High Pressure Pasteurization
Engineered Solutions for HPP Innovations
Fast – Safe – Pure

Uhde High Pressure Technologies

ThyssenKrupp

New ideas for your markets
Food preservation 2.0

„I do not know any other preservation method which handles food with more consideration than high pressure pasteurization.“ Prof. Bernhard Tauscher, Federal Food Research Center in Karlsruhe.

High Pressure Pasteurization (HPP) is a method applying high pressure to food efficiently and gently. The method exploits fast cycles and is very secure because all products are treated completely without exception. In addition, it is ecologically pure because no further preserving agents or chemicals are used. The flavouring substances, vitamins and visual nature of the products treated remain almost unaltered.

The ThyssenKrupp subsidiary Uhde High Pressure Technologies (HPT) being a worldwide leader in high pressure technologies specialized in that method years ago and presently develops plants used for many applications all over the world.

An experienced team consisting of engineers, chemists and technicians develops and constructs plants precisely matching with the customers‘ existing processes.

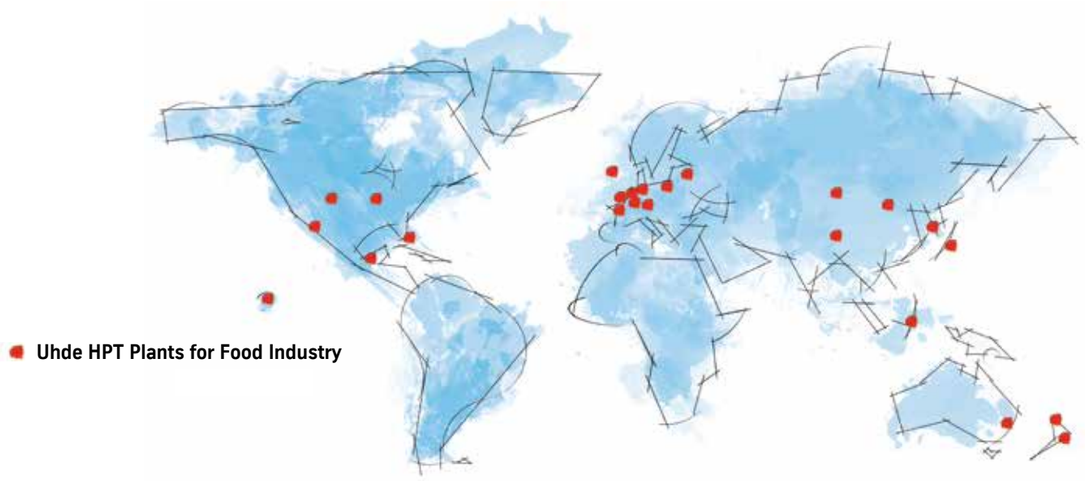
The product-preserving Uhde HPP method extends the shelf lives of products and therefore offers potential capacity for new markets and efficient delivery and storage conditions. Food manufacturers all over the world already treat fruit, vegetables and meat products that way.

The method

Though foodstuffs being highly sensitive in their final packages are partly exposed to water pressure of 6,000 bar they appear unaltered after the treatment. But at the cellular level the method does a good job. As water pressure is exerted uniformly from all sides, it also reaches the inside of foodstuffs directly. There, the high pressure influences big molecules and molecular compounds. Many food spoiling organisms and processes are inactivated. Some vegetables and fruit do no longer get brown. Flavouring substances and vitamins endure that pressure level without damage, because they are composed of very small molecules. The method is well-proven especially for vegetable / fruit and meat products.

Overview of advantages

- Pasteurization in the final packing
- Minimum shelf life: shelf life extended by 4 times
- Without heating up
- Without preserving agent
- Gentle treatment of food
- Increased safety
- Optimum consistency and visual appearance
- Means for product development



Made in Germany

From the market leader for high pressure technologies

A 24-t steel vessel whose walls are almost 40 cm thick. A frame of steel (35 t) which encloses the pressure in the vessel by means of cover plugs. Materials and manufacturing processes which are subject to quality standards being equal to those in aviation. They are the benchmark data of the biggest plant built by Uhde HPT, the Uhde 350-60, which can also be built as a TWIN plant, i.e. with two machines and one pump system.

