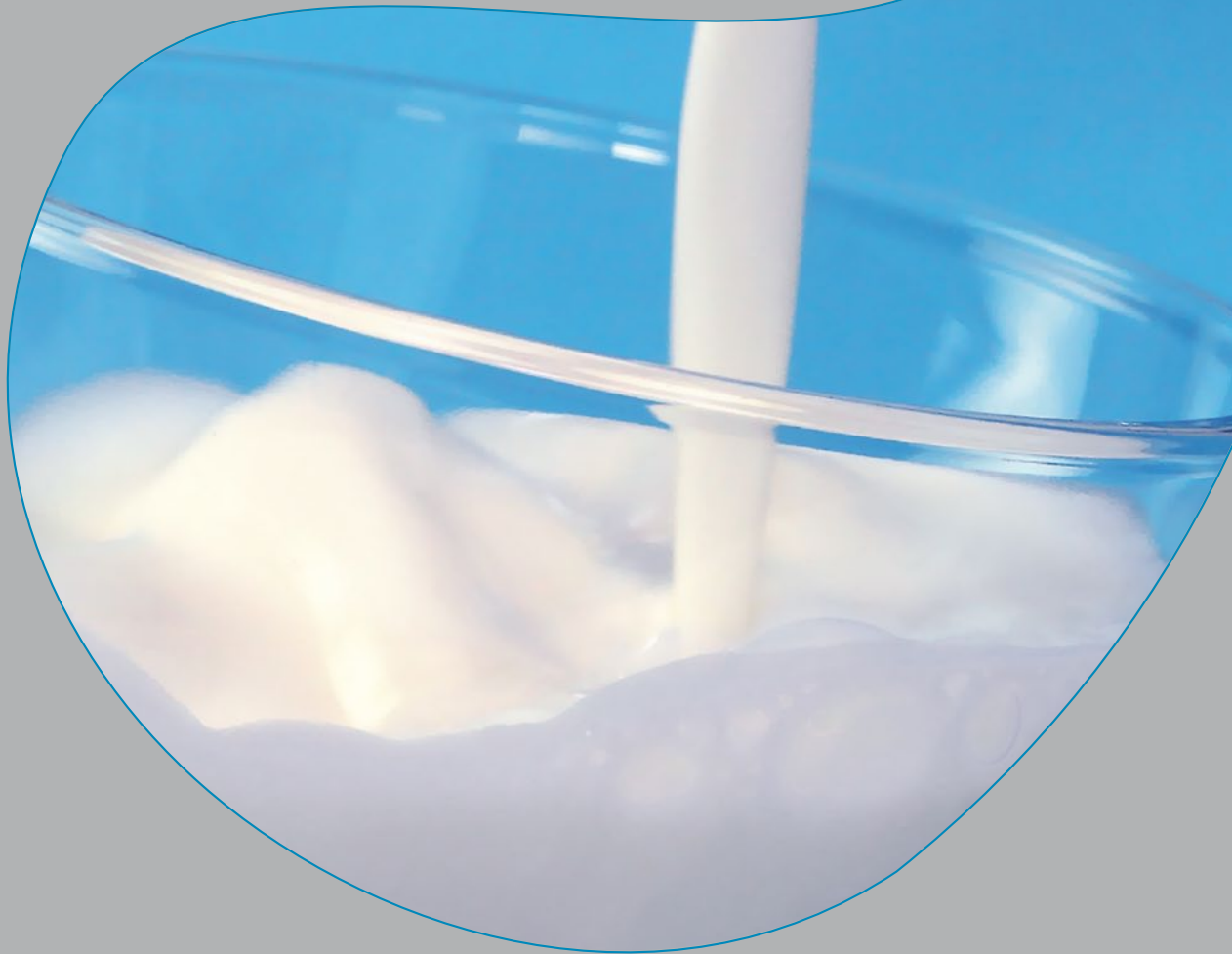


Process Technology for the Dairy Industry

 Innovative Engineering –
Quality in Line.



GEA TDS ...

... is established internationally as a specialist for technically and economically optimised process technology for the treatment of milk products, food and juice.

More than 150 years of experience with building food and dairy plants are our basis.

