



**HAMMELMANN®**



# HIGH-PRESSURE APPLICATIONS FOR FOOD PROCESSING

Innovative solutions for the food industry

FDA-certified

Gentle procedures

CIP-enabled

Integrated processes

Hygienic design

Systems from a single source



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WATER JET TECHNOLOGY

## HIGH-PRESSURE CLEANING OF MACHINERY AND EQUIPMENT

### KEEP ON TOP OF THE HYGIENE REGULATIONS IN THE FOOD INDUSTRY

Businesses that process and market food products are subject to numerous national and international legislations in order to ensure food safety and food health at all times. As a result, food hygiene requirements cover all areas of a business – from primary production through production itself, processing and ultimately also sales. Hammelmann offers powerful and innovative cleaning systems for each of these areas and every requirement. This is why we focus intensely on the safety and reliability of our products because we know that unsafe food products due to contaminated and unhygienic production equipment must not be brought to market and can cause huge financial damage. This can also lead to important certifications being lost. Well-coordinated systems from a single source have always proven to be the best solution.

### RELIABLE SYSTEMS FROM A SINGLE SOURCE

Our cleaning systems are as unique as our customers and their challenges. At Hammelmann we will support you from the very first contact with us and we apply the principle that there is solution for every requirement! Therefore, take advantage of the advice from our experts and develop *your* system with us.

- TAKE ADVANTAGE OF THE ADVICE FROM OUR EXPERTS
- JOINT DEVELOPMENT OF A SUITABLE CLEANING SOLUTION
- INSTALLATIONS AND TRAINING AVAILABLE







WATER JET TECHNOLOGY

## HIGH-PRESSURE CLEANING OF TANKS, VESSELS AND CONTAINERS

### CLEAN TANKS AND VESSELS THOROUGHLY AND QUICKLY

Hammelmann tank cleaning devices remove deposits and caking from the inside walls of vessels and installations with a wide range of diameters and with operating pressures up to 1800 bar. The devices are driven solely by the recoil forces of the water jets. Hammelmann supplies a wide range of nozzle holders to cover the many different applications. The tank cleaning devices can be fitted with one or two nozzle holders.

### ADAPTED TO THE SPECIFIC REQUIREMENTS OF THE FOOD INDUSTRY

Vessels used for food processing are subject to the strictest of hygiene requirements. Essential standards guarantee high food safety and quality and reduce risks of hazards. In order to obtain important certifications that are also relevant for marketing, several issues must be complied with.

Hammelmann tank cleaning devices can therefore be produced with FDA-certified components. This means that vessels can be cleaned thoroughly and reliably removing residue materials and contaminations of all types and then prepared for further production steps. Depending on the use case the tank cleaning devices can be operated with cold or hot water, and also with or without the addition of a food cleaner, and this will help you comply with the standards and obtain certifications.

### OPTIMUM CLEANING OF STATIONARY AND MOBILE VESSELS

Hammelmann offers you a solution for whatever you want to clean, whether this is high-performance pump units for stationary production equipment or highly-mobile tank cleaning systems for flexible use at many different locations:

- TANKERS AND FRUIT JUICE TANKERS
- REFRIGERATION, THERMO AND BOX TRAILERS
- MILK TRANSPORT VEHICLES

### OVERVIEW TANK CLEANING DEVICES



[www.hammelmann.com/aquamat](http://www.hammelmann.com/aquamat)



### EXTREMELY HIGH-PERFORMANCE

Efficient cleaning performance through high operating pressures (up to 1800 bar) and high flow rates (up to 700 l/min).



### EFFECTIVE AND ENVIRONMENTALLY-FRIENDLY

Hammelmann tank cleaning devices have been developed with a view to efficiency and sustainability. The high effectiveness of the systems makes them particularly energy-efficient to use.



### HIGH RELIABILITY

A high level of reliability and long service life thanks to the well designed, low maintenance construction and the compact housing shape.



### FOR EVERY FOOD APPLICATION

Available in different designs such as FDA-certified, explosion-proof, gas-tight encapsulated, pressure-resistant or for cleaning media.



### FLEXIBLE, ADJUSTABLE, COMBINABLE

Different nozzle holders and further accessories and configuration features adapt the device to every challenge.





