



**HAARSLEV™**

Processing Technology

# FISH PROCESSING SOLUTIONS

Products brochure



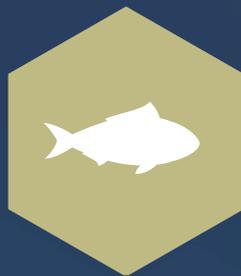
# ABOUT HAARSLEV

Haarslev manufactures processing equipment for customers in the meat, pet food, fish, oil, environmental protection and biofuel industries worldwide.

## MASTER YOUR PROCESS

If you are in the rendering industry – whatever type of material your specialty is – process is always key. Your process determines your yield, the quality of your end products, the level of investment, and in the end your costs.

Haarslev offers you true business partnership, addressing all of your challenges at the same time. Together with our technologies, knowhow and business expertise, we help you find – or create – solutions that fit into every step of your production process. Together, we master your process.



**FISH  
PROCESSING**



**COMPLIMENTARY  
PROCESS APPLICATION**

[www.haarslev.com](http://www.haarslev.com)

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# BINS & SILOS



“  
RUGGED, LEAK-PROOF BINS FOR USE WITH  
THE COUNTLESS DIFFERENT FUNCTIONS  
INVOLVED IN PROCESSING MEAT, POULTRY  
OR FISH BY-PRODUCTS

No matter what kinds of meat, poultry or fish by-products you process, you will always need simple, rugged bins for moving, parking and storing everything from raw material and other inputs to your finished output.

They're a big help in the practicalities of process management, providing you with a low-tech buffer between individual processing lines and pieces of equipment, and helping ensure good flows and maximum flexibility.

Haarslev bins and silos are tough and durable, designed to prevent leaks and ensure compliance with appropriate hygiene standards.

They're engineered to order from standard components, and can be delivered flat-packed for easy, inexpensive transport.

## **BENEFITS**

- Engineered to order, for your specific needs and requirements
- Easy to move and transfer contents from one process to another
- Robust and leak-proof
- Easy compliance with appropriate hygiene standards
- More effective process management

## WIDE RANGE OF CONFIGURATIONS

Haarslev bins and storage solutions give you plenty of choices. A wide range of sizes are available, from small charging/dosing bins to large reception hoppers, storage bins and silos with capacities of 150–200 m<sup>3</sup>. Different versions are available made of stainless steel, mild steel or combinations of both.

The individual designs and configurations depend on the kind of material you process and need to move, and on what your material will be used for downstream.

- Hydraulic lids
- Drain section
- Load cell systems
- Leveling screw
- Steam jacket with insulation



*Meal bins*



*Raw material pit*



*Storage silo*



*Buffer bin*

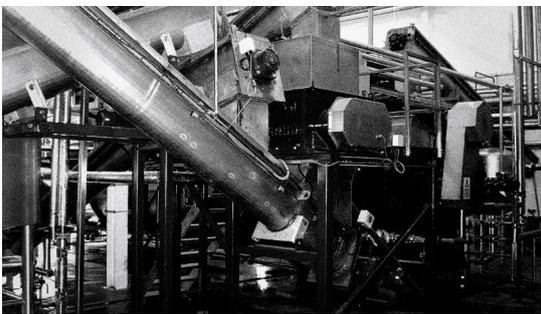
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# SCREW CONVEYOR



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VERSATILE, RELIABLE AND HYGIENIC WAY TO  
MOVE MATERIAL FROM ONE PROCESS STEP TO  
THE NEXT.

The Haarslev Screw Conveyor is specially designed to help you move material from one step to the next in your processing setup, coping easily with often-considerable height differences by operating reliably with an incline of as much as 30 degrees. This helps ensure processing continuity and higher overall outputs, by eliminating bottlenecks and “weak links” between the efficiency of individual processes.

These screw conveyors are available in stainless steel, mild steel, or a combination of the two, depending on the amounts and the type of material you need to move, as well as hygienic needs. 230, 300, 400, 500 and 600 mm screw diameters are available as standard.

These units are also available in both easy-clean and hygienic versions - the latter made entirely of stainless steel, with a self-supporting screw feed and no wear plates.

## APPLICABLE FOR:



- Wet or dry rendering processes
- Slaughterhouses
- Pet food processing
- Fish meal processing
- Feather processing
- Pre-heating
- Cooling by means of air or water
- Straining fats or water
- Dosing

## BENEFITS

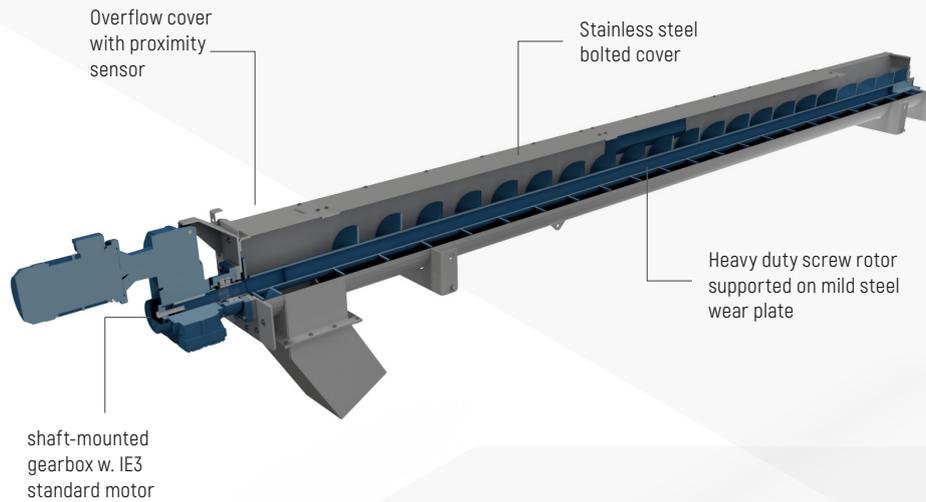
- Versatile screw conveyor that can be used in many places
- Reliable transport of material from one process to the next
- Ensures processing continuity
- Large-capacity units that support high processing output

## SCREW CONVEYORS

### UNIVERSAL

HAARSLEV'S UNIVERSAL SCREW CONVEYOR,  
DESIGNED FOR STANDARD PROCESSING SETUPS

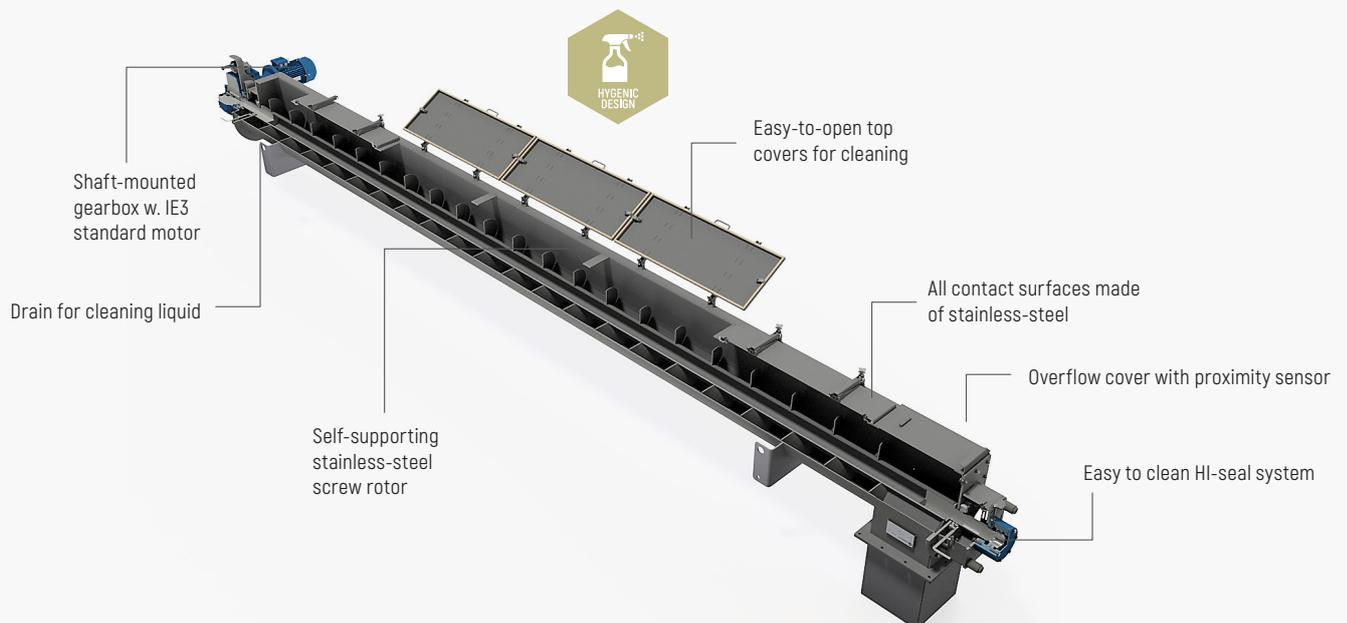
Applicable for complete carcasses, raw feather,  
bones & waste food



### HYGIENIC

HAARSLEV'S HYGIENIC SCREW CONVEYOR,  
DESIGNED FOR HYGIENIC PROCESSING OF MATERIAL

Applicable for pre-broken & fine crushed,  
soft product and meal



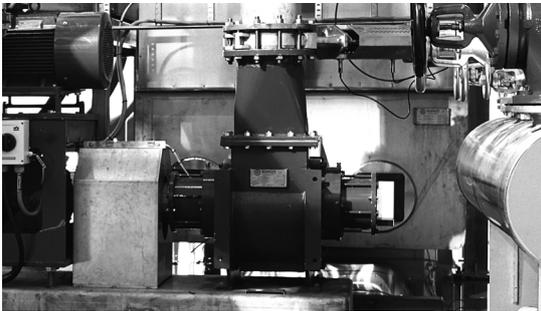
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## LAMELLA PUMP



“

RELIABLE, HIGH-CAPACITY PUMPS FOR TRANSFERRING MEAT, FISH OR POULTRY MATERIAL, EVEN IF IT CONTAINS LIMITED LIQUID AND LARGE PARTICLES.

If you need to move liquids containing large particles from one point to another – even over distances of as much as 200 meters – the Haarslev Lamella Pump is ideal. These uncomplicated, extremely robust units are widely accepted as the “gold standard” for pumping meat, fish and poultry material.

This type of positive-displacement sliding vane pump is specifically designed to transfer flows that contain large particles, such as pre-broken animal by-products, pet food or fish, with as little as 20% liquid in the flow. It is ideal for filling all types of cookers and other processing equipment in a closed system that ensures good hygiene and limits odor issues.

Even though these pumps have high capacities, they use very little energy compared with traditional conveying systems. There are four different versions and three different sizes, configured with the infeed on the side or top. They use the same standardized components for maximum reliability and effective spare parts backup.



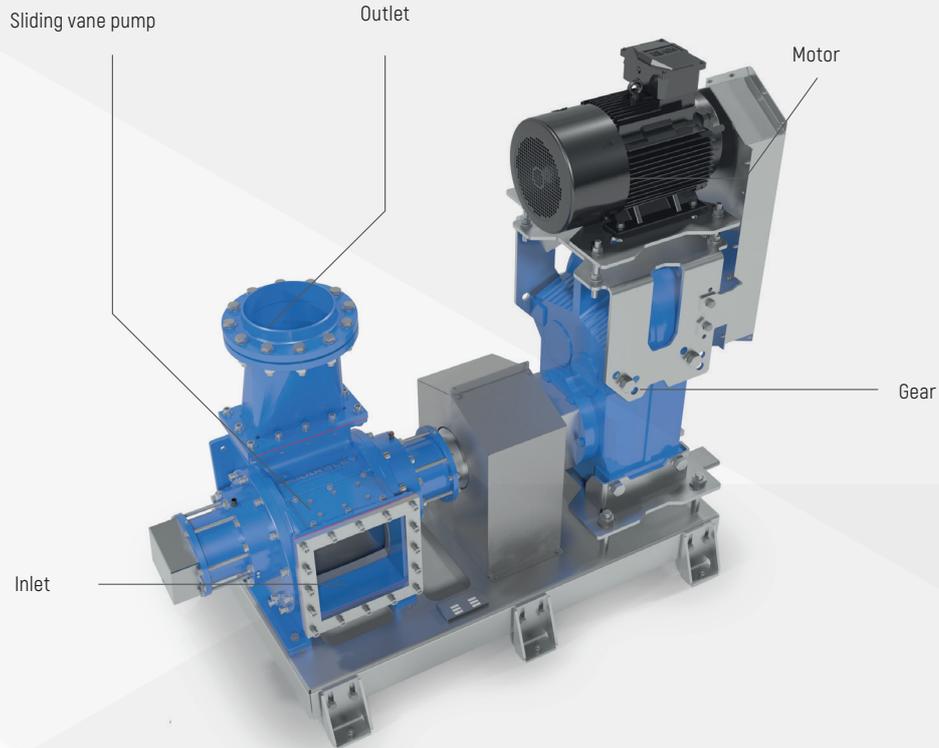
### APPLICABLE FOR:

- Fish processing
- Wet and dry rendering
- Pet food production
- Poultry offal (except feathers)

### BENEFITS

- Takes up very little space – can be mounted virtually anywhere
- You can use the same equipment in many different places in your processing setup
- Easy to maintain good hygiene standards, because of fully enclosed material transfer
- Extremely reliable – copes well with large chunks of input material, or even metal contamination in the input flow

**RAW AND COOKED ANIMAL AND FISH BY-PRODUCTS IN WET AND DRY RENDERING, AND FOR PET FOOD**



**FILLING COOKERS AND OTHER PROCESSING EQUIPMENT, IN A CLOSED SYSTEM**

TYPE	TYPICAL CAPACITY RANGE	MAX. SPEED	DISPLACEMENT (theoretical)	TORQUE	SOLID PARTICLE HANDLING	MIN. RECOMMENDED PIPE CONNECTION (outlet) DN/NW	NET. WEIGHT	
							Bare shaft pump	Pump unit (incl. motor and gear)
	ton	rpm	L/rev	Nm	mm	mm	kg	kg
HM 25	3-20	80	10	4,000	65	150	390	800
HM 35	5-30	70	25	7,000	85	250	550	1,950
HM 45	40-200	60	75	15,000	135	350	915	2,900

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# UNLOADING PUMP

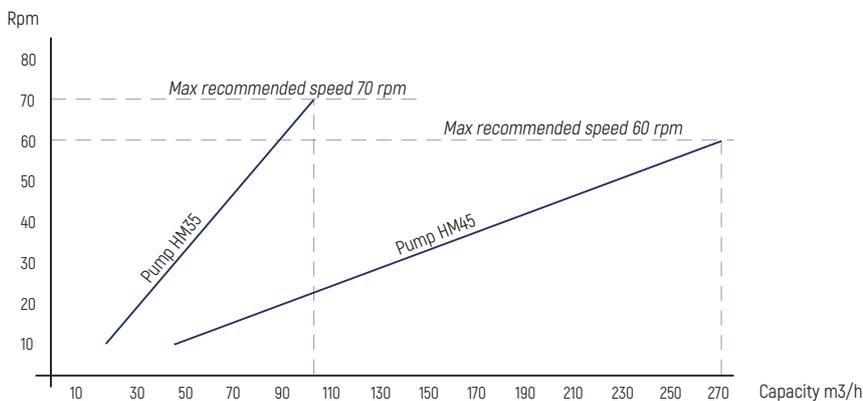
“  
COMPACT, HIGH-CAPACITY PUMP FOR GENTLE,  
EFFECTIVE UNLOADING OF FISH FROM A SHIP'S  
HOLD.

The right equipment can help you unload industrial fish from a ship's hold with minimum impact. Doing it gently helps maintain the quality and value of the catch.

The Haarslev Unloading Pump is specially designed to be suspended from a crane and lowered into the holds of ships, to unload their catches quickly and effectively.

The big advantage of this compact, reliable unloading pump lies in the compact high-torque hydraulic motor unit, which ensures gentle treatment of the fish. The geometry of the pump itself is ideal for pumping large particles – the fish are suspended in a flow of water.