Manufacture from a single source

The high-quality pumps which are manufactured completely in our facilities are operated at 270 kW or 540 kW to generate the pressure required in the machine. The water flows to the pressure vessel via pipes and connection elements. Like all HP parts in the HPP plant it is an in-house development and also manufactured completely at our factory.

Under process pressure each cm² of the inside of the vessel carries 6 t. To safely absorb those enormous forces Uhde HPT has recourse to an established and time-tested technique to grant long service lives of the highly loaded components to the customer. Therefore, defined internal stresses are admitted to the components stressed to increase the number of load cycles. The vessel is wrapped by means of a special kind of wire on a winder especially developed by Uhde HPT. Further to that, fittings are shrunk and pipes are autofrettaged with up to 14,000 bar.

More than just plants

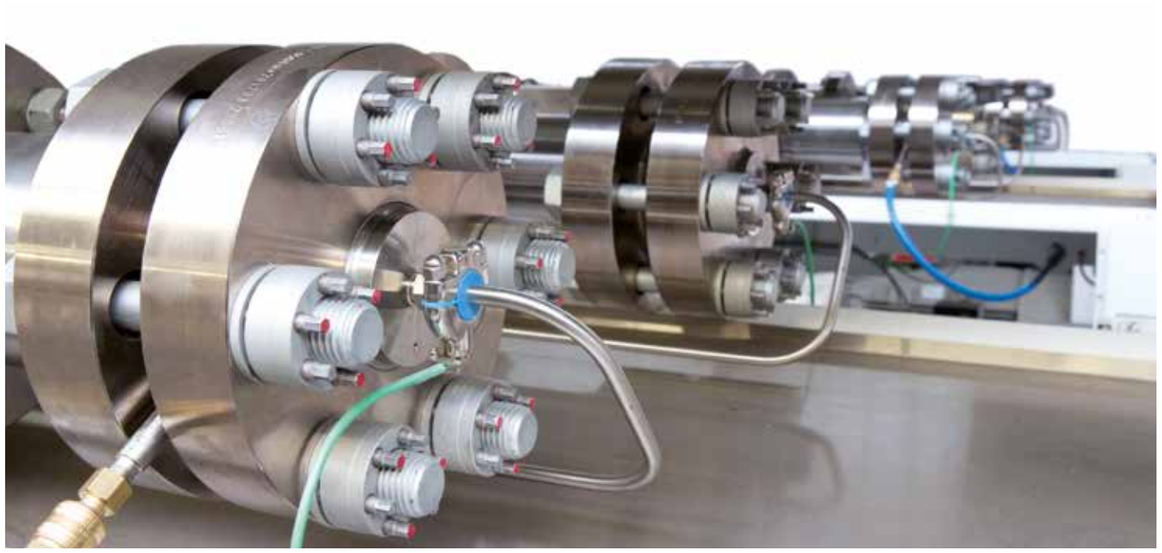
For almost ten years the company‘s experts have collected their experience made with HP technology for HPP and developed it further together. That resulted in masterly performances: valves, pipes, pipe connections and measuring instruments withstanding a pressure of more than 6,000 bar. Massive metal components, cut by computer control, manufactured precisely with an accuracy of several hundredths of a millimeter. Especially designed gaskets safely withstanding the enormous pressure of temporarily 6,800 t - a weight which conforms to 90 diesel engines - on the closure of the vessel.

Safety as the basic understanding

The plants are equipped with redundant pressure sensors as well as length measuring devices to permanently monitor and control pressure courses. In addition, emergency disables are installed; they prevent the overshooting of pressure.

Focus on the overall system

Apart from the HPP plants Uhde HPT also offers water treatment systems as well as handling and conveyor systems.



High-pressure intensifier of an HPP plant

Innovation for the food industry
Full-scale benefits

Uhde-HPP production plants are offered in different sizes from 55 l, 160 l and 350 l to 2 x 350 l (700 l). The plant components are laid out, designed and manufactured by and/or at Uhde HPT. Purchased components meet maximum standards. A product „Made in Germany“. All plants are integrated into existing production lines and can therefore be used for vacuum and modified atmosphere gas packages.