GEA TDS has the necessary know-how for the design and manufacture of hygienic, aseptic and sterile plants for the production of liquid and paste products. With short reaction times and presence on-site we are providing an international support for customer service and project construction – naturally speaking for After Sales as well. Experienced and competent teams provide a technical service tailored to your needs.

Your products for the dairy industry:

- Milk
- Milk powder
- Butter milk
- Cream
- Whey
- Joghurt
- Dessert
- Pudding
- Mousse
- Quarg
- Butter, butter oil
- Ice cream
- Cheese
- Fresh cheese

Our processing technology for the dairy industry:

- Complete process lines
- Valves and components
- Plate heat exchangers
- Tubular heat exchangers
- UHT plants
- Membrane filtration
- Homogenisation
- Separators
- Evaporation systems
- Deaeration technology
- Mixing and weighing
- CIP systems
- Process automation and integration
- Tank farm equipment
- Engineering, assembly and service



Process Technology for the Dairy Industry

Process lines from a single source for hygienic and efficient operation.



HTST plant for milk



Valve matrix



Milk reception



Fruit mixing station

Process Engineering

Are you planning a complete dairy plant, a cheese-making plant, a butter-making plant, a yoghurt line or a new milk processing room?

Whether your project is a new “greenfield” plant or an extension, conversion or modernisation of an existing process plant, GEA TDS engineers, with their complex know-how, are there to back you up with excellent service.



From isometric drawings to pipe class specifications, from detailed engineering to project management, GEA TDS takes charge of the projects on site, on the client's premises or in our technology centre. GEA TDS is now part of the international engineering sector of the GEA Group. This provides access to a variety of components and units made by members of the group, which can be integrated to create high-quality processing systems. The use of modern CAE tools for detail engineering is common throughout the company.



For project planning and engineering the main focus points are:

- Preliminary design
- Support in approval planning
- Preliminary planning and layouts
- Selection/dimensioning of process equipment
- Production of tender documents for process plants



Tank outlet matrix



Plate heat exchanger/
powder dissolving station

GEA TDS detailed engineering enhances:

- Layout planning and detailed coordination/clarification of details
- Inventory taking on site
- Design of pipe layout and instrumentation
- Arrangement of components
- Calculation of material requirements and technical specifications
- Definition of interfaces
- Configuration and dimensioning of instrumentation and control equipment
- Technical description of the processes
- Quality assurance and quality control
- Monitoring of time schedules
- Cost control
- Supervision of construction and installation work
- Commissioning of plant components
- Supervision of commissioning
- Technical support for production
- Process optimisation
- Documentation



Tank top matrix



Metering station/direct starter

Process Automation and Integration

Quality assurance and increased productivity drive the steadily increasing automation of plants and production processes. The advantages are obvious: labour and production downtimes are reduced and operator error is safely ruled out. The plants are upgraded so that all essential parameters relevant for the production processes are automatically controlled, monitored and documented.

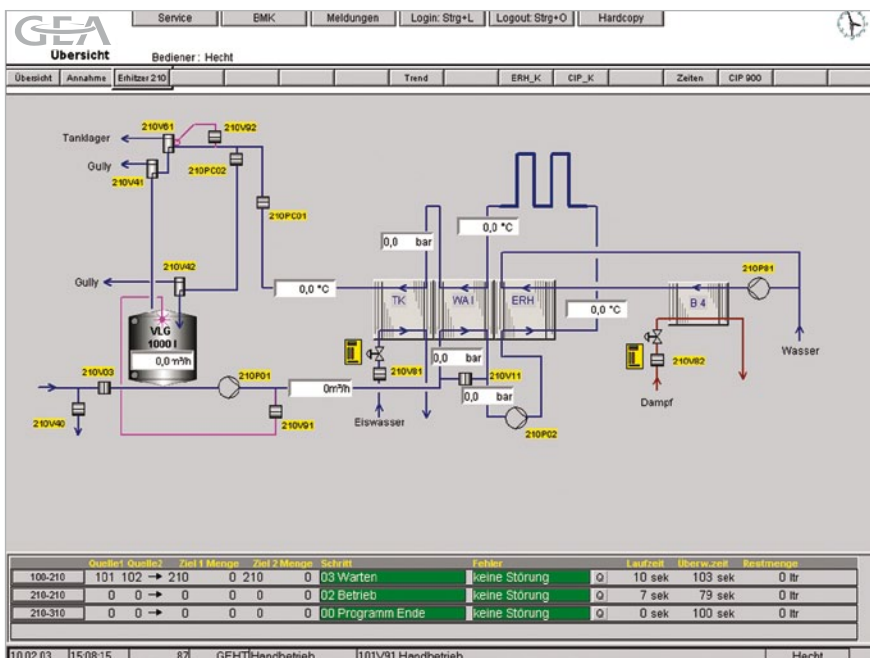
GEA TDS offers a wide spectrum of innovative process automation systems and services that range from the provision of electronic process control up to integrated, company-wide network systems complete with the corresponding management information systems. Machine control systems, for separators, homogenisers or filling machines, for example, can be homogeneously integrated into the overall automation system through the bus network.