## THEORETICAL PERFORMANCE

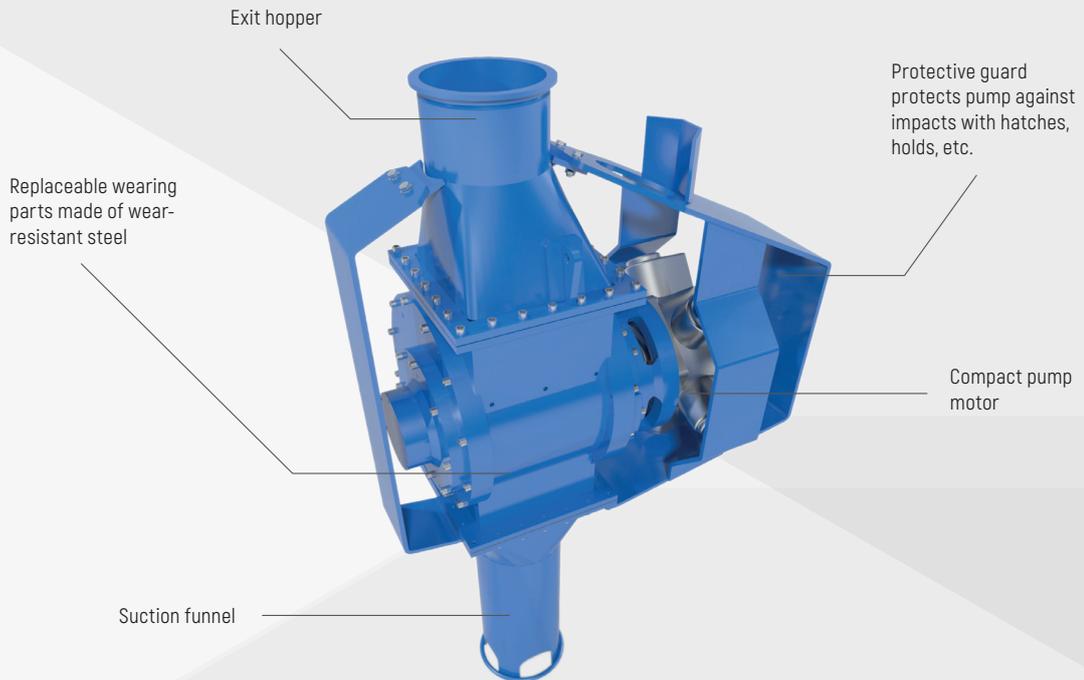


**APPLICABLE FOR:**  
Offloading any kinds of industrial fish

## BENEFITS

- Pump layout ideal for larger particles
- Less fish break-down, ensuring less oxidation and higher catch value
- Compact configuration makes this pump easy to use even in small holds
- Rugged design that withstands impacts when suspended from a crane
- High reliability and low maintenance

## FISH FROM A SHIP'S HOLD



## DRAINER/STRAINER IN ONSHORE DRAINING AND WEIGHING SYSTEM

TYPE	MAX. CAPACITY (theoretical)  m <sup>3</sup> /h	MAX. CAPACITY (theoretical at $\rho=800\text{kg/m}^3$ )  t/h	MAX. SPEED  rpm	DISPLACEMENT (theoretical)  L/rev	TORQUE  Nm	SOLID PARTICLE HANDLING  mm	MIN. RECOM- MENDED PIPE CONNECTION (outlet) DN/NW  mm	NET. WEIGHT	
								Bare shaft pump  kg	Pump unit (incl. motor and gear)  kg
HM35	105	84	70	25	7,000	85	250	614	1,950
HM45	270	216	60	75	15,000	135	350	1,039	2,900

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# FISH DRAINING AND WEIGHING SYSTEM



**A Haarslev Fish Draining and Weighing System is specially configured for draining and weighing fish catches as an onshore part of unloading systems.**

Water is used to pump from the catch from the hold with minimum damage, but this water needs to be drained off effectively so that the landed catch can be weighed accurately as an acceptable basis for payment.

Nothing goes to waste, and all component systems are engineered for reliability and energy efficiency.

## **STANDARDIZED FEATURES AND EQUIPMENT**

- Perforated pre-drainer drum fitted with internal flights for moving the fish and draining off water
- Rotating stainless steel strainer, with cleaning system
- Double-chamber weigher – appropriately calibrated and certificated
- Flotation tank for collecting and separating fat and foam
- Strainer drum that separates out any solid particles
- Lamella pumps that move the fish on to appropriate storage facilities, and transfer the water waste for other uses
- Control and automation systems that integrate processes effectively and ensure efficient operation

## **PURPOSE**

- Drain as much water as possible from the catch, causing as little damage as possible
- Ensure accurate catch weighing that provides a reliable basis for payments and settlements
- Recover as much waste as possible, and use it to provide additional revenue in other products
- Reduce environmental impacts by recovering as much water as possible, and re-using it elsewhere

## STAND-OUT FEATURES

- Haarslev control and automation systems make it easy to integrate individual processes and items of equipment effectively (regardless of supplier) and ensure efficient operation.
- Haarslev practical experience and equipment configuration expertise means individual systems become “more than the sum of the parts”
- Robust, well-engineered equipment helps ensure maximum reliability
- Long service life and low cost of ownership
- Haarslev engineering and fish processing expertise can integrate and optimize equipment from different specialist suppliers, re-using and updating legacy equipment if appropriate

## CUSTOMER BENEFITS

- Transferring the fish in a flow of water helps prevent damage and degradation of the catch
- Transferring the fish in a flow of water keeps mechanical wear to a minimum
- Catches maintain quality because of gentle treatment in slowly rotating strainer
- Recovers and re-uses as much water as possible
- Low energy consumption and limited environmental impacts
- Easy to customize to specific processing requirements, space constraints and end-customer specifications

## CUSTOMIZATION

Haarslev engineering and fish processing specialists can help you customize this fish draining and weighing system to your specific needs.

Our experts work with yours, to ensure maximum reliability and maximum revenue at minimum cost and with minimal environmental impacts.

Haarslev engineering services can include:

- Update and refurbishment of any of your existing equipment, if appropriate
- Integrating equipment from other suppliers for specific functions, if you prefer
- Integrating any new equipment with legacy installations, if they're sufficiently efficient
- Incorporating the latest technical advances, trialed and documented in Haarslev installations all over the world
- Advanced control, monitoring and automation systems that enable you to achieve and maintain peak operating efficiency at all times
- Electronic monitoring and modular maintenance/ service programs



*Fish Draining and Weighing System - single*



*Fish Draining and Weighing System - double*



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# METAL DETECTORS



“

EFFECTIVE REMOVAL OF ANY METAL FOREIGN OBJECTS FROM RAW OR COOKED MEAT, POULTRY AND FISH.

Haarslev metal detectors effectively remove a wide range of metal items from raw or cooked material, using a detector head with adjustable sensitivity. This can be used to trigger a separation device, or to stop the flow of material.

Any pieces of metal and metal residues – whether ferrous metals or stainless steel – are efficiently separated mechanically, with only a minimum of material being ejected with them, thus keeping waste to a minimum. Manual removal may be necessary in some processing setups.

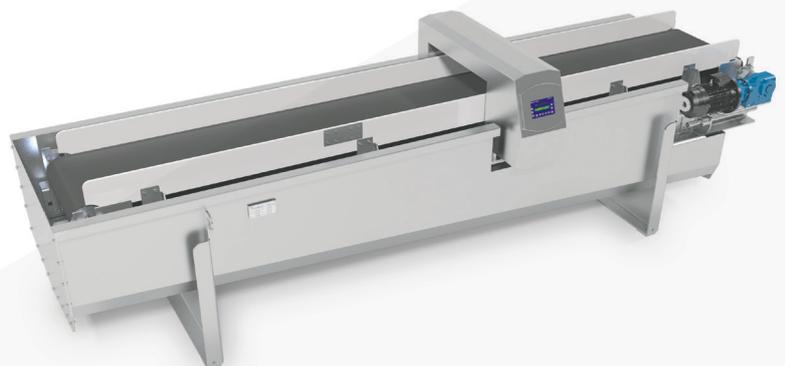
Haarslev metal detectors can be used in a wide variety of places and processing streams. You pick the technology and the configuration best suited to your particular inputs, flows and processing configurations.

Haarslev experts are on call to help you quickly and painlessly integrate a metal detector setup into your particular processing requirements and equipment configurations.

Three distinct types of Haarslev metal detectors are available.

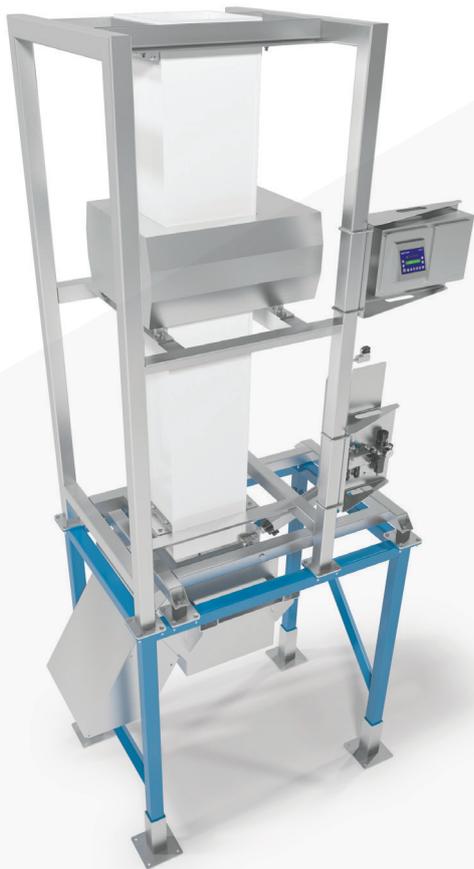
## **BELT CONVEYOR WITH METAL DETECTOR**

The belt conveyor is configured to order and available in stainless or mild steel. A deflector can be mounted at the end of the conveyor, or metal can be removed manually.



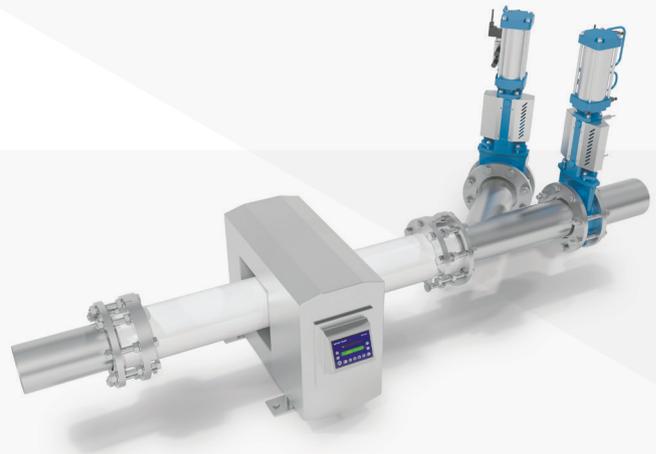
### VERTICAL METAL DETECTOR

The vertical metal detector system is configured to order and built on a single frame and delivered as a single unit. It is available in stainless or mild steel. This type of Haarslev vertical metal detector is fully automatic, and detects any metal present when the material falls through a non-ferrous pipe. A pneumatically operated diverter then removes any metal items present.



### IN-LINE PIPE METAL DETECTOR

The pipe metal detector is a clean, closed system that takes up a minimum of space. This kind of system requires a constant flow of material in the piping system.



#### APPLICABLE FOR:

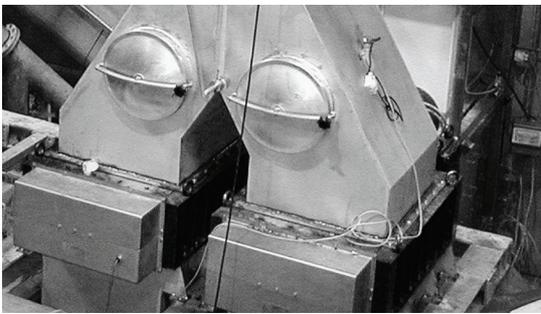
Haarslev provides systems that detect and extract metallic foreign objects from

- Red meat
- Poultry
- Feathers
- Fish



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# FINE CRUSHER



Smaller, more consistent particle sizes are an effective path to better efficiency in a wide range of meat and poultry processing setups. Smaller particles make heating processes more cost-effective and energy-efficient, making Haarslev Fine Crushers a valuable addition to processing lines that focus on operating costs.

“  
FOR REDUCING THE SIZE OF  
PARTICLES IN ALL KINDS OF MEAT  
AND POULTRY BY-PRODUCTS, OR  
DELUMPING FEATHERS.

The rugged, reliable Haarslev Fine Crusher cuts down pre-broken meat and poultry by-products to particle sizes of 13 mm, with throughputs of as much as 18 tons/hour.

You can also use these units for separating lumped-together feathers.



#### APPLICABLE FOR:

- Continuous feather processing, including hydrolysis
- Reducing the size of particles of meat and poultry by-products for use in low-temperature wet rendering

#### BENEFITS

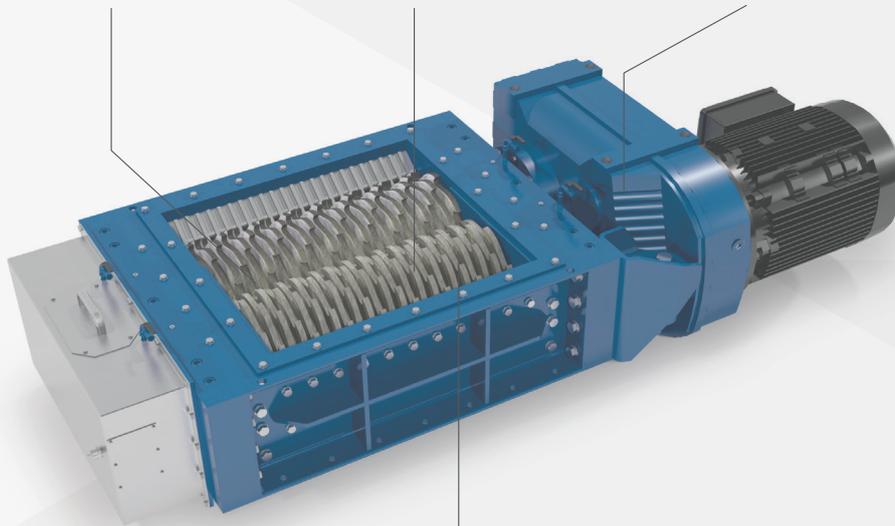
- High reliability that ensures uninterrupted operation
- Small clearance between knives, for good cutting performance
- Close-spaced cutting knives mean the input material is cut, rather than being ripped apart
- Easy to replace cutting blades and ensure maximum uptime

**MEAT AND POULTRY  
BY-PRODUCTS, OR FEATHERS**

Surface-ground knives for durability and effective cutting

Parallel counter-rotating shafts fitted with replaceable cutting blades

Heavy-duty motor drives one shaft directly, with gears connecting the two rotating shafts



Can be fitted with cutting blades of different sizes

**MORE EFFECTIVE DOWNSTREAM PROCESSES  
BECAUSE THE MATERIAL PARTICLES ARE  
SMALLER AND MORE CONSISTENT**

TYPE	CAPACITY (t/h)	ANVIL GAP (mm)	DIMENSIONS (mm)*			MOTOR POWER (kW)	SHIPPING WEIGHT (kg)
			Length (L)	Height (H)	Width (W)		
FC23/37	10 - 18	23	2,762	660	1,030	45	3,500
FC18/47	10 - 18	18	2,762	660	1,030	45	3,500
FC13/65	3 - 15	13	2,762	660	1,030	45	3,500

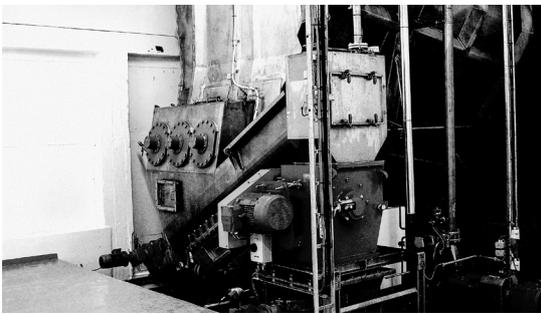
\* All statements of dimensions are approximate.

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# HIGH-SPEED CRUSHER



The Haarslev High-speed Crusher enables you to effectively, continuously crush almost any kind of animal or fish by-products, hard or soft. Models are available for production flows of 2-25 tons/hour (or more).

These compact, high-speed crushers rotate at approx. 300 rpm, and are ideal for producing finer, more consistent outputs from your crushing operations.

They provide a relatively inexpensive solution, with low operating costs, for processing setups when any metal or foreign objects have been removed prior to crushing. They are valued for dependable operation, a minimum of maintenance and a long service life.

“

STRAIGHTFORWARD, HIGH-SPEED  
CRUSHER FOR ALL KINDS OF HARD OR  
SOFT ANIMAL OR FISH BY-PRODUCTS.



#### APPLICABLE FOR:

- Drying free-flowing/non-sticky inputs
- Drying blood meal
- Drying operations in feather rendering setups
- Drying operations in fish meal plants, where oil content is removed before drying

#### BENEFITS

- Compact unit that's easy to install
- Dependable crushing operations at relatively low cost
- No gearbox – less maintenance

**ANIMAL OR FISH BY-PRODUCTS  
(HARD OR SOFT)**

Interchangeable stationary anvils in one or two rows. Each of the four identical anvil sides can be used

Welded housing containing single rotor with hard-welded cutting knives

Rotor shaft with hardened sleeves

Drum mounted on double-row roller bearings in watertight steel boxes

Driven by pulleys and belt drive (no gearbox)

**CONTINUOUS  
FLOW OF FINELY  
CRUSHED OUTPUTS**

TYPE	CAPACITY (t/h)	ANVIL GAP (mm)	POWER (kW)	WEIGHT (kg)	DIMENSIONS (mm)*			
					Height (H)	Length (L)	Inlet	Outlet
TCR 20	5-8	30	15-30	1,400	900	1,450	464 x 461	610 x 461
TCR 40-1/2	8-17	30	37-55	2,200	900	1,750	706 x 465	706 x 462
TCR 75-1/2	15-27	30	75-110	3,850	1300	1,950	924 x 656	924 x 593

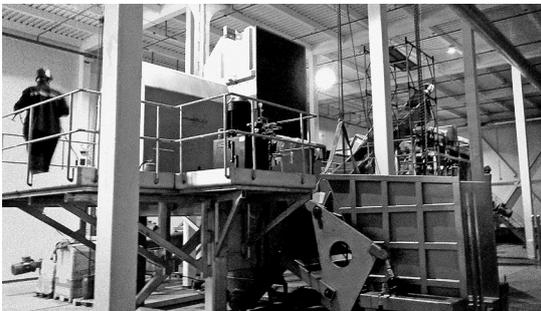
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# FROZEN BLOCK CRUSHER



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CRUSHES LARGE BLOCKS OF FROZEN BONE-FREE MEAT AND POULTRY BY-PRODUCTS, OFFCUTS AND TRIMMINGS.

The Haarslev Frozen Block Crusher is ideal for effectively and reliably crushing blocks of frozen meat and poultry by-products, offcuts and trimmings of all kinds. Such blocks often come from vertical plate freezers, and the material is usually destined for use in pet food.



#### APPLICABLE FOR:

- Wherever blocks of frozen meat and poultry by-products enter a processing plant
- Upstream from metal detectors, batching silos, etc.
- Preliminary processing before use of grinding equipment

These large crushers are available in two configurations. The single-shaft unit can crush up to 15 tons/hour of individual frozen blocks, while the double-shaft unit is best for crushing whole pallets of frozen blocks, with an output of 50 tons/hour or more.