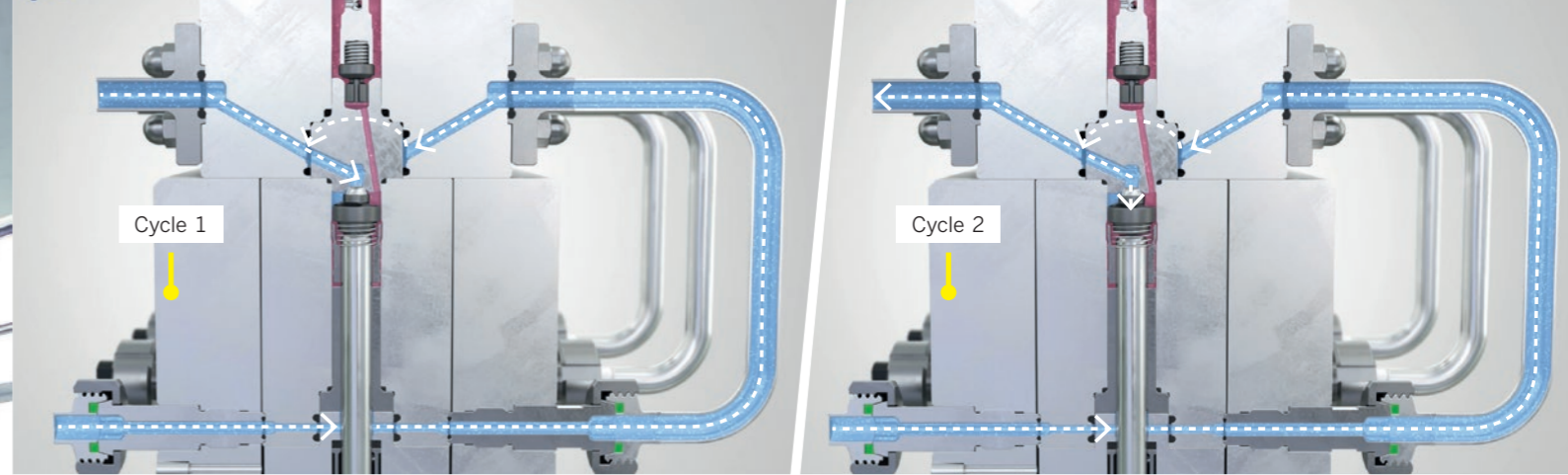
PROCESS TECHNOLOGY

## DIRECT CONVEYING OF FOOD PRODUCTS UNDER HIGH PRESSURE

### FOR HIGH AND LOW-VISCOSITY FOOD PRODUCTS

There are no limits to the conveying of flowable food products – from apple juice to zesty lemon tea, Hammelmann food pumps are perfectly suited for every task. All components and assemblies which come into direct contact with the food products to be conveyed are designed and produced under strict hygiene conditions and are FDA-certified.

- HYGIENIC TRANSPORTATION WITHOUT UNDESIRABLE EXTRANEIOUS SUBSTANCES DUE TO ABRASION
- GENTLE APPROACH WITHOUT NEGATIVELY IMPACTING THE FOOD PRODUCTS
- HYGIENIC DESIGN DUE TO SUITABLE MATERIALS AND THE AVOIDANCE OF DEAD SPACES
- EASY TO CLEAN THANKS TO THE HIGH SURFACE QUALITY



### CIP: CLEANING IN PLACE

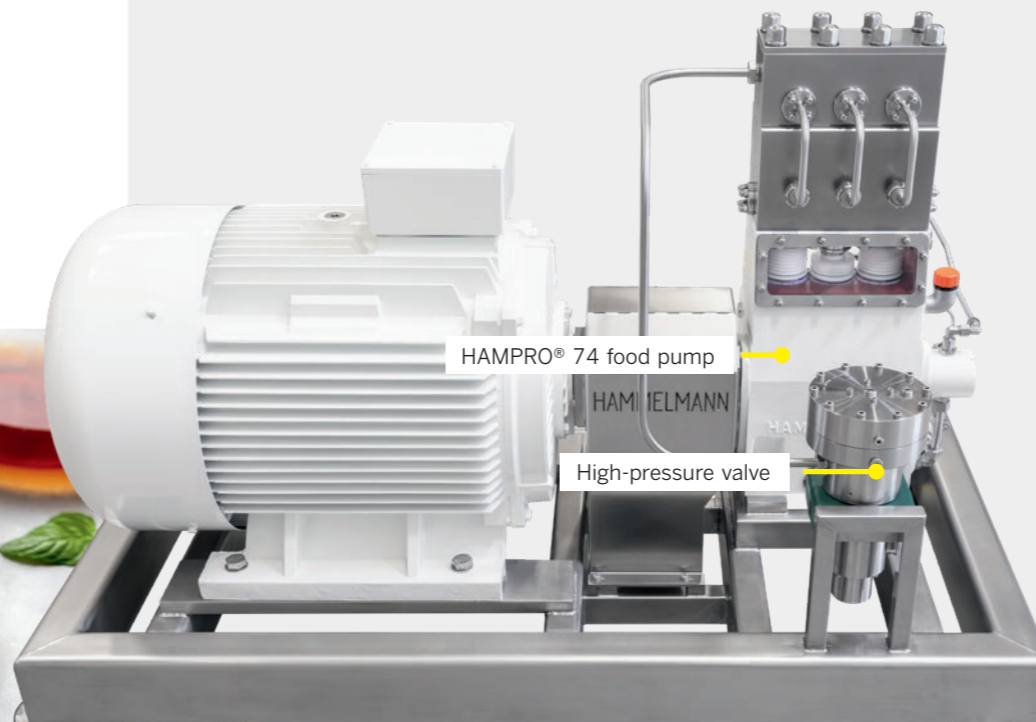
CIP cannot only be integrated into comprehensive production equipment, but also into different areas within one single process pump. When conveying food products the pump must undergo regular cleaning processes. To ensure the complete rinsing of all areas within the process pump, two cleaning cycles are performed per cleaning agent.