Uhde HPT covers the entire performance spectrum: it begins with a lay-out being followed by the support during the integration of the plant and ends with the training courses for the operating staff. Uhde HPT also offers full support after the commissioning of the plant as well. A team of experienced service engineers is on hand worldwide. Spare and wearing parts are dispatched by the HPP Service immediately.

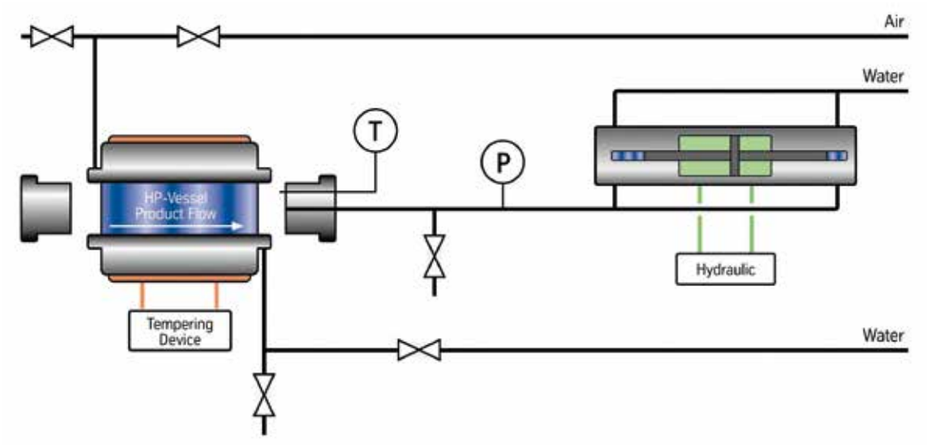
New market chances for your business

In Germany more than 50 % of the food produced is not used for consumption. At the same time consumers pay attention to the quality of food more and more intensely. Trading companies increase pressure on suppliers demanding shorter reaction times for deliveries and simultaneously demanding longer shelf lives. Demands which confront food manufacturers with economic tasks become more and more difficult.

Uhde HPP allows a substantially longer shelf life of food. Transport routes can be planned differently without the use of distribution cold chains thanks to the longer shelf life. New markets can be reached efficiently thanks to the extended reach.
In addition, Uhde HPP meets demands by their customers concerning a lasting, gentle technology - preservation agents are not applied.

Products treated by High Pressure Pasteurization are already used by many major manufacturers.

Process diagram of an HPP plant



Technical data of HPP plants

HPP	Uhde 055-60	Uhde 160-60	Uhde 350-60	Uhde 700-60
volume in litre	55	160	350	700
pumps (kW)	1 x 45	2 x 90	3 x 90	6 x 90
inner diameter (mm)	200	380	380	380
weight (to)*	11	47	66	132
production output (kg/h) **	210	750	1600	3200

* without pumps, hydraulic and cabinet
** depends on filling degree, product, recipe and operation

Uhde 055-60

Uhde 160-60

Uhde 350-60

HPATS - High pressure assisted thermal sterilization
Know-how with tradition

Special plants for research and development
In addition to the pasteurization of food by means of the high pressure treatment (6,000 bar at room temperature) Uhde HPT offers a further treatment option: high pressure treatment by means of temperature.

Hereby, the product is heated up to 95 °C before the pressure treatment and admitted to the actual process then. During the build-up of pressure up to 7,000 bar the product continues to be heated up. Thus, temperatures of up to 121 °C are developed at treatment pressure. This method allows a more efficient reduction in microorganisms and their permanent forms, e.g. spores, than it would be possible during the standard HPP.

Via HP heat exchangers the special plants applied heat up the process water for the vessel as well as the water for the build-up of pressure.

Uhde HPT has been building such special plants for the treatment of food for more than ten years. The biggest heat operated HPP plant with a treatment volume of 150 l was built for the pharmaceutical industry.

For the product development Uhde HPT additionally designed and constructed a pressure-proof data logger which - during the process in the vessel - records temperatures and temperature profiles at various points in the vessel. Those data are used for the validation of products and support the certification of processes. Generally plants are equipped with pressure-proof temperature sensors on both sides of the vessel. Here, possibilities are offered for the pharmaceutical and cosmetic industries to - for example - sterilize infusion solutions or impinge on proteins to manufacture gels or emulsions.

Pilot plants for product development
Apart from the special plants Uhde HPT continues to construct test or labor plants with a design pressure of 7,300 bar at 121 °C for research and development in the food industry. The volume of the HP vessel is about 2 l or 4 l with the operating pressure reaching up to 7,000 bar.

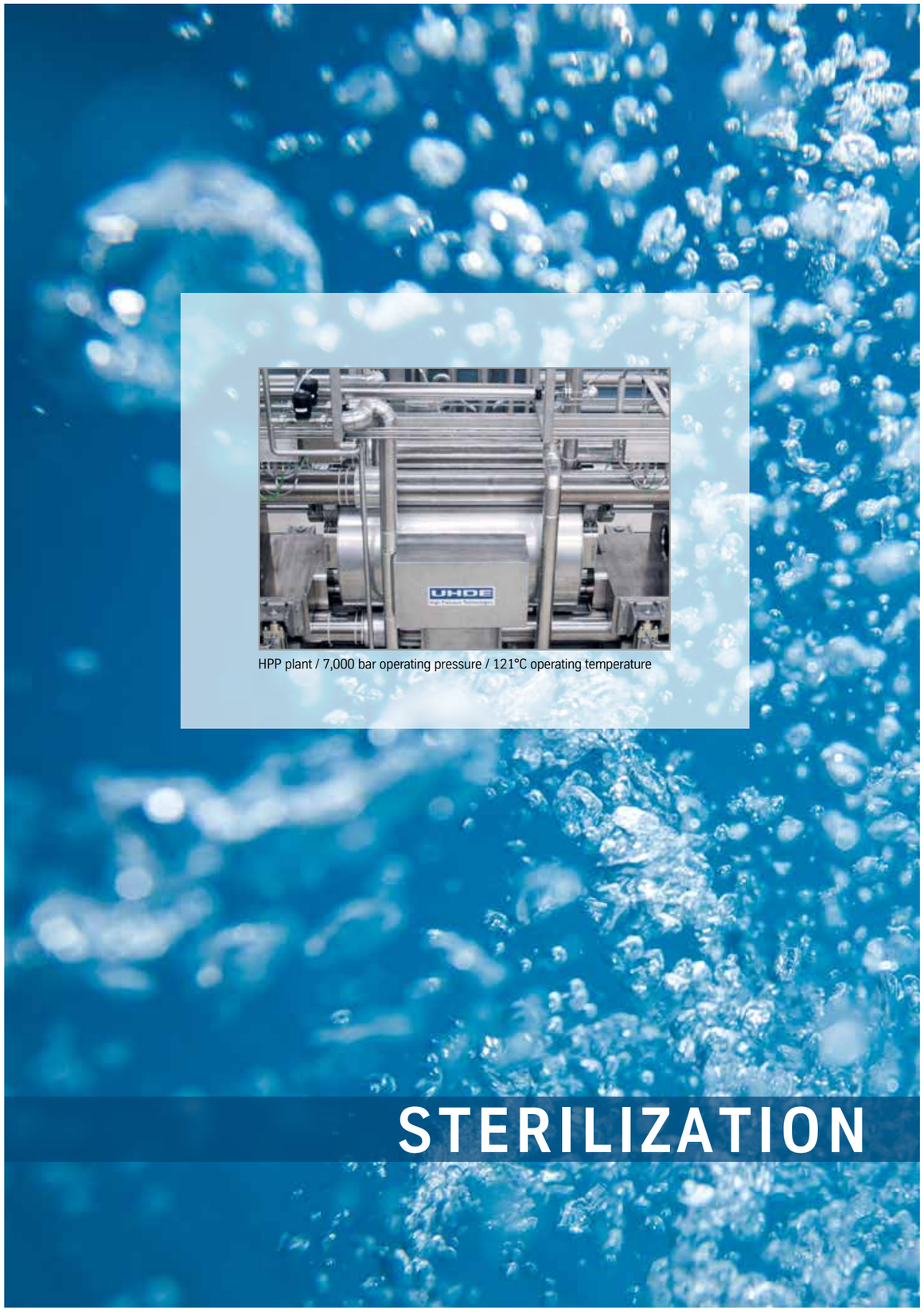
Being designed for product development those plants only need a power port and only little space for erection. If required, plants comprise a heating unit.

Uhde HPT made pilot plants are used for the treatment of exemplary samples or small production batches. The system comprises a high pressure vessel with integrated hydraulic pressure intensifier as well as a stable frame.

This design provides for an extremely fast, simple and safe handling. The opening, closing and securing of the cover as well as the build-up and release of pressure are controlled automatically. Further to that, the system can be operated with variable pressure cycles.

Those plants definitely meet the requirements in the Pressure Equipment Directive as well as ASME standards.

Laboratory plant Uhde 002-70



HPP plant / 7,000 bar operating pressure / 121°C operating temperature

STERILIZATION

Services
From planning to commissioning

Apart from HPP plants Uhde HPT also supplies many additional services in connection with HPP.

Process development
Processes are developed from the first application tests to application in production in cooperation with experienced institutes and companies. In addition, Uhde HPT prepares cost studies to offer a calculatory study for the assessment of the investment.

Mounting and installation
Depending on the size of the plant, the system can be premounted completely at our factory; alternatively, the final assembly is performed on site. Installation can be performed either by customer staff under the supervision of Uhde HPT experts or it is performed completely by Uhde HPT.

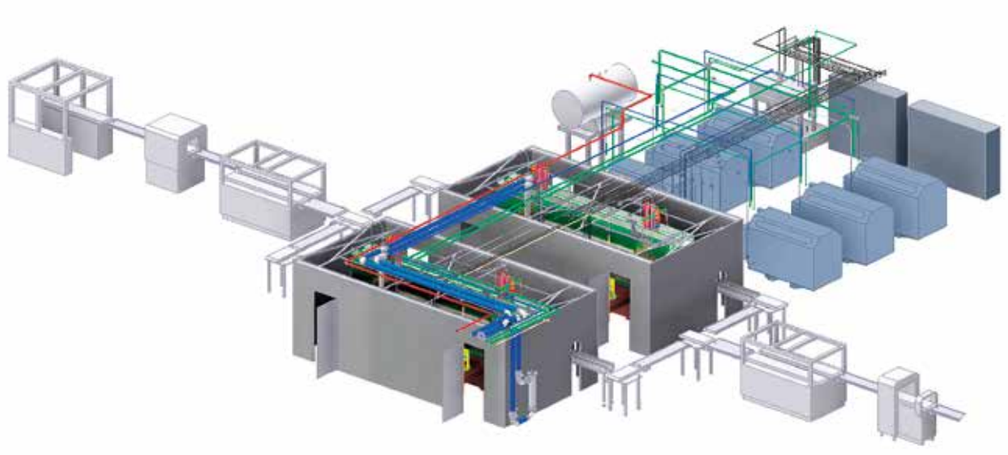
Start-up and commissioning
As soon as the installation has been completed, the plant is commissioned under the supervision of Uhde HPT. All important functions are checked together with the customer.

Training of the plant operator and the maintenance staff
The customer is trained on the high pressure equipment at the factory. Theoretical as well as practical contents are imparted by our specialists. Further to that, the contents are deepened during the commissioning of the plant.

High pressure relief valve DN4 PN6000

Spare parts, inspection and maintenance
Upon request, Uhde HPT offers maintenance contracts for storage and the delivery of wear-parts as well as for preventive maintenance. Uhde HPT also performs regular safety inspections in cooperation with local authorities. The availability of spare parts is guaranteed for the life of the plant.

Uhde High Pressure Technologies – a company certified by ASME/ISO
This certification proves that Uhde HPT plants are prepared for the requirements of the above standards and meet all important requirements at international level.



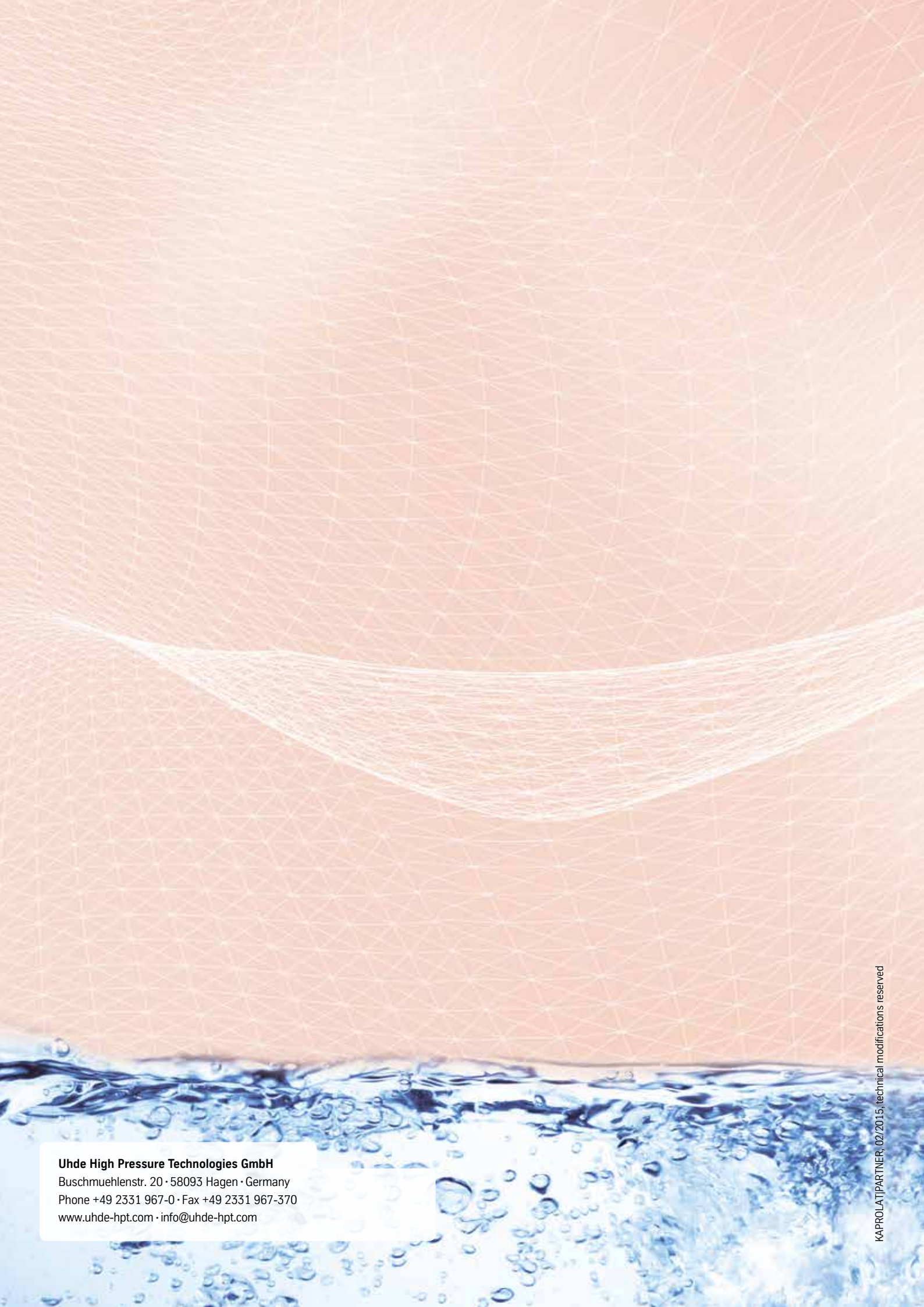
Example: Erection plan Uhde 700-60

Process development from the beginning

ENGINEERED SOLUTIONS

Installation of the plant by trained staff

Service by professional Uhde HPT specialist



Uhde High Pressure Technologies GmbH
Buschmuehlenstr. 20 · 58093 Hagen · Germany
Phone +49 2331 967-0 · Fax +49 2331 967-370
www.uhde-hpt.com · info@uhde-hpt.com