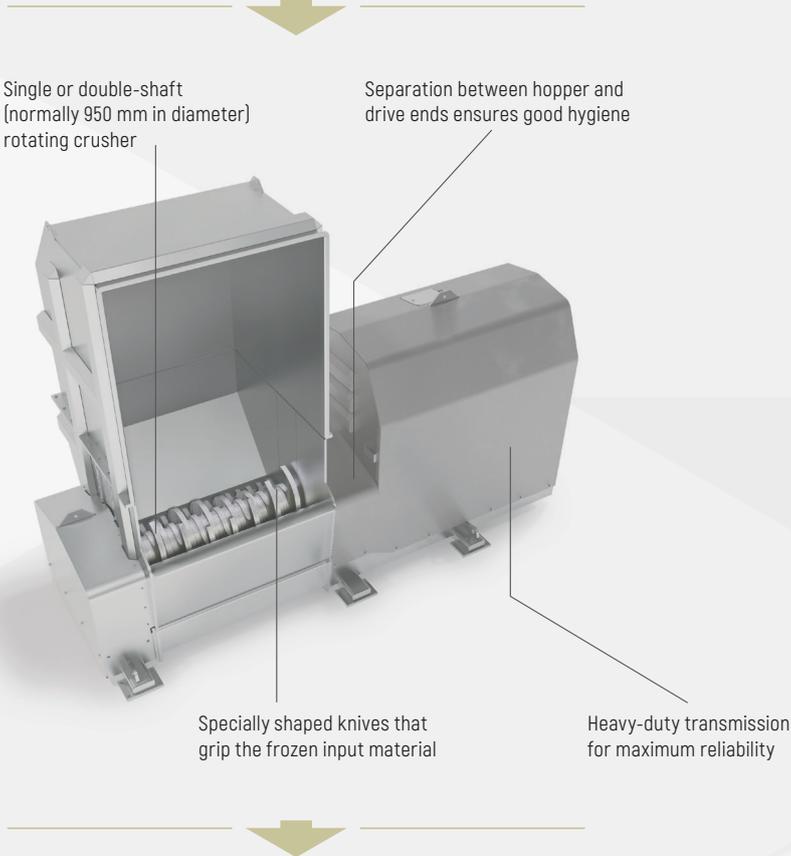
Both block crusher types feature knives specially shaped to grip the frozen input material, for effective crushing. This ensures outputs consisting of fist-sized pieces – ideal for efficient grinding further along in your process.

Haarslev Frozen Block Crushers can be combined with a wide range of hoppers, mounting frames, feed systems, discharge systems and other ancillary equipment.

#### BENEFITS

- Rugged and reliable to ensure uninterrupted operation
- Effective crushing of large quantities of frozen material
- Easy to keep clean and maintain

**BLOCKS OF FROZEN BONE-FREE  
MEAT AND POULTRY BY-PRODUCTS,  
OFFCUTS AND TRIMMINGS**



**INPUTS FOR  
PET FOOD, ETC.**

TYPE	CAPACITY (t/h)	ANVIL GAP (mm)	MOTOR POWER (kW)	WEIGHT (kg)
FZ 600	7.5 - 10	40	55	7,000
FZ 750	12 - 14	60	75	10,000
FZ 750 HD	12 - 14	60	110	13,000
FZ 750 TWIN	50	95	2 x 75	17,000
FZ 950	14 - 16	60	110	14,500

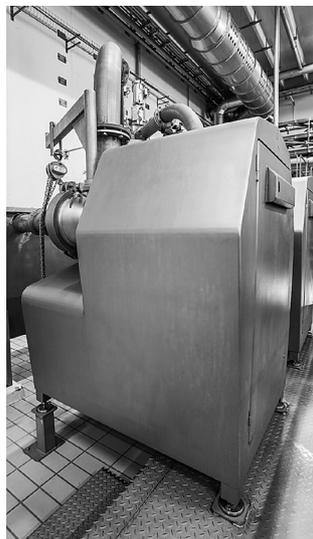
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# PUMP-FED GRINDER



The Haarslev Pump-fed Grinder performs particularly well with softer viscous, pumpable inputs. The connected feed pump ensures a consistent flow rate that helps eliminate slippage. The consistent flow also ensures clean cutting of the material passing through the grinder, and outputs in best possible condition.

You can figure these high-capacity grinder units in many different ways as part of a fluidizer system for sizing viscous animal by-products – with feeds by pump alone, by mixer with pump, by silo with pump, etc.

“

HIGH-CAPACITY PUMP-FED GRINDER FOR REDUCING PARTICLE SIZE IN RELATIVELY, SOFT VISCOUS ANIMAL BY-PRODUCTS.



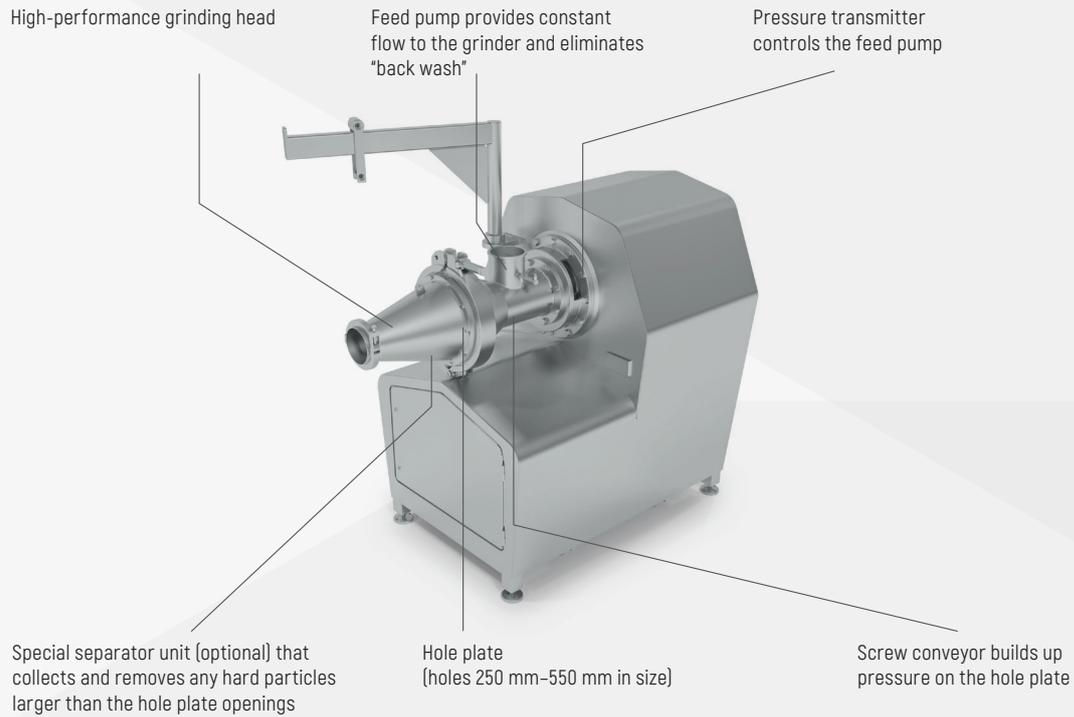
#### APPLICABLE FOR:

- Wet rendering plants
- Pet food plants
- Fat melting plants

#### BENEFITS

- Performs well with sloppy, viscous inputs, with excellent particle definition and clean cutting
- Consistent flow rates, with good control of particle size and minimum temperature increase
- Self-regulating feed pump ensures outputs in best possible condition
- Consistent operating pressure results in less wear on knives and hole plates

## VISCOUS, PUMPABLE ANIMAL BY-PRODUCTS



## COOKING, HEATING AND COAGULATING PROCESSES

TYPE	HOLE PLATE DIAMETER (mm)	CAPACITY (kg/h)	DIMENSIONS (mm)*		
			Length (L)	Height (H)	Width (W)
HF250P	Ø250	2,000 - 3,500	1,600	1,450	1,100
HF300P	Ø300	3,000 - 6,500	1,700	1,700	1,200
HF400P	Ø400	5,000 - 12,500	1,800	1,850	1,250
HF550P	Ø550	10,000 - 25,000	2,700	2,600	1,350

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# HOPPER-FED GRINDER



“

SIMPLE, GRAVITY-FED GRINDER FOR ALL KINDS OF ANIMAL BY-PRODUCTS, MAINLY COARSER OR FROZEN.

Haarslev Hopper-fed Grinders are reliable, larger-capacity units that are ideal for grinding fine or coarse, fresh or frozen animal by-products, prior to further processing in which consistent particle size helps increase efficiency.

However, they are very versatile, and can be used for many different kinds of inputs. A built-in screw conveyor maintains pressure inside the grinder, helping make sure of outputs with a consistent particle size.



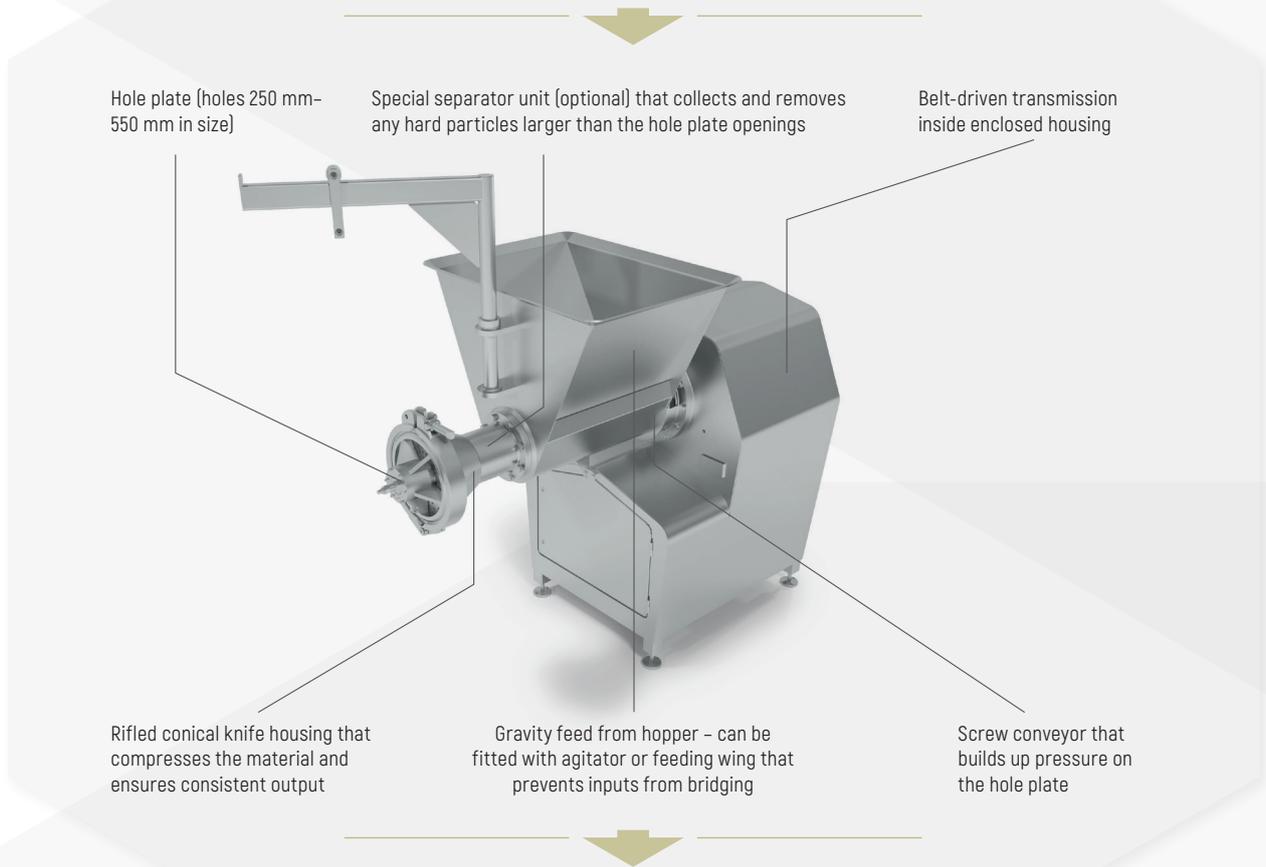
#### APPLICABLE FOR:

- After pre-breaker or frozen block crusher
- Wet rendering plants
- Pet food plants
- Fat melting plants

#### BENEFITS

- Conical knife housing ensures a consistent output
- Materials and surfaces have an edible-grade finish, and are easy to keep clean
- Well-engineered drive unit for low-noise operation
- Low operating costs and long-term reliability

## HARD AND/OR FROZEN ANIMAL BY-PRODUCTS



## COOKING, HEATING AND COAGULATING PROCESSES

TYPE	HOLE PLATE DIAMETER (mm)	CAPACITY (kg/h)	DIMENSIONS (mm)*		
			Length (L)	Height (H)	Width (W)
HF250H	Ø250	2,500 - 4,500	2,200	1,600	1,100
HF300H	Ø300	4,000 - 7,000	2,400	1,900	1,200
HF400H	Ø400	8,000 - 12,000	3,100	2,000	1,250
HF550H	Ø550	12,000 - 25,000	3,300	2,600	1,350

\* All statements of dimensions are approximate.

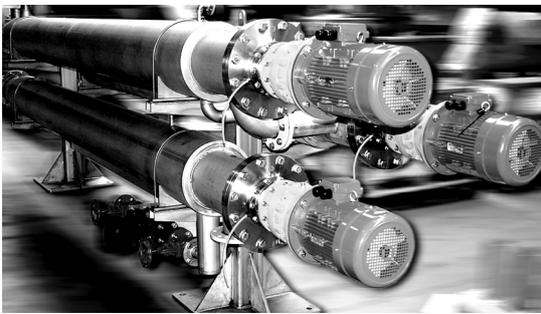
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**HAARSLEV™**

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# COMPACT COAGULATOR



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COOKS LIQUID FISH AND ANIMAL-BASED RAW MATERIALS SO THEY COAGULATE EFFECTIVELY.

The Haarslev Compact Coagulator is a horizontal, self-cleaning heat exchanger that uses indirect steam heating to cook, preheat or coagulate relatively liquid fish and animal-based raw materials so they are cooked in accordance with your requirements for effective downstream separation.

This space-saving cooker is a continuous-feed unit, normally with multiple cooking tubes connected in series. Your relatively wet raw material – often a slurry or in some other viscous state – is pumped through these narrow tubes. Steam flows through the casing in the opposite direction and very quickly heats the slurry to the required temperature. This means it can exit the cooker much quicker than with

traditional screw-type cooker units, and wet inputs are exposed to high temperatures for only a very short time – significantly boosting the quality of your output.

## BENEFITS

- Can exploit waste heat from other processes enables you to reduce energy consumption by as much as 80%
- Gentle, homogeneous cooking with rapid heating of the input, which is only very briefly exposed to high cooking temperatures
- Makes it possible to produce ultra-high-quality protein products with high revenue potential
- Exceptional thermal efficiency and low energy consumption, helping you reduce operating costs
- Scraped-surface paddles remove internal build-up and keep cleaning and maintenance costs down
- Compact units that are ideal for shipboard installation or to provide supplementary cooking capabilities
- Easy to disassemble for inspection and maintenance
- Vertically stacked for narrow passages



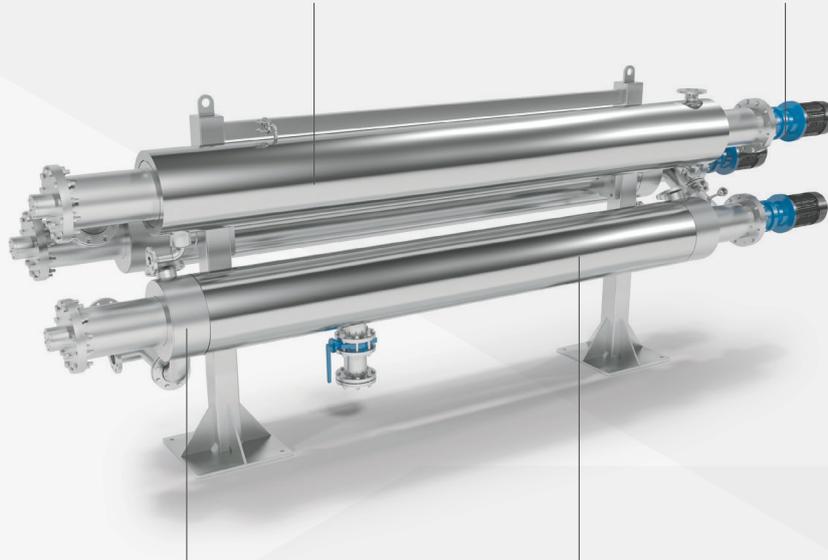
## APPLICABLE FOR:

- Cooking relatively wet fish and animal-based raw materials
- Meat rendering plants
- Poultry rendering plants
- Shipboard processing setups

**CONTINUOUS FEED OF RELATIVELY  
WET FISH, MEAT OR POULTRY INPUTS  
OF VIRTUALLY ANY KIND**

Rapid heating of the input, with only very brief exposure to high cooking temperatures

Cooking tube containing a rotor driven by a direct-coupled gear motor



Steam heating by counter-flow, with no direct contact with the input material

Waste heat pipes can heat material to over 60°C, drastically reducing steam production costs

**COOKED PRODUCT READY FOR  
DOWNSTREAM MECHANICAL OR  
CENTRIFUGAL SEPARATION**

TYPE*	NOMINAL CAPACITY (t/h)	STEAM CONSUMPTION** (kg/h)	NUMBER OF PIPES (waste heat/steam)	MOTOR POWER (kW)	WEIGHT (t)	DIMENSIONS (mm)***		
						Length (L)	Height (H)	Width (W)
CC-1	3.0	490	0/1	5.5	1.0	5,900	1,080	780
WHCC-2/1	6.6	205	2/1	11.5	2.8	5,900	1,680	1,100
CC-3	9.0	1,480	0/3	11.5	2.8	5,900	1,680	1,100
WHCC-3/2	11.4	410	3/2	20.0	4.7	5,900	2,230	1,100
CC-5	15.0	2,470	0/5	20.0	4.7	5,900	2,230	1,100
WHCC-5/2	15.0	410	5/2	28.5	6.5	5,900	2,840	1,100
CC-7	21.0	3,450	0/7	28.5	6.5	5,900	2,840	1,100

\* Configuration examples. Type and capacity is always configured to match customer needs and requirements.