#### CLEANING CYCLE 1

In the first cycle the cleaning system is connected to the suction aperture and the rinsing aperture. To reach all areas the pump must be operated continuously during this phase at high-pressure and at full operating speed.

#### CLEANING CYCLE 2

The second cleaning cycle performs a backwashing from the cleaning opening to the suction opening of the pump. The pump is not operated during this cycle.



### PROCESS TECHNOLOGY REQUIREMENTS

HAMPRO® process pumps with a CIP-function are manufactured under the highest quality standards and have perfect control of the rinsing process. Adjust the flow rate and speed to your cleaning agent to achieve maximum results. A fast and efficient recoil system along with many adjustable parameters underpin effective pump cleaning.

- NO NEED TO DISASSEMBLE THE PUMP
- EASILY REPRODUCIBLE CLEANING RESULTS
- RELIABLE COMPLIANCE WITH HYGIENE REGULATIONS
- FAST CLEANING TIMES, LOW CLEANING COSTS, VERY ENERGY-EFFICIENT





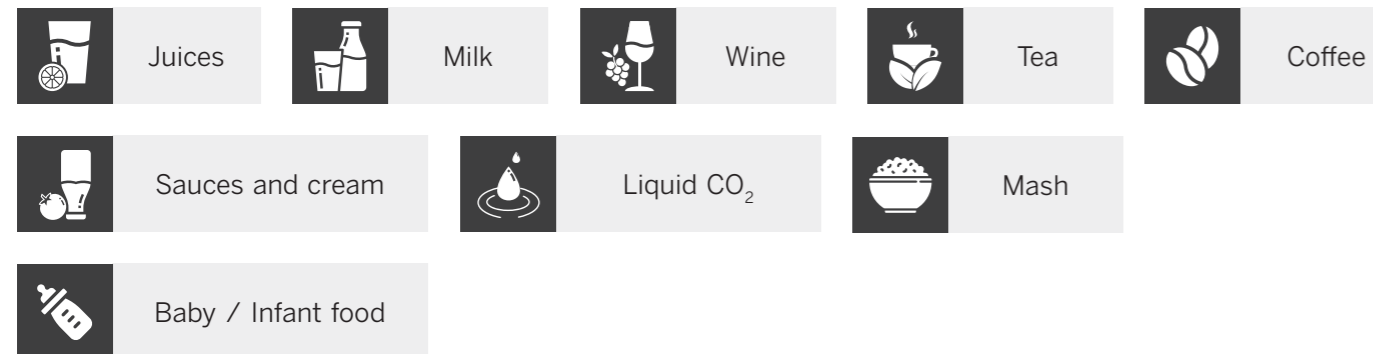
PROCESS TECHNOLOGY

## HIGH-PRESSURE PASTEURIZATION AND HOMOGENIZATION

### DIRECT PRESERVING WITHOUT ADDITIVES AND HEAT

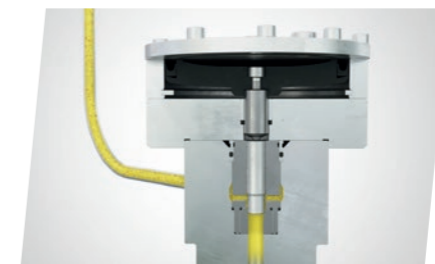
High-pressure pasteurization (HPP process) dramatically reduces the thermal load of food and leaves valuable ingredients such as vitamins and natural colours and aromas unchanged. In contrast to traditional high-pressure processes in which pressure is transferred via a transfer liquid (frequently water) and a plastic vessel onto the food, Hammelmann technology enables the direct compression of liquid food products. This enables high production volumes to be pasteurised at a low cost. Furthermore, the texture of the food product can be specifically influenced which enables the creation of new products with changed product features.

### SUITABLE FOR LIQUID FOOD PRODUCTS



### WHY DIRECT HIGH-PRESSURE PASTEURIZATION?

Direct high-pressure pasteurization has one crucial benefit: High-pressures and high shear forces can efficiently eliminate germs and bacteria. Added to this, direct high-pressure pasteurization is very economical as no energy for heating is required. Because the liquids flow directly through the food products pump, no wastewater is created.



### THE HIGH-PRESSURE VALVE

The high-pressure valve reduces the pressure and exposes the liquid to high shear forces which results in micro-organisms being destroyed and the shelf-life of the product being considerably extended. The food product is homogenised and pasteurized in one single cycle depending on operating pressure the temperature at the valve outlet is significantly higher than the inlet temperature so that upstream or downstream cooling of the conveyed medium may be required.

### HAMPRO® FOOD PROCESS PUMP

The high-pressure pump has a liquid part developed specifically for use in the food industry and which essentially builds on the well-known Hammelmann high-pressure technology. All fluid-touching components are FDA-certified and authorised for food processing. high-pressure seal is created through the patented Hammelmann sealing system with metallic sealing bushing and tungsten carbide pistons which minimises the risk of food contamination through seal abrasion.



### HAMPRO® PROCESS PUMPS PERFORMANCE DATA



[www.hammelmann.com/hampro](http://www.hammelmann.com/hampro)