Only the latest industrial standards are used for all automation projects. In this respect batch processes are automated in accordance with ISA-S88a as an essential factor for a transparent, traceable production.

To adapt existing production plants to new generations of automation systems (e. g. when replacing the visualisation system or upgrading from S5 to S7) migration strategies will be developed for you that allow safe conversion while production continues to run.

Operation and process visualisation

All operator interfaces are designed with logical menu structures that allow intuitive operation of the plant. The operator is comprehensively informed at a glance and guided progressively through the system.



Process visualisation



Documentation and process optimisation

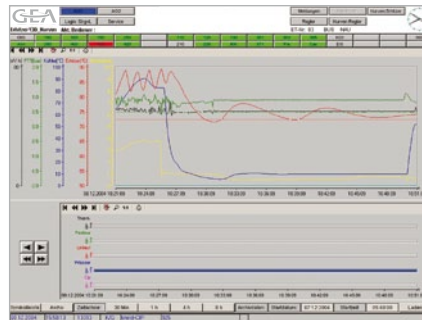
The supervisory control system allows operators to record measured values and switch status thus creating the necessary transparency for process optimisation.

Recording of measured data is supplemented by a database-supported event log with practice-oriented evaluation features. This audit trail allows the tracking of individual batches or an entire production.

Reporting and batch tracking

The process data is transferred online to an SQL database extended with powerful evaluation tools:

- The report generator can be customised so you can configure your own application-oriented reports.
- Batch tracking in graphical or tabular form helps you to keep track of your products in accordance with the EU regulation 178/2002. The standardised approach allows you to introduce a batch tracking system in manageable steps at a known cost.



Process optimisation

Tag	Uhr	Zeit	Arb.	Einl.	Menge	Verf.	Temp.	pH-Wert	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.
12.09.06	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00

Production data acquisition

Tag	Uhr	Zeit	Arb.	Einl.	Menge	Verf.	Temp.	pH-Wert	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.	Verf.
12.09.06	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00



Central control room

Process Technology for ESL-Milk

GEA TDS perceives extended shelf life (ESL) as a quality ranking concerning a high hygienic standard for a complete process technology. For that purpose we are offering four different microbial reduction methods.



Indirect heating plant

Direct heating

The starting product for the ESL direct heating plant is standardised and heat treated milk. The inline direct heating plant uses raw milk that has been separated and standardised in the heating plant. This product is preheated to 70–85 °C and then heated to max. 127 °C with direct steam. The milk passes through a holding tube in about 3 seconds and will then be cooled down to 70–85 °C in a flash cooler.

Indirect heating

An ESL indirect heating plant processes heated milk with standardised fat content. From a storage tank farm the product is supplied to an ESL indirect heating plant. By regenerative heat transfer from product to water the milk is preheated to 70 °C and then homogenised. Afterwards the product is preheated to approx. 103 °C by regenerative heat transfer and then heated to 125 °C in a heating section.

Microfiltration

For this process ceramic membranes with pore sizes of 0.8–1.4 µm are used. Bacteria removal rates of more than 99.5 % are achieved. We are talking of cross-flow filtration resulting in a bacteria-reduced permeate and a bacteria-enriched retentate. The bacteria concentrate is 20 or 100–200 times concentrated. After 20 times concentration, the retentate is high-heat treated and added to the permeate.

Deep-bed filtration

For this process polypropylene filter cartridges are employed. A unit consists of a pre-filter with a nominal separation limit of 0.3 µm and a final filter of 0.2 µm. The sieving of micro-organisms takes place in the filter material's depth. The filtration is achieved by separation temperature.

Bacteria-removing separation

Two additional bacteria removing separators are installed in a conventional milk pasteuriser line. These separators remove approx. 99.9 % of bacteria from the milk. The milk is then treated in a conventional flash pasteuriser as usual. The thermal load of this process corresponds to the load of a conventional pasteuriser line; native β-lactoglobulin values of approx. 3100 mg/l are attained. It allows average product shelf lives of at least 20 days. The bacteria count of bacillus cereus, a spore-forming bacterium which is not sensitive to heat and is therefore critical for the production of drinking milk, can be reduced to a level of less than one spore in 10 ml of milk by Westfalia Separator® prolong.



Microfiltration plant



Mixing Plants

Mixing processes are necessary when:

- Dry substances or paste media are to be added to a liquid phase
- Several liquid phases or paste media are to be blended to form a final product
- Products are made from different components in a batch process
- Basic products are varied by adding ingredients prior to filling

Some products require these processes to run under ultra-clean and aseptic conditions. Sometimes, additional thermal process steps are required during the mixing phase. The use of volume and mass flow meters or weighing systems allows mixing processes to be semi- or fully-automated and recipe-controlled.



In-line dosing



Powder mixing station



Fruit tank top valve matrix

CIP Systems

The diversity of products and processes calls for different methods for cleaning process plants.

Variable CIP systems are available for different cleaning procedures. Using a modern CIP system ensures the optimum quality assurance and increases product quality. GEA TDS is always striving to find the optimum balance between chemicals, mechanics, temperature and residence time, with additional focus on environmental protection and downtimes.

CIP recovery systems

These CIP systems consist of various cleaning medium tanks for drinking water, cleaning solution and returned water. The system or tank size is adjusted to the cleaning cycles required. The number of cleaning systems installed determines the cleaning frequency, the simultaneous execution of operations and the number of objects. The systems are technically equipped and configured to meet the cleaning objectives defined.



CIP system with five cleaning circuits



Single-use cleaning system with ECOCIP

The system consists of a detergent tank for the ready-made cleaning solution, pre-assembled on a base frame. The cleaning solution is circulated and heated up to the operating temperature. Conductivity measurement and in-line concentrate metering ensure that the required amount of detergent is added. The detergent flow rates are adjusted by the cleaning program. CIP modules are easy to integrate into the process and offer the most appropriate cleaning even for demanding products.

VARICIP

In the VARICIP automation system, cleaning objectives are translated into recipes.

The recipes contain target-dependent parameters:

- Start enabling and cleaning monitoring tasks
- Conductivity limit values
- Temperature limit values
- Turbidity monitoring tasks
- Flow rate set points
- Rinsing interval chains

as well as step-dependent parameters:

- Step function as a selection of configured steps
- Run and monitoring times

These blocks can be used to configure cleaning sequences. A water blocker considerably reduces the water consumption during CIP. Trend curves are recorded to document the cleaning process. An event log in table form is created as a file for quality management purposes.

Detergent concentrate storage

A CIP station needs detergents. As a certified specialist company in accordance with § 19i WHG (federal water resources law) GEA TDS is authorised to install concentrate storage tanks that conform to all legal and environmental requirements. The company has extensive experience in this field for designing concentrate draw off and exhaust air cleaning, also calculating caustic, acid and additive metering rates – this includes the generation of the necessary balance sheets.



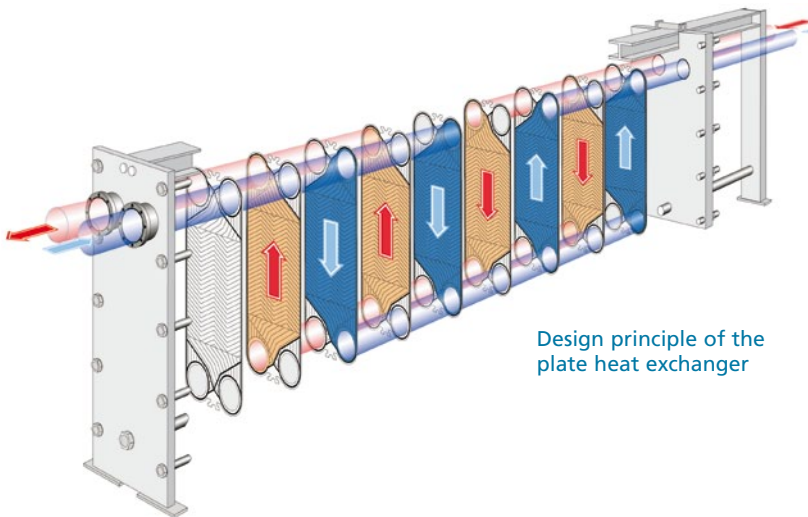
Single-use CIP system



CIP system

VARITHERM® Plate Heat Exchangers

Heat exchangers are at the heart of all process plants for cooling, heating, pasteurising or UHT heating. GEA TDS use plate and tubular heat exchangers depending on the plant configuration. As a central module in thermal process technology, the plate heat exchanger has always been the cornerstone in systems engineering.



Design principle of the plate heat exchanger

Standard System VARITHERM®
for clear to turbid products

System N and NT
for turbid products and products
with fibres

VARITHERM®

Multiple plate profiles and pressure stages for a most efficient heat transfer and gentle treatment of different types of products in different viscosities.

The advantages at a glance:

- Efficient heat transfer, i.e. small heat exchange area with low investment costs
- High degree of heat recovery, this means low energy costs
- Low space requirements due to large heat transfer surface in a compact assembly
- Easy adaptation to changed capacity parameters by expansion or reduction of plates
- Short dwelling times in the heat treatment section giving gentle product treatment



Plate heat exchanger with
a capacity of 50,000 l/h



VARITUBE® Tubular Heat Exchanger

The VARITUBE® tubular heat exchanger is specifically designed for the thermal treatment of low- to high-viscosity products and for products containing particles, pulp and fibres. The VARITUBE® system is mainly used in heating, cooling and aseptic systems.



Juice pasteur plant with VARITUBE®

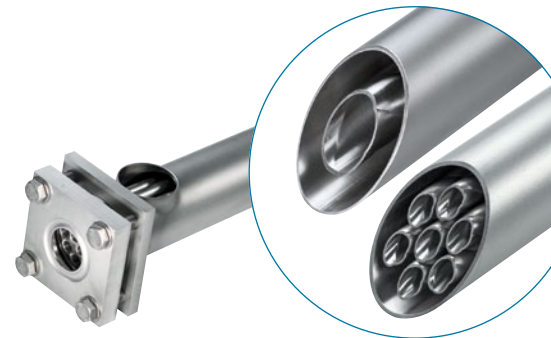
VARITUBE® M – the multi-tube heat exchanger for indirect heat exchange is also suitable for products containing particles of approx. 18 mm length.

VARITUBE® S – the single-tube heat exchanger for indirect heat exchange for the treatment of products containing pieces. Product recovery is possible using pigging technology.

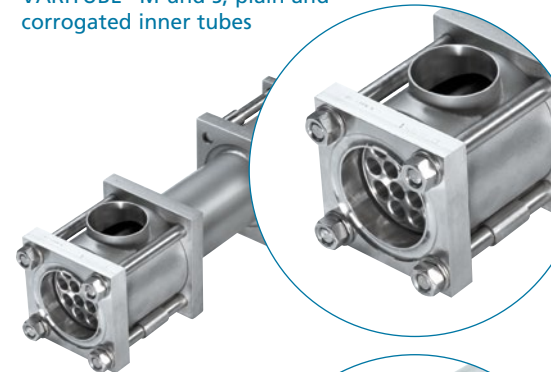
VARITUBE® P – for the direct product/product heat exchange of smooth, fibre-containing and viscous products.

VARITUBE® HS – the multi-tube heat exchanger for indirect heat exchange, suitable mainly for hot water generation and heating of CIP media.

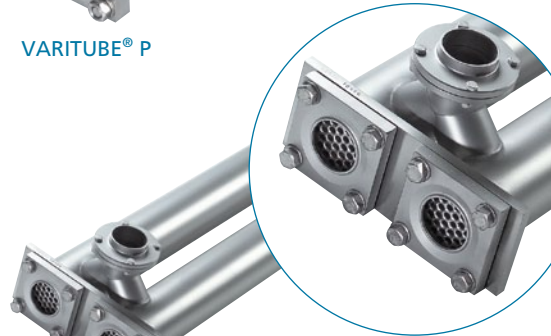
VARITUBE® SK – for the direct product/product heat exchange of fibre-containing products up to a length of 30 mm.



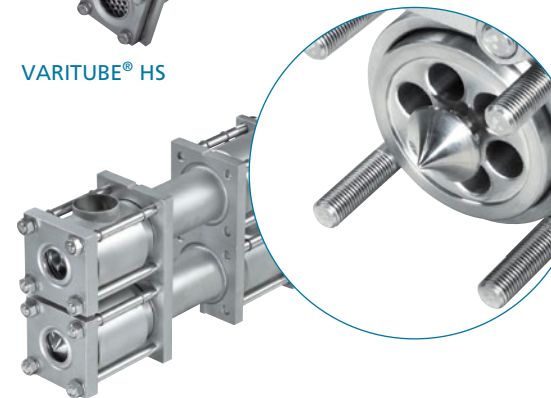
VARITUBE® M und S, plain and corrugated inner tubes



VARITUBE® P



VARITUBE® HS



VARITUBE® SK

UHT Plants for Aseptic Product Treatment

Depending on the product to be treated, the product quality and efficiency, three different types of UHT processes are at your disposal.

UHT plant, type I

These product treatment plants work according to the indirect heating principle. Their great benefit: providing a very high production safety. This process technology has proved successful for many years. The UHT plants have optimised flow conditions which produce good product quality and high efficiency with a heat recovery up to 90 percent.

UHT plant, type P

Similar to the indirect UHT plant type I, the UHT plant type P is widely based on identical process technology. The difference is the used tubular heat exchanger type here, this one makes the indirect heat transfer circuit dispensable between the product to be heated and that to be cooled. The advantage is that this plant type P achieves an even higher efficiency and improves product quality without the need of expanding the heat exchange surface.

UHT plant, type D

The direct heating method used in these UHT plants gives a very high product quality. The integral steam injector and a flash cooler provide very short dwelling times in the temperature intensive zones.

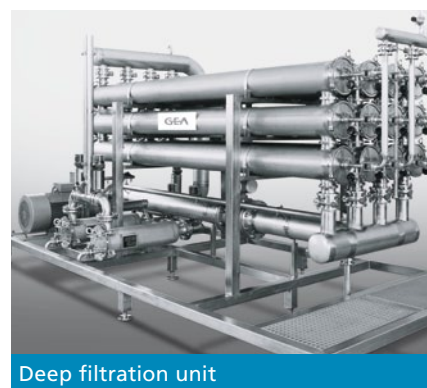


UHT plant, type P

Membrane Filtration for Liquid Separation

Reverse osmosis, nanofiltration, ultra-filtration and microfiltration

Membrane filtration is specifically used for mass transfer at low temperatures and/or ambient temperatures in special applications. These methods are used to separate liquid components or to concentrate solids without thermal or mechanical treatment. The filtration plants are equipped with membranes made of organic polymer or ceramics.



Deep filtration unit



Homogenisation

Homogenisation under high pressure plays a key role in many production processes. GEA TDS has extensive experience in this sector and is able to supply homogenisers, complete with valves, which fit perfectly into the production process of the specific product. Homogenisers work at pressures up to 1,500 bar.



Homogenisers with a capacity of 50,000 l/h, 180 bar

Assembly and After Sales

GEA TDS as a matter of course undertakes the task of assembling entire plants. A comprehensive range of services is available throughout the entire service life of your plants, all designed to achieve maximum productivity and economic efficiency.



Assembly

Our After Sales program includes a permanent support service: taking care of service and maintenance directly after hand-over of the plant.

Customer support also includes defined maintenance and individual inspection agreements to ensure fault-free and reliable operation and to keep your plant running efficiently for years.



Maintenance and inspection

 Innovative Engineering –
Quality in Line.



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

GEA

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