\*\* Based on inlet temperature of 10°C, out of waste heat pipes at 60°C and steam heated pipes will bring the material to 95°C.

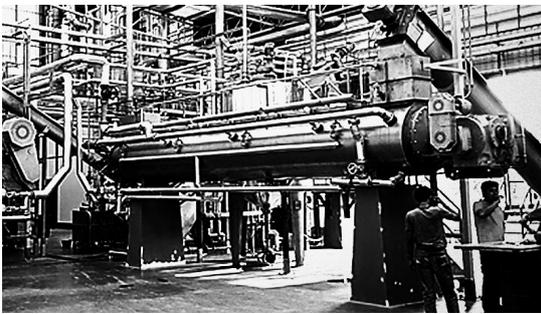
\*\*\* All statements of dimensions are approximate.



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# SCREW COOKER



Rugged, energy-efficient Haarslev screw cookers are ideal for processing setups where inputs vary in both quality and composition, with a bare minimum of pre-cooking preparation. You can choose throughputs from 2 to 50 metric tons per hour, and the modulating valve for the steam supply makes it easy to process even small volumes if and when needed.

“

STRAIGHTFORWARD, LARGE-CAPACITY STEAM-HEATED UNIT AS PART OF PRODUCING HIGH-VALUE MEAL BY COOKING A WIDE RANGE OF INPUTS WITH FLUCTUATING QUALITY.

These are straightforward, heavy-duty units in which the steam-heated screw rotor and flights mounted on it distribute heat evenly while the rotor gently moves the material through the cooker. This only involves a minimum of mechanical agitation, which provides better quality outputs, using as little energy as possible.



#### APPLICABLE FOR:

- Sea or land-based fish meal plants
- Poultry rendering plants

#### BENEFITS

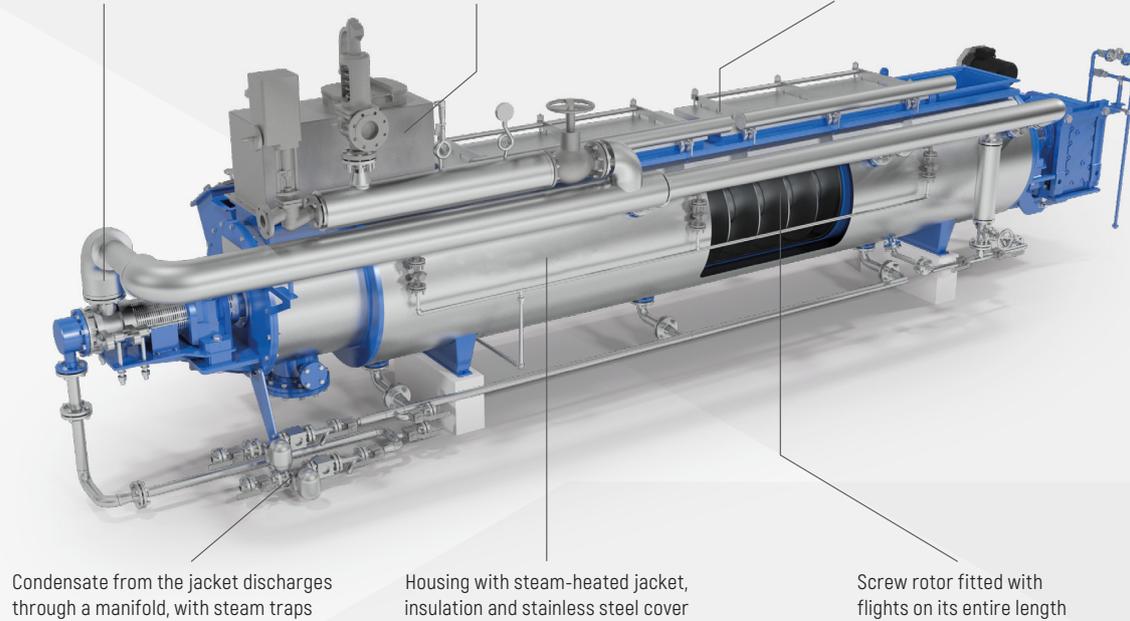
- Energy-efficient, with maximum throughput per dollar
- Easy cleaning using standard high-pressure equipment
- Easy inspection of the cooked material at outlet end
- Good basis for more effective solids/liquid separation in downstream presses and decanter centrifuges

**CONTINUOUS FEED OF FRESH FISH  
OR POULTRY RAW  
MATERIAL OF VIRTUALLY ANY  
KIND, ENTERING COLD**

Steam-heated screw rotor moves material through the cooker

Modulating valve for adjusting steam pressure

Hinged hatches for easy inspection and cleaning



Condensate from the jacket discharges through a manifold, with steam traps

Housing with steam-heated jacket, insulation and stainless steel cover

Screw rotor fitted with flights on its entire length

**COOKED MATERIAL EXITS  
HOT, READY FOR MECHANICAL  
SEPARATION INTO SOLIDS AND  
LIQUIDS**

TYPE	CAPACITY (t/h)	DIMENSIONS (mm)*			WEIGHT (t)
		Length (L)	Height (H)	Width (W)	
SFC 0605	3,5 – 4,5	6,600	1,000	1,200	4
SFC 0806	7,0 – 8,5	8,250	1,900	1,900	10
SFC 0808	9,5 – 12,0	10,210	1,900	1,900	14
SFC 1108	15,0 – 19,0	10,750	2,300	2,400	18
SFC 1110	20,0 – 25,0	12,580	2,300	2,400	23
SFC 1112	24,0 – 30,0	14,800	2,300	2,400	27
SFC 1310	23,0 – 29,0	13,020	2,450	2,350	32
SFC 1312	28,0 – 35,0	15,020	2,450	2,350	35
SFC 1314	33,0 – 41,0	17,020	2,450	2,350	40
SFC 1612	38,0 – 48,0	15,100	2,900	2,750	41
SFC 1614	45,0 – 56,0	17,100	2,900	2,750	48
SFC 1616	52,0 – 65,0	19,100	2,900	2,750	55

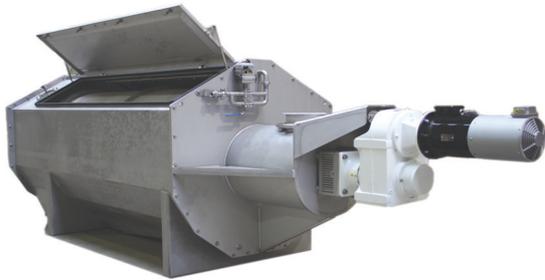
\* All statements of dimensions are approximate.

We reserve the right to alter the specifications at any time without prior notice.



**HAARSLEV™**  
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# ROTATING STRAINER



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MECHANICALLY REMOVING LIQUID FROM COOKED MEAT OR FISH MATERIAL BEFORE IT'S SENT FOR PRESSING.

The pump-fed Haarslev Rotating Strainer enables you to effectively separate free liquid from cooked meat or fish inputs before you send them for pressing.

Reducing the moisture content before this gives you greater pressing efficiency and helps reduce energy consumption in all of your subsequent drying processes.



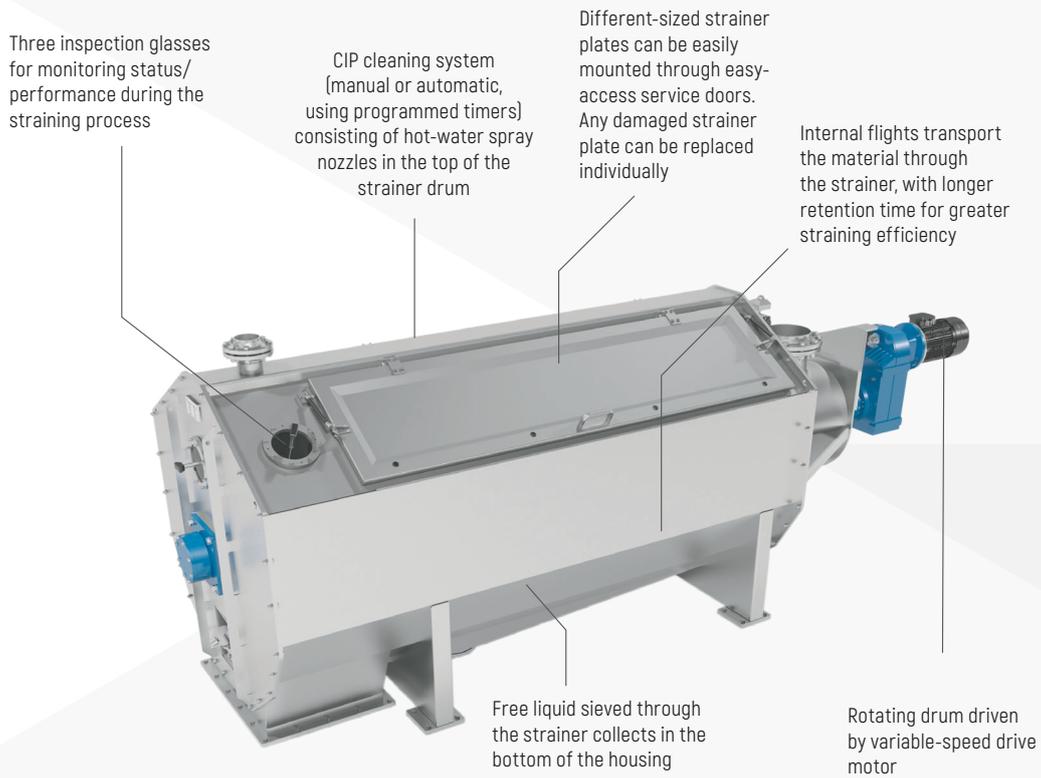
#### • APPLICABLE FOR:

- Wet rendering processes
- Straining cooked meat or fish material with relatively high liquid content

#### BENEFITS

- Motor with variable-speed drive for cost-effective draining
- Easy-to-swap screens for dealing with different inputs
- Easy checks/monitoring during operation
- CIP cleaning system for good hygiene
- Long service life, with minimal wear and low maintenance

## COOKING EQUIPMENT



## TWIN-SCREW PRESS

TYPE	CAPACITY (t/h)	POWER (kW)	DIMENSIONS*			WEIGHT (kg)
			Length (L) (mm)	Width (W) (mm)	Height (H) (mm)	
HI 10	1 - 10	2.2	3,200	800	950	900
HI 25	10 - 25	4.0 - 5.5	3,470	1,300	1,490	1,560
HI 50	20 - 50	5.5 - 7.5	5,250	1,500	1,830	3,000

\* All statements of dimensions are approximate.

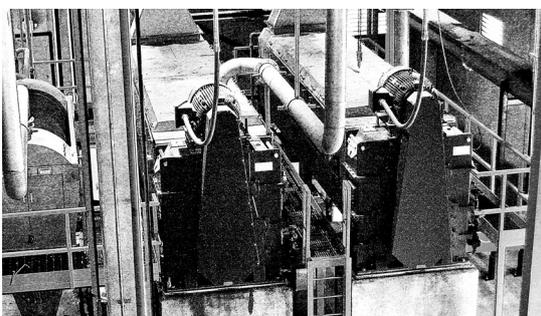
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# TWIN-SCREW PRESS



A Haarslev Twin-screw Press is ideal for extracting liquid from cooked fish or meat as part of wet rendering processes. These units provide you with an effective way to remove water from the fats and solids content in cooked fish or meat. This then helps you improve the overall efficiency of subsequent processing and paves the way to significant energy savings.



#### APPLICABLE FOR:

- Haarslev twin-screw presses are often used to extract liquid from cooked fish or meat as part of low-temperature wet rendering processes.
- They are also ideal as the first stage in mechanical dewatering processes, before the material enters a centrifugal decanter centrifuge.
- They can also be used in high-capacity feather plants.

These presses consist of two intermeshing, counter-rotating screws enclosed by a strainer shell and surrounded by a cover. There are bi-conical and cylindrical options, consisting of a conical shaft with either conical or cylindrical flights.

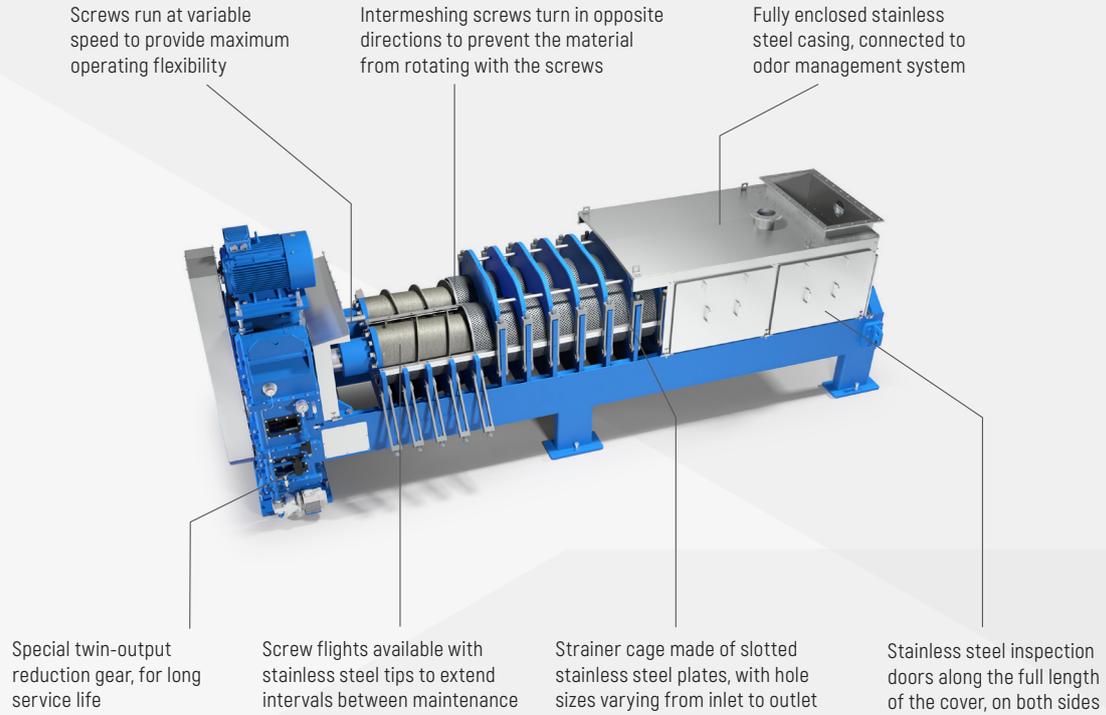
In both types, the flights of one screw reach almost into the core of the other screw, providing high compression and minimum slip and a more consistent press cake with a low content of both moisture and oil/fat.

Haarslev twin-screw presses are ideal as a reliable, slow-rotating (3 rpm) alternative to decanter centrifuges (3600 rpm). You can set the screws to turn at varying speeds to provide the flexibility you need to handle different raw materials and input volumes. For example, bi-conical configurations are better for use with soft fish. Bi-conical versions also provide higher liquid removal capabilities for any given rpm, compared to cylindrical presses.

#### BENEFITS

- Higher solids content in press cake than with decanter centrifuges
- Easy to operate and monitor using advanced control system
- Easy to connect to odor control system, to minimize impacts
- Exceptional service life
- Easy to refurbish when they finally wear out

## COAGULATOR/ PRE-COOKER/COOKER



## DRYER EQUIPMENT MECHANICAL DEWATERING USING DECANTER CENTRIFUGES

TYPE	NOMINAL CAPACITY* (t/h)	DIMENSIONS (mm)**			SHIPPING WEIGHT (mt)	INSTALLED POWER (kW)
		Length (L)	Height (H)	Width (W)		
TP 24	2.5	4,400	1,250	1,030	3.0	7.5 - 11
MS 35	5	5,460	1,800	1,300	7.0	11 - 18.5
MS 41	13	4,600	2,000	1,500	9.5	22 - 37
MS 49	18	5,700	2,400	1,950	15.5	30 - 55
MS 56	25	6,700	2,500	1,870	23.0	45 - 75
MS 64	40	7,400	2,800	2,100	31.0	90 - 110
RS 64	50	8,350	2,800	2,100	34.0	110 - 132
XS 88F	60	8,400	2,850	2,165	46.0	90 - 132

\* Depending on e.g. material composition and density

\*\*All statements of dimensions are approximate

We reserve the right to alter the specifications at any time without prior notice.



**HAARSLEV™**  
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# DISC DRYER



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FOR CONTINUOUS DRYING OF  
DE-FATTED FISH, ANIMAL OR  
POULTRY BY-PRODUCTS.

A Haarslev Disc Dryer is the ideal solution for removing as much water as possible, as gently as possible, from coarser fish, animal or poultry by-products with a low fat content.



#### APPLICABLE FOR:

Haarslev disc dryers are ideal for drying products that include:

- Defatted animal by-products such as meat and bone
- Defatted fish by-products
- Hydrolyzed feathers
- Mechanically dewatered blood

Designed to use steam pressures of up to 10 bar, these dryers have become the solution of choice for coarser inputs featuring lower fat levels, because they make use of the natural fatty content in the material.

These sturdy, reliable units are built around a rotor consisting of a central shaft fitted with multiple steam-heated discs. These apply indirect heat over a very large area, in a compact design that quickly and effectively removes the evaporated water vapor. This means as much heat as possible gets transferred to the material in the dryer.

The dried material is discharged at the bottom, using a screw conveyor fitted with variable-speed drive. This can be adjusted independently of the dryer itself, providing maximum flexibility. Vacuum drying configurations are also available to provide exceptional end-product quality.

