turbulence, high levels of sterilisation are achieved more quickly, even with difficult products. At the same time, the high performance module provides a more effective cleaning result with a reduced cleaning requirement.

The high performance module can be installed in a new facility and also be integrated into an existing facility. As a result of the modular design, installation can take place within a short time.





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To find out more about GEA TDS process
technology, see www.gea-tds.com.



Process Engineering

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