



John Meunier Escalator® Fine Screen

WATER TECHNOLOGIES

John Meunier Escalator® Fine Screen

The John Meunier Escalator gives continuous fine screening for channel type applications with superior efficiency to slotted and bar screens. This highly versatile screen is successfully employed in wastewater, stormwater and potable water applications. Perforated stainless steel screen panels are carried on heavy-duty chains and incorporate holes of 1 / 4" (6mm) diameter or less, giving fine screening in any direction.

The screen panels are specially formed to create shelves giving the ability to remove larger screenings and to increase the effective screening area. Flow capacity is dependent on channel width, water level and perforation size.

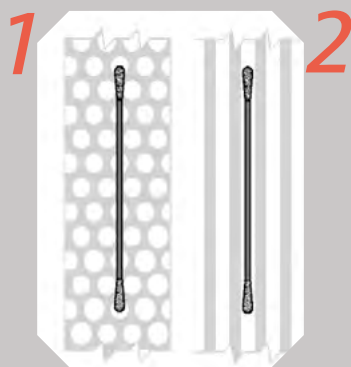
The Escalator can readily be installed in new or existing channels with a minimum of civil alterations. With over 1100 units in service, the Escalator Fine Screen is a proven, reliable component of John Meunier pretreatment products.

Features

- Top performer in UK study.
- Versatile for wastewater, stormwater and surface water applications.
- Heavy duty, stainless steel construction.
- Intermediate internal grid supports.
- Industry leading tight-tolerance construction.
- Positive sealing at foot via double full-width brushes and neoprene sealing flap.
- Superior cleaning with combined spray wash and mechanical high-speed brush.
- All maintenance from operating floor.
- Available pivoting design.
- John Meunier products' superior applications engineering, support and service.

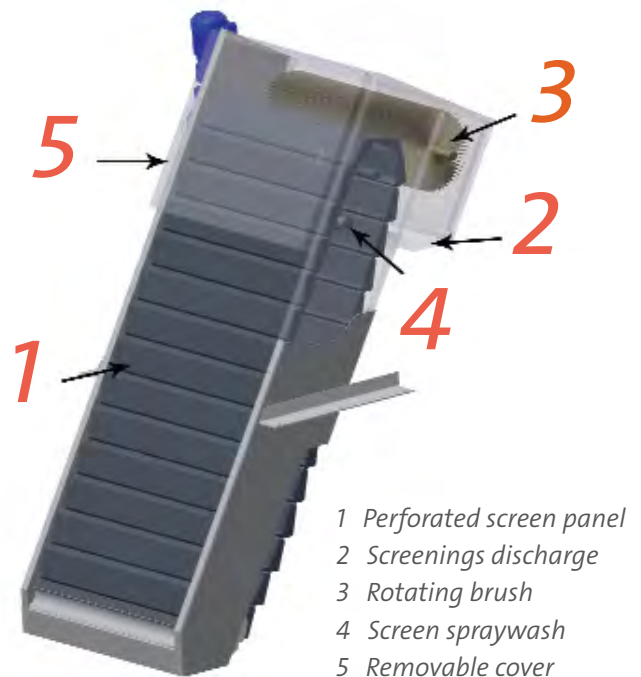
Screening removal efficiency comparison

1. John Meunier Escalator Fine Screen
2. Bar & Step Type Fine Screen



79% **35%**

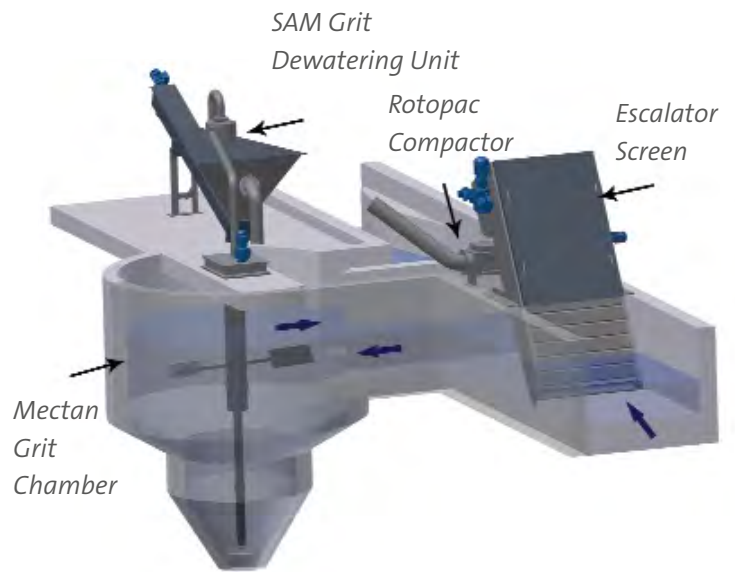
Percentage of Solid
Capture Ratio



- 1 Perforated screen panel
- 2 Screenings discharge
- 3 Rotating brush
- 4 Screen spraywash
- 5 Removable cover

Principle of operation

- Flow enters screen at foot and solids are captured by perforated panels.
- Perforated panels convey screenings to operating floor discharge on downstream side of screen.
- Structural shelf on perforated panels lifts larger “unmattable” items.
- High-speed rotating brush and spray wash clean screening from perforated panels.
- Screenings pass through discharge chute into dewatering compactor.



Your Pretreatment Specialist

A complete line of John Meunier headworks solutions

Proven Performance

The screen performance impacts the overall operation and maintenance of the subsequent treatment processes. Between 1998 and 2000, the Escalator screen was evaluated along with other manufacturers' units at the Chester-Le-Street STP, Co Durham UK.

These tests demonstrated that for all inclined screens tested, the Escalator Fine Screen has the highest SCR (Solids Capture Ratio) in the static mode (Off- mode).

Other tests also determined that the Escalator screen is over 97% efficient in limiting solids “Carry Over”, thus reducing significantly the amount of traceable solids in the effluent.



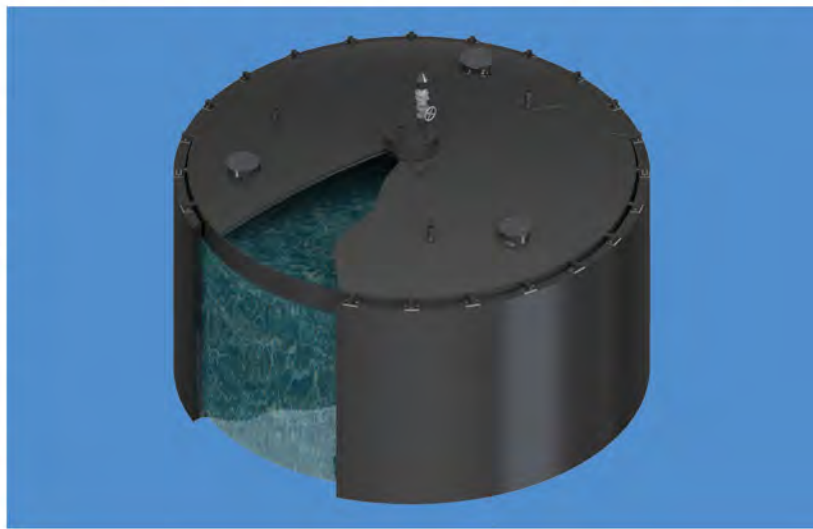
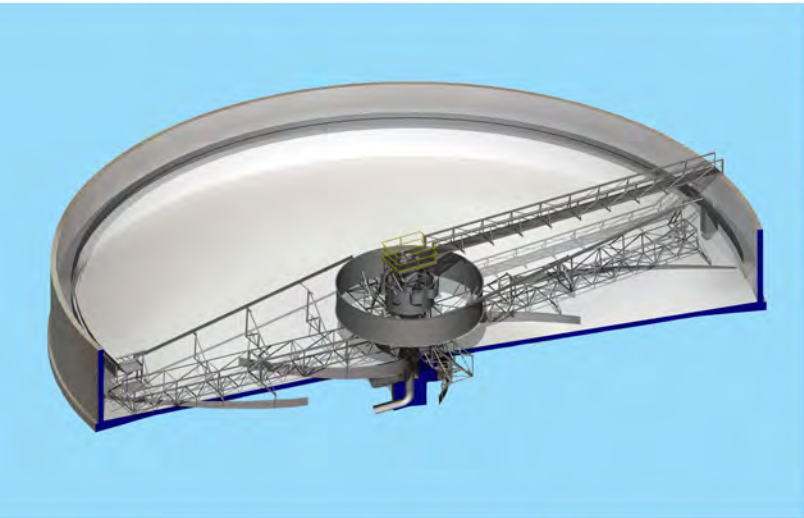
Resourcing the world

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Water & Wastewater Treatment Solutions
Municipal & Industrial

CORPORATE SUMMARY

ClearStream Environmental was incorporated in 2002 to provide superior process equipment to the water and wastewater treatment industries. ClearStream has experienced tremendous success over the past few years, and has grown by approximately 100% per year for the past seven years. ClearStream is planning to continue to grow aggressively in the future. The success of the company can be directly attributed to our philosophy of supplying innovative, high quality, and competitively priced equipment, with superior customer service and support.



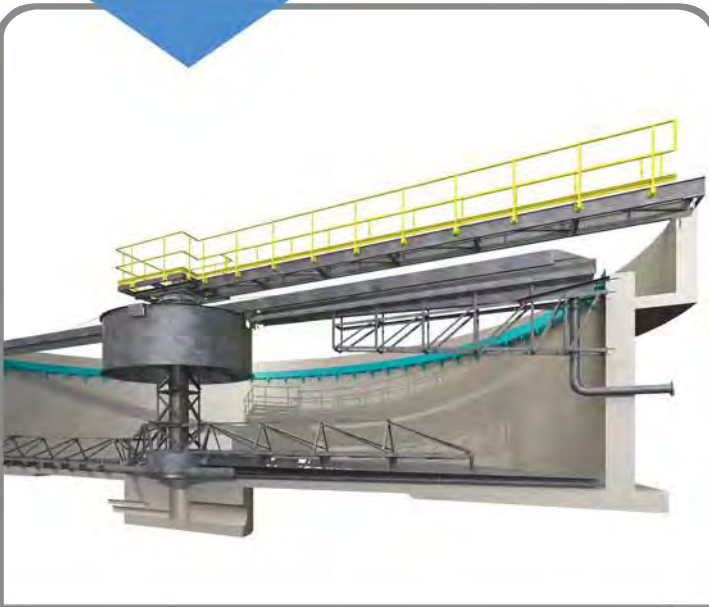


EXPERIENCE

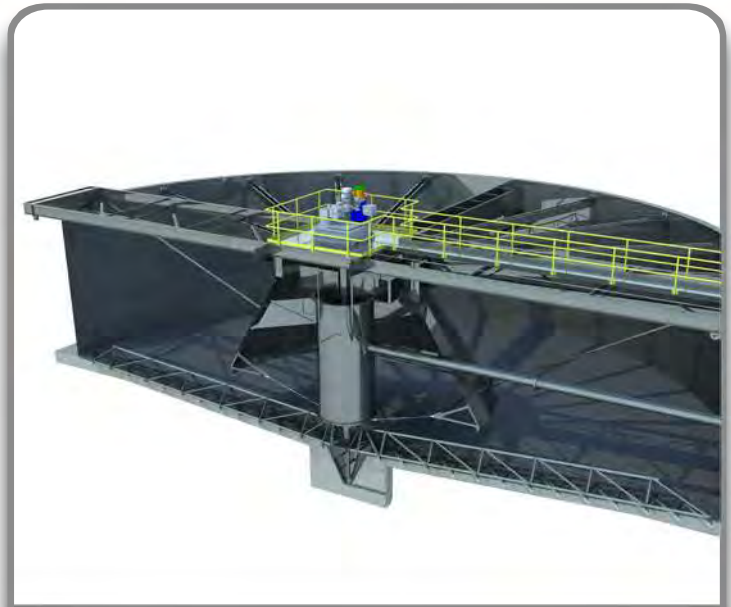
The ClearStream technical staff has combined industry experience in excess of 45 years. Corporate management has been working in the water & wastewater treatment arena for nearly 35 years. ClearStream maintains a highly trained technical staff of engineers, project managers, equipment designers, procurement specialists, and detail draftsmen to ensure product quality and safety.

PRODUCTS

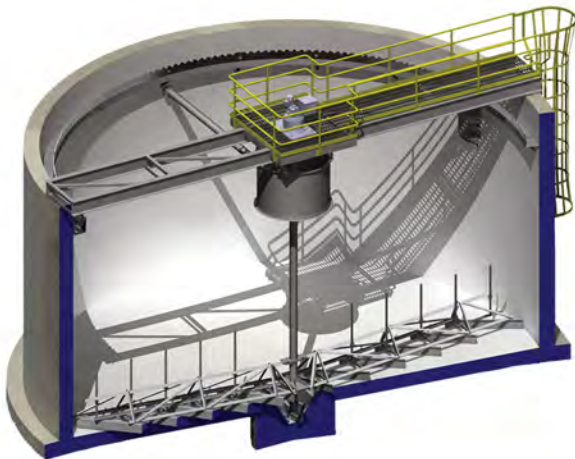
ClearStream offers a complete line of sedimentation equipment for all municipal and industrial applications. We can supply equipment ranging from very small pilot type mechanisms to very large and complex treatment equipment. ClearStream equipment is custom designed and fabricated to each individual customer's needs and specifications. ClearStream equipment has been installed, commissioned, and is reliably operating all over the world in numerous process applications.



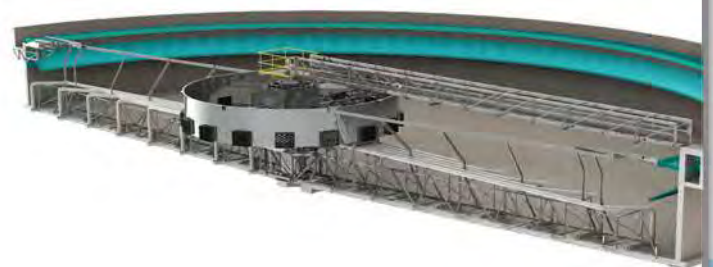
Suction Header Clarifiers



Solids Contact Clarifiers



Thickeners



Suction Pipe Clarifiers

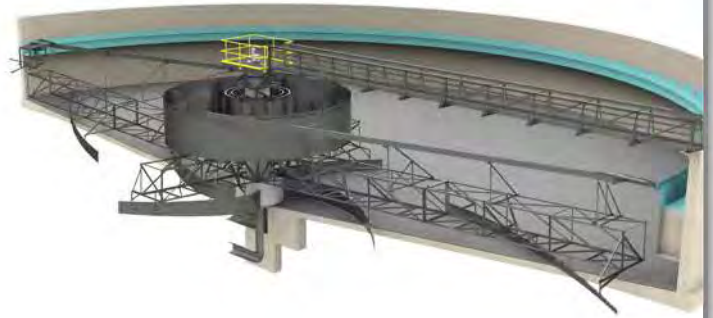
ClearStream welcomes all opportunities to supply proposals for any customer equipment needs.

PROCESS EQUIPMENT

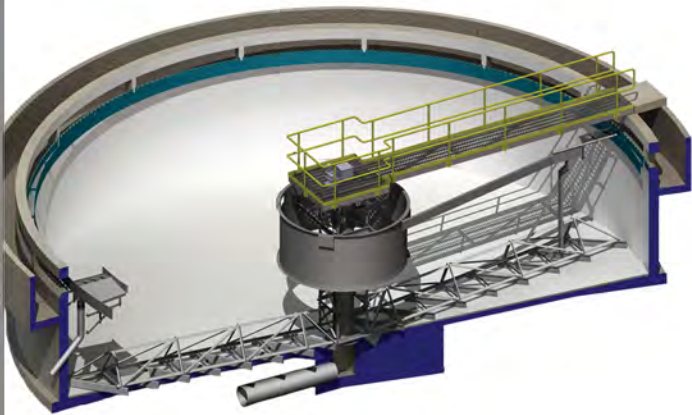
ClearStream offers a full line of process equipment. All of our equipment is custom designed and optimized, to meet each individual customer's specification and performance requirements.



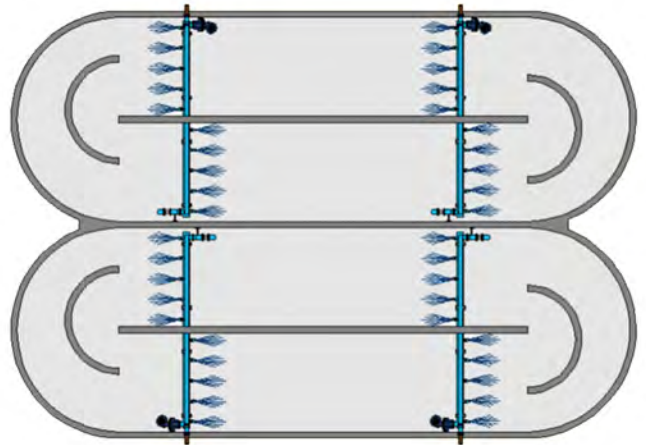
Digester Covers



Spiral Blade Clarifiers

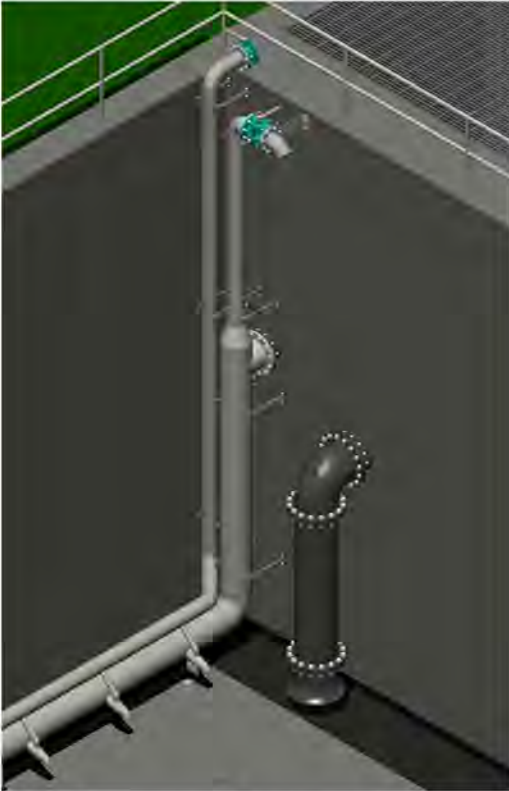


Segmented Blade Clarifiers



Oxidation Ditches

ClearFlo Biological Process Solutions



CLEARFLO JET AERATION SYSTEMS

ClearFlo jet aeration systems offer state of the art aeration and mixing for a wide variety of municipal and industrial wastewater and process applications.