#### BENEFITS

- Relatively large heating surface provides exceptional evaporation in a compact design
- Good control of load level inside the dryer, making sure the rotating discs transfer heat as efficiently as possible
- Effective heat transfer because condensate is removed quickly
- Full control of drying processes enables you to boost yield and product quality
- Exceptional reliability and long service life thanks to cool-running, oil-lubricated bearings

**RELATIVELY HOMOGENOUS,  
GRANULAR FISH, ANIMAL OR  
POULTRY BY-PRODUCTS WITH  
A LOW FAT CONTENT**

Full-length vapor dome reduces carry-over and separates solids from the evaporated water vapor

Scraper bars prevent material accumulating between the discs

Steam-heated, double-wall discs (featuring fewer exposed welds than any other design)

Removable covers provide easy inspection, cleaning and adjustment

Paddles on the edges of the discs agitate the material and move it through the dryer towards the discharge outlet

Material dried by direct contact with these discs, which are welded onto a rotating shaft

Discharge screw conveyor fitted with variable-speed drive ensures positive discharge

**DRIED FISH OR ANIMAL  
PROTEIN MATERIAL,  
READY FOR COOLING  
AND MILLING**

TYPE	HEATING SURFACE (m <sup>2</sup> )	STEAM JACKET (m <sup>2</sup> )	POWER* (kW)	DIMENSIONS			
				Length (L) (mm)	Width (W) (mm)	Height (H) (mm)	Weight** (t)
1228	60	8	30	7,750	2,050	2,600	22
1242	90	12	45	9,700	2,050	2,600	26
1537	110	13	45	9,050	2,200	3,200	30
1542	125	14	45	9,750	2,200	3,200	31
1551	150	19	55	11,100	2,200	3,200	37
1850	215	24	75	11,100	2,560	3,500	52
2050	260	26	75	11,300	2,800	3,650	59
2064	320	34	90	13,250	2,800	3,650	68
2264	375	37	110	14,000	3,000	3,850	79
2550	400	31	110	12,200	3,300	4,150	84
2564	515	40	132	14,150	3,300	4,150	99
2578	595	49	160	16,150	3,300	4,150	120
2864	650	47	160	14,150	3,600	4,500	116

\*Depending on application

\*\*Based on 10 mm. discs and without vacuum

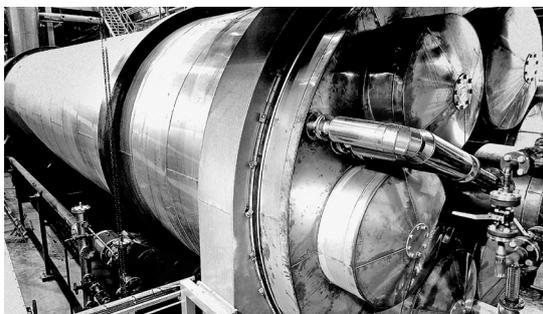
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**HAARSLEV™**

Processing Technology

# ROTATING TUBE DRYER



“

VERY LARGE STEAM-HEATED CONTACT DRYER FOR DRYING BIOMASS AND PROTEIN-BASED FEEDSTUFFS.



#### APPLICABLE FOR:

- Drying fish meal
- Drying ingredients for protein-focused animal feed
- Drying materials (such as spent distillery grains – DDG and DDGS) to be used as fuel
- Mechanical dewatering of stillage
- Drying by-products
- Drying biomass (such as sawdust or peat) as part of producing pellets and briquettes

The Haarslev Rotating Tube Dryer – popularly known as a RotaTube Dryer – is the go-to solution for large-scale contact drying of biomass of many different kinds.

These units consist of six bundles of steam-heated tubes inside a rotating drum fitted with lifting paddles. The steam enters at one end of the bundle and the condensate leaves at the other.

These extremely large dryers can provide approx. 2000 square meters of heating surface. Their big advantage is that they are significantly lighter than disc dryers (which are normally available with up to 700 square meters of heating surface) in terms of weight per unit of heating surface.

The unique heating/weight ratio of these dryers means they are used in an unusually wide range of drying setups.

#### BENEFITS

- Exceptional weight/heating ratio that's ideal for large-scale drying setups
- Efficient thermal transfer because rotation of the whole drum distributes the input product uniformly over the steam-heated tubes
- Removes as much water as possible per unit of thermal input
- Waste heat can be recovered and used to drive an evaporator

**RELATIVELY WET  
BIOMASS AND PROTEIN-BASED  
FEEDSTUFFS**

Input product enters the dryer via a horizontal feed screw in the center

Drying tubes are gathered into bundles, each with end domes for the steam inlet and condensate outlet

The rotating drum blends the product as it progresses towards the outlet on an inclined path

Steam-jacketed rotating drum, fitted with lifting paddles that distribute the product evenly over the steam-heated tube bundles

Product cascades down through the steam-heated tubes and gets heated

Dried output is discharged by cascading from holes located around the shell

**DRIED PRODUCT**

TYPE	HEATING SURFACE (m <sup>2</sup> )	WEIGHT (t)	MOTOR (kW)
RTD 3115-15	794	77	90
RTD 3118-18	951	81	90
RTD 3518-18	1,312	98	110
RTD 3522-22	1,601	112	110
RTD 3922-22	1,901	151	160

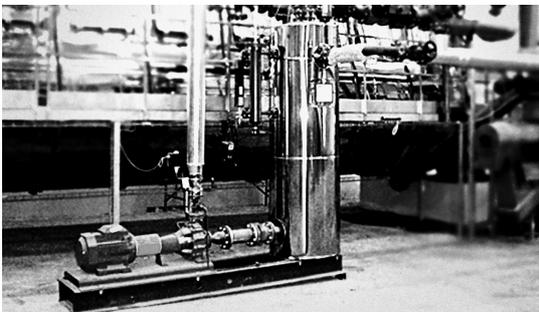
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**HAARSLEV™**

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# SYSTEM FOR AUTOMATIC RETURN OF STEAM CONDENSATE



“

SAVE ENERGY AND WATER BY KEEPING STEAM CONDENSATE FROM COOKERS AND DISC DRYERS UNDER PRESSURE.

In many processing setups, it's quite normal to send the pressurized condensate from disc dryers and continuous and/or batch cookers back to the feed-water tank of a boiler system.

## APPLICABLE FOR:



- Fish and meat rendering plants
- Any steam using equipment

If nothing is done, the condensate simply depressurizes (flashing), resulting in a significant loss of temperature and pressure, as well as venting water to the atmosphere.

Instead, the Haarslev System for Automatic Return of Steam Condensate (SARC) sends such steam condensate directly to the boiler – still under pressure – by a pressurized tank with a wide range high pressure pump unit.

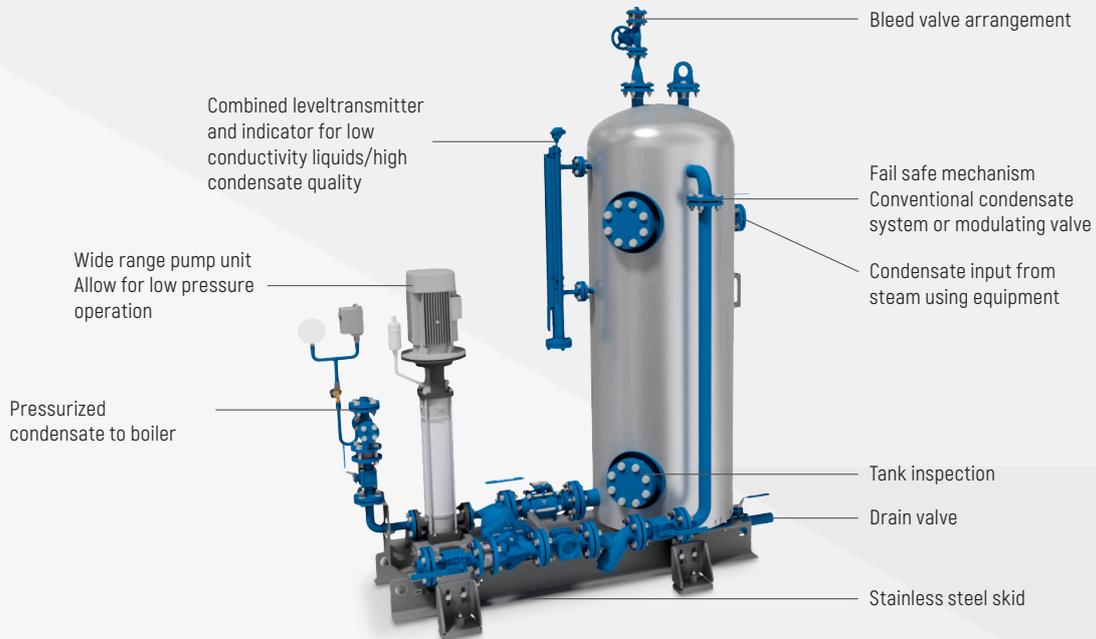
This nearly eliminates the energy losses, and means your boiler setup doesn't use as much fuel and water. You also get better boiler performance, because the water temperature inside the boiler no longer fluctuates as much. Maintaining pressure means you can save as much as 15% on your steam production costs.

The system is easy to install in any existing steam/condensate/steam boiler setup, and provides significant reductions in your operating costs by eliminating steam pressure and water losses between the connected cooking or drying equipment and the boiler.

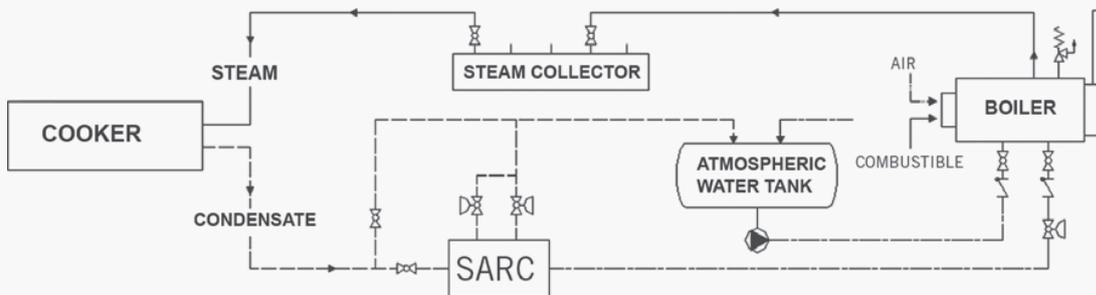
## BENEFITS

- Save approx. 15% on steam production costs
- No water losses between cookers/dryers and boiler
- No blow-offs from the feed water tank
- Major savings on water, and on chemicals used for water softening
- Better boiler performance, and greater overall energy efficiency

**CONDENSATE FROM ANY STEAM USING EQUIPMENT, E.G. DISK DRYERS AND CONTINUOUS OR BATCH PROCESS**



**BOILERS FOR PRODUCING STEAM FOR COOKING/DRYING AND OTHER PURPOSES**



TYPE	DIMENSIONS (mm) approx.*			POWER CONSUMPTION (kW)	CONDENSING CAPACITY (kg/h)	WEIGHT (kg)
	Length (L) (mm)	Width (W) (mm)	Height (H) (mm)			
SARC 8000	1,835	830	2,450	5,5	800-8,000	995
SARC 18000	1,835	830	2,450	11	2,000-18,000	1,015
SARC 36000	1,835	1,400	2,450	22	2,000-36,000	1,315

\* All statements of dimensions are approximate.

We reserve the right to alter the specifications at any time without prior notice.



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# MILLING PLANT



The Haarslev Milling Plant effectively reduces the size of particles in the not-yet-finished meal after fat extraction, helping you meet customer specifications about particle size.

This is a complete system, featuring a conveyor under the platform on which the hammer mill is mounted, and an extractor fan that draws air through the system, keeping everything cool and evacuating dust to a self-cleaning filter bag.

It is a very efficient solution that uses a much smaller motor than most other comparable systems, running cooler and using less energy.

“  
FOR REDUCING THE SIZE OF PARTICLES IN THE FEED MEAL THAT IS THE END RESULT OF MANY RENDERING PROCESSES.



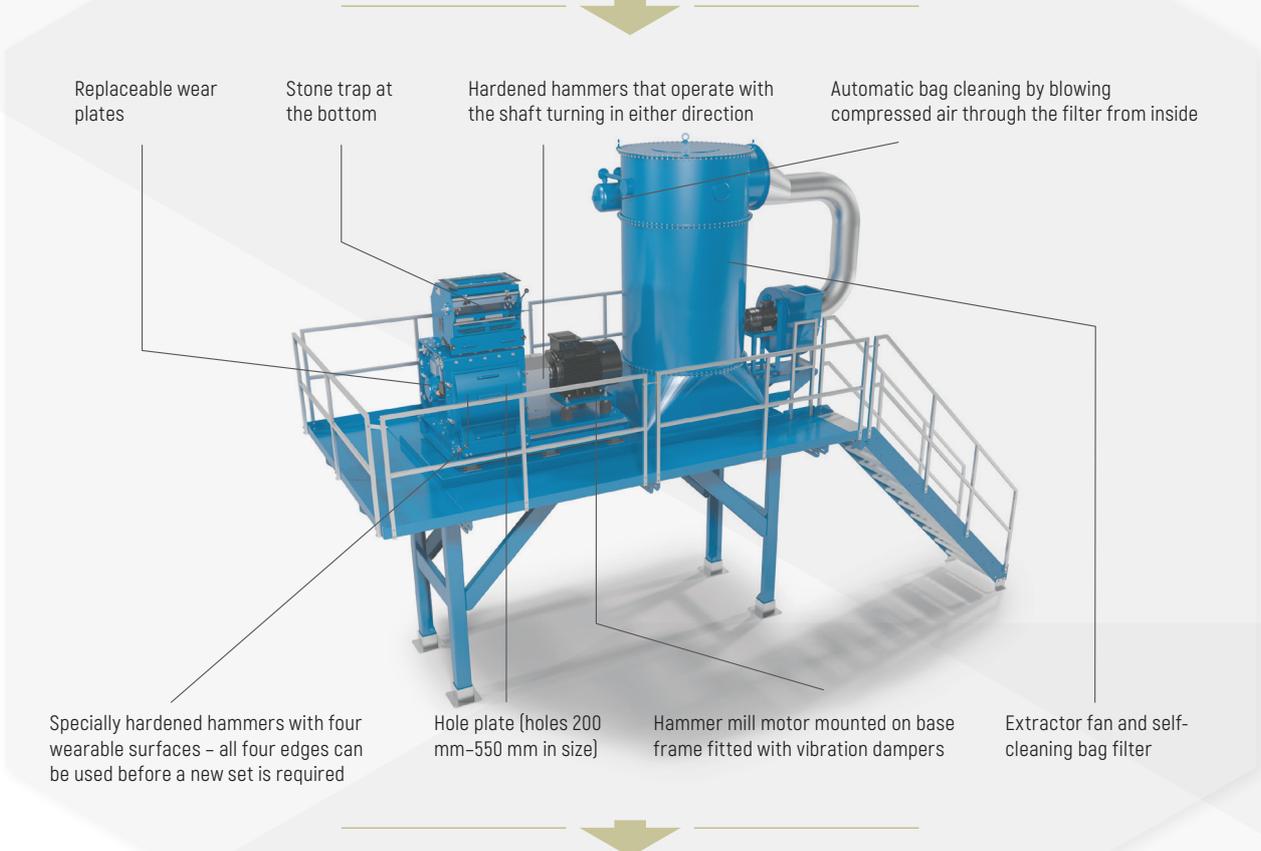
#### APPLICABLE FOR:

- Complete system for grinding meal that's relatively brittle after drying
- Installed after a dryer in wet rendering processes
- Installed after a press in dry rendering processes

#### BENEFITS

- High throughput, with low energy consumption
- Cool running that avoids heating the product or the surroundings
- Quiet, cool running helps ensure good working environment
- Automatic cleaning

**MEAL (MEAT, FISH, BLOOD, FEATHERS, ETC.) EXITING DRYER (WET RENDERING) OR PRESS (DRY RENDERING)**



**FLOW OF CONSISTENTLY-SPEC'ED MEAL TO PACKAGING PLANTS, STORAGE SILOS AND BULK LOADING FACILITIES**

MODEL	MOTOR SIZE (kW)	CAPACITY MEAT AND BONE MEAL* (t/h)	CAPACITY FISH MEAL** (t/h)
HM450	37 - 55	1 - 3	1.5 - 3.5
HM630	45 - 75	2 - 4	3.5 - 8.0
HM800	55 - 110	4 - 6	8.0 - 11.0
HM1000	75 - 160	5 - 10	11.0 - 15.0

\* MBM density is 600 kg/m<sup>3</sup>; Ø10 mm mesh. Capacity depends on bone content, fat and water content and the press cake temperature.

\*\* Fish meal density is 500 kg/m<sup>3</sup>; Ø16 mm mesh. The capacity will depend on the the type of fish, the content of water and oil and on the temperature.

We reserve the right to alter the specifications at any time without prior notice.



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# CONTINUOUS MEAL COOLER



This sturdy, no-frills cooler enables you to use ambient air to cool a broad range of meal products (usually derived from poultry, fish or meat) after they have passed through a dryer. Cooling helps make the processed cake more brittle, so it's easier to mill.

Importantly, such cooling also enables you to make sure temperatures are kept below 50°C to prevent self-ignition. The cooler is basically a long drum equipped with an agitator mounted in roller bearings on the end plates. This moves the hot meal (usually 90–110°C) through the cooler, while a counterflow of cooler air is drawn through by a centrifugal fan. This cooler air can either be ambient air or air from suitable processes elsewhere in your plant – usually at approx. 20–30°C above ambient temperatures.

Rugged construction, few components and wearing parts make this a reliable, inexpensive way to cool a wide range of meal products.

“

A STRAIGHTFORWARD  
CONTINUOUS COOLER FOR  
STABILIZING THE TEMPERATURE  
OF MEAL PRODUCTS AFTER  
DRYING.



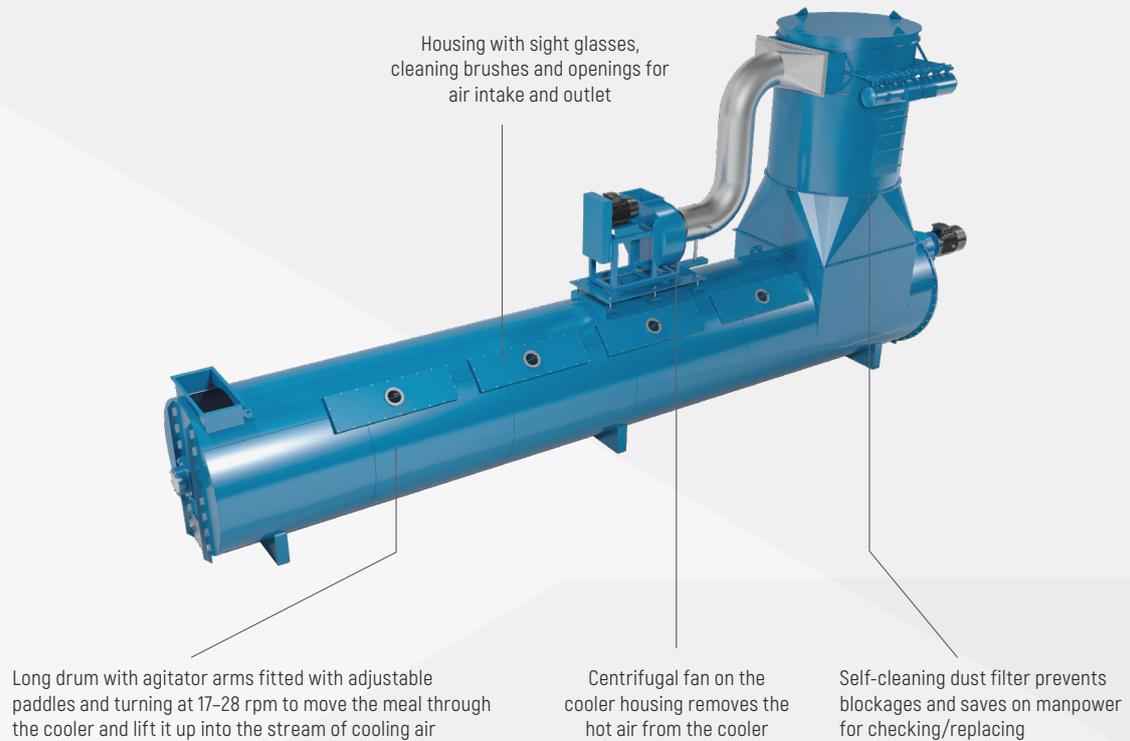
#### APPLICABLE FOR:

- Cooling press cake in dry rendering processes
- Cooling dry goods in low-temperature wet rendering processes
- Cooling feather meal
- Cooling fish meal

#### BENEFITS

- Best possible use of thermal inputs because of efficient contact between cooling air and hot meal
- Cooling to your exact specifications – usually approx. 15°C above ambient temperatures
- Few wearing parts and exceptional reliability
- Savings on operating costs and manpower
- Low installation and maintenance costs

**RELATIVELY HOT MEAL  
PRODUCTS COMING FROM DRYER  
OR EXPELLER PRESS**



**MEAL READY FOR MILLING  
(MUCH EASIER WHEN AT LOWER  
TEMPERATURES)**

TYPE	DIMENSIONS DxL (m)	NOMINAL CAPACITY *) (kg/hr)	NOMINAL AIRFLOW [m <sup>3</sup> /h]	MOTOR DRIVE/FAN (kW)	rpm
CAC906	0.9 x 6.0	800	1,700	5.5/2.2	35
CAC1207	1.2 x 7.0	1,700	3,600	11.0/5.5	28
CAC1606	1.6 x 6.5	2,600	5,450	15.0/5.5	25
CAC1609	1.6 x 9.5	3,350	7,000	18.5/11.0	25
CAC2009	2.0 x 9.0	5,250	11,000	30.0/15.0	21
CAC2012	2.0 x 12.0	7,000	15,000	37.0/18.5	21
CAC2909	2.9 x 9.0	10,500	22,000	45.0/37.0	19
CAC2912	2.9 x 12.0	14,500	31,200	55.0/37.0	19

We reserve the right to alter the specifications at any time without prior notice.



**HAARSLEV™**

Processing Technology

# RECUPERATIVE THERMAL OXIDIZER



“

ELIMINATE ODOR PROBLEMS STEMMING FROM RENDERING AND PROCESSING MEAT AND FISH BY-PRODUCTS – AND OTHER INDUSTRIAL PROCESSES.

You can quickly and effectively get rid of virtually all unpleasant odors in the gases and vapors from your rendering plant by exposing them to very high temperatures in combination with the presence of oxygen. This triggers an oxidation reaction that transforms the problematic complex organic solvents into simple, easy-to-dispose-of mixture of mainly CO<sub>2</sub> and H<sub>2</sub>O.

This provides you with an energy-efficient way to ensure compliance with increasingly stringent environmental requirements. Another big upside is that energy from the oxidized hot gases is recovered using a steam boiler that generates large quantities of valuable steam for use elsewhere in your rendering plant or in other processing equipment.



#### APPLICABLE FOR:

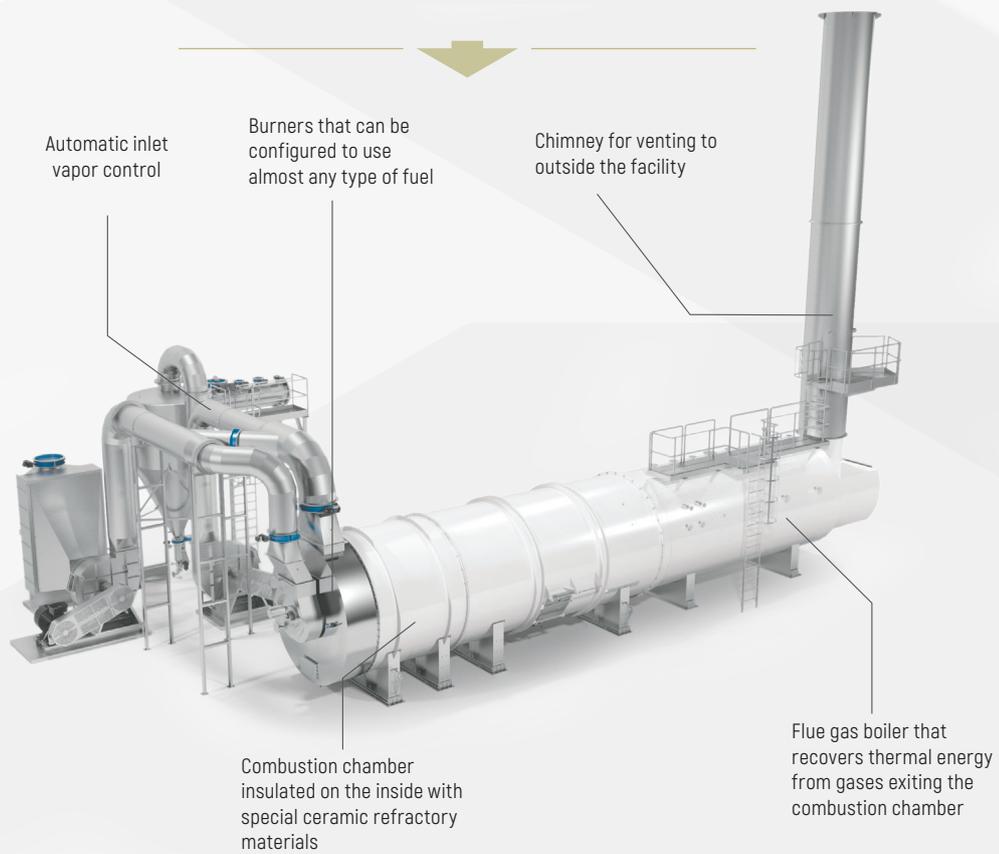
This recuperative thermal oxidizer system purifies gaseous effluents that include:

- Vapors from cookers and dryers used in processing meat and fish by-products
- Air contaminated by VOCs from rendering processes
- Non-condensable gases coming from vapor condensation

#### BENEFITS

- Widely accepted as the best-available (BAT) technology for combating odors from rendering plants
- Effective recovery of energy from the oxidized hot gases
- Ideal for all rendering plants where large quantities of steam are needed
- Very short start-up time ensures maximum operational flexibility

## GASEOUS EFFLUENTS AND PROCESSING VAPORS FROM RENDERING OPERATIONS



**BETTER THAN 99% ODOR  
REDUCTION IN OUTGOING GASES**

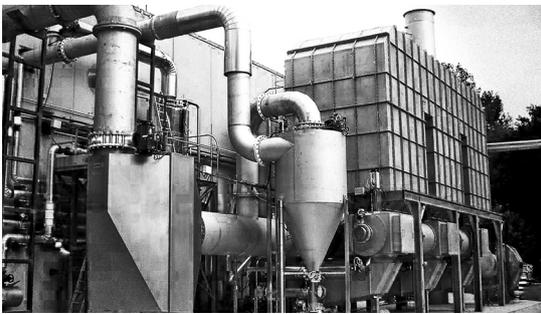
We reserve the right to alter the specifications at any time without prior notice.



**HAARSLEV™**

Processing Technology

# REGENERATIVE THERMAL OXIDIZER



“

TO COMBAT VOC-RELATED ODOR PROBLEMS WHEN RENDERING AND PROCESSING MEAT AND FISH BY-PRODUCTS – AND IN OTHER INDUSTRIAL PROCESSES.

According to the EU Environmental Protection Agency, this is the best-available technology (BAT) for combating unpleasant odors in gaseous air flows from cookers and dryers used in rendering processes.



#### APPLICABLE FOR:

- Eliminating VOC-related odors from process air used in rendering operations
- Purifying vapors from cookers and dryers in rendering plants
- Treatment of non-condensable gases coming from vapors condensation

A Haarslev Regenerative Thermal Oxidizer guarantees minimum 98% odor reduction at the same time as ensuring the highest possible thermal efficiency.

This regenerative thermal oxidizer system is built around a high temperature oxidation process that inputs gaseous effluents with a complex and variable composition of odor causing compounds to be broken down into simple, easy-to-manage mixture of gases mainly composed of CO<sub>2</sub> and H<sub>2</sub>O, while using as little energy as possible.

The exceptional energy-efficiency of this system stems from the fact that a substantial proportion of the thermal energy needed for the oxidation process is continually transferred to – or recovered from – the special ceramic material inside the three large vertical rectangular sections.

Haarslev is the only manufacturer that builds both rendering and thermal oxidation systems, ensuring customers the best possible integration and streamlining of these two key technologies and systems.

#### BENEFITS

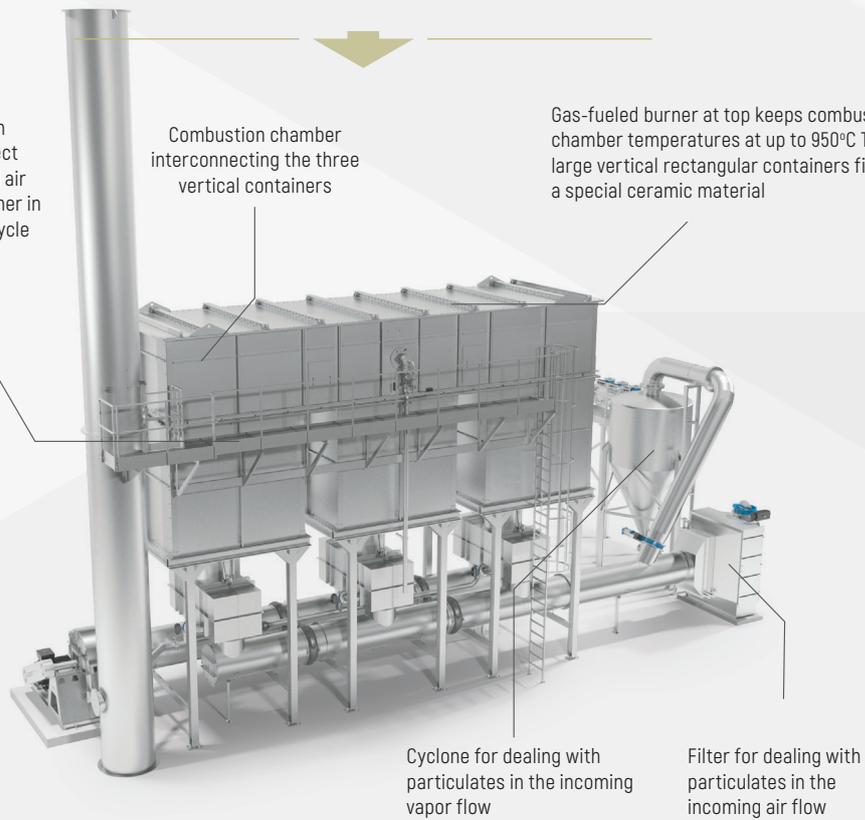
- Most effective odor-reduction technology currently available for use with bioproduct processes
- Easy front-end control
- Most thermally efficient recovery of energy from the hot gases resulting from the oxidation process

## SMELLY, GASEOUS EFFLUENTS FROM MEAT AND FISH TREATMENT PROCESSES

Flow control valves in each rectangular container direct contaminated and treated air from one canister to another in a continuous, controlled cycle

Combustion chamber interconnecting the three vertical containers

Gas-fueled burner at top keeps combustion chamber temperatures at up to 950°C Three large vertical rectangular containers filled with a special ceramic material



Cyclone for dealing with particulates in the incoming vapor flow

Filter for dealing with particulates in the incoming air flow

**>98% ODOR REDUCTION IN OUTGOING AIR**

We reserve the right to alter the specifications at any time without prior notice.



**HAARSLEV™**

Processing Technology

# FALLING-FILM EVAPORATOR



The most widely used Haarslev evaporators use the falling-film principle to concentrate these liquids, drawing thermal energy from the dryer in order to bring the liquid up to temperatures at which the water content evaporates. This means you can achieve higher concentrations at lower cost, and also recover the dissolved higher-protein solids to boost yields in your meal production setup.

“

USE SURPLUS HEAT OR STEAM (OR A COMBINATION OF THE TWO) TO CONCENTRATE LIQUIDS FROM MEAT, FISH OR POULTRY BY-PRODUCTS, AS PART OF YOUR DRY RENDERING PROCESS.

**Haarslev evaporators are an integral part of an effective dry rendering setup, playing a big role in improving the overall efficiency of the downstream cooking process by evaporating the water content of stick water.**

In Haarslev evaporation systems, you can install these evaporators in multiple effects, reducing operating costs by using the vapor produced in one effect to provide heating in the subsequent evaporator. This means the temperature difference per effect falls (and thermal efficiency increases) as the number of stages increases – a three-effect evaporator uses about one-third as much steam as a single-effect unit.

Haarslev evaporators are available in four distinct configurations, based on different technologies. These can be combined to meet your particular processing requirements. You can (for example) use a steam-heated evaporator as a finisher to boost capacity from an evaporator setup fuelled by waste heat.

### Waste-heat falling-film evaporator

uses waste heat from a dryer as a heat source, often re-using steam in multiple stages for maximum thermal efficiency

### Steam-heated falling-film evaporator

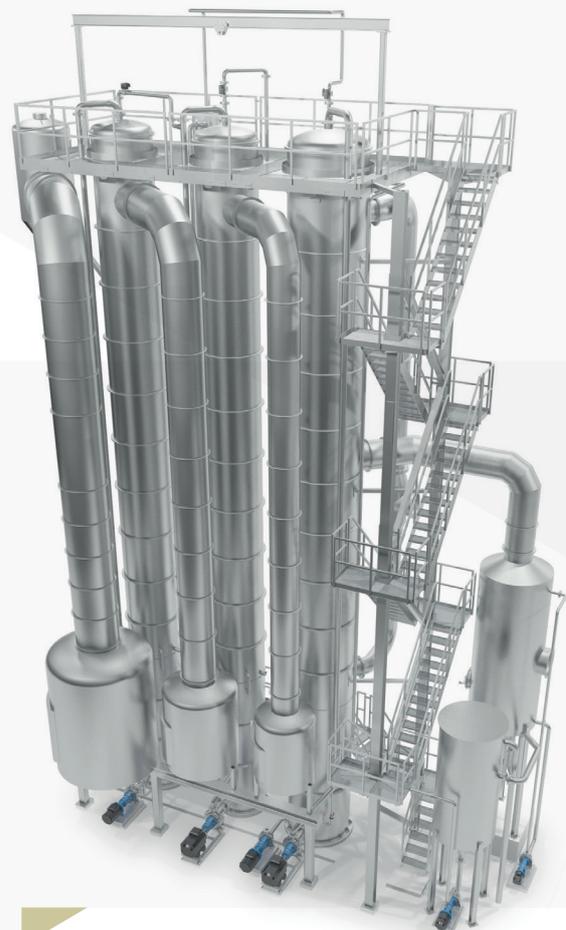
uses live steam as the heat source, enabling you to achieve higher concentrations. Can also be installed as a finisher after multiple evaporator effects, to boost concentration capacity. Haarslev can also provide two other technology setups to meet specific requirements.

### Forced-circulation flash evaporator

in which the liquid to be concentrated is pumped from the bottom to entirely fill the evaporator chamber, before it flashes off into a separate chamber

### Heat pump evaporator or Mechanical vapor recompression evaporator

ideal if no waste heat is available or the vapor flow is unsuitable – or if you can source electricity at very low cost



#### APPLICABLE FOR:

- Different pressing operations used in dry rendering processes result in solid and liquid components. The liquid usually contains both dissolved and suspended solids, and the latter are removed mechanically with a three-phase decanter centrifuge, leaving behind stick water that usually contains 4–6% solids. The dissolved solids contain higher levels of protein, so recovering these enables you to increase the protein content in the end-product meal.
- An effective evaporator can help you concentrate these up to about 30% solids, so that the material can be circulated back to the dryer for effective recovery.

#### BENEFITS

- Relatively inexpensive concentration solution, with high yields
- 50–60% savings on steam/fuel requirements (compared with ordinary dry rendering systems)
- Straightforward, rugged design that's very dependable
- Short retention time ensures quick start-up and shutdown
- Easy to operate
- Easy to clean



**HAARSLEV™**  
Processing Technology

# SHELL & TUBE HEAT EXCHANGER



“

FOR CONDENSING VAPORS FROM COOKERS AND DRYERS USED IN MEAT RENDERING AND FISH MEAL PLANTS, USING LIQUID AS THE COOLING MEDIUM.

The many types of cookers and dryers used in meat rendering and fish meal plants produce large quantities of hot gases and vapors that can be hard to deal with or dispose of responsibly.



#### APPLICABLE FOR:

- After cookers or dryers in meat rendering and fish meal plants
- In conjunction with an air-cooled condenser for exceptionally effective heat recovery

Haarslev shell & tube heat exchangers quickly and effectively bring these vapors into an easy-to-handle liquid form, using only a minimum of energy – for pumps to circulate the cooling water.

This setup draws the vapor out of such cookers and dryers, because energy always flows to the coldest point. This makes it easy to separate the non-condensable gases (VOCs), leaving just condensed water as effluent.

You can also use the thermal transfer capabilities of these units to recover waste heat and/or valuable thermal energy to heat wash-down water or to reduce operating costs elsewhere in your plant.

This shell & tube heat exchanger's design is ideal for installations with sufficient space for large equipment,

#### BENEFITS

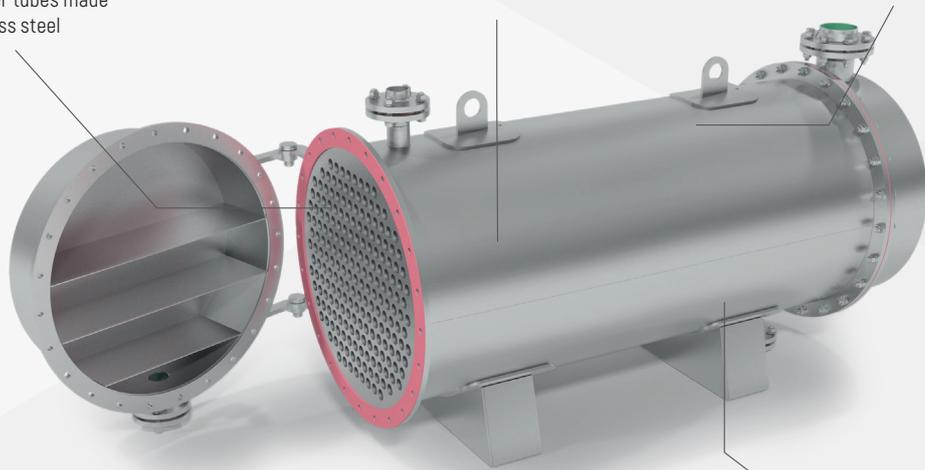
- Cost-effective combination of odor reduction and energy recovery
- No need for costly equipment to generate vacuum for condensing operations
- No worries about heat exchanger fouling, and easy to CIP
- Available in vertical or horizontal configurations, for maximum installation flexibility

**HOT GASES AND VAPORS FROM  
COOKERS AND DRYERS**

Hot process vapors  
flow through 38-mm  
condenser tubes made  
of stainless steel

Cooling water passes over the outer surface  
of the tubes in a counterflow arrangement

Non-condensable  
gases led away to  
further air treatment



Temperature differences  
makes gases and vapors  
condense into liquid form  
for pumping away

**NON-CONDENSABLE GASES (AND  
CONDENSED WATER VAPOR (OR  
OTHER LIQUID CONDENSATE)**



**HAARSLEV™**  
Processing Technology

# AIR-COOLED CONDENSER



“  
FOR CONDENSING PROCESS  
VAPORS USING AIR AS  
COOLING MEDIUM

## APPLICABLE FOR:



- After cookers or dryers in plants processing meat or fish by-products
- May be combined with a shell and tube condenser for efficient heat recovery, i.e. hot water generation

Air-cooled condensers are used to condense steam or vapors by using ambient air as cooling medium. In Haarslev's plants, aircooled condensers are typically used for condensation of vapors originating from cooking and drying processes.

The vapors enter at the top of the front chamber and are then distributed to the inside of a large number of finned tubes. Multiple axial fans force ambient air across the finned tube bundle, which efficiently cools the vapors in the tubes and makes them condense. After the first pass through the condenser, the condensate and the non-condensable gases are redirected for a second pass through the condenser. At nominal conditions, the condensate can be cooled to a temperature of fifteen degrees above ambient air temperature. Finally, the condensate and non-condensable gases leave the condenser at the lower side of the front chamber.

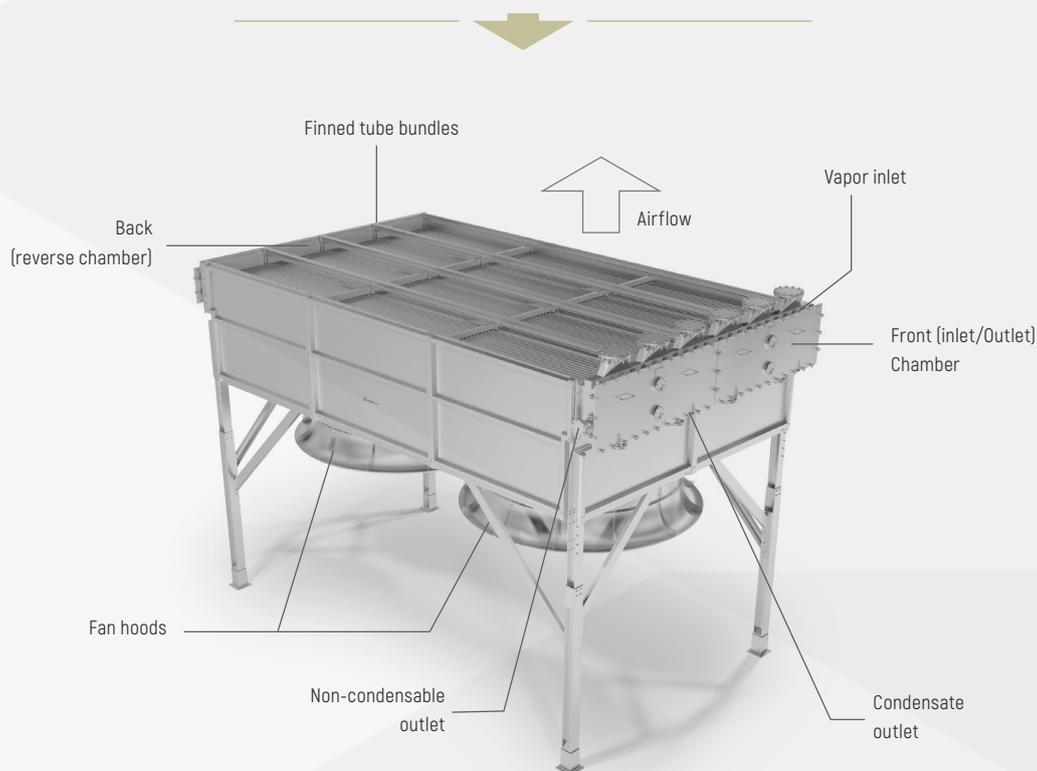
## BENEFITS

- Low-noise solution that is easy to mount outside a building
  - on the roof, for example
- No water consumption
- Low-maintenance reliability
- Low operating costs
- Automated operation available to maximize energy-efficiency

## OPTIONS

- Low-noise fans are available for all ACC-models
- Standard material for all parts in contact with vapor/condensate is EN 1.4301 (AISI 304). EN 1.4401 (AISI 316) is optional.
- Louvers can be ordered if requested

## STEAM OR VAPORS FROM COOKERS AND DRYERS



## NON-CONDENSABLE GASES AND CONDENSED WATER VAPOR (OR OTHER LIQUID CONDENSATE)

### TECHNICAL SPECIFICATIONS

TYPE	CONDENSING CAPACITY (kg/h*)	DIMENSIONS (mm)			POWER/MOTOR (kW)	WEIGHT (kg)
		Length (L)	Width (W)	Height (H)		
ACC2000	2100	5600	2600	5900	2 x 11	4800
ACC3000	3400	8100	2600	5900	3 x 7.5	7200
ACC5000	5000	8100	3700	5800	2 x 15	10800
ACC7000	7100	8100	4800	5800	2 x 30	14400
ACC9000	9200	10600	4800	4300	2 x 37	19100
ACC12000	11700	10600	5900	4300	2 x 45	23900

<sup>1</sup> Nominal condensation capacity is defined at the following conditions:

Tube side pressure: 0 bar(g)

Vapor moisture content: 10 kg vapo/kg dry air (corresponding to a dewpoint of approx. 95°C at 0 bar(g))

Ambient air temperature: 30°C

Altitude: Sea level

At nominal conditions the condensate is cooled down to 45°C.



**HAARSLEV™**  
Processing Technology

# AIR WASHER



“  
MAKE SURE AIR FLOWS FROM YOUR RENDERING  
OPERATIONS HAVE THE RIGHT LEVELS OF  
HUMIDITY, AND IMPURITIES ARE REMOVED



**APPLICABLE FOR:**  
• Rendering plants

The compact Haarslev Air Washer enables you to control the levels of moisture in air flows from your rendering operations and to rinse out impurities such as solid particles and dust.

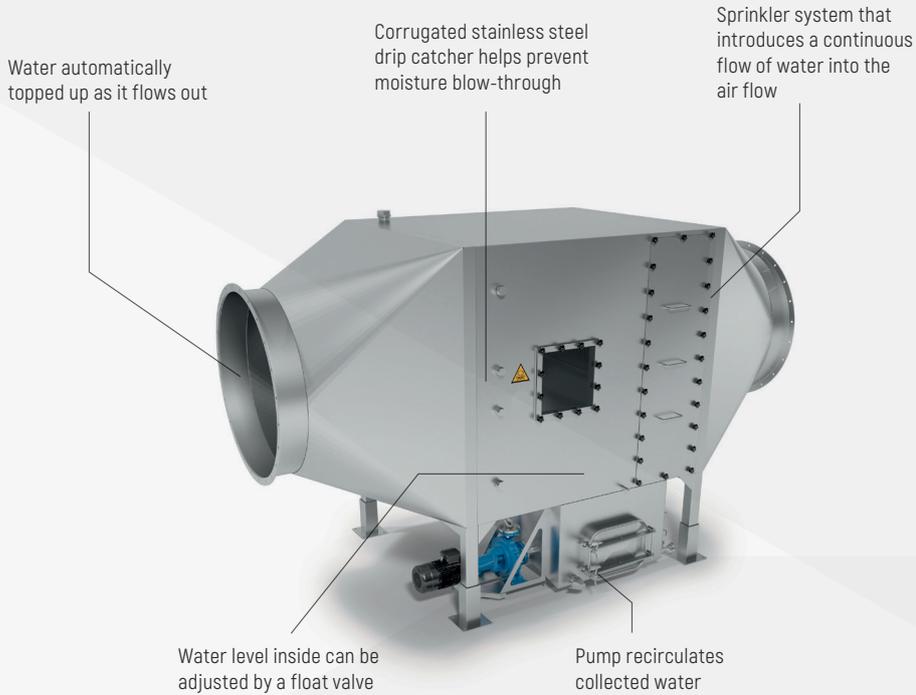
The big payoff, however, stems from effective filter bed performance because the flow of air passing over the bed can be kept at saturation point. This prevents the organic material and micro-organisms in the filter bed drying out, and makes it possible to remove odors efficiently.

Air washers are normally installed as part of a complete system, as the end of a suction line. The whole unit is made of stainless steel to protect against corrosion and ensure low maintenance, and can be installed outdoors if required.

## **BENEFITS**

- Removes impurities such as particles and dust from any flow of air
- Compact unit that can be placed just about anywhere – even close to a wall, or outdoors
- Prevents organic material in the filter bed drying out, ensuring reliable, consistent odor reduction
- Easy access to the equipment and fittings from the front

**FLOWS OF AIR FROM ANY AREA IN  
MEAT AND FISH RENDERING AND  
OTHER PROCESSING PLANTS**



**ODOR-FREE AIR**

TYPE	CAPACITY (m <sup>3</sup> /h)	DIMENSION (mm)*			PUMP (kW)
		Length (L)	Height (H)	Width (W)	
AW 10	10,000	2,600	1,655	1,135	3.0
AW 25	25,000	3,000	2,300	1,640	3.0
AW 50	50,000	4,500	2,760	2,190	4.0
AW 75	75,000	5,000	3,240	2,620	5.5
AW 100	100,000	5,190	3,600	2,975	7.5

\* All statements of dimensions are approximate.

We reserve the right to alter the specifications at any time without prior notice.



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Processing Technology

# CHEMICAL SCRUBBER



“

FOR DEALING WITH VOC-RELATED ODOR PROBLEMS WHEN PROCESSING MEAT AND FISH BY-PRODUCTS

The Haarslev Chemical Scrubber is an effective way to deal with odor problems caused by volatile organic compounds (VOCs). Normally sized to treat 6–8 times the volume of air inside a building or other enclosed space, and to repeat this 6–8 times an hour.



#### APPLICABLE FOR:

- Processing meat and fish by-products
- As a primary chemical washing system in odor reduction
- As an additional oxidation stage, in combination with thermal oxidation

Undesirable odors from rendering operations are mainly the result of degradation of proteins from raw materials producing gases as hydrogen sulfide, ammonia and volatile organic compounds (VOCs) such as amines, mercaptans, aldehydes, ketones, organic sulfides, etc. This results in complex mixtures of odorous effluents in low concentrations.

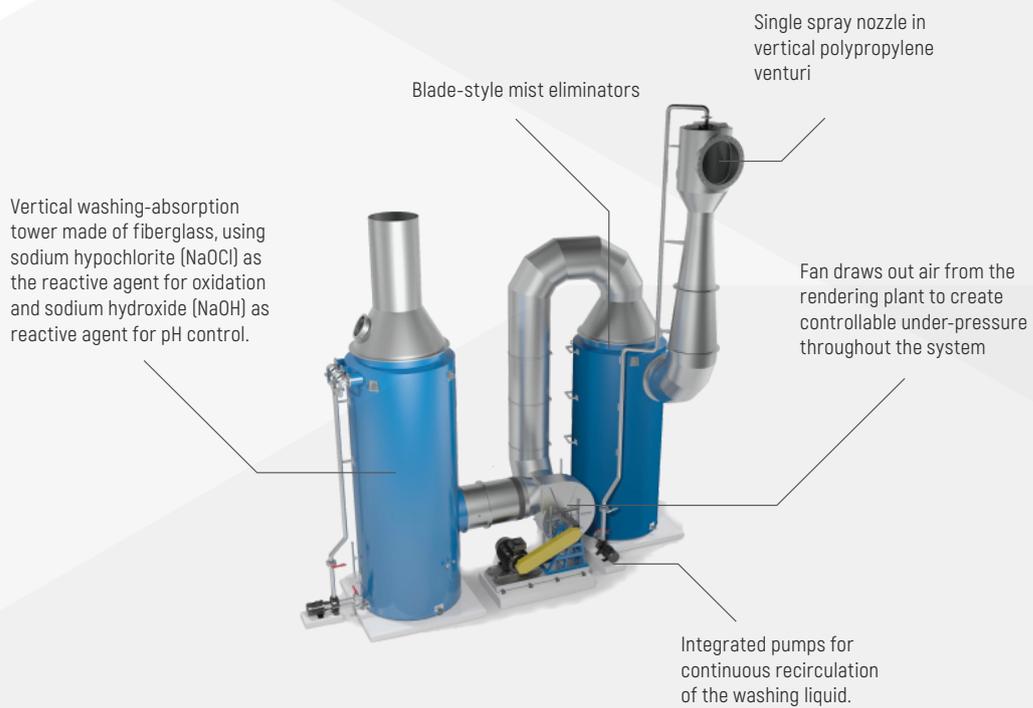
This system uses water and reagents to absorb acidic and basic molecules (such as H<sub>2</sub>S and NH<sub>3</sub>) and bring about chemical oxidation of the other organic particles. The reagent combinations and equipment configurations are always engineered to order, to deal with the air flow rates and gas compositions in your particular operations.

These systems are available as single or multi-stage setups, with towers made of corrosion-proof. You can also choose between automatic and manual chemical control and monitoring.

#### BENEFITS

- Small investment enables you to remove odors from large volumes of air
- Controlled process, with low operating costs
- Takes up much less space than a biofilter bed and other possible odor reduction alternatives
- Easy to add to space-constrained facilities – can be installed outdoors
- Very little maintenance required

## FLOWS OF AIR FROM ANY AREA IN MEAT AND FISH MEAL PROCESSING PLANTS

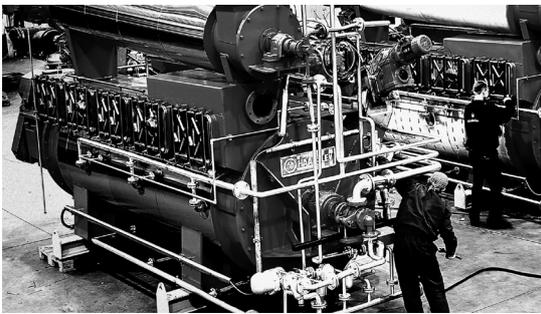


**OUTGOING AIR WITH VASTLY  
REDUCED ODOR CONCENTRATION**



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# ONBOARD FISH MEAL PLANT



“

CUSTOMIZED ONBOARD FISH MEAL CAPABILITIES  
WITH HAARSLEV FISH MEAL SYSTEMS

## COMPACT, ALL-IN-ONE UNITS

Haarslev Onboard Fish Meal Plants are designed to meet worldwide demand for well-engineered, reliable processing equipment that can be slotted into the very limited spaces available below deck in trawlers and catcher processors.

A Haarslev Onboard Fish Meal Plant features a standardized cooker, press and dryer configuration, pre-assembled as a single integrated unit to take up the absolute minimum of space. There's rarely enough room for repair work while at sea, so these specialist Haarslev fish meal plants are configured for exceptional reliability.

A Haarslev unit like this can be installed quickly and easily – you simply connect it to the onboard power supply and pipework, and are ready to go.

## STANDARDIZED CONFIGURATION

- Haarslev Twin-screw Press for quickly reducing water content prior to drying. Effective dewatering means using less steam in the drying process.
- Haarslev Disc Dryer, featuring a rotor with multiple steam-heated discs that apply indirect heat over a very large area. These dryers are famous for their reliability.
- Decanter centrifuge for improved oil recovery.
- Automated control system that provides control and monitoring from a tablet in different locations in the vessel.

## COMPRESSED, CUSTOMIZED UNITS

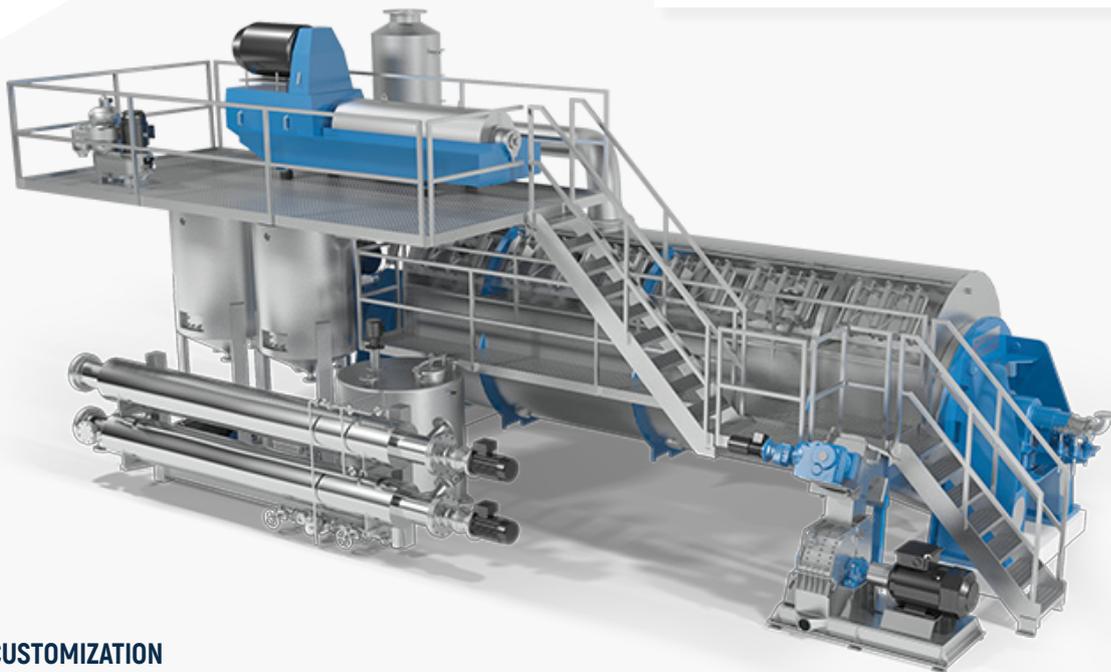
Haarslev also provides larger shipboard fish meal processing systems, custom-engineered to individual vessel requirements, deck layouts and processing priorities, and with hardly any upper capacity limit.

These compressed systems provide savings of as much as 10–20% by recovering waste heat and using it to generate a lot of the steam needed on board. Using less fuel to produce steam and to run the onboard processing equipment means the ship can stay at sea longer, as well as reducing operating costs.



## STANDARDIZED CONFIGURATION

- Haarslev Waste Heat Compact Coagulator. Up to 70% less steam consumption for the cooking process, short retention time and higher-quality fish meal and oil.
- Haarslev Twin-Screw Press for quickly reducing water content prior to drying. Effective dewatering means using less steam in the drying process.
- Haarslev Disc Dryer, featuring a rotor with multiple steam-heated discs that apply indirect heat over a very large area. These dryers are famous for their reliability.
- Three-phase decanter centrifuge for separation of relatively homogenous inputs, or two-phase decanter centrifuge with a disc-stack centrifuge if the input raw material fluctuates in quality and composition.
- Fish oil polisher, for cleaning the fish oil so it remains fresh for longer and has higher commercial value.
- Advanced automation systems and tablet control options. Haarslev instrumentation and control systems make it easy to ensure meal outputs with consistent specifications.
- Evaporator system (optional – best for large installations).



## CUSTOMIZATION

You can choose between standardized configurations, or Haarslev experts can customize a setup to your exact processing needs and your customers' priorities.



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# **HAARSLEV** **AUTOMATION** **& CONTROL**



# BETTER CONTROL, BETTER RESULTS



HAARSLEV IS THE WORLD'S LEADING SUPPLIER OF SOLIDLY ENGINEERED SOLUTIONS FOR PROCESSING MEAT, POULTRY AND FISH, AS WELL AS FOR OTHER RELATED INDUSTRIES.

Effective control systems for these solutions help you integrate different specialist setups, and make sure you have better control of processing conditions and product flows. This in turn helps you get even better results, with lower operating costs.

Haarslev processing solutions are available with modular, standards-compliant control systems that make it easy to configure, integrate and commission the equipment on time and on budget.

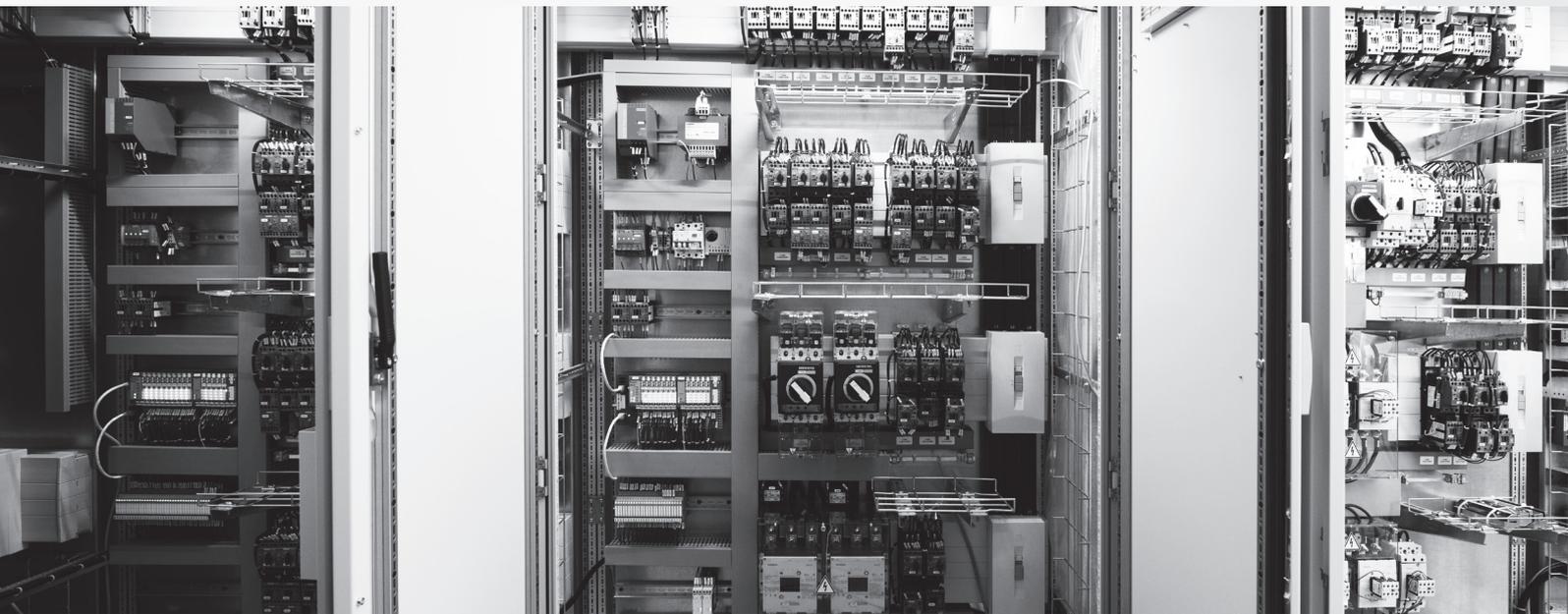


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# GET MORE OUT OF WHAT YOU'VE GOT

Haarslev control systems help you raise the efficiency and reliability of any Haarslev processing setup, and make it easier to integrate them into any kind of bigger line.

More – and better – data about what's going on in your processes enables you to improve efficiency and to document the specifications and quality of your outputs, and that they comply with all relevant customer requirements and legislation.



## **CONTROL PLATFORM**

Industry-standard control software provides the ideal shared platform for connecting different parts of your process, and streamlining your processing operations as a whole. We configure Haarslev control systems to your exact processing needs.

## **CONNECTIVITY COUNTS**

The easier it is to coordinate and integrate important operating data from different sources, the quicker and cheaper it is to configure the equipment, optimize your processes, and improve the results you can achieve.

## **ACCESS TO KNOW-HOW**

Haarslev control systems help customers share in all the benefits of Haarslev configuration and processing experience – accumulated worldwide. Our unique know-how is “built in” to each software configuration we deliver.

## **CAPABILITIES YOU CAN RELY ON**

We provide a full spectrum of factory-configured automation and control systems for Haarslev processing equipment, ranging from small and simple to huge and complex. You can rely on tested, standards-compliant Haarslev control systems to work consistently and as intended.

## **HAARSLEV AUTOMATION & CONTROL**

- Control systems link individual items of Haarslev equipment together smoothly and effectively, so customers get more bang for their buck
- Modular, standards-compliant control systems ensure easy equipment configuration and rapid, glitch-free integration of new equipment
- Electronic control and monitoring help prevent unscheduled downtime, eliminate uncertainty and reduce waste
- Effective control systems save time and money on commissioning, operating, maintenance and diagnostics. They also help with energy optimization
- Paving the way to round-the-clock monitoring and support, along with future-compatible remote diagnostics, systems optimization and automated operation



# MODULAR RELIABILITY



HAARSLEV PROVIDES A WIDE RANGE OF STANDARDIZED AND/OR CUSTOMIZABLE MODULAR CONTROL SYSTEMS CONFIGURED TO HELP YOUR PROCESSING EQUIPMENT (AND OTHER RELATED SYSTEMS) RUN MORE EFFECTIVELY AND MORE RELIABLY.

These solutions are extensively proven, extremely reliable and comply with relevant risk assessments and all appropriate national and international standards.

# MCC AND PLC CONTROL SYSTEMS

Haarslev MCC and PLC control systems feature:

- User-friendly interface via SCADA or HMI
- 24/7 remote online support via VPN connection (if required)
- Data easily available for each customer's Manufacturing Execution System (MES)



WE USE ULTRA-RELIABLE ROCKWELL  
AUTOMATION INDUSTRIAL SOFTWARE  
AS STANDARD, WITH OTHER  
SOFTWARE PLATFORMS, AS AN  
ALTERNATIVE UPON REQUEST (MAY  
BE SUBJECT TO ADDITIONAL COST).

All control setups from Haarslev Automation & Control are based on standardized, modular units. We configure these to your exact requirements using industry-standard Rockwell Automation Industrial software.

## CHECKED, TESTED AND READY

All Haarslev MCC and PLC control systems are assembled, checked and validated before final installation, so customers can bring Haarslev equipment on line quickly and with no unpleasant surprises or compatibility issues.

# CONNECTABILITY AND COMPATIBILITY

Haarslev control systems can be seamlessly connected to a vast range of sensors, data inputs, signal providers, control units and electrical panels. Easy configuration makes installation and configuring much quicker, easier and cheaper, so you can bring new capabilities on line fast. We deliver all Haarslev Automation & Control systems with a VPN connection as standard, so your Haarslev processing setup can be linked to the internet whenever your company is ready.

# HOW YOU BENEFIT

## SINGLE-SOURCE RESPONSIBILITY

Sourcing your control systems from the same global company that helps you configure your processing setup means responsibilities are clear. No overlaps, discrepancies or dropping the ball.

## LOWER OPERATING COSTS, BETTER ROI

Effective monitoring and control of how equipment is working and how processes are running goes a long way to help you reduce operating costs and achieve a better return on investment.

## KEEPING DOWNTIME TO A MINIMUM

Effective, reliable software monitoring and controlling your processing equipment helps avoid breakdowns, prevent problems and bottlenecks and keep your processes running as intended.

## PREDICTIVE MAINTENANCE

Accurate, reliable data about equipment operations and conditions helps you with predictive service and preventive maintenance – and big savings on operating costs and downtime/processing interruptions.

## SAFER WORKING CONDITIONS

Properly shielded, standards-compliant control systems significantly reduce accident statistics and improve employee safety. Well-planned installation layouts can also help prevent accidents and breakdowns, and make it easier to react quickly if anything goes wrong.

## AVOIDING FALSE ECONOMIES

Locally sourced “DIY” electrical panels may seem cheaper up front – but are rarely as safe and reliable. They’re also unlikely to be future-proof, standards compliant or connectible/compatible with other systems.



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## THOROUGHLY TESTED, FULLY RELIABLE

Haarslev control systems are well-proven and thoroughly tested before installation in your plant. This makes for quicker commissioning and greater reliability.

## DOCUMENTATION AND COMPLIANCE

Demonstrating compliance with key standards and legislative requirements depends on reliable data and documentation. Haarslev control systems are delivered with the exact documentation you need.

## SOLID GUARANTEES, 24/7 SUPPORT

Haarslev guarantees and 24/7 software support help reduce risk and worry, and also help you reduce downtime if anything does happen.







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# BREAKTHROUGH CAPABILITIES

Processing control has moved a long way beyond on/off switches and a few gauges. With the right setup, you can now often monitor, control and bug-fix key aspects of your processes from a smartphone or tablet anywhere in the world.

Our Automation & Control capabilities pave the way for two-way data flows, remote diagnostics and automatic software updates, as well as round-the-clock monitoring and support services.

Ultimately, they can open the door to process automation, web-linked systems, data mining and Industry 4.0-style data sharing on the Internet of Things.

# CORE ADAPTIVE PROCESS CONTROLLERS

FLUCTUATIONS IN CONDITIONS AND INPUT SPECIFICATIONS ARE A WELL-KNOWN CHALLENGE IN PROCESSING OPERATIONS WORLDWIDE.

They result in excessive energy consumption, bottlenecks, fluctuations in output specs and countless other small irregularities that impact efficiency, make it difficult to ensure consistency, and make operations difficult to manage.

Add-on CORE adaptive process controllers and the patented CORE software package change all this.



HAARSLEV AUTOMATION & CONTROL SYSTEMS ENABLE YOU TO CONTROL YOUR OPERATIONS EFFECTIVELY AT ANY GIVEN TIME.

CORE ADD-ON ADAPTIVE PROCESS CONTROL CAPABILITIES ENABLE YOU TO AUTOMATICALLY EVEN OUT FLUCTUATING CONDITIONS AND CONTROL YOUR OPERATIONS EVEN BETTER AND MORE EFFICIENTLY OVER TIME.



**HAARSLÉV™**  
Processing Technology

# CONDITIONS ARE NEVER STATIC

No matter how efficient your new Haarslev processing equipment is when installed – or how effective your control system is – conditions alter over time.

Processing conditions change, inputs vary, ambient conditions fluctuate, staff make small setup alterations, linked-up systems wear, inaccuracies creep in.

Add-on CORE software solutions register all these small changes and automatically compensate for them. This stabilizes operating conditions, so you maintain peak performance and maximum efficiency throughout the service life of your Haarslev installation.





# HAARSLEV™

Processing Technology

## LEARNING TO BECOME MORE EFFICIENT

CORE adaptive process controllers feature advanced software algorithms that learn from what has happened.

These build a data-driven process model that then predicts variations and makes appropriate adjustments. This means you can keep your

processing operations working efficiently, regardless of changing conditions.

And if you make changes in your processing parameters, the CORE controller automatically adapts to these, so your process is always running at peak efficiency.



## BENEFITS

CORE software solutions normally enable you to reduce variations in key processes and parameters by as much as 30–70%. This paves the way to more stable operations and a more consistent output, making it much easier to tune your operations to provide better yields, and at lower cost.

These data-driven adaptive process controllers also substantially reduce energy costs, minimize bottlenecks, increase throughput and yield, and help your operation deliver end products of consistently high quality.

# RAPID PAYBACK

TURNING ON CORE IMPROVEMENTS DOESN'T INVOLVE ANY DOWNTIME. A SAFE INTERFACE MAKES CORE SOLUTIONS EASY TO INSTALL AND IMPLEMENT, WITH NO DISTURBANCE TO YOUR PRODUCTION SETUP OR PROCESSING ACTIVITIES.



## HAARSLEV AND CORE

HAARSLEV INDUSTRIES A/S AND CORE A/S ARE TWO SEPARATE COMPANIES THAT WORK CLOSELY AND SUCCESSFULLY TOGETHER VIA AN EXCLUSIVE PARTNERSHIP.

HAARSLEV OWNS 49% OF THE EQUITY IN CORE A/S.

Contact your Haarslev equipment experts to see whether add-on CORE adaptive process controllers would help add new capabilities to your control system, and how they'd bring you greater processing efficiency and better profit margins.

CORE specialists only engage with projects that enable users to recover their outlay in less than 12 months.



# HAARSLEV™

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## MASTER YOUR PROCESS

### HEAD OFFICE

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