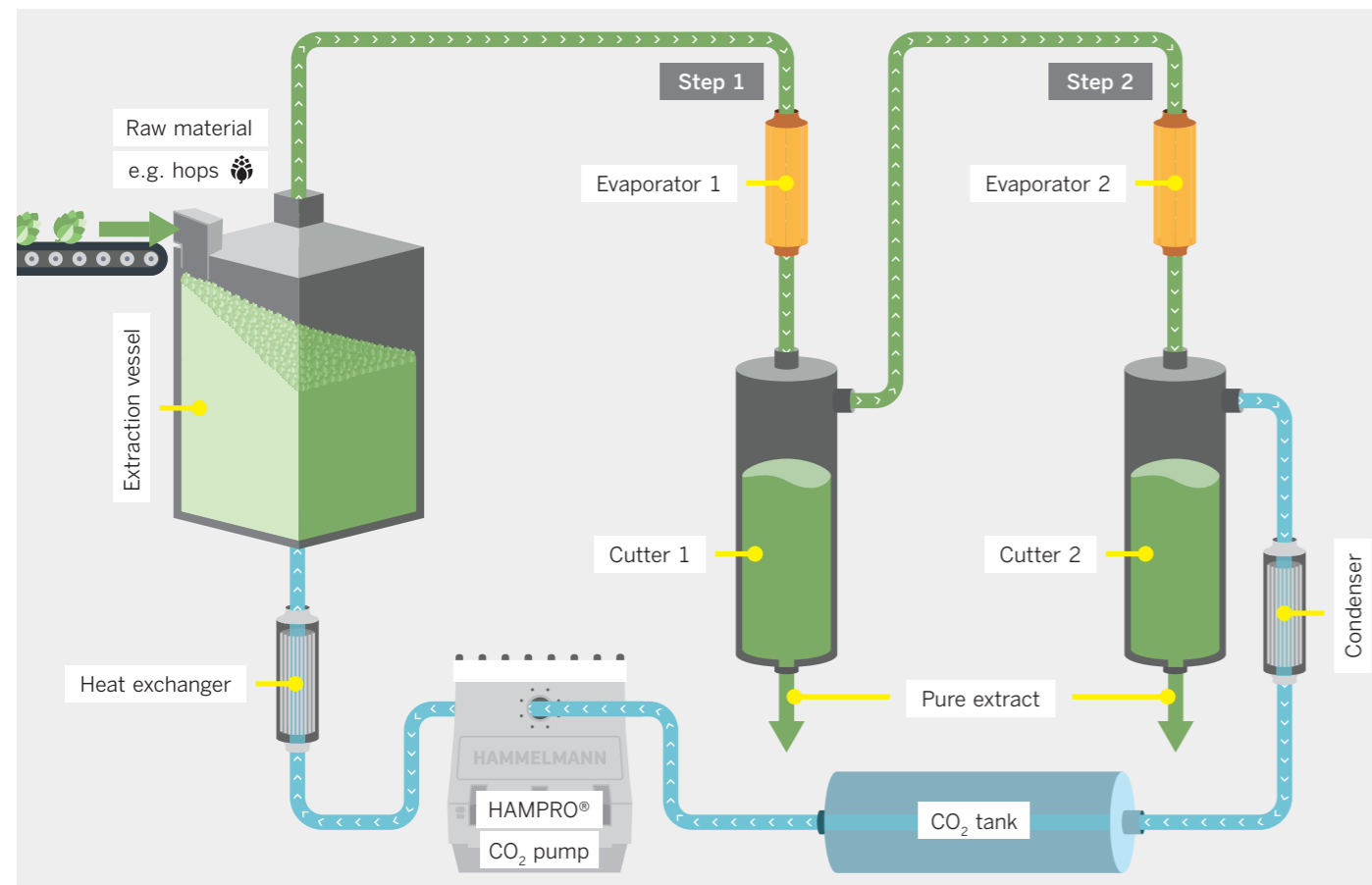




PROCESS TECHNOLOGY

## EXTRACTION WITH SUPERCRITICAL CO<sub>2</sub>

### MODE OF OPERATION









### ONE SOLUTION FOR MANY APPLICATIONS

Carbon dioxide (CO<sub>2</sub>) has over the years proven to be a useful aid in many different sectors, as is also the case for food processing. Thanks to state-of-the-art processes, liquid CO<sub>2</sub> is firstly supercooled in a condenser and then fed into a high-pressure pump. If strong pressure (up to 1000 bar) is now exerted on the CO<sub>2</sub>, a supercritical aggregate state is achieved. What makes this so special is that the properties of the supercritical CO<sub>2</sub> are now to be found between those of gas and liquid, or in other words: It has the same viscosity as gas but is just as dense as a liquid! In this state the CO<sub>2</sub> develops unimagined benefits for the food industry:

- Supercritical CO<sub>2</sub> has excellent dissolving properties and very good flowability. This means it can penetrate into other substances and separate these from each other. When the CO<sub>2</sub> is returned to its natural state, it again becomes gaseous. Only the extract remains!
- Thanks to the totally health-harmless CO<sub>2</sub> the use of traditional synthetic solvents can be discontinued.
- The solubility can be quickly and easily adapted to many different substances. A higher density, therefore a higher pressure, increases solubility accordingly.
- CO<sub>2</sub> is easily and quickly available.
- The CO<sub>2</sub> is conveyed through the cycle and does not access the environment.

### TYPICAL USE EXAMPLES

 Production of hop extract from hop cones	 Extraction of coffee oil and caffeine from ground coffee
 Extraction of CBD from cannabis	 Extraction of cardamom oil
 Nicotine from tobacco	 Flavourings from aromatic plants

### PROCESS TECHNOLOGY REQUIREMENTS

A process pump must meet specific requirements to convey supercritical CO<sub>2</sub>. To achieve this, Hammelmann has developed proven process technologies and complemented them with the necessary design features. When compressing CO<sub>2</sub> compression heat occurs. To prevent overheating, different areas of the pump are cooled. In addition, the valve technology and the liquid part are optimised. Dead spaces are therefore minimised.













WATER JET TECHNOLOGY

## CUTTING AND CRUSHING FOOD PRODUCTS WITH WATER

FOR FOOD AND DEEP-FROZEN PRODUCTS OF ALL TYPES

 Fish	 Meat	 Fruit	 Vegetables
 Bread and bakery products		 Cakes, tarts and biscuits	

### A PROCEDURE WITH HUGE BENEFITS

Nearly all materials can be easily cut and crushed with water and this is also the case in the food industry. Hammelmann sells cutting pumps and equipment between 600 and 3000 bar which have the capacity to cut or crush food products and deep-frozen goods of all types. The use of water jets for cutting and crushing food products offers you huge benefits in comparison to traditional systems:

- **HYGIENIC WITHOUT CROSS-CONTAMINATION**
- **TIME-SAVING**
- **EFFICIENT AND MORE PROFITABLE**
- **QUALITATIVE, SUSTAINABLE AND LONGER SHELF-LIFE**

### HYGIENIC WITHOUT CROSS-CONTAMINATION

Hygienic procedure with pure water without additives and chemicals. Food products do not come into contact with knives or other tools. No salmonella risk thanks to the use of purified water.



### TIME-SAVING

Considerable time savings as now there is no need to use knives, blades or other tools which require regular maintenance, cleaning and re-sharpening. Downtime is reduced to a minimum.



### EFFICIENT AND MORE PROFITABLE

Maximum efficiency and higher profits because waste is minimised and the cutting water can be recycled. This helps the environment and decreases production costs.



### QUALITATIVE, SUSTAINABLE AND LONGER SHELF-LIFE

No thermal load, no compression and no washing out of the food product thanks to the very precisely concentrated water jet with speeds up to ~ 1000 m/s, for the very highest quality and a longer shelf life.



### CUTTING PUMPS

The optimum use of available resources not only helps the environment, it is also a crucial factor in commercial success. Rapid-switching high-pressure pumps from Hammelmann impress with their excellent implementation of available energy and their maximum reliability in daily operation.

OVERVIEW AND PERFORMANCE DATA



[www.hammelmann.com/fast](http://www.hammelmann.com/fast)





WATER JET TECHNOLOGY

## MEAT RESIDUE EXTRACTION WITH HIGH-PRESSURE WATER JETS

### TRADITIONAL PROCEDURES

Traditional procedures for extracting meat residues are expensive and laborious. Experienced operators must carefully cut the meat residues from the bone by hand using electric knives. This process is very laborious and knives must be re-sharpened regularly. In contrast to separators, undesirable elements such as bone fragments, veins or bone marrow, are not transferred into the meat residue volume.

### INNOVATIVE REMOVAL OF MEAT RESIDUES

Another way of meat residue extraction! Meat residue can be removed gently and efficiently from bones using high-pressure water jets. The meat residues are caught in a sieve and the water is discharged. Depending on the type and state of the meat, the water pressure or jet pattern can be adapted to achieve the best possible results.

- NO PREPARATION OF THE BONES REQUIRED
- NO UNDESIRABLE ELEMENTS IN THE MEAT
- FAST, EFFICIENT, RELIABLE

### FOR FISH, MEAT AND POULTRY



PROCESS TECHNOLOGY

## INJECTION OF BRINE AND LIQUID SEASONINGS

### IMPROVE THE CONSUMPTION QUALITY OF YOUR PRODUCTS

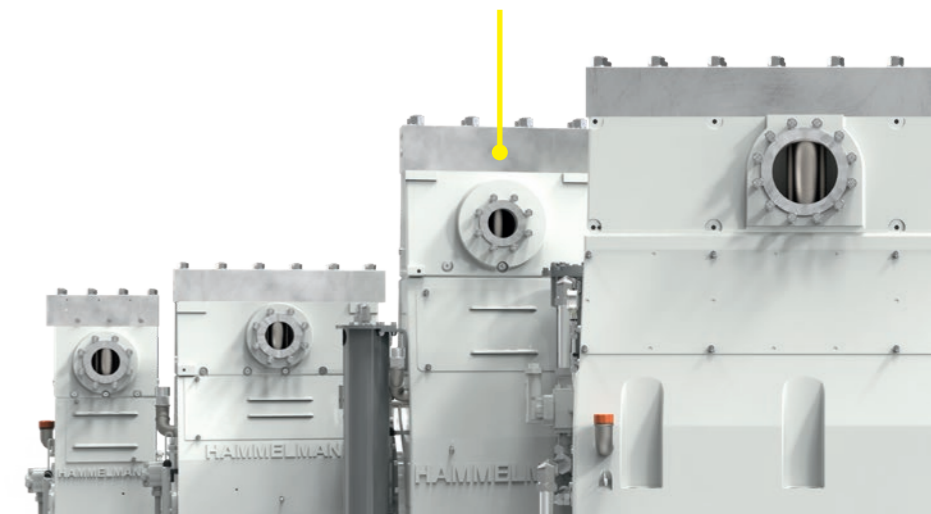
By injecting brine and liquid seasoning mixes in different types of red meat, pork, poultry and fish, products can be processed and handled to improve their consumption quality. Furthermore, injecting salt or curing brine enables products to be cured more quickly. Expand your product selection by creating new taste directions and thereby attracting new customers.