Independent control of oxygen transfer and mixing, low installation costs, long life, high clean water transfer efficiency, high “dirty water” transfer efficiency, low maintenance, thermal conservation, and clean operation (eliminates airborne volatiles), make jets the ideal choice for new facilities, as well as upgrades, and process optimization projects.

Independent Control of Oxygen Transfer and Mixing

Air flow to each jet aerator can be varied from 10 SCFM to 80 SCFM to control oxygen delivery, without affecting mixing; jet systems can be operated ungasged for anoxic mixing. Anoxic mixing improves nutrient removal and settling.

The Highest Oxygen Transfer Efficiency of Any Aeration System in Dirty Water

No Mist, Spray, or Splash

Walkways and Hand Rails Stay Clean. Odors and Airborne VOCs are Reduced, or Eliminated.

Thermal Conservation

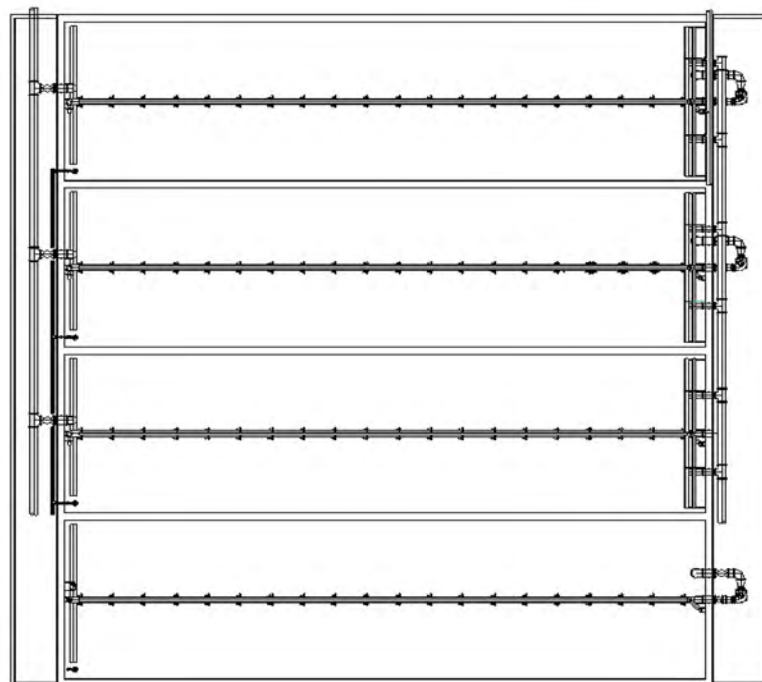
Submerged Release of Warm Compressed Air, and Lack of Splashing Eliminates Freezing Problems, Even in the Coldest Climates; Allows Year Round Nitrification/Denitrification.

Low Maintenance

Simple Five Minute Backflushing Operation is the Only Required Maintenance

CLEARFLO SEQUENCING BATCH REACTOR SYSTEMS

ClearFlo SBR systems are optimized for a wide variety of applications; from small packaged single train systems, to large Constant Level SBR systems. State of the art SBR designs are available to meet the Nation's toughest BNR standards. Our proprietary operating strategy enables ClearFlo SBR systems to treat flows from zero to 350% of design flow without bypassing, or permit violations.



CLEARFLO CONTINUOUS LOOP REACTOR

ClearFlo CLR systems are optimized for a wide variety of applications; from small packaged “bullseye” systems with an oxidation channel wrapped around a ClearStream clarifier for carbonaceous and ammonia removal, to large multi-channel systems for reliable and cost effective BNR processes.

Deeper space saving basins increase overall efficiency, and reduce heat loss during winter operation. Clean operating subsurface jet aeration eliminates mist and spray. Low maintenance, (no shafts or disks to break, or expensive gear drives to service), and long life make ClearFlo CLR Systems the clear choice.

ClearFlo Biological Process Solutions

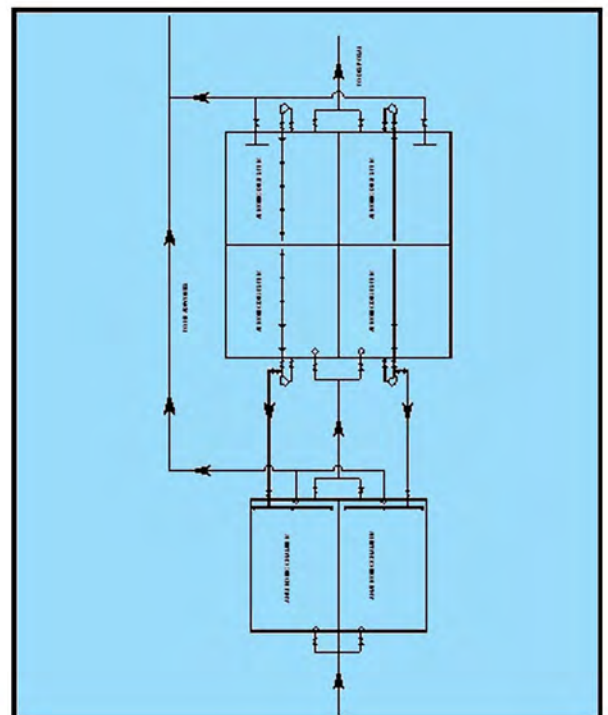


CLEARFLO PROCESS OPTIMIZATION & RETROFITS

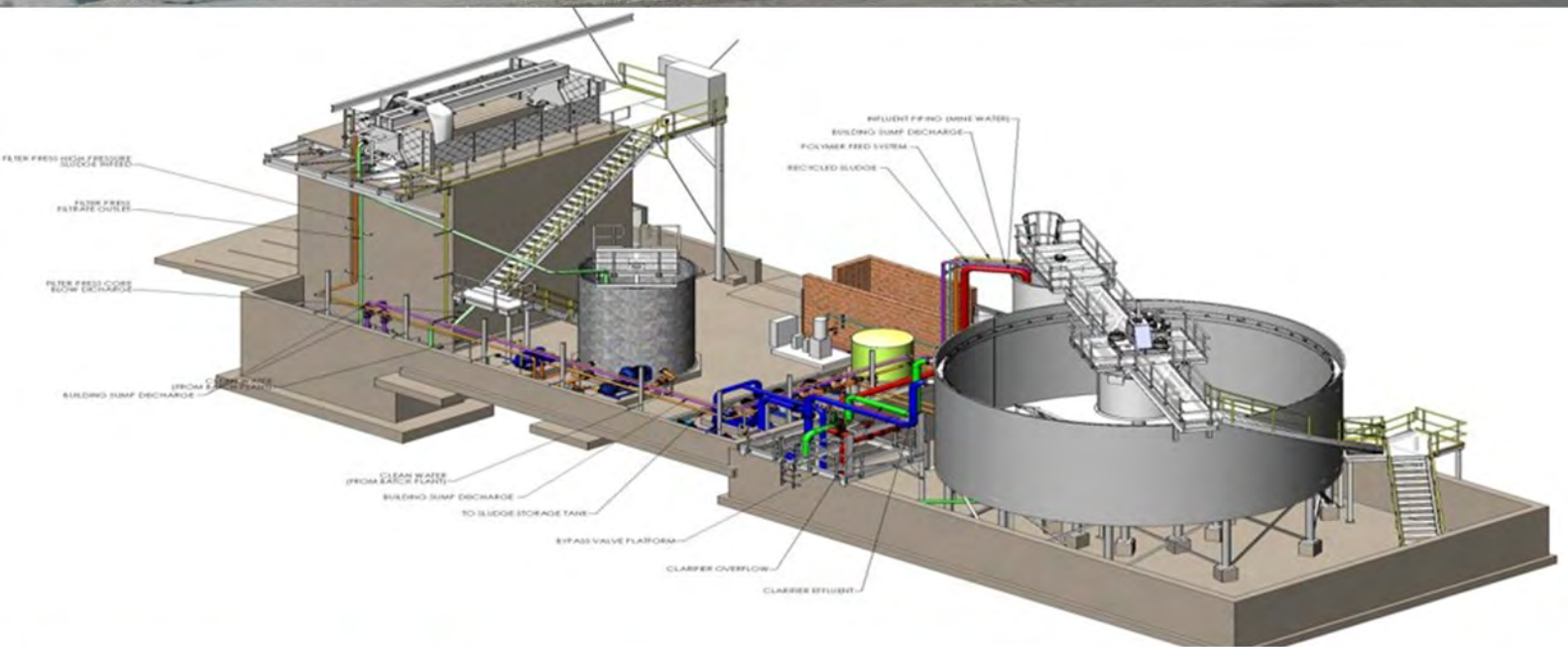
Tightening effluent standards and rising energy costs have left many facilities in an untenable situation. Process systems designed and installed in the 1970s and 80s are incapable of meeting current effluent standards, and the power costs continue to rise. Let ClearStream process engineers evaluate your current system and develop a plan to increase capacity, meet current standards, and reduce energy consumption.

CLEARFLO HYBRID DIGESTER SLUDGE MINIMIZATION SYSTEMS

By combining facultative/anaerobic and aerobic digestion chambers, ClearFlo process engineers can reduce solids sent to disposal by up to 80%, compared to conventional solids digestion systems. Using proven principles of enhanced facultative cell lysis, coupled with state of the art ORP control, a ClearFlo Hybrid digestion system can reduce solids handling costs to a fraction of that of current aerobic systems.



Industrial Treatment Equipment



Gold Mine Slimes Recovery - Turn-key Supply with Erection and Installation



Custom Designed Piloting Equipment

Consol Energy - 80' Diameter Flocculating Clarifier

Frac Water SCC - FRP & Rubber Lined Steel Construction

TANKAGE & INSTALLATION

ClearStream offers steel and fiberglass tank supply, to complement our sedimentation equipment lines. Additionally, we offer turn-key installation services for the tank and mechanism, if desired by the customer. Our in-house specialists can oversee the construction and installation of the mechanism and tank to create a single source for the entire treatment package.



FIELD SERVICE & RETROFIT SERVICES

ClearStream also offers field service for existing mechanisms, including part replacement and rehabilitation. We can also supply complete retro-fit of existing mechanisms supplied by any manufacturer. Many ClearStream supplied replacement units are currently in operation all over the world.



DRIVE UNITS

ClearStream provides drive units to deliver a superior treatment package. Our drives utilize a precision main gear and bearing, with a torque overload protection system. The main bearing comes standard with a 10 year warranty.



DESIGN METHODOLOGY

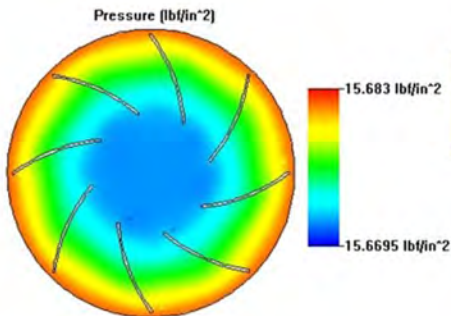
ClearStream utilizes cutting edge analysis and design technologies, to custom design each piece of process equipment to meet each individual customer's needs. All equipment is analyzed using advanced Computational Fluid Dynamic (CFD), Finite Element Analysis (FEA), and Civil / Structural software codes, to ensure process performance and structural integrity. All mechanisms are fully designed in a 3-D CAD environment, to produce the highest quality, and customer friendly designs possible.



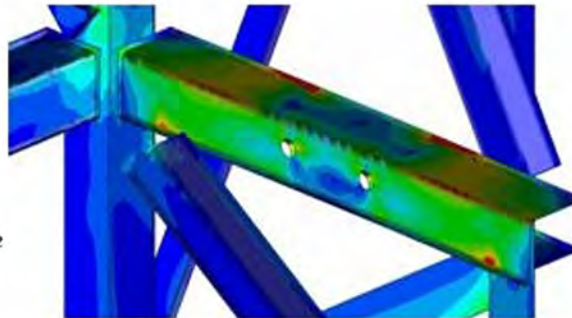
26' Clarifier Installation



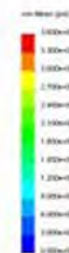
26' Clarifier CAD Design



Radial Turbine CFD Analysis



Rake Arm FEA Analysis



RISA Structural Analysis


ADDITIONAL DESIGN RESOURCES


In addition to substantial internal capability for design and testing, ClearStream utilizes several outside, independent design resources, to ensure the highest quality equipment designs. To complement internal capabilities, ClearStream occasionally contracts with an independent testing lab (Pocock Industrial), for additional support on more elaborate projects.



CONTACT US

 9547 South 500 West, Sandy, UT 84070

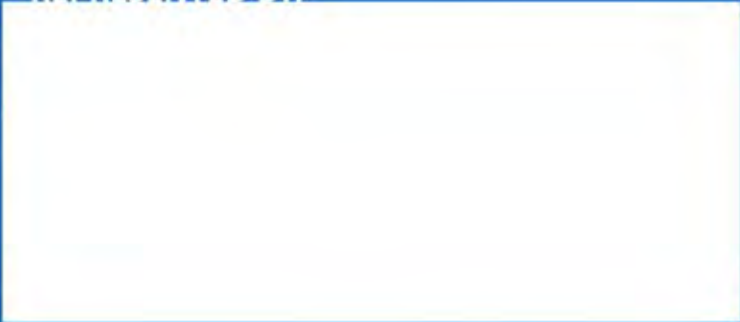
 (801) 676.1890

 (801) 676.1893

 www.clearstreameng.com



REPRESENTED BY:





Sustainable efficiency

Increase reliability and profitability with Alfa Laval air-cooled heat exchangers



Improve the sustainability of your plant

Effective cooling of gases and liquids is a critical part of many industrial processes. Choosing the right equipment is essential for a sustainable operation – both in business and environmental terms. With the right cooling system you cut resource consumption, ensure long-term operating reliability and minimize maintenance.

Alfa Laval offers both the know-how and the technology you need to optimize your cooling processes. We have been designing and manufacturing cooling systems for over 50 years and can provide you with the perfect solution for your process cooling needs.

Our three technical platforms give us the flexibility required to engineer systems that are optimized according to a wide range of factors, such as cooling requirements, ambient temperatures, water supply, energy cost and process medium.

With Alfa Laval as your partner you get a robust cooling system that benefits both your business and the environment – that's what we call sustainability.

Please contact your local Alfa Laval representative or visit www.alfalaval.com to learn more.



- Lowest process fluid outlet temperature
- Compact size
- Low power consumption
- Minimal water consumption

Maximum cooling

Alfa Laval Niagara Wet Surface Air Coolers (WSAC®) are fully customized closed-loop cooling and condensing systems. Thanks to the WetSurface technology, WSAC systems offer a unique combination of high cooling performance, low operating costs and compact size. Alfa Laval Niagara WSACs are used in a wide range of industries such as oil & gas, refining, petrochemicals and power.

Lowest process fluid outlet temperature

An Alfa Laval Niagara WSAC uses evaporative cooling to reject heat from a process stream. The WetSurface technology makes heat transfer much more efficient than in a traditional air-cooled heat exchanger, resulting in a more compact system and lower power consumption. WetSurface technology also has the benefit of having a single approach to the wet bulb temperature, thereby lowering the output temperature of the process fluid more than is possible in other types of systems, for example cooling tower systems.

Minimal water consumption

A WSAC system can operate with higher cycles of concentration than cooling towers, i.e. the cooling water can be reused more times, and water of low quality, such as blowdown water from a cooling tower, treated wastewater or seawater can be used as makeup water. This means that water costs are significantly lower for a WSAC.

Full flexibility – wet or dry operation

Alfa Laval can supply HybridCool systems with sections for both dry and wet cooling, allowing operators to choose operating mode depending on ambient temperatures, thereby minimizing water consumption.



WetSurface

Maximum cooling efficiency and lowest possible outlet temperature.



FlexWater

A WSAC can operate on recycled water of low quality such as blowdown water.



HybridCool

Combined wet and dry bulb cooling for minimized water consumption.



ALOnsite

Global, onsite service by skilled engineers.



- Wide range of models, tailored for different applications
- Vspeed variable fan drive minimizes power consumption
- Robust design
- Easy to service

Leading energy efficiency

Alfa Laval ACE air-cooled heat exchangers are ideal in installations where water is unavailable or costly. Alfa Laval offers a wide range of models that can be tailored to your requirements. The patented Vspeed variable fan drive means that energy consumption is substantially lower than that of traditional air coolers. Common applications are in the oil & gas, and power industries.

Wide range of models

Alfa Laval's ACE range comprises six different models, offering numerous combinations of vertical or horizontal air flows, single or multi fan configurations, drive systems, cooling capacities, etc. Based on your specific requirements, our engineers will configure a system that gives you high performance and low OPEX.

Low operating costs

Alfa Laval's patented Vspeed variable fan drive automatically adjusts the fan speed according to the cooling requirements and ambient temperature, avoiding process fluid overcooling and liquid fallout. The result is substantial energy savings if compared to traditional air coolers that usually operate according to worst-case conditions at all times.

Easy service

All Alfa Laval air-cooling systems are designed for quick and easy maintenance with good access to parts such as tube bundles, fan motors, etc.

Alfa Laval also offers on-site assistance by our network of service engineers. We can help you with all types of service and improvements. We are just a phone call away.



Vspeed

Automatic fan-speed adjustment for minimal power consumption.



HyperFin

Slitted fin design maximizes heat transfer. See next page.



HybridCool

Combined wet and dry bulb cooling for minimized water consumption.



ALOnsite

Global, onsite service by skilled engineers.



Vspeed variable fan drive minimizes power consumption.



- Fully customized design
- Handles very high temperatures and pressures
- Vspeed variable fan drive minimizes power consumption
- Available in many materials

For the toughest applications

Alfa Laval Olmi air-cooled heat exchangers are fully customized systems used in duties with high temperatures and pressures. These systems are the preferred choice for demanding positions in downstream oil and gas processing, refining and petrochemical industries, combining unmatched operating reliability with low maintenance requirements and minimal energy consumption.

Reliable uptime

Alfa Laval Olmi dry air-coolers are engineered-to-order systems used in applications with extreme operating conditions. Our experienced engineers take on the most complex design challenges and can assist in all aspects of the design phase including fluid dynamics, fatigue prevention and recommending the best materials for the optimum balance between OPEX and CAPEX.

Alfa Laval Olmi systems are manufactured according to the highest quality standards and are rigorously tested prior to delivery to ensure a long, trouble-free service life. The heat exchangers can be certified according to all leading standards and codes.

Efficient design

Alfa Laval's HyperFin slitted tube fins improve the air flow closest to the fin surface. This increases heat transfer efficiency, allowing the unit to be smaller than traditional air heat exchangers. The HyperFin design has a minimal effect on the turbulence of the air flow and thus minimizes impact to the airside pressure drop and power consumption of the fan.



Vspeed

Automatic fan-speed adjustment for minimal power consumption.



HyperFin

Slitted fin design maximizes heat transfer.



HybridCool

Combined wet and dry bulb cooling for minimized water consumption.



ALOnsite

Global, onsite service by skilled engineers.



Alfa Laval Olmi unit with tubes in duplex and alloy 6Mo.

Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

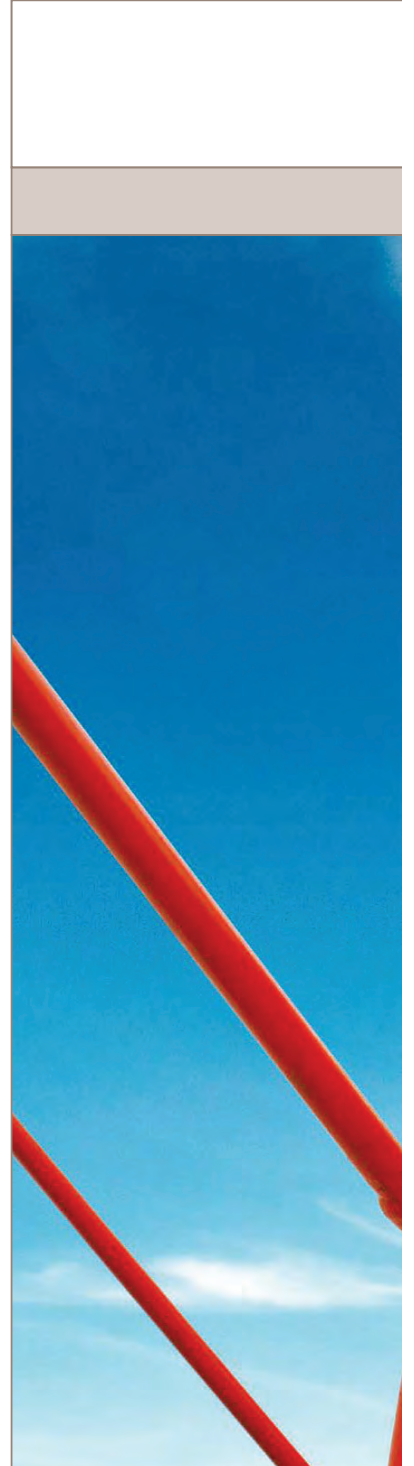
We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.

ALFA LAVAL is a trademark registered and owned by Alfa Laval Corporate AB.



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Web: www.alfalaval.com/wsac

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information directly.



Sustainable performance

Improve your cooling operations with Alfa Laval Niagara Wet Surface Air Coolers



Effective, reliable cooling

Optimizing your cooling processes is a straightforward way to improve sustainability – both in business and environmental terms. With the right equipment you maximize cooling performance and energy efficiency, while keeping water consumption and service costs low.

Alfa Laval Niagara Wet Surface Air Coolers are custom-built, closed-loop cooling and condensing systems that help you do just this. They are used in a wide range of applications where low temperatures and high operating reliability is a must in industries such as oil & gas, refinery, power, pulp & paper, petrochemicals and steel.

An Alfa Laval Niagara WSAC can in many cases replace a cooling tower plus heat exchanger or a traditional air-cooled heat exchanger, and they offer many advantages:

- Lowest process fluid outlet temperature
- Minimal water consumption
- Low energy consumption
- Compact size
- Low service needs
- Lowest lifecycle cost

Please contact your local Alfa Laval representative or visit www.alfalaval.com/wsac to learn more.





Unique technology

Thanks to Alfa Laval's unique WetSurface and FlexWater technologies, a WSAC system offers better cooling performance, lower operating costs, smaller installation footprint and lower maintenance requirements than a traditional cooling solution, such as a cooling tower plus heat exchanger or an air-cooled heat exchanger.

Operating principle

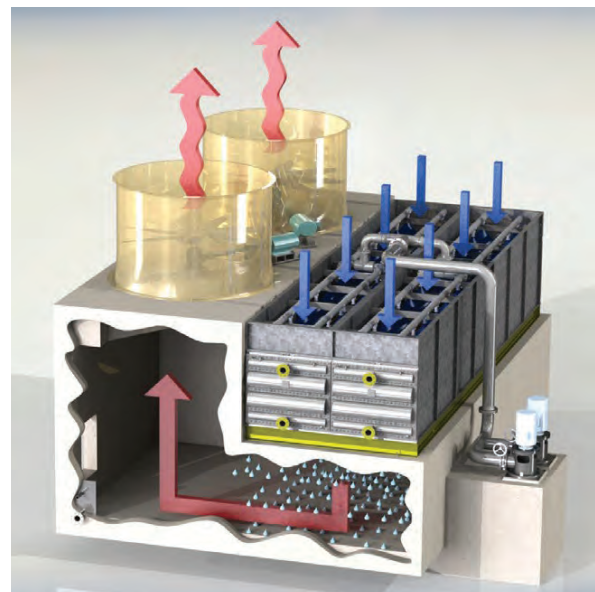
An Alfa Laval Niagara WSAC can be used for liquid and gas cooling, as well as condensing duties.

The WetSurface technology used in a WSAC system is based on evaporative cooling. The hot process medium flows through prime surface tube bundles that are sprayed with water. The heat causes the water to evaporate and the vapour is removed by fans that draw cool air over the tubes.

The water that does not evaporate is collected in a basin and is reused as spray water. The same cooling water can be reused 6-10 times, depending on water quality.

Next, the air/water vapour stream is forced to make a 180° turn, which effectively removes free water droplets and minimizes drift.

An Alfa Laval Niagara WSAC is a closed loop system, meaning there is no risk of contaminants entering the process stream.



Tubes with a hot process medium are sprayed with water. As the water evaporates, heat is rejected from the process medium.

Benefits

Lowest process fluid outlet temperature

WetSurface technology gives the system a single approach to the wet bulb temperature, thereby lowering the output temperature of the process fluid more than is possible in cooling tower systems. Compared to a traditional (dry) air-cooled heat exchanger heat transfer is much more efficient in a WSAC, resulting in a more compact system, lower outlet temperature and lower power consumption.

Minimal water consumption

A WSAC system can operate with higher cycles of concentration than cooling towers, i.e. the cooling water can be reused more times, and water of low quality, such as blowdown water from a cooling tower, treated wastewater or seawater can be used as makeup water. This means that water costs are significantly lower for a WSAC.



WetSurface

Maximum cooling efficiency and lowest possible outlet temperature.



FlexWater

A WSAC can operate on recycled water of low quality such as blowdown water.



HybridCool

Combined wet and dry bulb cooling for minimized water consumption.



ALOnsite

Global, onsite service by skilled engineers.

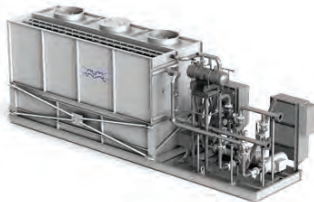
Fully customized

All Alfa Laval Niagara WSAC systems are custom-designed according to our customers' specifications and are fine-tuned to fit the requirements and conditions of their intended duties. They come in all sizes from small packaged units to large field-erected systems.

Alfa Laval can supply HybridCool systems with sections for both dry and wet cooling, allowing operators to choose operating mode depending on ambient temperatures. The units can also be designed to cool several separate process streams independently.

Alfa Laval WSACs are engineered to meet heavy-duty industrial requirements and standards. They are fireproof, can sustain pressures up to 170 bar (2,500 psi) and be designed to meet ASME, TEMA, PED and API specifications.

All components are made of hot-dip galvanized steel for high corrosion resistance. For applications with corrosive media, the tube bundles are offered in a variety of materials, for example different grades of stainless steel, super duplex and titanium.



Packaged WSAC systems

- Compact, skidded, pre-piped and pre-wired units, complete with control cabinets
- Factory tested
- Plug-and-play units, fast and easy installation



Modular WSAC systems

- Medium-sized systems ideal for expanding capacity
- Casings made of heavy-gauge steel
- Delivered in pre-fabricated modules that are easily assembled on site



Field-erected WSAC systems

- Our largest systems
- Concrete basin with overlying structure made of fibre-reinforced plastics (FRP) or concrete
- Lowest total cost of ownership for high-capacity cooling/condensing

Comparison with other technologies

Alfa Laval Niagara WSAC systems produce the coldest possible process outlet temperature compared to other technologies. Other WSAC advantages are shown in the

table below. In this example the dry bulb air temperature is 37.7°C (100°F) and the wet bulb temperature is 26.1°C (79°F).

	Wet Surface Air Cooler (WSAC)	Cooling tower plus heat exchanger	Traditional air-cooled heat exchanger (dry)
Practical approach temperature	5.6°C (10°F)	8.3°C (15°F) in total, 5.6°C (10°F) for CT and 2.7°C (5°F) for heat exchanger	8.3°C (15°F)
Coldest practical process temperature	31.7°C (89°F)	34.4°C (94°F)	46.1°C (115°F)
Water consumption	Low-medium	High	Not applicable
Electrical consumption	Low	Medium	High
Space requirements	Small	Medium-large	Large
Total system cost	Low-medium	Medium	Medium-high
Maintenance	Low-medium	Medium-high	Low

Service

An Alfa Laval Niagara WSAC is designed and built for minimal maintenance and all components are easily accessible. The water spray system is reached from the top and, unlike cooling towers, there is no tower fill where dirt and fouling can accumulate. The tubes are placed with enough space for airborne debris to fall through the bundle, down to the basin where it is filtered out in a pump screen.

WSAC systems can be designed to handle highly fouling media and by removing the header, the tubes are accessible for cleaning.

Alfa Laval offers support for all types of service on WSAC systems. Our experienced field service technicians are available 24/7. We are glad to help with assistance during installation and commissioning, optimization of performance, training of operators, etc.



Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.





Alfa Laval Niagara Wet Surface Air Coolers (WSAC)

Efficient closed-loop, evaporative cooling systems

Introduction

Alfa Laval Niagara Wet Surface Air Coolers (WSAC®) are the most efficient and durable closed-loop, evaporative cooling systems available. These fluid cooling and vapor condensing systems are tailored to customer specifications for inlet and outlet temperature, as well as worst case ambient conditions.

WSAC systems provide optimal performance and are configured as packaged, modular, field erected, wet/dry or elevated pipe rack mounted designs depending on specifications and performance requirements.

Applications

Alfa Laval Niagara WSAC systems are optimized for industrial applications where rugged designs, and cost-effective, efficient closed-loop cooling and condensing duties are required. The WSAC has the ability to cool or condense a broad range of fluids more effectively than traditional air-cooled systems.

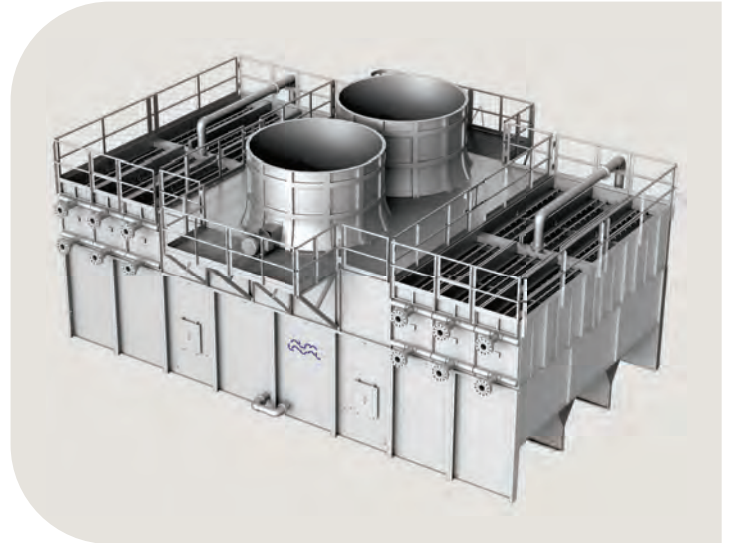
Niagara WSAC systems are used in power, process, refinery, wastewater, natural gas and petrochemical industries and are designed to meet customer's rigorous industry specifications.

Benefits

- Produces coldest possible process outlet temperature through single approach to ambient wet bulb temp.
- Low quality water can be used as makeup. When utilizing existing blowdown or wastewater streams, no additional fresh water is required.
- Increased water conservation due to higher concentration cycles with minimal makeup and blowdown.
- No plastic fill means minimum fouling and ensures 100% prime surface for reliable operation.
- Remote basin (surface mounted tank or underground sump) for spray water collection and storage allows for lighter weight installation on elevated structures.
- Long service life and minimal maintenance required in rugged industrial settings due to durable materials and simple design.

Working principle

The closed-loop design ensures that the process liquid or vapor flows through the inside of the heat exchanger tubes, with the cooling air and the spray water flow in the same direction on the outside of the tubes.



Air is induced downward over the tubes. Water flows downward along with the air. Heat from the process stream is released to the cascading water. Vaporization transfers heat from the cascading water to the air stream. The air stream is then forced to turn 180° providing maximum free water removal. Fans discharge air vertically at a high velocity to minimize recirculation.

Unique features



WetSurface
Maximum cooling efficiency and lowest possible outlet temperature.



FlexWater
A WSAC can operate on recycled water of low quality such as blowdown water.



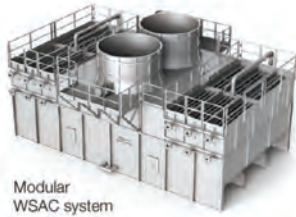
HybridCool
Combined wet and dry bulb cooling for minimized water consumption.

Learn more at www.alfalaval.com/wsac

Packaged
WSAC system



Modular
WSAC system



Field erected
WSAC system



Designs

Alfa Laval Niagara WSAC systems are engineered-to-order to provide optimal performance for each unique application. The WSAC configuration could be a packaged, modular, field erected, wet/dry or elevated pipe rack mounted design, depending on many factors, specifications and performance requirements. All WSAC are designed for long service life of 20+ years.

Packaged WSAC systems

- Skidded, pre-piped and pre-wired for plug and play installation
- Full redundancy of fans and pumps
- Includes control cabinet and water treatment
- Drain pan arrangement lowers operating weight
- Full factory testing
- Freeze protection for cold weather installs

Modular WSAC systems

- Shop fabricated modular design with final assembly on-site
- Direct or gear drive fan system
- Access package available
- Drain pan arrangement lowers operating weight
- Full factory testing

Field erected WSAC systems

- Poured in place reinforced concrete basin
- Pultruded FRP structure
- Interchangeable modules
- Reduced footprint for large systems
- Lowest optimized installed cost
- Economized layout

Technical data

Tube bundle options

Tube bundles	Straight through/cleanable Serpentine
Code designs	ASME, PED
Material options	C.S., S.S., Exotics

Structure options

Metal	Heavy duty 10-12 gauge carbon steel, H.D.G.A.F., stainless steel optional
Concrete	Poured in place reinforced concrete
FRP	Fiberglass reinforced plastic

Fan system options

Fans	Direct drive 5 ft (1.524 m) diameter and smaller Gear drive 6 ft (1.8288 m) diameter and larger
Motors	Totally enclosed fan cooled (TEFC)

Spray system

Design	Low pressure/high flow design for drenching coverage
Coverage	8-10 GPM/ft ² spray water coverage
Nozzles	Quarter turn, quick disconnect for easy install/clean out
Pumps	Centrifugal end suction Vertical turbine

Ancillary components

Electrical options	Complete in-house electrical design Custom control panels PLC/HMI programming
Skids	Pump skids with available redundancy Water treatment skids Complete pre-wired systems with controls
Access packages	Ladders, walkways, platforms

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How to contact Alfa Laval

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Auxiliary cooling for power applications

Niagara Wet Surface Air Coolers (WSAC®)

Technical bulletin



Alfa Laval Niagara Wet Surface Air Coolers (WSAC®) are efficient closed-loop, evaporative cooling systems designed for the power, process, wastewater, natural gas and petrochemical industries. These fluid cooling systems are optimized for industrial applications where rugged designs, and cost-effective, efficient closed-loop cooling and condensing duties are required.

Direct auxiliary fluid cooling

Accomplished by using the field erected closed-loop auxiliary cooling system for single and combined cycle power plants.

System benefits:

- Built-in redundancy
- Lower installed cost
- 60-80% less parasitic energy than dry/fin-fan coolers
- Lowest possible fluid outlet temperature
- Closed-loop design
- Can be combined with a vapor condenser in a single structure for reduced carbon footprint
- Can use cooling tower water blowdown or other reclaimed water as makeup to the spray system



Closed-loop evaporative cooler advantages

Niagara Wet Surface Air Coolers (WSAC®)

Technical bulletin



Alfa Laval Niagara Wet Surface Air Coolers (WSAC®) are efficient closed-loop, evaporative cooling systems designed for the power, process, wastewater, natural gas and petrochemical industries. These fluid cooling and vapor condensing systems are optimized for industrial applications where rugged designs, and cost-effective, efficient closed-loop cooling and condensing duties are required.

WSAC closed-loop evaporative cooler advantages:

- Process fluid is contained in a closed-loop; it's never exposed to the environment or recirculating spray water.
- Rugged industrial design utilizes 12-gauge steel and/or concrete. The construction is fireproof and has been known to last over 30 years. FRP designs are also available.
- WSAC units can run at higher cycles of concentration than cooling towers – resulting in reduced makeup water requirements and blow-down. These reductions are due to smooth tube materials, wide spacing, high flow/low pressure spray nozzle designs and the absence of plastic fill.
- Makeup water can come from almost any source – including cooling tower blowdown, sea water, R/O and plant discharge.
- A wide variety of tube materials and component configurations can be optimized for each heat transfer application based on the stream to be cooled or condensed (inside the tubes), and the quality of the spray water (outside the tubes).
- WSAC systems have the ability to achieve closer approach temperatures (5-10°F to the wet bulb), compared to other cooling technologies.
- Intrinsic freeze protection is achieved when sprays operate year round.
- Partial dry operation designs are available to reduce plume and overall water consumption.
- The WSAC co-current flow of air and water dramatically reduces the occurrence of scaling, minimizes tube bundle icing, and offers less drift and plume due to the 180° turn.

WSAC closed-loop evaporative cooler advantages continued:

- WSAC systems feature a lower pump HP than a cooling tower due to reduced head pressure.
- Single source thermal responsibility.
- Water treatment can be easily achieved – consulting a water treatment professional is also recommended.
- WSAC systems offer easy maintenance including an easily accessible and removable spray system and pressure washable tubes.
- Serpentine tube bundles can be designed for operating pressures up to 2500 psi.

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Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information directly.

AnoxKaldnes™ MBBR



Biological Treatment of Wastewater

WATER TECHNOLOGIES

AnoxKaldnes™ Moving Bed Biofilm Reactor (MBBR) technology is based on the biofilm principle, which uses microorganisms for biological treatment of wastewater. This technology is the core for several unique processes that we have developed.

High treatment capacity in a very small footprint

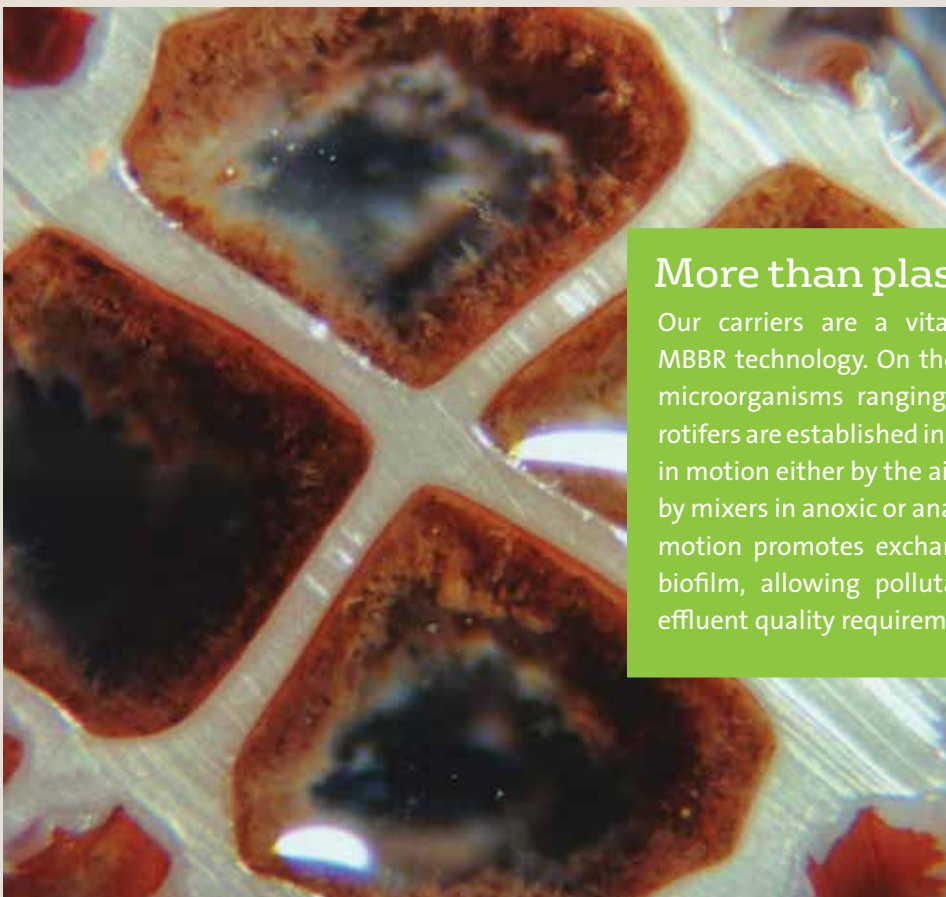
Wastewater treatment with microorganisms

In the AnoxKaldnes MBBR technology, microorganisms grow on the surfaces of plastic carriers in the treatment reactor. As the carriers move through wastewater in the reactor, microorganisms utilize contaminants present in the effluent for their biological activity.

The proprietary design of the carriers ensures that a high protected surface area is provided for the development of biofilm, enabling high treatment capacity in a very

small footprint. The carriers are made of durable high density polypropylene, eliminating the need to replace the media.

The flexibility of our patented technology allows the design of very compact and efficient MBBR solutions for new installations as well as optimal upgrades of existing biological processes, often without the need for new basins.



More than plastics

Our carriers are a vital component in AnoxKaldnes MBBR technology. On their protected surfaces, different microorganisms ranging from bacteria to ciliates and rotifers are established in a biofilm. These carriers are kept in motion either by the air injection in aerobic systems or by mixers in anoxic or anaerobic systems. The continuous motion promotes exchanges between wastewater and biofilm, allowing pollutants to be degraded to meet effluent quality requirements.



Standard

- Pre-Screens
- MBBR Reactor
- Biocarriers (K5)
- Sieve
- Aeration grid
- Blowers (1 op + 1 stby)
- Analyzers (Temp/DO)
- Post treatment for solids removal
- PLC with starters
- Engineering/Start-up
- Shipment FOB factory
- Defoamer addition (if required)

Stand-alone MBBR Solutions

AnoxKaldnes stand-alone MBBR solutions

AnoxKaldnes pure MBBR systems are compact, simple to operate and very efficient for removal of BOD, ammonia and nitrates. Today, stand-alone MBBR solutions are used in hundreds of installations around the world.

Packaged solutions

The MBBR modular packaged plant is a pre-engineered application of the AnoxKaldnes technology provided in a steel tank. The standard sizing and simplified connections provided in this modular unit serve to reduce the cost of supply and installation of the technology. This system is designed for ease of installation. Provisions are made to enable easy inclusion of ancillary equipment items in the design, such as the chemical feed systems typically required.

Add-ons

- Nutrients addition
- Foundations
- Drains and sump
- Dewatering equipment
- SCADA
- Building/winterization
- Nutrient removal
- pH control and adjustment system
- Piping 5 ft from equipment
- Utilities (compressed air, tap water, power connection)
- Pre-treatment DAF
- Equalization optional

BAS™ combination process

The BAS biological wastewater treatment process is the optimally designed combination of the MBBR and activated sludge processes. The stable and robust biofilm stage can cope with large variations in load and acts as a guard for the more sensitive activated sludge system.

The volumetric loading capacity of the BAS treatment process is 2 to 3 times higher than a conventional activated sludge system due to the dramatically reduced load on the activated sludge by the MBBR. The result is a much smaller footprint.

Advantages are dramatically increased capacity, improved process stability and improved sludge separation. Conversion to a BAS process is an ideal way of upgrading existing activated sludge plants for higher capacity of organic removal and optimized performance.



The BAS combination process consists of one or more AnoxKaldnes™ MBBRs, followed by an activated sludge system. The high-rate biofilm stage is designed to pretreat the wastewater to remove the readily bio-degradable organic matter prior to the activated sludge system.

Nutrient-limited BAS combination process

For nutrient-limited wastewaters, the BAS process has demonstrated lower sludge production when compared to both stand-alone MBBR and activated sludge processes.

Hybas™ combination process

The Hybas combination process is a superior Integrated Fixed-film Activated Sludge (IFAS) process from AnoxKaldnes. This compact solution requires little process volume to achieve reduction of both organic material and nitrogen. Hybas is often a cost-effective way of upgrading an existing activated sludge system to include nitrogen removal or to improve the capacity of the nitrogen removal process. Enhanced biological phosphorus removal (EBPR) can also be accomplished.

Advantages of the MBBR

Benefits of a suspended biofilm system include increased resilience to toxicity and variable loading, simple operation and a treatment system insensitive to sludge bulking.

In an activated sludge based treatment system, the sludge has to continuously be separated from the

treated water and returned to the treatment basin. In an AnoxKaldnes MBBR, the carriers and the active biofilm are retained in the reactor by sieves over the outlet, which allow the treated water to pass to downstream units for further processing.

AnoxKaldnes MBBR Process Guarantees

Veolia Water Technologies performs bench-scale and pilot-scale testing of the AnoxKaldnes MBBR process on your wastewater, providing confidence in the treatment process supported by a process guarantee.

Bench-scale testing

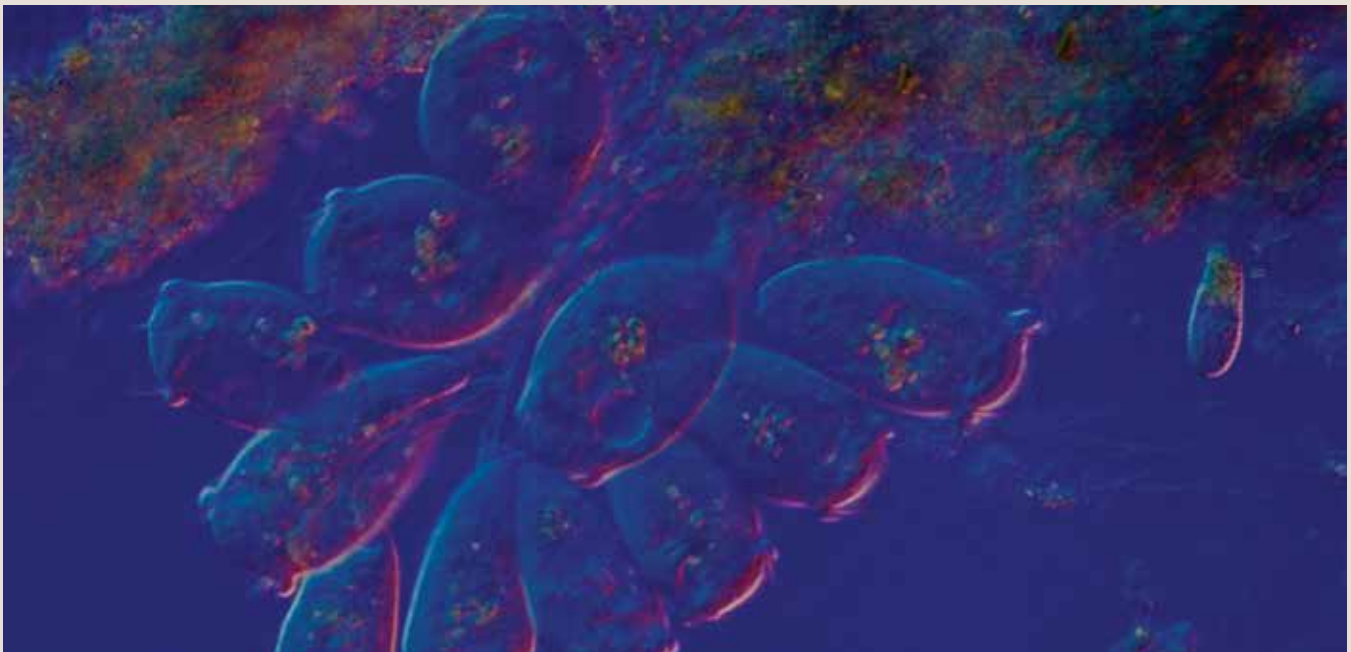
Full-scale wastewater treatment processes are simulated in the laboratory with bench-scale bioreactors. Continuous-flow laboratory systems are used to evaluate operational parameters such as efficiency, stability and economy.

Pilot-scale testing

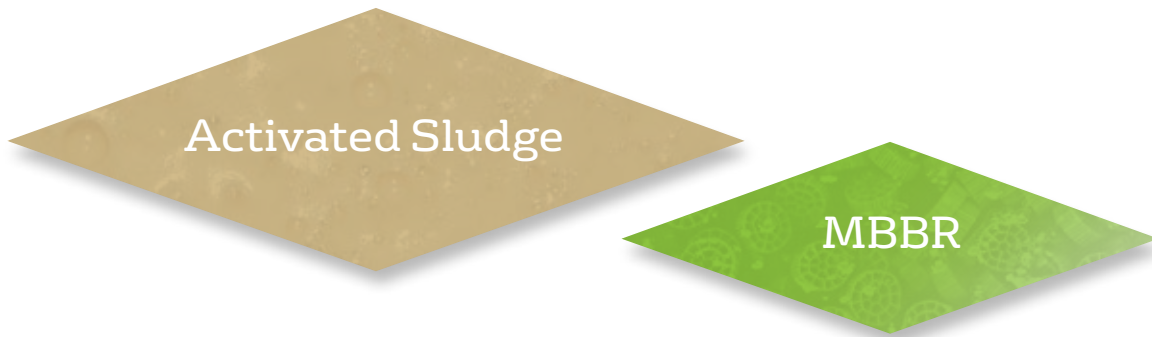
Mobile pilot treatment trailers can be deployed to your site to demonstrate the process at higher flow rates under actual site conditions. On-site demonstration enables plant personnel to become familiar with the simplicity of the system.

Process Expertise and Proven Performance

- Over 20 years of experience
- Over 700 installations worldwide
- More than 90 Industrial and Municipal installations in the US
- 50 Industrial installations in the US on Food and Beverage, Chemical, Mining, Pharmaceutical, Petrochemical and Pulp & Paper applications



Comparative Footprint for Readily Biodegradable Carbonaceous BOD Removal



Research-driven innovation

We continuously conduct research and development of AnoxKaldnes MBBR technology. Existing processes are improved and processes for new applications are developed.

Flexible solution	Features
<p>Our processes based on the AnoxKaldnes MBBR technology are utilized in both industrial and municipal wastewater applications for:</p> <ul style="list-style-type: none">• Organic removal• Nitrification• Denitrification• Toxicity removal• Selenium removal• Cyanide compounds removal• AnitaMox™ <p>The flexibility of our MBBR processes makes them ideal solutions for new plants, upgrades and expansions.</p>	<ul style="list-style-type: none">• Compact• Robust• Simple operation• Low maintenance• Proven technology• Enhances nitrification• High tolerance to TSS influent



Resourcing the world

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Oil-free air centrifugal blowers

ZB 5-6 VSD+

Atlas Copco





The ZB turbo blower: a unique design with proven efficiency

With its new generation of ZB magnetic bearing turbo blowers, Atlas Copco releases one of the most efficient oil-free turbo blower in the market in all aspects. Paired with the highest efficiency, the ZB range proves an incomparable reliability and lifetime with its unsensitivity to process changes.

Durable technology, smart design

Using magnetic bearings for turbo blowers is the choice Atlas Copco made to ensure a complete peace of mind to users. As no air is used from the system to operate the machine, pressure variations will not trouble the operation of the blower at all. This technology combined with the fact that no power bank is needed in case of power failure makes the Atlas Copco ZB one of the most straight forward magnetic bearing blower ever made.

Much more than only the turbo technology

Having a very efficient turbo technology is not enough. To really enhance its capacities every component has been designed and selected to deliver the best performance and the longest lifetime.

No hidden surprises

Comparing blowers can be a hard and confusing job. Our motive is very simple: you will get what we quote. We don't want to confuse you with differences between inlet or delivered flow, shaft or package power. We will tell you exactly which flow and pressure our machines will produce for your process as well as how much electricity in total it will consume. If you are lost just call us and we will help you!



The ZB range: a reliable solution for your applications

Not only the active magnetic bearing technology but also its complete design makes the ZB range one of the most reliable turbo blowers in the market, insuring a perfect fit for all your low pressure applications.



— **Wastewater treatment**

The ZB blowers have a very wide flow and pressure operational range, making them suitable for different wastewater treatment applications. Typically, the major energy consumers in these plants are the blowers. ZB however helps you to reduce your energy bill significantly thanks to the efficient impeller and bearing design.

— **Pneumatic conveying**

Conveying is a delicate process which needs 100% clean oil-free air for trouble-free and continuous operation. The ZB blowers are a perfect fit for this kind of applications, ensuring energy-efficient Class 0 certified oil-free compressed air you can rely on.





— Food and beverage

The ZB provides 100% pure oil-free air for all kinds of applications in the food and beverage industry such as fermentation, packaging, aeration for wastewater treatment purposes. Class 0 certified ZB blowers avoid compromising the purity of your end product and ensure zero risk of contamination by ensuring no oil is added during the compression process and thus delivering you 100% oil free air if the atmosphere doesn't contain any oil particles.

— Flue gas desulphurization

In coal-fired power plants, who are running 24/7, the compressed air solution needs to be highly reliable and no downtime can be permitted. With the ZB blowers, you don't need to worry about this. They are designed to offer a constant reliable air flow at minimal energy cost.



High efficiency and reliability



1. Protecting electrical cubicle

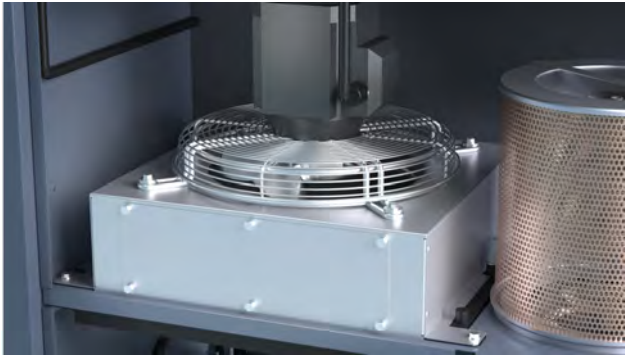
- Separated from the mechanical components to ensure proper cooling and compactness
- Includes all necessary components to protect the machine as well as the complete electrical network (RFI filters, AC choke, LC filters, sine filters etc.)
- Temperature controlled with integrated cooling fan and heating system to maintain a constant temperature in all conditions

2. Compact and low heat rejection frequency drive

- The high-frequency variable speed drive is the component ensuring the motor's optimum operation
- Water-cooled, it provides minimum rejection and is the most compact as well.

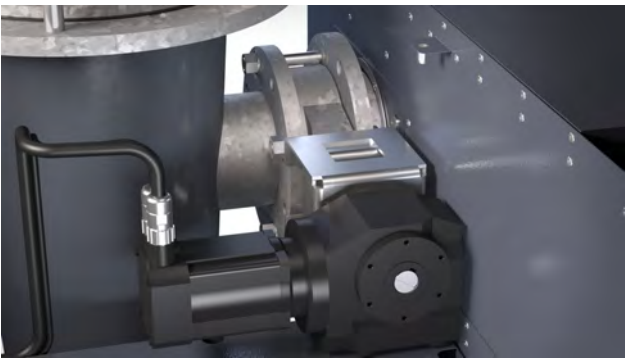
3. Magnetic bearing controller

- Compiles information from position sensors to dynamically adjust the shaft's position
- Full control of the rotor is guaranteed by the magnetic force adjustment
- No external source required nor UPS in case of power failure. Energy is pulled from the variable frequency drive through a DC/DC converter.



4. Minimum internal temperature with heatsink cooling fan

- Reduces cooling water temperature for the permanent magnet motor and drive
- Cools down mechanical components inside the machine to ensure the lowest operating temperature and longest lifetime
- Centralized warm cooling air to one single common location on the machine's roof to ease ducting and heat extraction



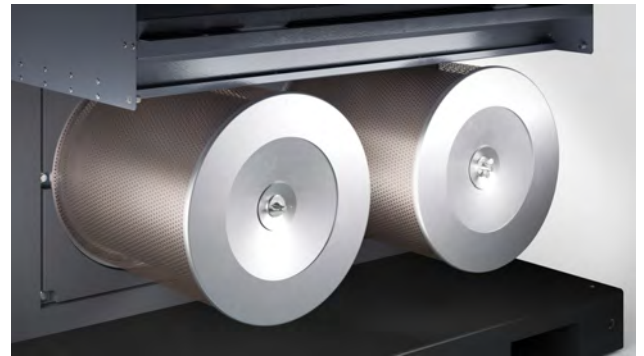
5. Actuated modulating blow-off valve

- Integrated and factory mounted modulating blow-off valve protecting the blower from overheating.
- Advanced control algorithm which allows the machine to run in the most efficient way in an extended operating flow range (from 100% to 0% turndown)



6. Integrated blow-off silencer

- Integrated and factory mounted blow-off silencer to reduce noise from blow-off operation
- Attenuated noise through built-in internal turns



7. High-efficiency process air filters

- Separated process air path to ensure lowest intake temperature and highest mass flow
- Parallel high-efficiency filters
- Easily accessible from the back of the machine and replaceable

8. Separated process air inlet

- Manifold leading air directly from intake point to blower's impeller to separate it from internal heat
- Maintains the process air temperature to a minimum to increase mass flow delivered by the blower

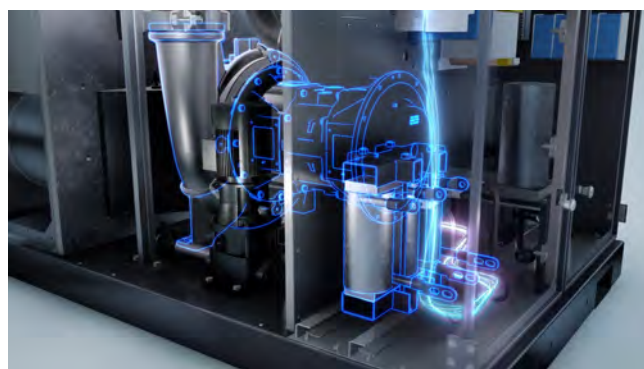
All components required to protect the machine and your network



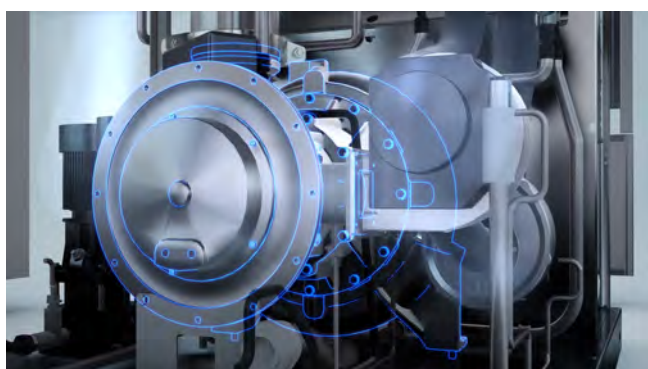
Advanced components

The ZB range electrical cubicle combines one of the most advanced systems to ensure the machine's reliability as well as the network in which it is connected to:

- RFI filters reducing harmonic disturbances in the network
- AC chokes against high voltage peaks
- Unit controller
- High-frequency variable speed drive
- DC/DC converter energizing the magnetic bearing controller in case of power failure
- Magnetic bearing controller dynamically adjusting the blower's shaft position
- LC filters protecting the permanent magnet motor of harmonics



The lowest operating temperature for all components



Separated cooling air paths for one single common outlet

The design of the Atlas Copco ZB turbo blower includes an advanced design in term of cooling paths. Three different cooling paths are joined to a single outlet source at the top of the machine. Below details of each cooling path:

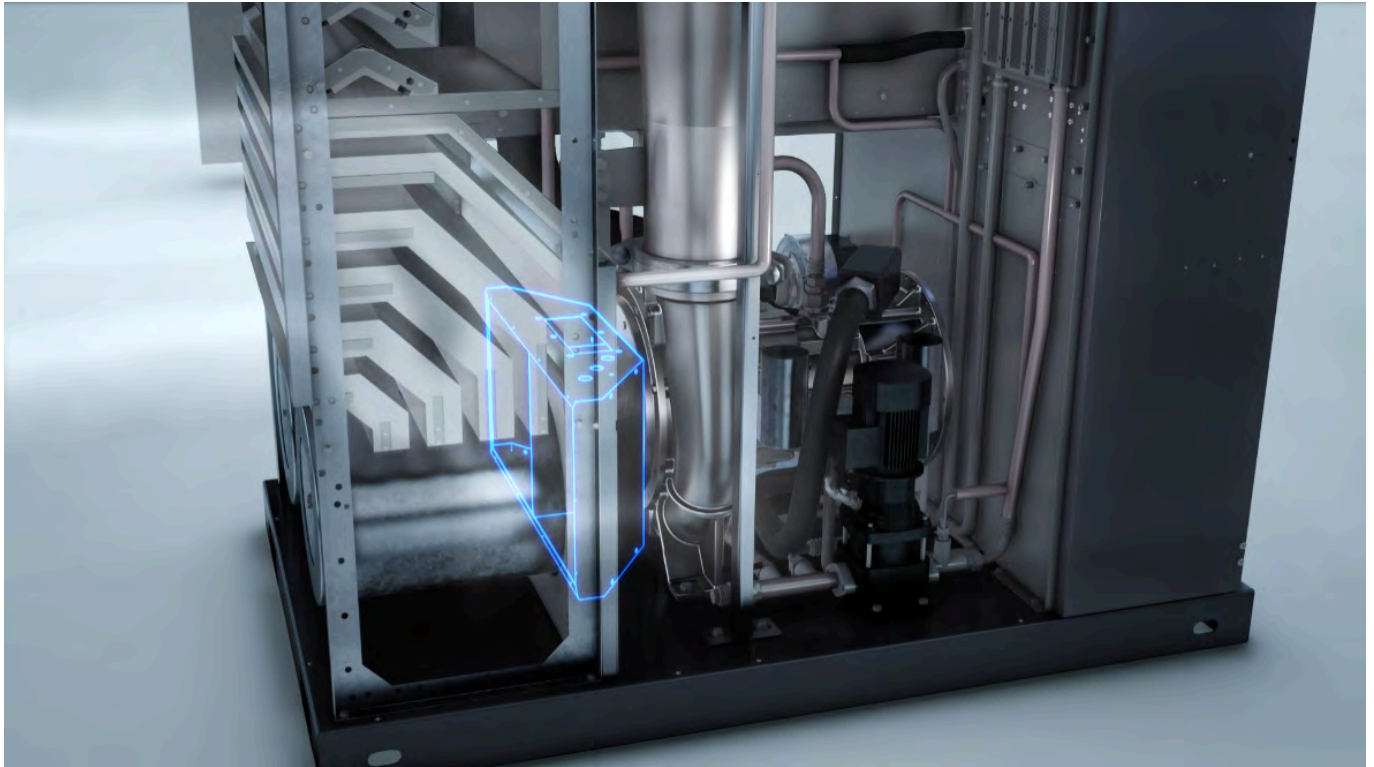
- Magnetic bearing cooling path is using fresh air from outside of the blower which is cleaned and ducted directly onto the bearings
- Internal cooling path also uses fresh cleaned air from outside of the machine to circulate around the mechanical components such as the permanent magnet motor
- Electrical cubicle cooling path is taking fresh air from the bottom of the cubicle to the top, cooling down each and every component

Ducted cooling paths for even more savings!

With the possibility to duct or pipe the inlet and outlet cooling air paths, even more energy savings can be aimed. With air coming from a colder location (outside of the blower room for example), its cooling capacity is even higher and requires the dedicated cooling fans to operate less. Also, directing the warm outlet air outside of the location where the blowers are installed will result in a smaller need of blower's room cooling and consequently lead to further energy savings. With these simple two connections, high savings can be considered in the long run!



Straight from the ambient to your process



Minimum temperature rise and pressure drops are key

Having air delivered to your process in the most efficient way, will be ensured by two simple principles: maintaining the air intake temperature at a minimum and inducing as few resistance as possible to the air passing through each component of the process air path. Both are achieved in the way the ZB range is packaged:

- No mix between process air and cooling air is guaranteeing low temperature into the impeller and leads to the most efficient compression
- Smoothest path for the process air to move from outside of the blower to your process without turns or drastic direction changes which could lead to several pressure and efficiency losses

Technical specifications

ZB 5 VSD+ - ZB 6 VSD+

TYPE	Working pressure		Max Capacity FAD		Noise level (1)	Max installed motor power		Dimensions							
								L		W		H		Weight	
	mbar(g)	psig	m ³ /hr	cfm	dB(A)	kW	hp	mm	in	mm	in	mm	in	kg	lb
50 Hz															
ZB 5 VSD+	1200	17.4	6000	3531	69	140	190	1900	75	1200	48	1954	77	1500	3307
ZB 6 VSD+	1200	17.4	12000	7062	75	250	335	2265	90	1200	48	1954	77	2500	5512

(1) A-weighted emission sound pressure level at the work station, L_p WSA (re 20 µPa) dB (with uncertainty 3 dB). Values determined according to noise level test code ISO 2151 and noise measurement standard ISO 9614.



Technical specifications

Below you will find all the technical information related to the Atlas Copco ZB turbo blower as well as a hands-on preselection tool based on your flow and pressure requirement.

A complete turbo blower range for all your needs

Atlas Copco turbo blowers make the difference. The state-of-the-art components combined in a flexible design will meet all your needs. Already for decades, Atlas Copco has proven its superiority in pairing key features into superior machines.

The scope of these plug-and-play packages can be extended with their range of standardized options. Don't hesitate to contact your local representative for more information.



COMMITTED TO SUSTAINABLE PRODUCTIVITY

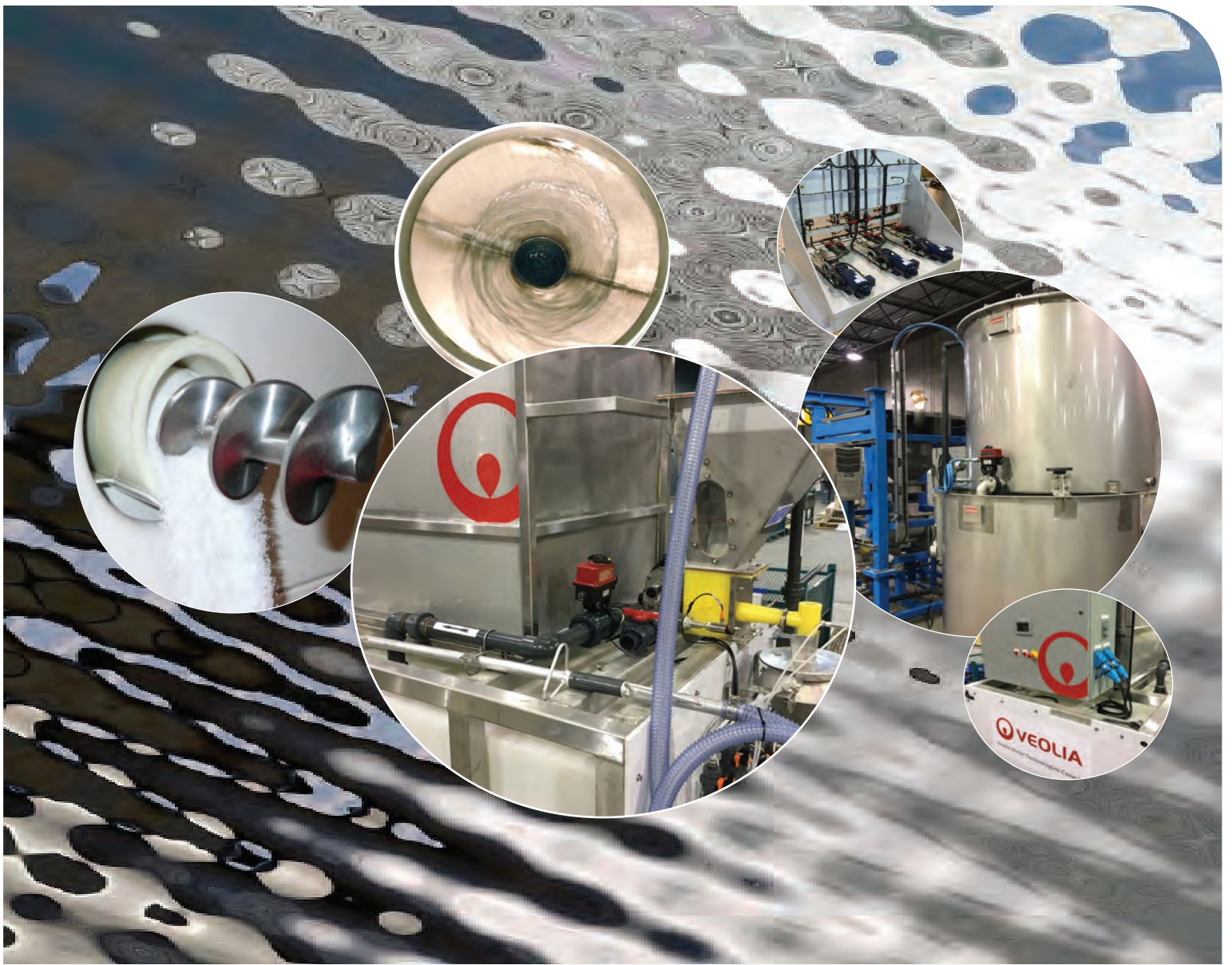
We stand by our responsibilities towards our customers, towards the environment and the people around us. We make performance stand the test of time. This is what we call – Sustainable Productivity.



ISO 9001 • ISO 14001
OHSAS 18001
ISO 22000

www.atlascopco.com





HydraPol™

Dry Polymer Make-up Systems

WATER TECHNOLOGIES

Overview

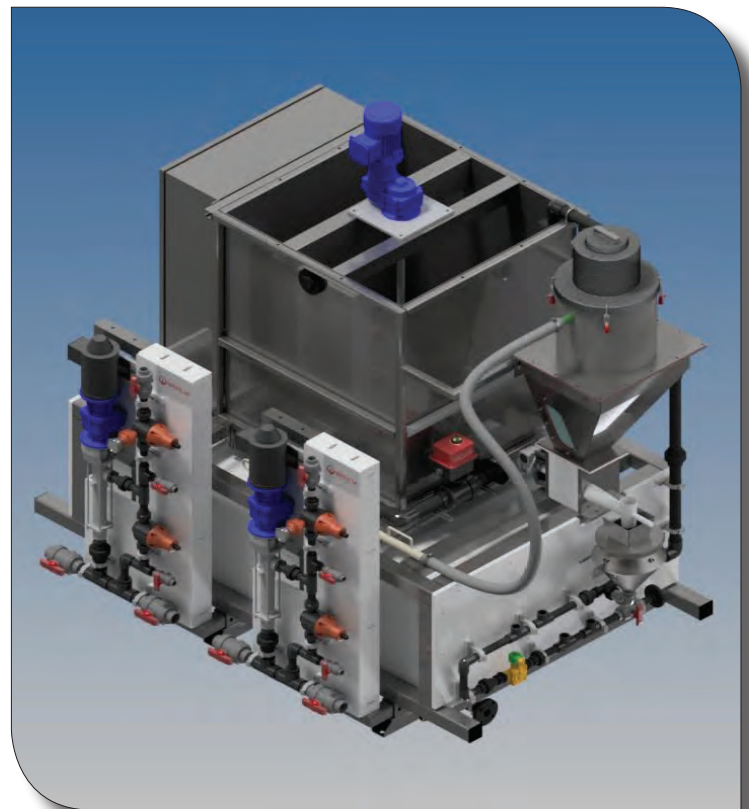
Veolia's HydraPol™ dry polymer make-up and dosing systems are designed to prepare and activate any type of dry polymer. Equipped with a volumetric feeder, the HydraPol™ introduces dry polymer (from 25 kg/50 lbs bags or super sacks) into the dampening system. The output of the volumetric feeder is equipped with an automatic shut-off valve which prevents all contact between the dry polymer and moisture.

The optimal activation of the dry polymer is ensured by multiple shearing zones, initiated through an effective high shear pre-wetting stage to enhance the reaction of polymer chains. This eliminates the formation of polymer lumps and greatly reduces the risks of clogging. The pre-wetting stage consists of a cone shaped stainless steel vortex for instantaneous dry polymer dispersion in water. Pre-wetted particles of polymer are then transported via an eductor, to the mixing tank.

In the mixing tank, the polymer solution is continuously activated with a low shear agitator. Veolia customizes the speed of the agitator and the diameter of the propeller, based on the geometry of the tank, to ensure optimal activation of polymer. Once the polymer is properly mixed, the solution is transferred to the storage tank. The mixing and storage tanks are mounted on top of each other to reduce total footprint (up to model HP4000). All operations are fully automated through a customizable control panel for easy management of polymer preparation.

HydraPol™ Compact

- Compact integrated design for specific applications
- Standard pre-engineered models with defined packaged options
- Small footprint, all pre-wired and pre-piped
- Manual or vacuum dry polymer handling
- Easy to install, operate and maintain
- Easy integration of dosing skids



HydraPol™ Flex

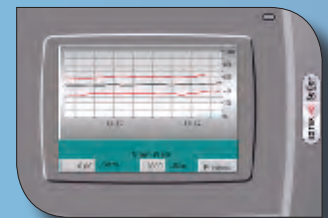
- Modular design to suit a wide range of applications requirements
- Customizable control panel to govern operational sequences
- Handling system adapted to customer needs: vacuum or super-bag unloader
- Stacked tank design resulting in a reduced footprint
- Easy maintenance



System Capacity		0.2% Solution				0.5% Solution			
MODEL	Concentration	45 min		90 min		45 min		90 min	
	Maturation Time	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
HydraPol™ Compact 500		1.5	(3.3)	0.78	(1.7)	3.7	(8.1)	1.9	(4.2)
HydraPol™ Compact 1000		2.3	(5.0)	1.2	(2.6)	5.4	(11.8)	2.9	(6.4)
HydraPol™ Flex 250		0.72	(1.6)	0.37	(0.8)	1.8	(3.9)	0.92	(2.0)
HydraPol™ Flex 500		1.1	(2.4)	0.58	(1.3)	2.7	(6.0)	1.4	(3.1)
HydraPol™ Flex 750		1.6	(3.6)	0.87	(1.9)	4.0	(8.7)	2.1	(4.7)
HydraPol™ Flex 1000		2.1	(4.7)	1.2	(2.5)	5.1	(11.2)	2.8	(6.2)
HydraPol™ Flex 1250		2.6	(5.6)	1.4	(3.1)	6.1	(13.3)	3.4	(7.5)
HydraPol™ Flex 1500		3.0	(6.5)	1.7	(3.7)	7.0	(15.4)	4.0	(8.8)
HydraPol™ Flex 1750		3.4	(7.5)	1.9	(4.2)	7.9	(17.4)	4.6	(10.2)
HydraPol™ Flex 2000		4.1	(9.0)	2.2	(4.9)	10.0	(22.1)	5.5	(12.1)
HydraPol™ Flex 2500		4.9	(10.8)	2.7	(6.0)	12.1	(26.6)	6.8	(14.9)
HydraPol™ Flex 3000		5.8	(12.7)	3.3	(7.2)	14.1	(31.0)	8.1	(17.7)
HydraPol™ Flex 3500		6.5	(14.2)	3.7	(8.2)	15.7	(34.6)	9.2	(20.1)
HydraPol™ Flex 4000		7.2	(15.8)	4.2	(9.2)	17.5	(38.5)	10.3	(22.7)
HydraPol™ Flex 9000		14.5	(31.9)	8.9	(19.5)	34.3	(75.5)	21.4	(47.1)
HydraPol™ Flex 15000		19.1	(41.9)	12.9	(28.4)	44.4	(97.6)	30.8	(67.7)

Hydra-Stat

- Real-time polymer activation monitoring
- Prevents process downtime
- Validates operation and system performance
- Optimizes polymer consumption (ROI)



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Veolia Water Technologies

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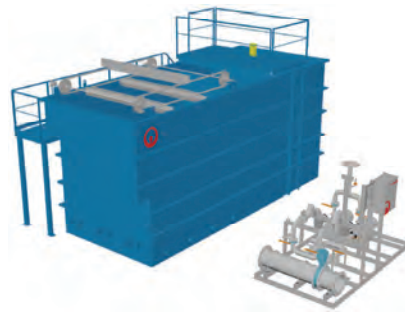
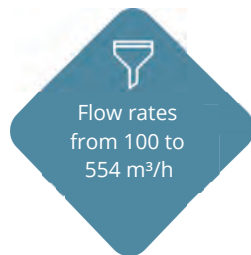
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SPIDFLOW™ Pack

Rapid Dissolved Air Flotation

SPIDFLOW® PACK is the new generation of standardized rapid flotation packaged plant. This product range is based on the Spidflow™ process developed by Veolia that uses « white water » special nozzles for unequalled water clarification efficiency. This package plant is integrating the continuous innovation carried out by Veolia in order to always stay on the cutting edge to meet customer needs and performance excellence. It comprises a flocculation step and a clarification phase. The fast flocculation stage use a Turbomix®, especially effective when dealing with cold water.



FEATURES & BENEFITS

- Very compact unit
- High removal efficiency : up to 99% of algae removed, 90% of dissolved oils and hydrocarbons and 95% of TSS
- A significant reduction of the water clogging ability, thanks to excellent clarified water SDI.
- A direct concentration of floating sludge of 25 g/l on average, which does not require an additional thickening stage.
- Extremely quick start-up time: reaches treatment efficiency within few minutes
- Efficient in cold water application
- Flotation velocity up to 35 m/h
- Highly reactive to water quality variation
- Use of multiphasic pump to produce white water: no need for pressurized vessel



APPLICATIONS

- Pretreatment of seawater desalination before a granular or membrane filtration
- Clarification of surface or ground water containing up to 200 mg/l of suspended solids during episodic peak
- Colorful and rich in algae water, organic matter and humic substances
- Process water clarification step



OPTIONS

- Materials of construction suitable for seawater treatment in coastal area
- Access Platform
- Ladder or stairs

HYDREX™ CHEMICALS

Hydrex™ 6000 water treatment chemicals from Veolia Water Technologies should be used for optimized operation.

ASSOCIATED SERVICES

Local after-sales service and support teams offer preventative and corrective maintenance programs to ensure the long-term, efficient operation of installed plant.





System Operating Parameters

Model	Unit	SFP500-F	SFP600-F	SFP700-F	SFP800-F
Min Feed Flowrate	m³/h	100.00	145.00	200.00	300.00
Max Feed Flowrate	m³/h	186.00	271.00	372.00	554.00
Flocculation Zone Volume	m³	19.00	28.50	38.30	58.50
Injection Zone Surface	m²	1.80	2.50	3.60	5.25
Injection Zone Volume	m³	4.60	6.10	8.60	11.50
Number of White Water Nozzles	-	24	36	48	64
Flotation Surface	m²	6.00	8.75	12.00	17.50
Min White Water Flowrate	m³/h	20.94	30.95	45.62	56.65
Max White Water Flowrate	m³/h	23.09	34.63	47.40	58.29
White water skid model	-	C	D	E	E
Installed Power	kW	11.60	15.78	19.83	19.83
Absorbed Power	kW	10.48	13.71	17.10	19.02

Dimensions (unit in operation)

Model	Unit	SFP500-F	SFP600-F	SFP700-F	SFP800-F
Total Installed Length	m	7.60	8.70	9.70	12.00
Total Installed Width	m	2.70	3.20	3.70	4.20
Total Installed Height	m	4.70	4.70	4.70	4.70
Empty Weight	kg	9 000	10 000	12 000	14 000
Operating Weight	kg	54 000	76 000	102 000	147 000
White water skid Length	m	3.90	3.90	3.90	3.90
White water skid Width	m	2.00	2.00	2.00	2.00
White water skid Height	m	1.90	1.90	1.90	1.90
White water skid Empty Weight	kg	1 100	1 200	1 300	1 400
White water skid Operating Weight	kg	1 700	1 800	1 900	2 000

Pipes Connections

Model	Unit	SFP500-F	SFP600-F	SFP700-F	SFP800-F
Feed	DN	250	300	350	400
Drain ⁽¹⁾	DN	Fc - 50 In - 25 Ft - 50	Fc - 50 In - 50 Ft - 50	Fc - 50 In - 50 Ft - 65	Fc - 65 In - 50 Ft - 65
Number of Outlet Pipes	-	2	2	2	3
Outlet	DN	250	300	350	350
White Water Skid Outlet	DN	50	65	80	100

(1) Fc - Flocculation In - Injection Ft - Flotation

Feed water requirements

Parameter	Unit	Value
Minimum water temperature ⁽²⁾	°C	+10
Maximum water temperature	°C	+35
Maximum Inlet particle size	mm	2
Maximum Inlet TSS ⁽³⁾	mg/l	50
Maximum Inlet Turbidity ⁽³⁾	NTU	30

(2) Please consult SOLYS for lower temperatures.

(3) 200 mg TSS/l and 100 NTU acceptable for up to 1h maximum, 3 times per year maximum.

Power requirements⁽⁴⁾

Parameter	Unit	Value
Voltage	V	400
Frequency	Hz	50
Phases	-	3

(4) Other voltage or frequency available on request.

SPIDFLOW™

- A new generation of rapid flotation



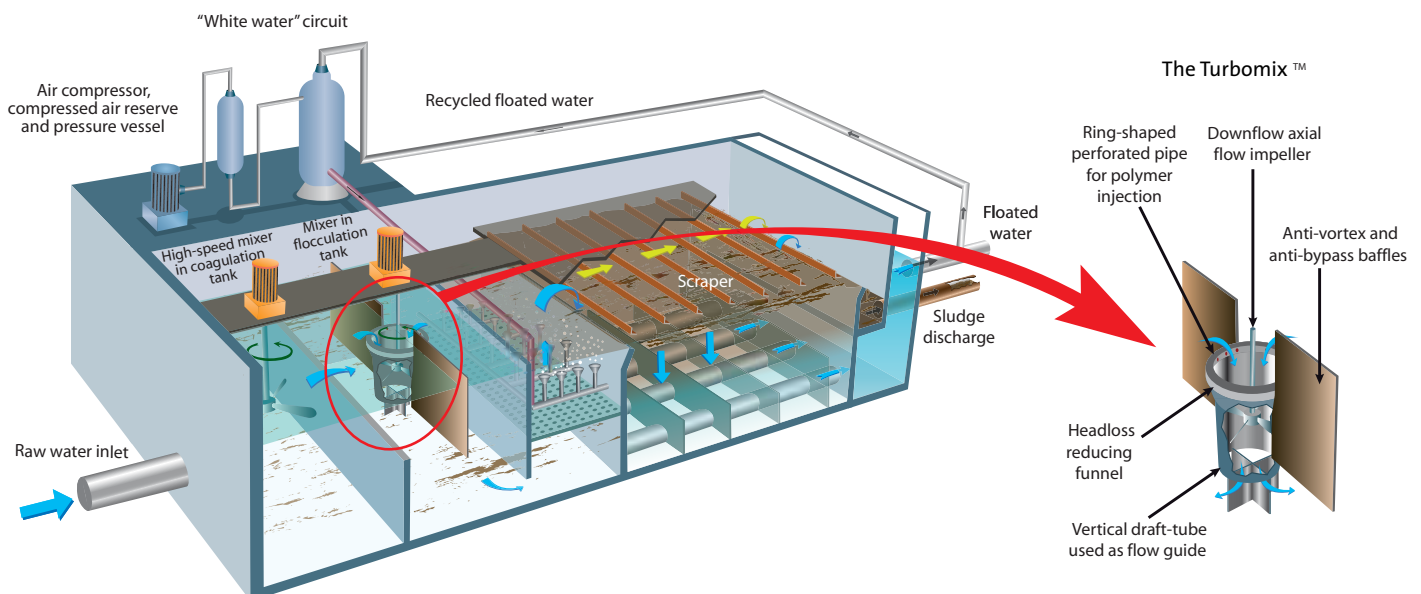
Clarification of water containing low density particles is a delicate step, especially during episodes of fast algae growth.

This is why Veolia Water Solutions & Technologies has developed Spidflow™, a new generation of rapid and compact flotation units that can produce high-quality drinking or process water.

No matter the kind of water resources to be treated, Spidflow™ effectively removes colour, organic matter and algae, even when present in high concentrations.

●●● The Spidflow™ process

- Spidflow™ comprises a coagulation stage, followed by a flocculation step and a clarification phase through fast flotation. The flocculation stage may also use a Turbomix™ when dealing with cold water.
- The fine air bubbles, formed by pressurising air in water (at pressures of 5 to 6 bar) when producing white water, are injected into the Spidflow™ flotation units through a dedicated distribution system. This ensures the separation of Suspended Solids (SS), algae, oil, and hydrocarbons, which are trapped in hydroxide flocs formed by the addition of coagulant.
- The hydraulic sequencing of the various compartments of the Spidflow™ process has been designed in accordance with specific Computerized Fluid Dynamics (CFD) type studies. Spidflow™ has a floor for the distribution of flocculated water, which is located before the mixing step with white water. It also includes anti-spiral flow plates that break down any short circuits and collection lines which uniformly distribute water flow.
- This unparalleled process optimisation ensures that Spidflow™ achieves levels of treatment efficiency which allow it to operate at clarification rates between 30 and 50 m/hour.



SPIDFLOW™



Applications

- Spidflow™ fits specifically well **seawater desalination pretreatment**, as an upstream step of a reverse osmosis membrane treatment chain. Spidflow™ is especially efficient during red tide algal bloom periods.
- This process significantly maximises filtration cycles duration following pretreatment steps and protects reverse osmosis membranes against ill-timed clogging. As a result, Spidflow™ guarantees very low SDI (Silt Density Index) figures that remain stable over time.
- Spidflow™ is also an excellent solution for:
 - Clarifying **surface water** (from lakes, dams, or rivers), containing up to 80 mg/l of SS in occasional peaks, into drinking water.
 - Severe cyanotoxine and/or pesticide issues management. Spidflow™ can in this context be used in association with Powdered Activated Carbon (PAC). The addition of PAC noticeably increases Spidflow™ range of use and enables various organic micro-pollutants to be removed by adsorption.
 - **Underground water treatment** (turbidity, Fe, Mn, H₂S), while re-oxygenating it.
- To meet the needs of large capacity production plants, Spidflow™ is installed in concrete works.

The process is also available as Spidflow™ Package Plant, in a metal, modular and compact version. This specific product range is ideal for industrial installations with small treatment capacity.

References

For seawater desalination:

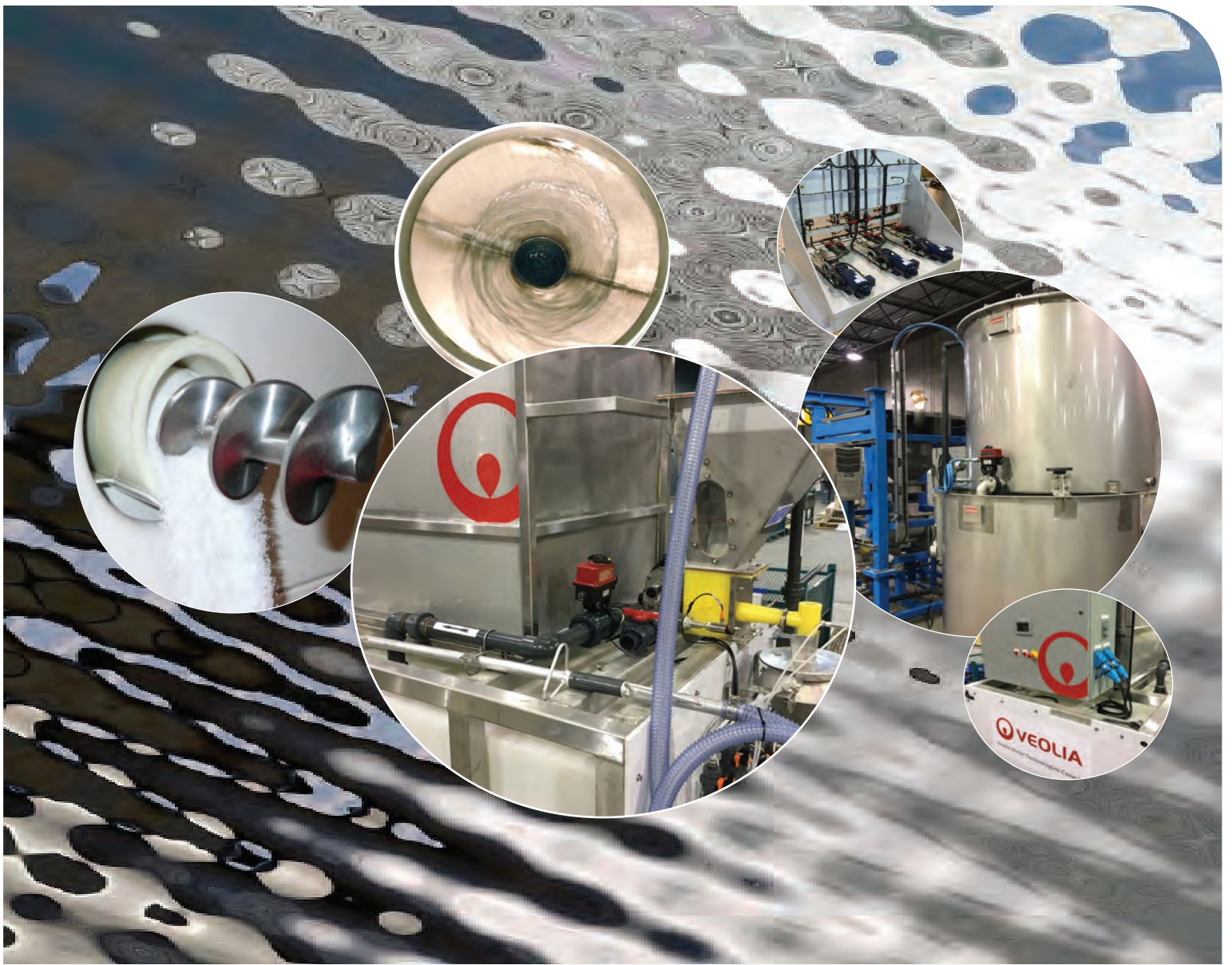
- Fujairah 2, United Arab Emirates (2010), 369,000 m³/day
- RWE Power Production Plant, Eemshaven, The Netherlands (2011) 30,000 m³/day

For drinking water production:

- Annet sur Marne, France (2009), 2,400 m³/day
- Toulon La Valette, France (2010), 67,760 m³/day
- Kermorvan, France (2011), 6,000 m³/day

Advantages

- Even without the additional use of polymers, Spidflow™ provides unequalled water treatment efficiency by eliminating:
 - ▶ Over 99% of algae
 - ▶ Over 50% of organic matters
 - ▶ Over 90% of colour
 - ▶ And over 90% of oils and hydrocarbons, making Spidflow™ an excellent protection system for installations in locations that are sensitive to unplanned petrochemical releases (hold blasting and ballast discharges).
- A significant reduction of the clogging ability of water, thanks to excellent clarified water SDI.
- A direct concentration of floating sludge of 30 g/l on average, which does not require an additional thickening stage.
- A flexible and highly reactive solution to variations in the quality of water to be treated, thanks to full and extensive automation.
- Competitive operating costs, thanks to a well-managed energy consumption and a moderate use of chemicals.
- Limited footprint, allowing Spidflow™ to be installed in treatment plants of all sizes, including during retrofitting of installations.
- Full-time operating reliability as well as simplified maintenance and operation.



HydraPol™

Dry Polymer Make-up Systems

WATER TECHNOLOGIES

Overview

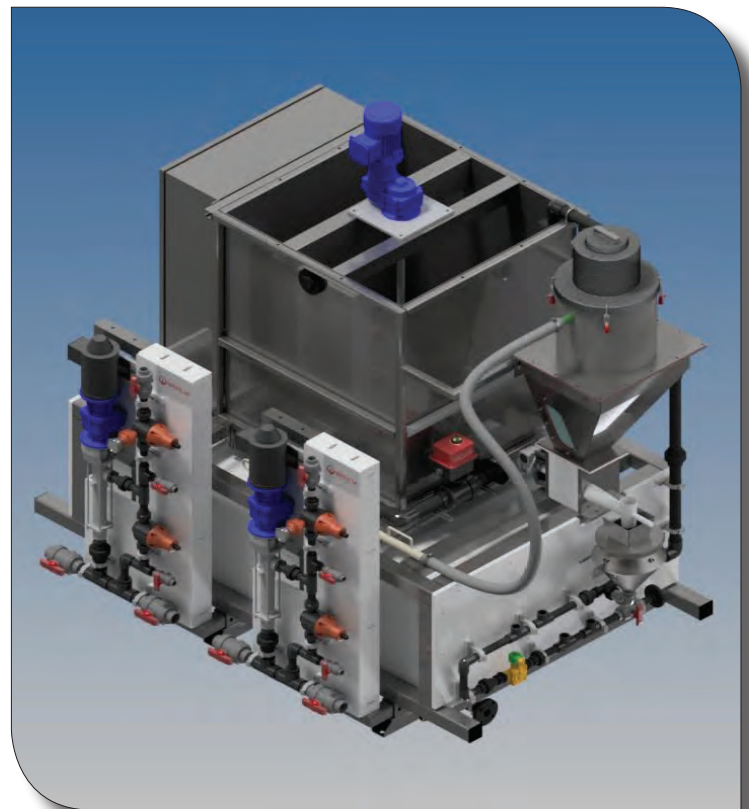
Veolia's HydraPol™ dry polymer make-up and dosing systems are designed to prepare and activate any type of dry polymer. Equipped with a volumetric feeder, the HydraPol™ introduces dry polymer (from 25 kg/50 lbs bags or super sacks) into the dampening system. The output of the volumetric feeder is equipped with an automatic shut-off valve which prevents all contact between the dry polymer and moisture.

The optimal activation of the dry polymer is ensured by multiple shearing zones, initiated through an effective high shear pre-wetting stage to enhance the reaction of polymer chains. This eliminates the formation of polymer lumps and greatly reduces the risks of clogging. The pre-wetting stage consists of a cone shaped stainless steel vortex for instantaneous dry polymer dispersion in water. Pre-wetted particles of polymer are then transported via an eductor, to the mixing tank.

In the mixing tank, the polymer solution is continuously activated with a low shear agitator. Veolia customizes the speed of the agitator and the diameter of the propeller, based on the geometry of the tank, to ensure optimal activation of polymer. Once the polymer is properly mixed, the solution is transferred to the storage tank. The mixing and storage tanks are mounted on top of each other to reduce total footprint (up to model HP4000). All operations are fully automated through a customizable control panel for easy management of polymer preparation.

HydraPol™ Compact

- Compact integrated design for specific applications
- Standard pre-engineered models with defined packaged options
- Small footprint, all pre-wired and pre-piped
- Manual or vacuum dry polymer handling
- Easy to install, operate and maintain
- Easy integration of dosing skids



HydraPol™ Flex

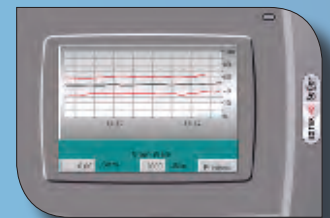
- Modular design to suit a wide range of applications requirements
- Customizable control panel to govern operational sequences
- Handling system adapted to customer needs: vacuum or super-bag unloader
- Stacked tank design resulting in a reduced footprint
- Easy maintenance



System Capacity		0.2% Solution				0.5% Solution			
MODEL	Concentration	45 min		90 min		45 min		90 min	
	Maturation Time	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
HydraPol™ Compact 500		1.5	(3.3)	0.78	(1.7)	3.7	(8.1)	1.9	(4.2)
HydraPol™ Compact 1000		2.3	(5.0)	1.2	(2.6)	5.4	(11.8)	2.9	(6.4)
HydraPol™ Flex 250		0.72	(1.6)	0.37	(0.8)	1.8	(3.9)	0.92	(2.0)
HydraPol™ Flex 500		1.1	(2.4)	0.58	(1.3)	2.7	(6.0)	1.4	(3.1)
HydraPol™ Flex 750		1.6	(3.6)	0.87	(1.9)	4.0	(8.7)	2.1	(4.7)
HydraPol™ Flex 1000		2.1	(4.7)	1.2	(2.5)	5.1	(11.2)	2.8	(6.2)
HydraPol™ Flex 1250		2.6	(5.6)	1.4	(3.1)	6.1	(13.3)	3.4	(7.5)
HydraPol™ Flex 1500		3.0	(6.5)	1.7	(3.7)	7.0	(15.4)	4.0	(8.8)
HydraPol™ Flex 1750		3.4	(7.5)	1.9	(4.2)	7.9	(17.4)	4.6	(10.2)
HydraPol™ Flex 2000		4.1	(9.0)	2.2	(4.9)	10.0	(22.1)	5.5	(12.1)
HydraPol™ Flex 2500		4.9	(10.8)	2.7	(6.0)	12.1	(26.6)	6.8	(14.9)
HydraPol™ Flex 3000		5.8	(12.7)	3.3	(7.2)	14.1	(31.0)	8.1	(17.7)
HydraPol™ Flex 3500		6.5	(14.2)	3.7	(8.2)	15.7	(34.6)	9.2	(20.1)
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Hydra-Stat

- Real-time polymer activation monitoring
- Prevents process downtime
- Validates operation and system performance
- Optimizes polymer consumption (ROI)



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SEPARATION

EFFICIENT SLUDGE THICKENING AND DEWATERING FOR THE ENVIRONMENT INDUSTRY

DECANTER CENTRIFUGE D

ANDRITZ

ENGINEERED SUCCESS

Centrifugation, an efficient solution to solve your dewatering and thickening tasks

Centrifugation is a mechanical separation process in which two or more materials are separated using centrifugal forces. The demands of a centrifuge depend strongly on the specific application (e.g. flow rates and solids load), the material characteristics (e.g. particle size and abrasion behavior), and the operating environment (e.g. explosion-proof design).



Each machine in the ANDRITZ decanter centrifuge family benefits from an application-specific design. Whether your goal is to separate solids from liquids, two liquids from each other, or even to accomplish both tasks at the same time, our application specialists have an optimal design for you. Thanks to decades of experience with continuously evolving machine designs, our top-of-the-class decanter centrifuges ensure reliable and efficient performance.

FILTRATION VERSUS SEDIMENTATION

Compared to filtration equipment, centrifugal sedimentation equipment can often achieve the same capacity at a lower investment cost. The sedimentation process can also reach higher flow rates in a continuous mode. Wide variations in feeding parameters can also be accepted.

In sedimentation processes, consumables, such as filter media in filtration processes, are not used. Better capture rates can be achieved by centrifugal sedimentation as washing cycles in the filtration process could reduce the final product capture rate. Sedimentation processes are better able to handle complex products, especially compressible ones, which are difficult to separate in filtration processes.

Washing of sedimentation equipment is easier than with filtration equipment because the filtration equipment's wash water is under pressure, thus larger quantities are used.





ANDRITZ

ANDRITZ
DECANTER
CE

Decanter with low
energy consumption
features

Get more results with less energy

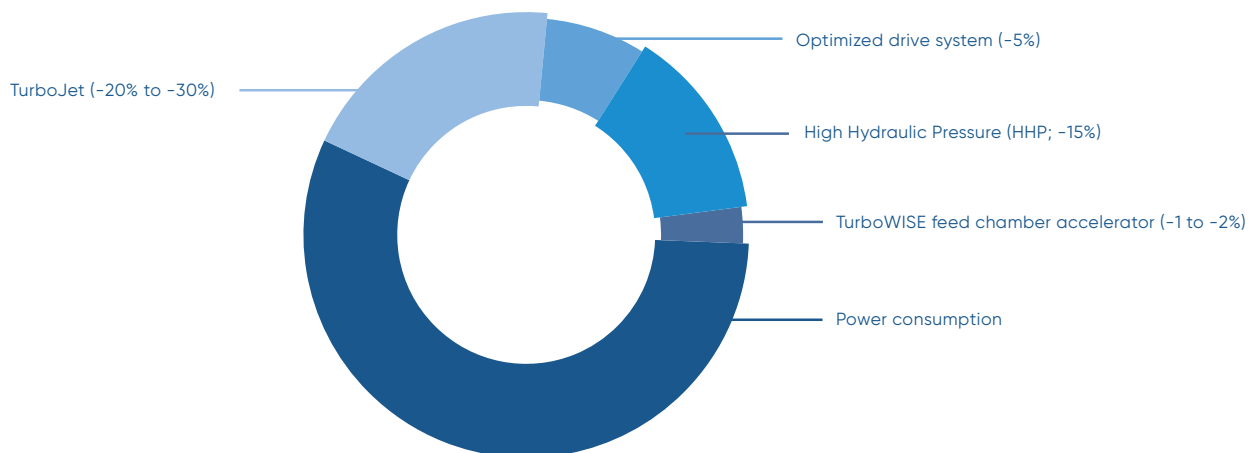
We put all our energy into delivering the best separation equipment so that you never have to waste energy in your decanter centrifuge.

Energy efficiency

The ANDRITZ decanter centrifuge D has always been at the cutting edge of energy efficiency. We have shaped and improved today's industry standards through a number of technological innovations.

KEY ENERGY-SAVING FEATURES

- The High Hydraulic Pressure (HHP) design of the rotating assembly reduces the discharge radius of the clarified liquid (centrate). Besides improved separation characteristics, this design helps to recover the kinetic energy of the fluid to reduce energy consumption by up to 15%.
- Working the same way as a jet engine, the TurboJet weir plates recover the remaining kinetic energy of the clarified liquid. By creating liquid jets pointing in the opposite direction to the bowl rotation, the reaction force thus supports bowl rotation. The TurboJet weir plate reduces total power consumption by up to 30% as a stand-alone feature.
- As a standard feature, ANDRITZ offers two drive systems: a regenerative back drive and a direct drive. Whereas common back drive systems dissipate the braking energy of the scroll into heat, the regenerative back drive recovers this energy and feeds it back to the main motor. The direct drive system feeds the scrolling power directly to the scroll and therefore avoids recirculation losses, thus reducing total power consumption by another 5%.
- The unmatched TurboWISE solution is key to performance in the raw material feed chamber. The polyurethane liners of the TurboWISE system can be replaced easily on site and serve to accelerate the incoming slurry efficiently. The computational fluid dynamic optimization ensures lowest flocculant consumption, significantly reduced wear, and decreases the total power consumption again by up to 2%.



Energy-saving features

What's your separation challenge?

ANDRITZ decanter centrifuges are suitable for different processes.

DEWATERING

The ANDRITZ decanter centrifuge D is the most versatile of all existing solid/liquid separation technologies, and can be tailored to meet your target dry solids content. The decanter makes it possible to produce both thickened sludge and extremely dry cake from highly diluted sludge. Some Thermal Hydrolysis Process (THP) plant projects, for example, use it to achieve pre-dewatering (upstream thermal lysis step) and thickening during the same process stage. Others use this dual functionality to run the ANDRITZ decanter centrifuge D in thickening mode during the period in which liquid sludge can be spread on the fields, and in dewatering mode when it is forbidden to spread liquid sludge on the fields. Pig manure separation also falls

into this category. The ANDRITZ decanter centrifuge D is capable of producing clarified liquid with a capture rate of more than 80% TSS, while at the same time producing dewatered solids with a very specific granularity necessary for efficient composting.

THICKENING

As with all sludge dewatering and thickening technologies, performance of the ANDRITZ decanter centrifuge D is affected by the conditioning process, such as polymer type and dosage. But unlike other sludge separation technologies, the ANDRITZ decanter centrifuge D can still achieve a high solid/liquid separation rate in many applications without slurry pre-conditioning.



CLARIFICATION

The ANDRITZ decanter centrifuge D combines two significant advantages: high g-force capability and a specific HHP rotor design. The HHP rotor design helps to manage internal solids transportation, making it possible to utilize g-force capabilities to their fullest. All applications benefit from this approach, particularly food production processes such as juice clarification, which demand a high degree of separation at all times.

CLASSIFICATION

The ANDRITZ decanter centrifuge D can also be used in classification processes in all industries – from mining & minerals to food, chemical, and environmental applications. One such application is the classification

of sand contained in sludge before being processed in a wet oxidation unit.

3-PHASE SEPARATION

The ANDRITZ decanter centrifuge D can also be used for 3-phase separation, in which the centrifugal force is used to separate liquids and solids with different densities, or to separate light liquid phase and heavy liquid phase from solids. Many ANDRITZ decanter centrifuges D in three phases design are used in applications ranging from slop oil and animal fat separation to olive oil and palm oil. Our machines are designed to support high-temperature processes, up to almost 100°C, to achieve the highest separation rate efficiency.



Getting to know your ANDRITZ decanter centrifuge D

Design optimized to the very smallest detail to provide best results, while ensuring ease of maintenance and providing modularity for optimum fit to your needs.



SCROLL

The scroll of the ANDRITZ decanter centrifuge D is the most flexible scroll available on the market. Its specific open flight design reduces the torque created by the sludge and maximizes the clarification rate. The special cone design leads to high sludge compaction.

- Reduction of sludge conveying torque by 30%, which impacts the gear box lifetime and the scroll drive size positively.
- High cake dryness due to better sludge compaction.
- Excellent centrate quality due to minimized internal turbulences and maximized settling volume.



BOWL

The bowl design is carefully selected to balance the various needs for integrity, stability, smooth operation, minimized windage, high durability, low wear, and easy maintenance, while ensuring the principle process functions. The design is modular to allow an easy fit to different basic process conditions by adjustment of diameter, length, and cone angle. The overall design is optimized to minimize the power consumption and provide the best possible stiffness. ANDRITZ decanter centrifuges are not only factory-tested before delivery to a customer's site, but also extensively type-tested according to international standards to meet all product safety requirements.



COVER

Covers protect you against spillage and touching rotating parts, meet the noise radiation and thus are vital safety features. The shape is optimized for easy cleaning and handling. Different options are available to fit in with your needs, be it highest corrosion resistance, lowest noise radiation, or similar.



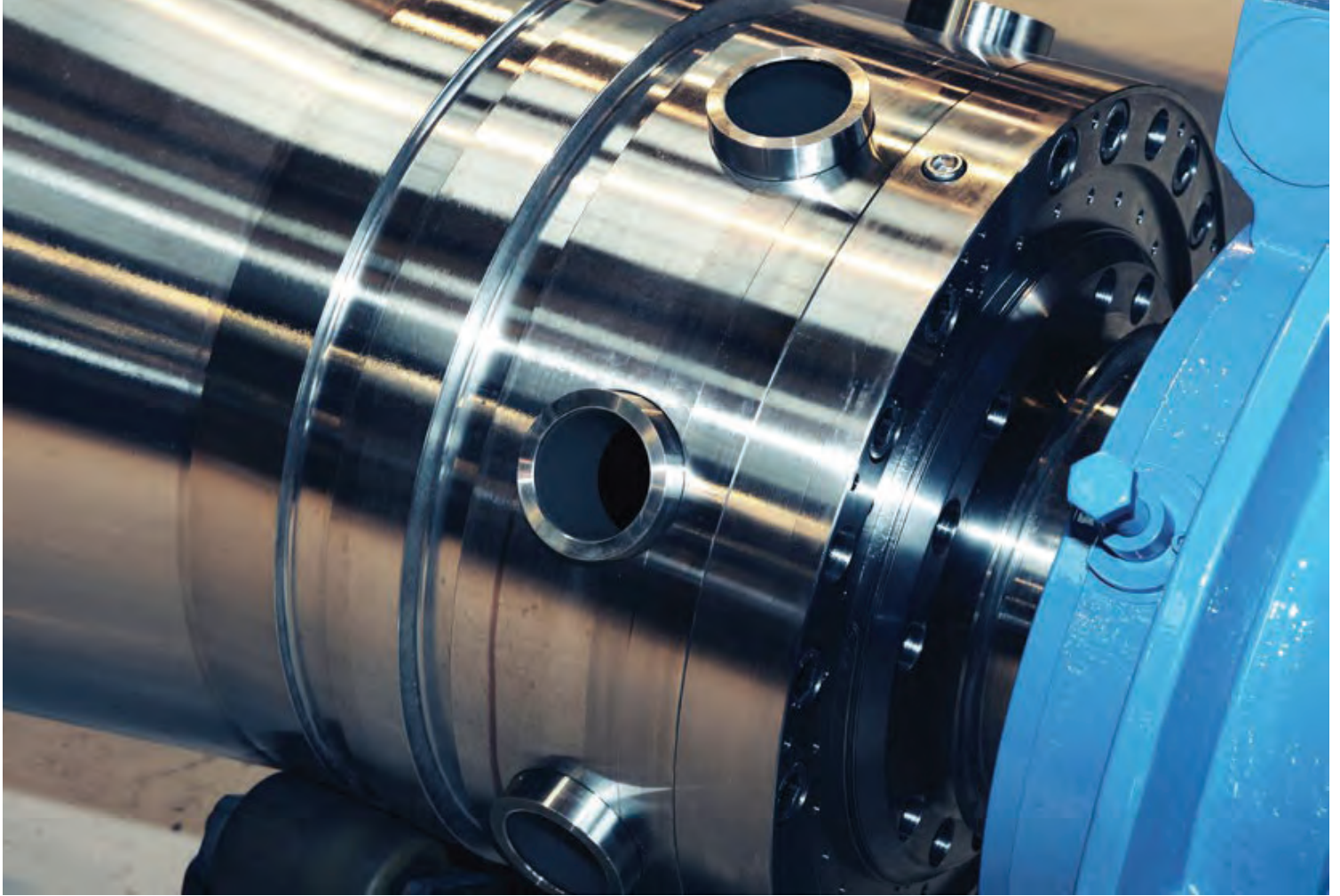
WEAR PROTECTION

The different zones and elements in a decanter that may be subject to higher wear are protected by a carefully composed selection of wear protection means. Depending on the extent of wear, different material compositions, ranging from polyurethane to sintered tungsten carbide elements, are used to protect scroll flights, feed chamber, feed pipe discharge ports, and discharge housing. Your ANDRITZ specialists are glad to offer their expertise in working towards the best combination of protection choice versus cost and selecting the best fit from the wide range of options.



MACHINE CONTROL AND PROTECTION

ANDRITZ decanter centrifuges will be as transparent in operation and for maintenance as you require. From the minimum machine protection to all levels of predictive maintenance information, including bearing conditioning sensors, the recommended minimum configuration depends on your operation and your application environment. It can be scaled to your needs in perfect combination with our addIQ control systems to support optimization of your operation. Our separation specialists seek to make operation and good care of your equipment, ensuring a long service life, blend seamlessly into your work schedule, and will provide fast and precise support should you need it.



High-performance materials: Best protection against wear for extended decanter life cycle

The ANDRITZ decanter centrifuge D is manufactured with advanced wear-resistant materials for a long, continuous life cycle. A variety of materials ensures that your operations are able to withstand high temperatures, heavy-duty products, and corrosive products.

- To protect the bowl, the inner surface has strips or grooves, depending on machine size and application. Bowl outlets are protected with easily replaceable bushings.
 - To protect the screw conveyor, the inside of the feed chamber is coated with tungsten carbide spray or protected with TurboWISE polyurethane inserts. Feed chamber outlets are equipped with replaceable bushings, and the screw conveyor blade has replaceable tiles made of tungsten carbide.
- Good wear protection is a strategic, long-term investment with a guaranteed return.
 - To protect the solids casing, the receiving surface is a thick stainless steel plate with polyurethane or tungsten carbide spray coating, depending on the application.
 - Exchangeable wear parts mean fewer repairs and less downtime, both of which lead directly to reduced maintenance costs.

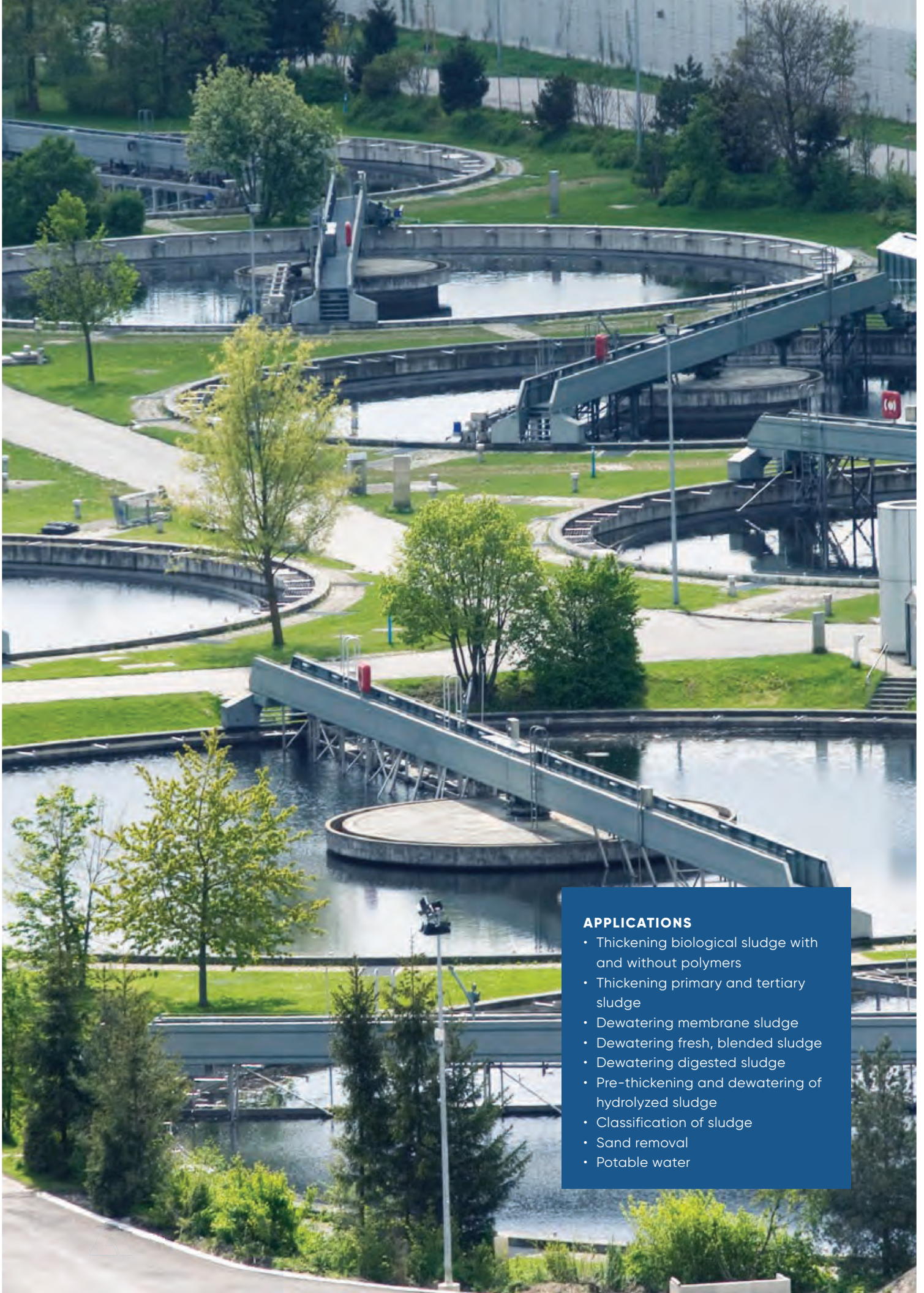


Metris addIQ control system, decades of experience in one box

The addIQ centrifuge control system combines all of our extensive operational, troubleshooting, and start-up experience in one tailored automation solution. The heart of addIQ system is a modular, PLC-based control system that supports you in making the best use of your ANDRITZ equipment.

The addIQ product range is scalable from Eco, Pure up to Prime level and can be run in different operating modes to enhance the performance of your process:

- Optional remote access gives immediate support to your operation and maintenance team.
- Relative speed control allows the operator to enter the speed set points directly. If the feed product concentration is stable, this is the preferred and most efficient control mode.
- Torque control mode ensures constant dryness under varying process conditions. This automatic operation is achieved by a torque feedback algorithm.
- Maintenance and manual operation.
- CIP (Cleaning-In-Place) sequences and an optimized thickening control facilitate the operation of the machine and assure economical best return of the process.
- Alarms and support in troubleshooting.
- Built-in support for trending, documenting, and reporting efficiency is included. Multilanguage functionality is integrated in the operation interface to support communication.



APPLICATIONS

- Thickening biological sludge with and without polymers
- Thickening primary and tertiary sludge
- Dewatering membrane sludge
- Dewatering fresh, blended sludge
- Dewatering digested sludge
- Pre-thickening and dewatering of hydrolyzed sludge
- Classification of sludge
- Sand removal
- Potable water

Municipal wastewater: Reliability and performance guaranteed by experience

In cities all over the world, there is a rising need for efficient processing of wastewater and sludge, combined with increasingly tight regulatory standards and municipal budgets. To tackle these complex and conflicting challenges, you need a partner with the full perspective of your wastewater treatment needs, and an array of reliable solutions to fulfill them. Across all thickening, pre-thickening, and dewatering applications, ANDRITZ has the most experience worldwide with the largest installed base of equipment in operation.

FLEXIBLE HANDLING OF ALL TYPES OF SLUDGE

The ANDRITZ decanter centrifuge D is a high-performance solid bowl decanter centrifuge engineered for sludge treatment. It accepts any type of sludge, making the technology extremely suitable for centralized dewatering plants receiving different sludges from different regions. The centrifuge's unique design is the result of decades of engineering experience together with continuous feedback from our customers and service partners. ANDRITZ decanter centrifuges D provide a unique combination of robust design requirements, high-quality manufacturing, and enhanced maintenance-friendly features.

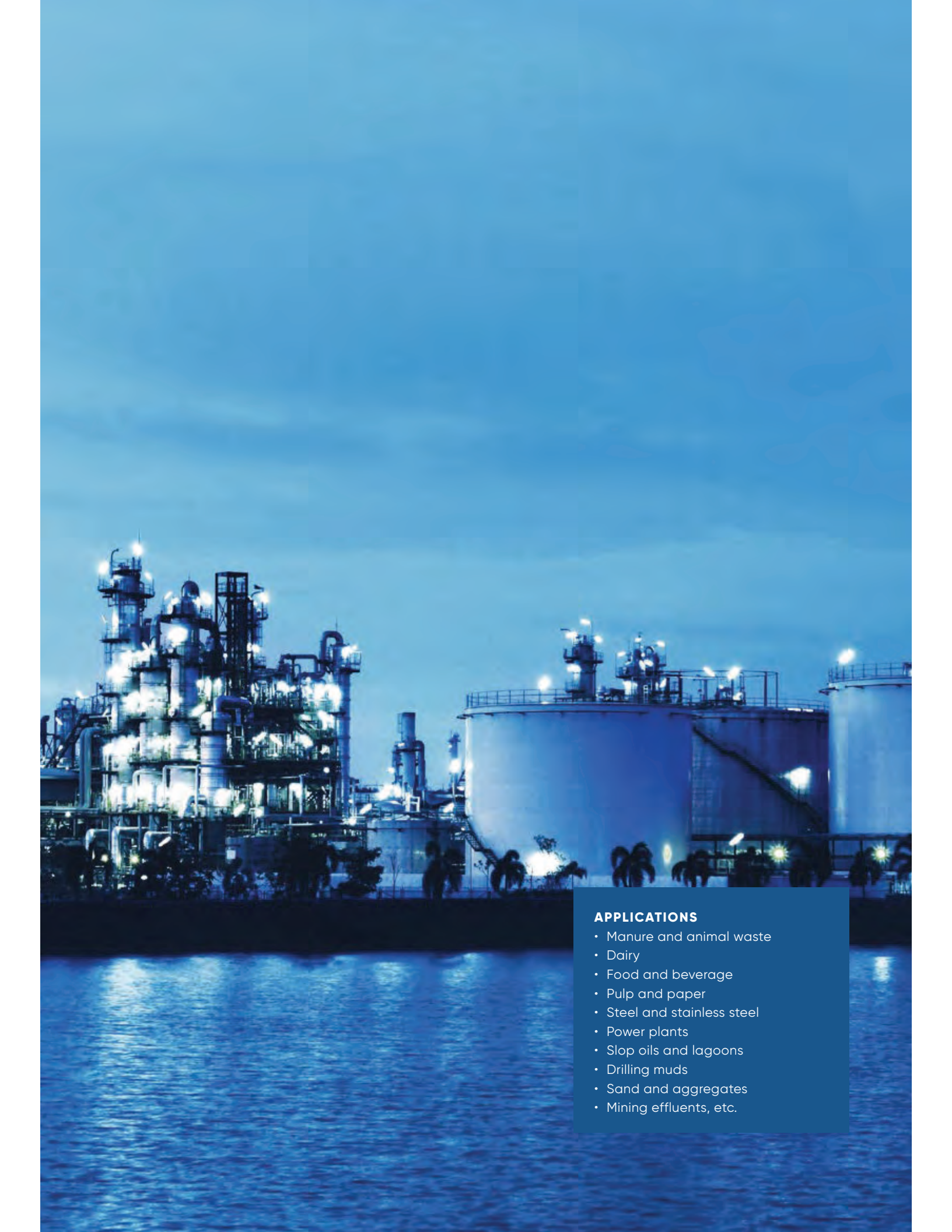
For municipal wastewater treatment plants of all sizes, the final step of sludge treatment is a critical one, accounting for a significant share of the plant's total operating costs. Since this is the last step before the sludge leaves the facility, the equipment must reliably produce stable dewatered sludge while minimizing downtime and maintenance requirements. Medium to large plants will also include a digestion treatment step using either

standard aerobic, anaerobic, or more advanced methods such as pre-hydrolysis sludge treatment.

In each of these cases, the performance of the digester is directly linked to performance of the thickening equipment. ANDRITZ decanter centrifuge D technology is designed to ensure that both thickening and digestion are extremely reliable, flexible, and easily automated.

TURNKEY SOLUTIONS FOR VARIOUS APPLICATIONS

Although each production line must be specially designed, a sludge dewatering line typically includes a sludge feeding system, a polymer preparation and feeding system, dewatered sludge conveying equipment, and a centrifuge. Over the years, we have gained extensive knowledge concerning all types of production facilities and machines to obtain the required final product characteristics. As a result, we offer comprehensive capabilities for the design, support, and supply of your plant's complete dewatering facility – all with one global partner to respond to your needs.



APPLICATIONS

- Manure and animal waste
- Dairy
- Food and beverage
- Pulp and paper
- Steel and stainless steel
- Power plants
- Slop oils and lagoons
- Drilling muds
- Sand and aggregates
- Mining effluents, etc.

Industrial wastewater: All wastewater deserves the right solution

Industrial manufacturing processes generate specific wastewater and residual material flows. Systematic and efficient processing reduces water consumption, conserves raw materials, provides marketable residues, and improves overall efficiency.

VERSATILE SOLUTIONS FOR DIFFERENT TYPES OF WASTEWATER

Organic or non-organic, greasy or oily, corrosive or abrasive, high- or low-solids – all types of content need to be recycled back into the process or discharged into the municipal sewage system. When it comes to industrial wastewater treatment, ANDRITZ provides expertise for each market-specific requirement with a wealth of references and a range of proven solutions.

WATER TREATMENT AND ZERO LIQUID DISCHARGE

Along with the recovery of raw materials, reduced water consumption has become a major topic for most industries. ANDRITZ provides a comprehensive selection of water-conserving and water-recycling solutions based on the unique design of screens, continuous sand filtration technologies, belt presses, centrifuges, and separators.

SLUDGE MANAGEMENT

The sewage sludge produced in organic production processes is often suitable for use as secondary fuel for on-site steam or electricity generation, or for supplying to buyers from energy-intensive industries. In many cases, waste heat can be used to dewater or dry the sewage sludge. Today, there are already large installations that process both their own sewage sludge as well as municipal sewage sludge to generate secondary fuel such as pellets.

SOLID/LIQUID SEPARATION

Every industrial site has to treat its wastewater – even if it does not have its own in-house treatment plant – and performs phase separation, thereby decreasing pollution levels in order to comply with discharge limits or decrease the size of its wastewater treatment plant. In some applications, the solid phase can be reutilized as fertilizer or even be recycled back into the production process. This phase separation process is applicable to mineral as well as organic streams. ANDRITZ offers complete technology packages requiring no further investments and with no environmental impact because no chemicals are used.

SELECT THE BEST TECHNOLOGY FOR THE TOUGHEST CHALLENGE

The ANDRITZ decanter centrifuge D is a high-performance solid bowl decanter centrifuge and one of the market's most versatile technology. Its compact and efficient design makes it possible to customize your solution with a wide range of advanced features. The most suitable configuration is chosen based on the specific industrial waste to be treated. Our vast experience includes the selection of specific construction materials, comprehensive abrasion protection, and 2- or 3-phase separation systems. The standardized design of the ANDRITZ decanter centrifuge D ensures that all configurations perform reliably and cost-efficiently.



Staying ahead in innovation: Test centers and extra focus on R&D

ANDRITZ, with its competence center for decanter centrifuges D in France, operates its own on-site test center to speed up product innovation and reduce the time to release new products and features to customers in a systematic and well-controlled fashion.

With an available area of more than 250 m², this state-of-the-art facility is able to test all kinds of machines (screens, decanters, separators, filter presses, and similar, including mobile units), even at high flow rates exceeding today's market requirements for single units.

Modern instrumentation equipment is available to analyze mechanical and process elements such as effective power, vibration characteristics, noise rating, and more.





A decanter centrifuge for every need

At ANDRITZ, we have one of the largest decanter centrifuge ranges on the market, from D2 centrifuges for small flow to the largest decanter either for municipal or industrial applications.

Range	D2 to D 12
Hydraulic capacity (m ³ /hr)	0.2 to 400
Installed power (kW)	7.5 to 350



D2



D3



D5



D7



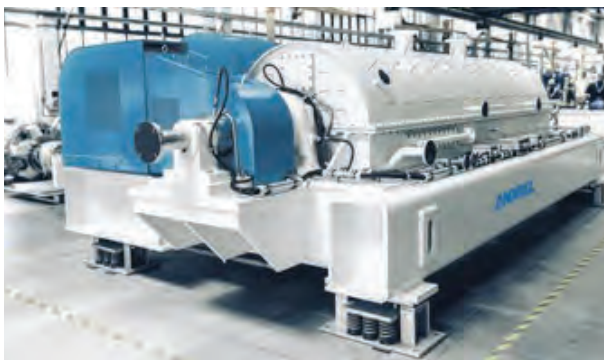
D6 and D10



Container

ANDRITZ decanter centrifuges: The best fit for the widest range of applications

The ANDRITZ decanter centrifuge D is a centrifuge optimized for lowest consumption and highest output to meet the demands of environmental processes. In addition to the environment market, ANDRITZ decanter centrifuges are versatile in order to fit several applications in various industries. For these specific applications, ANDRITZ specialists would recommend you the following units:



The ANDRITZ decanter centrifuge A, a heavy-duty industry machine, rugged and robust, ideal for mining and minerals as well as the chemical industry. The decanter centrifuge A also includes special products such as the screen bowl decanter (AS machine) or ACZ Censor for plastics recycling.

APPLICATIONS

Mining and minerals

- Calcium carbonate
- Potash
- Clay
- Salt
- Coal and tailings
- Aluminum
- Iron and tailings
- Copper and tailings
- Phosphate

Chemicals

- Petrochemicals
- Soda ash
- Mineral and slop oil
- Pigments and dyes
- Agrochemicals
- Specialty chemicals
- Natural rubber and bioplastics
- Pharmaceuticals and cosmetics



The ANDRITZ decanter centrifuge F, designed for the food industry, an optimized machine in three different finishes to meet the most stringent hygienic requirements, including CIP (Cleaning-In-Place) and pressure discharge.

APPLICATIONS

Food

- Beverages
- Dairy
- Vegetable oil
- Animal protein processing
- Functional ingredients
- Industrial fermentation
- Starches and proteins
- Sugar



Laboratory and trials to meet your needs

Could you get more from your existing equipment? Or do changing process conditions demand a completely new approach? At ANDRITZ, we have the knowledge and resources to help you find out. Whether you are looking to maximize efficiency, reduce filtration times, or explore new processes and products, our test facilities worldwide are always at your service. Helping you to optimize residual moisture levels, bulk density, particle size distribution, and more. Always with the latest application knowledge and an unmatched database of process performance analysis.

MISSIONS

- Define process warranty, design from experience
- Build sizing charts, specific sizing study
- Build process knowledge, process expertise
- Check technical feasibility of solid/liquid separation through lab tests
- Check performance by pilot tests on-site

GOALS

- Define and validate technical process warranties, separation performance
- