

Industrial Solutions

High-pressure processing

Maximum shelf life and
quality without heating



thyssenkrupp





Increasing shelf life by up to 10 x – gently and safely.

Tasty, healthy foods that stay fresh and keep for a long time without using additives? Now it's possible with our high-pressure preservation process, which pasteurizes fruit, vegetables and meats gently – and with no need for chemicals. The food is subjected to 6,000 bar – that's roughly the pressure you would find at a depth of 60 kilometers below water and is high enough to neutralize germs and bacteria.

No heat is needed. The products are processed in their final packaging and their texture, looks, taste, vitamins and nutrients remain intact.

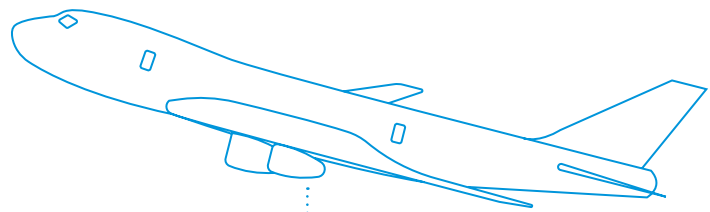
The only thing that changes is their shelf life, which is up to 10 times longer after the preservation process.



The benefits of the thyssenkrupp high-pressure pasteurization process at a glance:

- Maximum safety: Products are processed in their final packaging, so no subsequent contamination is possible
- Longer shelf life allows you to reduce costs and develop new markets
- No heating: Looks, taste and nutrients are almost fully unchanged
- 100% biological process – no additives are used
- High-pressure preservation is ecological and sustainable – there is no waste
- Consistent product quality improves yield.

The result: Higher efficiency, quality and safety.



6,000 bar

That corresponds roughly to the weight of three jumbo jets acting on an area the size of a smartphone.

A close-up photograph of a clear glass filled with a vibrant pink smoothie. The smoothie is topped with several fresh blueberries and a sprig of green mint leaves. The background is softly blurred, showing more blueberries. In the upper left, there is a blue circular graphic with a white dot and text indicating shelf life.

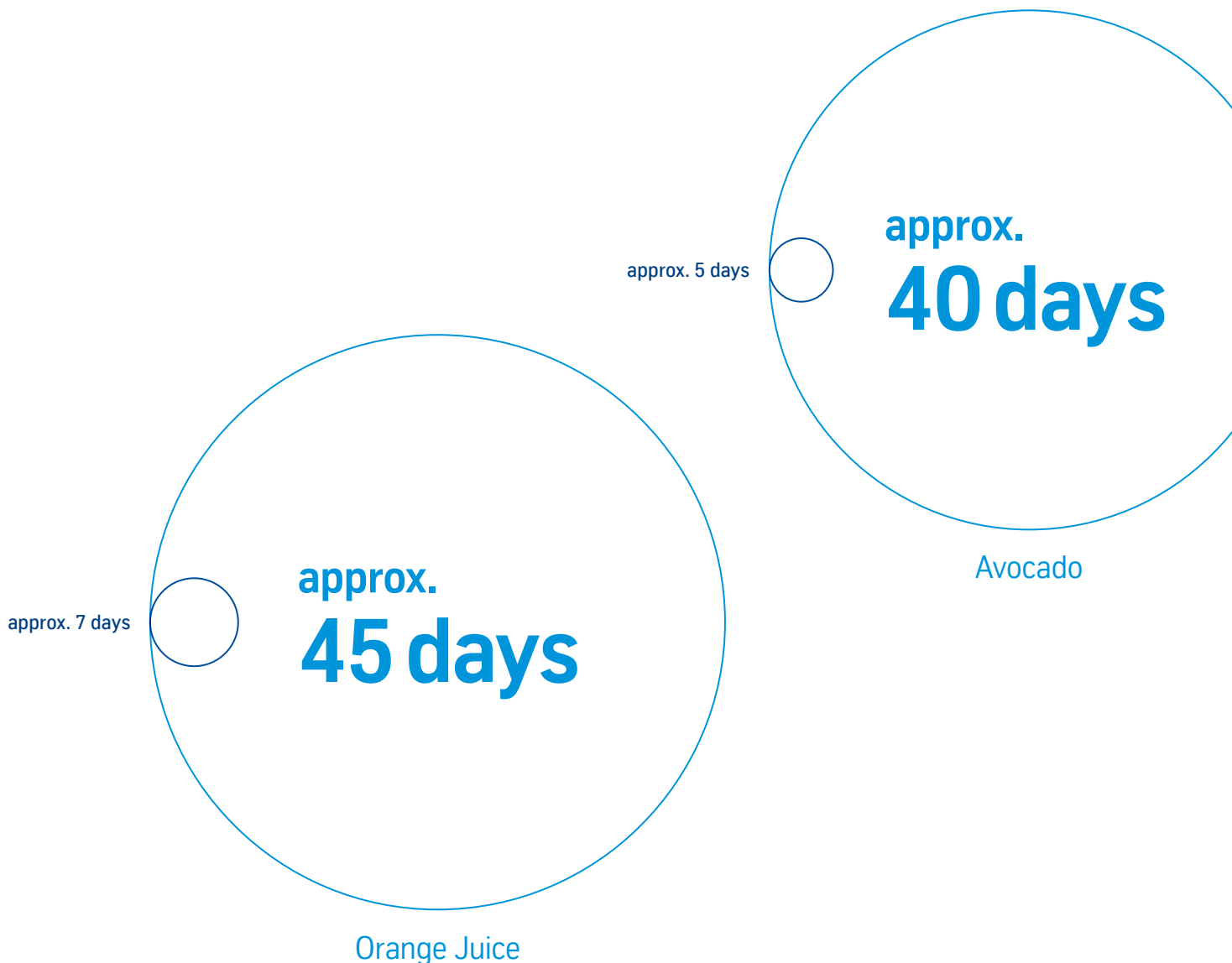
approx. 3 days

approx.
28 days

Smoothies

Longer shelf life,
same product quality.

100% of the vitamins
are retained



Juices and fruit products

The high-pressure pasteurization process is particularly valuable for foods that perish quickly, such as juices and other fruit products. With more and more people looking to pursue a healthy lifestyle, green smoothies and exotic fruits are increasingly in demand.

The problem is that many of these products ripen quickly and have to be consumed within a short space of time. For example an avocado only keeps for around 5 days, and its pulp quickly turns brown and unappetizing. The same is true of other fruits, such as pears and berries. thyssenkrupp's high-pressure treatment solves both problems at once: The process neutralizes pathogens and harmful microorganisms without the need for chemical additives.

At the same time the enzyme polyphenol oxidase that causes browning is inactivated. Fruit products such as juices and purees keep up to eight times longer with no loss of vitamins, color or flavor. Longer shelf life means less food needs to be thrown away and thus reduces costs.

- Shelf life with HPP for selected products
- Shelf life without HPP for selected products



Ham

Enhanced shelf life and
maximum safety, e.g.
with regard to listeria

approx. 24 days

approx.
49 days

Maximum product
safety for greater efficiency.

Gentle high-pressure treatment –
uncompromisingly safe



Meat products

When it comes to meat products, maximum safety and strict hygiene standards are essential. High-pressure processing meets these requirements in full by destroying pathogens and fungi without heat.

The gentle HPP process is already being used by numerous companies around the world to safely process meat products worth billions of euros. The advantage: Increased microbiological safety reduces the risk of costly product recalls. The extended shelf life of the products also allows new export markets to be developed. For example, the process has been approved in line with the very high food safety standards applied in the USA and Canada.

The products stay clean and natural and retain their vitamins, flavors and colors. Processing the meat products in their final packaging rules out any risk of recontamination. The process is suitable for both vacuum and modified atmosphere packaging (MAP). A specially developed controlled decompression technique protects both the packaging and the product.

- Shelf life with HPP for selected products
- Shelf life without HPP for selected products

Higher yield, longer shelf life.

Lobster meat
yield doubled

approx.
45 %

approx.
22 %

Seafood, dairy products and ready meals

Products with numerous different ingredients are particularly susceptible to germs and cross-contamination, which can negatively impact the shelf life and product safety of individual foodstuffs.

This is particularly the case with ready meals and dairy products such as yoghurt, sauces, dressings and cream cheese. High-pressure preservation can keep cream cheese fresh for more than 120 days longer. Moreover, by modifying the enzymatic structure of cheese, it ripens more quickly without compromising quality.

Seafood –

greater freshness, higher yield

The same applies to seafood such as lobster, prawns, crab, oysters or mussels: *Listeria* and *salmonella* are usually high risks, but our technologies eliminate them altogether. These and other vegetative

pathogens are neutralized safely and reliably without the use of heat. As this is a cold process, the meat of these crustaceans stays raw, and the meat yield can be doubled. At pressures of between 2,000 and 3,500 bar the meat detaches from the shell for easy removal. That increases product quality as well. And of course the products retain their taste and looks.





approx.
150 days

approx.
35 days

Shelf life of cream
cheese (or other
dairy products)



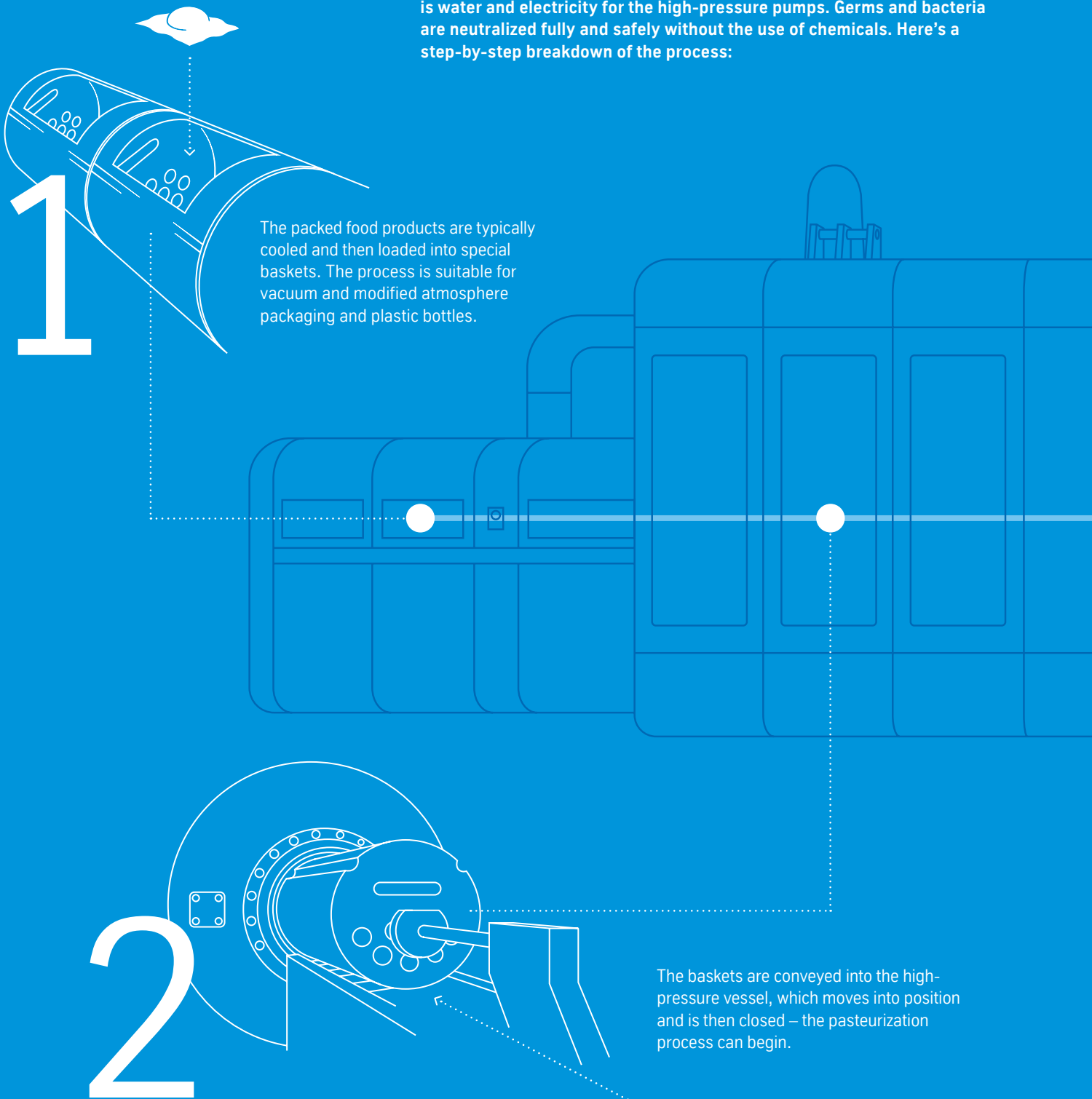
6x

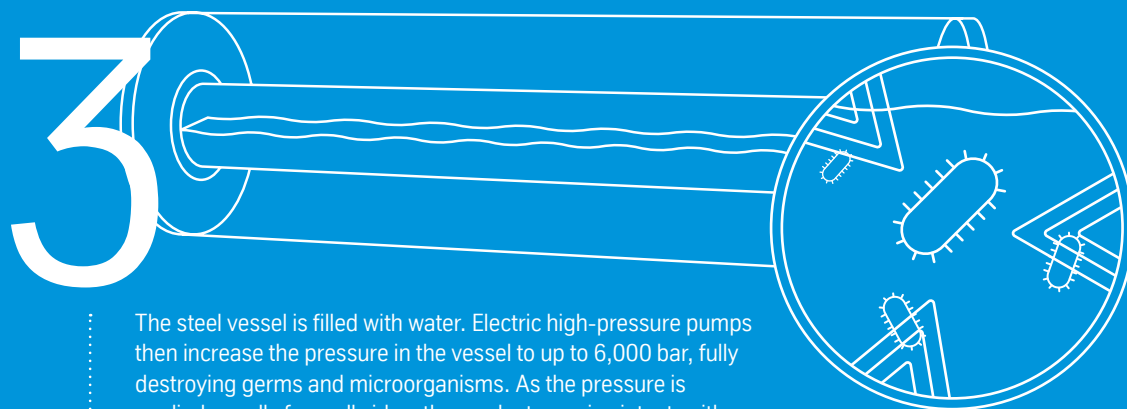
thyssenkrupp's HPP
process keeps
ready meals fresh
up to 6x longer

- Shelf life with HPP for selected products
- Shelf life without HPP for selected products

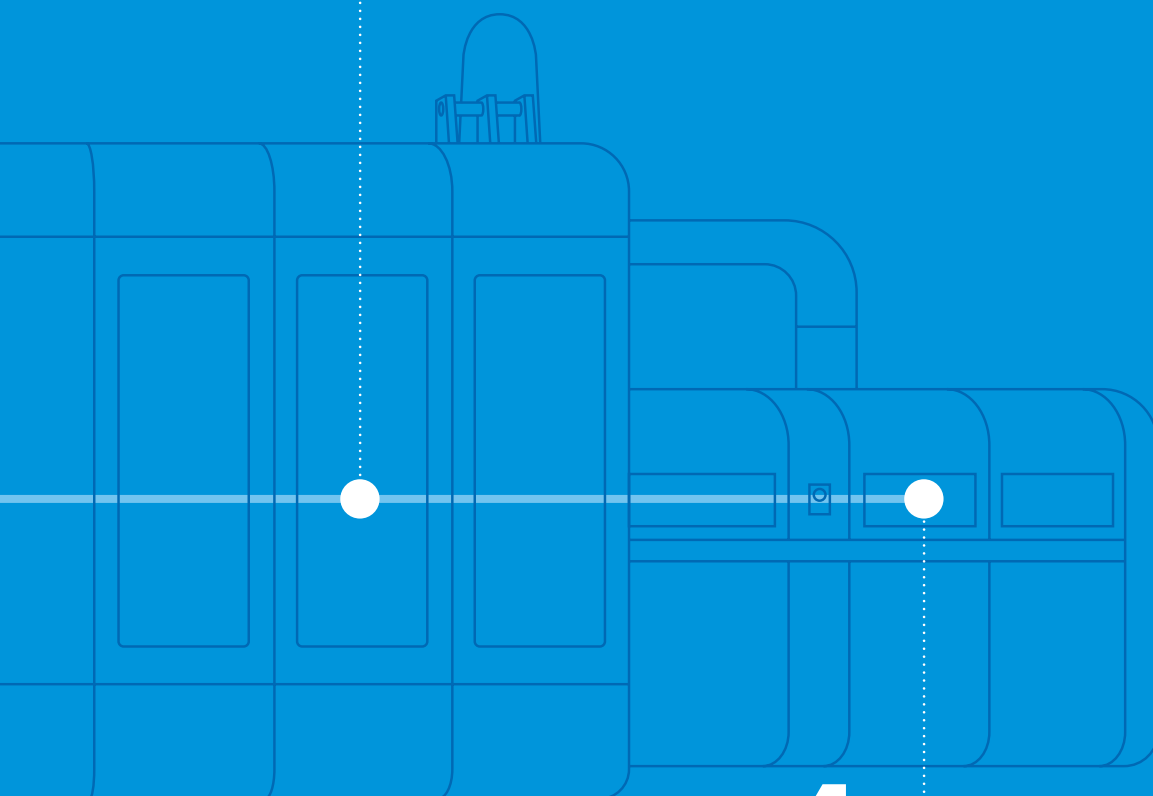
How does the high-pressure pasteurization process work?

Our process offers both ecological and economic benefits: All it needs is water and electricity for the high-pressure pumps. Germs and bacteria are neutralized fully and safely without the use of chemicals. Here's a step-by-step breakdown of the process:





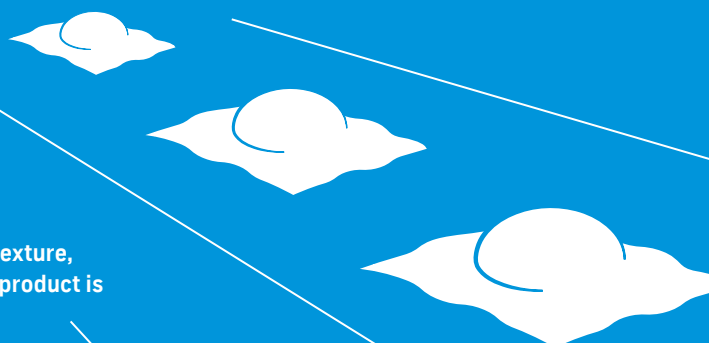
The steel vessel is filled with water. Electric high-pressure pumps then increase the pressure in the vessel to up to 6,000 bar, fully destroying germs and microorganisms. As the pressure is applied equally from all sides, the product remains intact, with no changes to structure or shape.



4

After the pressure has been reduced again, the water is drained off. The high-pressure vessel opens and can be unloaded.

The result: Food that keeps up to ten times longer with no change in texture, appearance or taste. Nutrients and vitamins are retained in full – the product is ready for transportation and sale.



Engineering Made in Germany.

For the innovative high-pressure pasteurization process we offer a range of systems matched to the individual requirements of our customers. Whether it's for high, medium or low production volumes, we have the right solution. Our HPP systems are flexible and scalable. Their modular design allows performance increases up to double the capacity.

Maximum efficiency

The use of two parallel high-pressure vessels on the Uhde 700-60 TWIN, the biggest and most flexible system on the market, allows an almost continuous process that can handle over 3,200 kg of product per hour and maximum utilization of the system components. While one vessel is at operating

pressure, the second is unloaded, reloaded and filled with water. This concept also has a positive impact on availability: If one of the units is being serviced, the second can continue in operation. In this way the maintenance-friendly design reduces downtimes to a minimum.

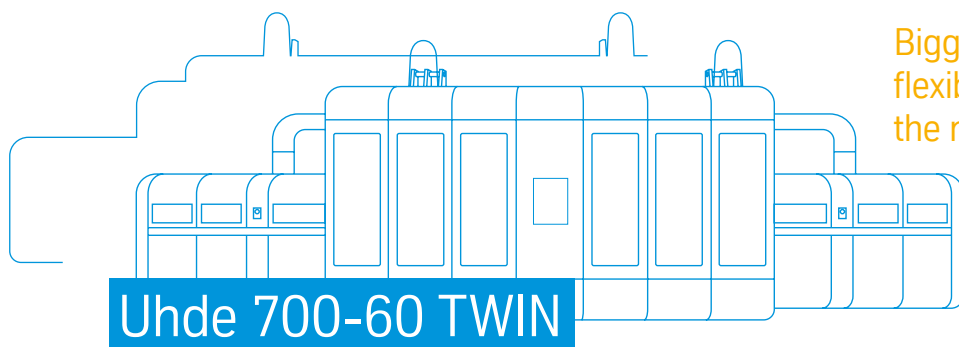
Easy to operate, optimum safety

Operation is just as efficient as the design: An integrated control panel provides all process information at a glance. Key process data are compiled in a user-friendly way and made available to the operator. The innovative software monitors the system's functions continuously and identifies irregularities before they can cause a shutdown. Automatic door locks, multiple

emergency stop switches and double resets after entering the functional and stylish enclosure ensure maximum safety and ease of operation for your staff.

Long lasting, highest quality

Another reason for choosing our HPP systems is the durability of their individual components. We use only high-quality materials that meet our strict quality requirements. Each component is 100% traceable from manufacturing, pressure testing up to delivery and operation.



Biggest and most
flexible system on
the market

Capacity

over 3,200 kg
per hour

Volume

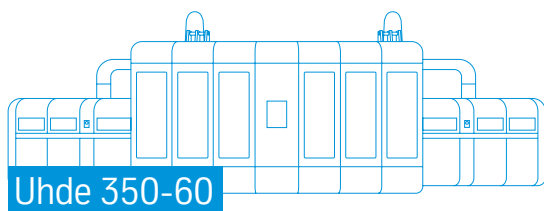
700 liters

Weight

132 metric tons

Special feature

Maximum efficiency: The parallel use of two identical high-pressure vessels allows optimized cycles and thus maximum utilization.

**Uhde 350-60****Capacity**

over 1,600 kg
per hour

Volume

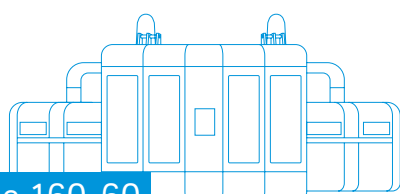
350 liters

Weight

66 metric tons

Special feature

Flexibly expandable: Adding further HP units allows production volumes to be increased variably.

**Uhde 160-60****Capacity**

over 750 kg
per hour

Volume

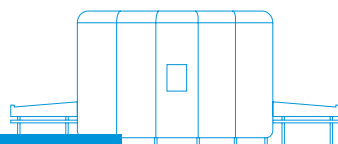
160 liters

Weight

47 metric tons

Special feature

Simply practical: The two high-pressure intensifiers are sited in a different room to ensure heat and noise do not affect production. This also simplifies maintenance.

**Uhde 055-60****Capacity**

over 210 kg
per hour

Volume

55 liters

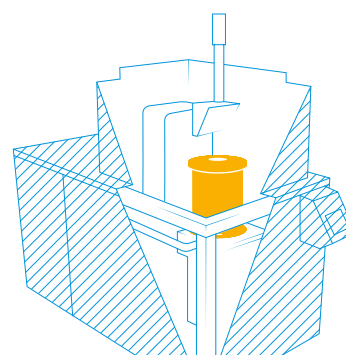
Weight

11 metric tons

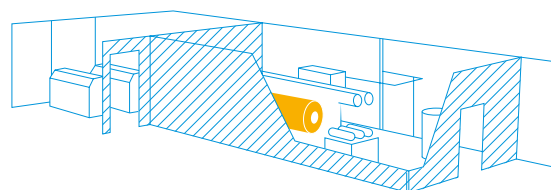
Special feature

Optimum compactness: The design of the system allows a small footprint as almost all major components are located directly on or in the machine.

Test and special systems

**Uhde 002-70 – test systems**

Our test systems are used in institutes and universities for product and process development and can be expanded if required.

**Special systems**

Our special systems combine the advantages of normal HPP treatment with those of thermal preservation, meaning that even bacterial spores are thoroughly neutralized.

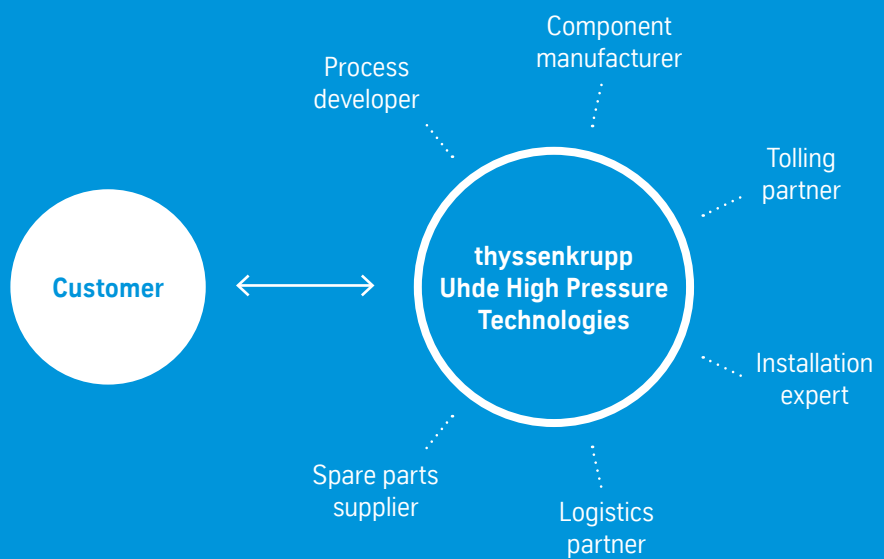
For further information on our systems, go to:
www.uhde-hpp.com

Global service from a single source.

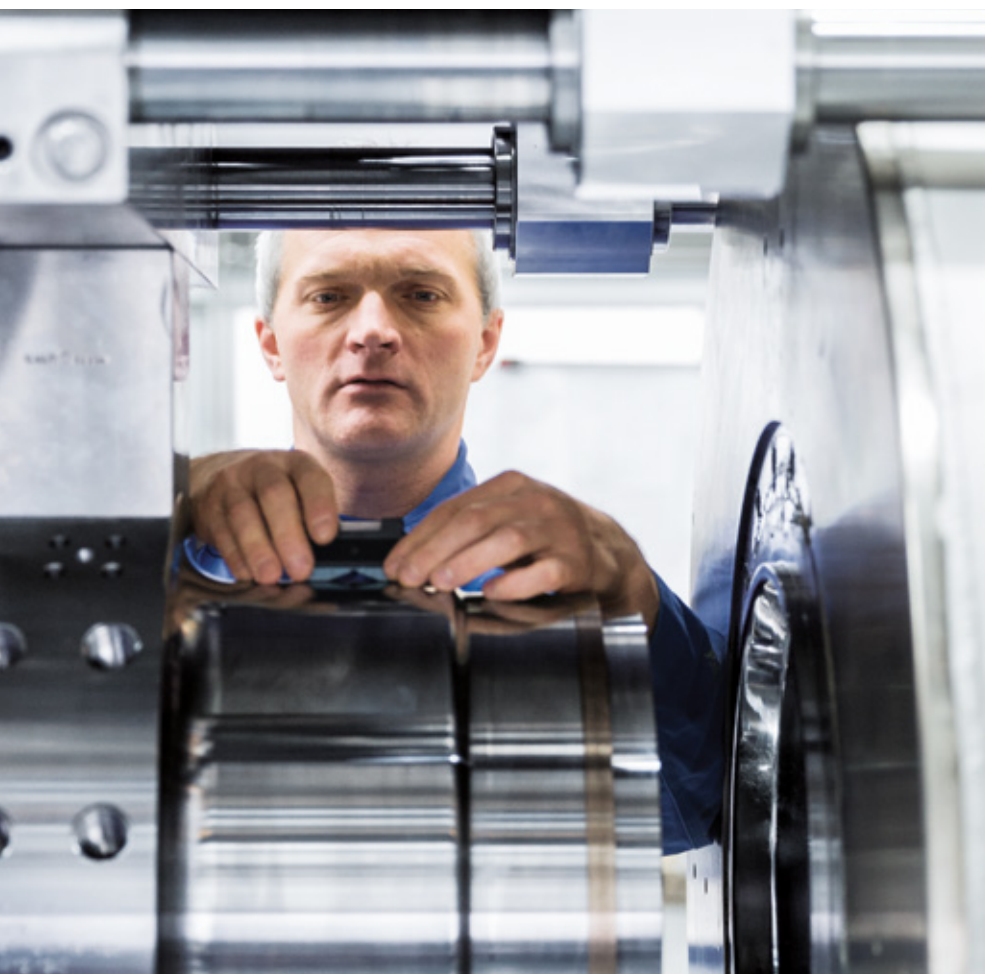
thyssenkrupp Uhde High Pressure Technologies is a world leader in high-pressure technologies, and its licensed high-pressure pasteurization (HPP) is a unique and innovative process. With over 80 years of experience, more than 500 installed facilities and 20 years of HPP expertise we enjoy a worldwide reputation as a reliable and professional partner. Our aim is to maintain long-term successful customer relationships. So in addition to our high-pressure pasteurization process we also offer an extensive range of services that enable us to meet the individual requirements of our customers – worldwide.



Comprehensive range –
maximum service,
minimum downtimes



The challenge in maintenance is to keep downtimes to a minimum. Alongside our practical equipment designs, our combination of experience, know-how and highly skilled service technicians, ensures top quality and maximum production.

**360° service**

You want systems that provide maximum efficiency and safety throughout their entire lifecycle? Then we're just the partner you need. We help you minimize your energy consumption and increase system availability, safety and product quality. Our 360° service offering starts with detailed project planning and supports you throughout the lifetime of your system. With our many years of engineering expertise and our highly skilled employees, we find the right solution for every customer.

Spare parts

The innovative design of our high-pressure systems ensures that maintenance is kept to a minimum. If components need to be replaced, we can provide certified and carefully tested spare parts. Short delivery periods and qualified service partners help avoid lengthy downtimes.

**Asset Management****Spare Parts Supply
& Management****Revamps****Service Center
& Field Services****Toll processing**

Benefit from all the advantages of high-pressure pasteurization without having to invest in your own systems: Our toll processing is particularly ideal for smaller production setups and startups. Simply send us your products and we will treat them for a small fee. In addition to our tolling plant in Hagen (Germany/NRW) we have facilities in tolling centers around the world.

Industrial Solutions
Electrolysis & Polymers
Technologies

Uhde High Pressure Technologies GmbH
Buschmühlenstrasse 20
58093 Hagen
P: +49 2331 967- 302
F: +49 2331 967- 370
www.uhde-hpp.com

engineering.tomorrow.together.