- INCREASED PRODUCT SUCCULENCE AND TENDERNESS
- MORE CONSISTENT FRIABILITY
- MORE BALANCED TASTE AND SALT CONTENT
- MANY DIFFERENT AROMAS CAN BE ABSORBED

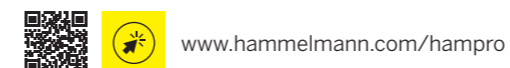
### FOR FISH, MEAT AND POULTRY



Hammelman offers you food-grade injection pumps with a CIP- function for conveying brine and liquid spices.



HAMPRO®  
INJECTIONPUMPS



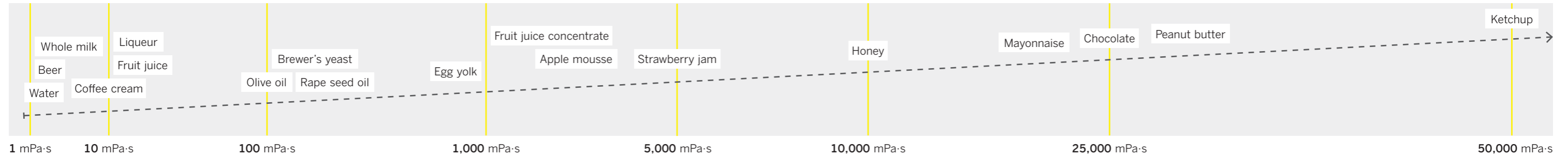
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# FOOD INDEX (FURTHER FOOD PRODUCTS ON REQUEST)

DIRECT CONVEYING OF FOOD PRODUCTS WITH HAMPRO® PROCESS PUMPS UP TO 50,000 mPa·s.

APPROXIMATE VALUES AT TEMPERATURES OF 20 - 24 °C / FOOD PRODUCTS MAY DEVIATE DEPENDING ON THE COMPOSITION.



## A

Alcohol 10, 14  
Almond milk, See Milk  
Apple juice, See Juice  
Apple mash, See Mash  
Apple puree, See Puree  
Asparagus, See Vegetables

## B

Baby food 10, 12  
Bakery products 16  
Beans, See Vegetables  
Beer 10, 14  
Bread 16  
Brewer's yeast 10, 14  
Brine 19  
Broccoli, See Vegetables

## C

Caffeine 10, 14  
Cake 16  
Cannabis 14  
Cardamom 14

Cardamom oil, See Oil

Carrots, See Vegetables

CBD 14

Celery, See Vegetables

Cereal bar, See Bakery products

Chicken meat, See Meat

Chicory, See Vegetables

Chocolate 10

Coffee 10, 12, 14

Coffee beans 14

Coffee cream 10, 12

Coffee oil, See Oil

Cooking oil, See Oil

Cream 10, 12

Curd 10, 12

## D

Deep-frozen food 16

Drinking water 10

## E

Egg yolk 10

## F

Fats 10, 14

Fish 16, 18, 19

Flavors 12, 14, 19

Fruit juice, See Juice

Fruit puree, See Puree

Fruits 16

## H

Honey 10

Hop 14

## I

Infant food 10, 12

## J

Jam 10, 12

Juice 10, 12

## K

Ketchup 10

## L

Lecithin 14

Leek, See Vegetables

Lemon tea, See Tea

Lettuce, See Vegetables

Liqueur 10, 12

## M

Marmalade 10, 12

Mash 10, 12

Mayonnaise 10

Meat 16, 18, 19

Milk 10, 12

## N

Nicotine 14

## O

Oat bar, See Bakery products

Oatmeal, See Porridge

Oat milk, See Milk

Oil 10, 14, 19

Orange juice, See Juice

## P

Pastries 16

Peanut butter 10

Pickle brine, See Brine

Pie 16

Pizza, See Deep-frozen food

Pork, See Meat

Porridge 10, 12

Poultry, See Meat

Pudding, See Yogurt

Puree 10, 12

## R

Romaine lettuce, See Vegetables

## S

Salmon, See Fish

Salt brine, See Brine

Sauces 10, 12, 19

Shark, See Fish

Smoothie, See Juice

Soy 14

Spice plants 14, 16

Spices 14, 19

Spinach, See Vegetables

Sugar beets, See Vegetables

Sushi, See Fish

## T

Tea 10, 12, 14

Tobacco 14

Tomatoes, See Vegetables

Tomato juice, See Juice

Tuna, See Fish

## V

Vegetables 16

## W

Wine 10, 12, 14

## Y

Yogurt 10, 12



**HAMMELMANN - FIND OUT ABOUT THE MARKET LEADER**

For over 70 years Hammelman has been a successful manufacturer of high-pressure systems which are used for cleaning and cutting purposes and also in production processes. With over 500 employees in the Hammelmann Group, in Oelde and in subsidiaries in the USA, Australia, Spain, China, France and der Switzerland as well as 40 other agencies, we are a global company.

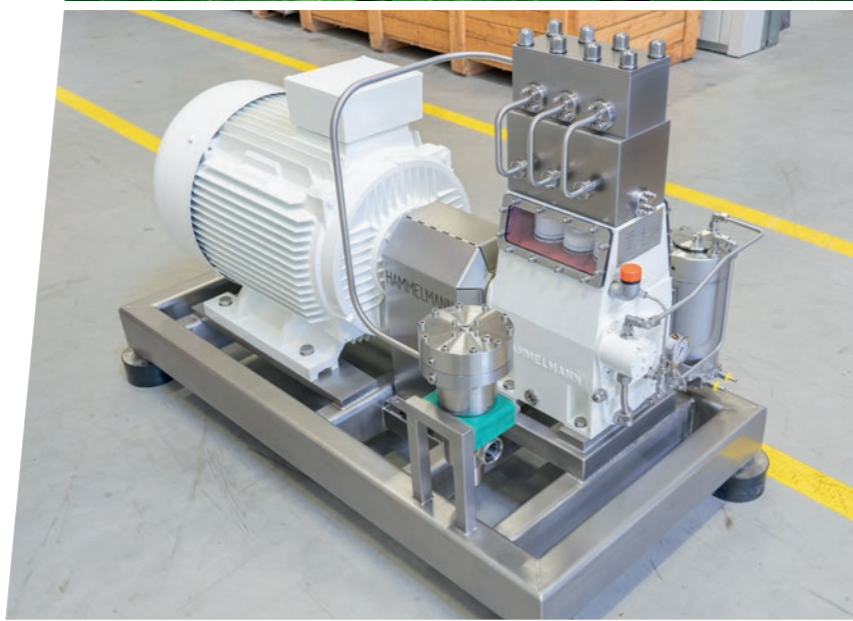


**STATE-OF-THE-ART TECHNOLOGY CENTRE**

Our Technology Centre fitted out with state-of-the-art equipment is where we test, both for you and for us, whether and how water jet technology can be usefully deployed both economically and ecologically. In a unique area, modern technology and a spirit of innovation work closely together to test product developments and specific customer requests in a practical environment and really put them through their paces.

Hammelmann places great importance on product quality and on the associated satisfaction of you – our customers. This is why products are not only tested under ideal conditions and then sold but are deployed in advance in our Technology Centre under extreme conditions.

On request the simulation can also be developed in collaboration with you. Together we will test possible solutions for your particular application and we will supply you with complete documented test protocols and reproducible results. We look forward to your challenge.



**FIRST-CLASS SPARE PARTS SERVICE, AVAILABLE ROUND THE CLOCK**

Hammelmann's unique spare parts service offers you many benefits including a state-of-the-art logistics centre, same day shipping and short delivery times.



**SAME DAY SHIPPING**  
of spare parts

**23,000 SPACES**  
in a fully-automated warehouse system

**500 EMPLOYEES**  
in the Hammelmann Group

**YOUR CONTACT FOR WATER JET TECHNOLOGY**

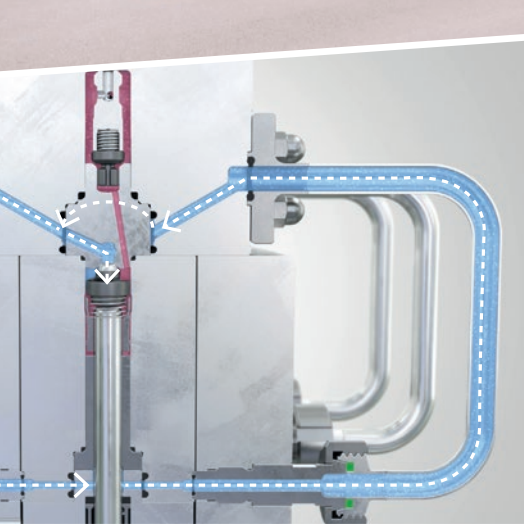
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**YOUR CONTACT FOR PROCESS TECHNOLOGY**

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## CERTIFICATIONS

- FDA certifications
- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2018
- ISO 50001:2018
- ASME Certificate
- SIR Certificate
- Others



### The free-of-charge Hammelmann app

For iOS, Android and your browser

**Water Jetting Calculator:** [hammelmann.com/app](http://hammelmann.com/app)

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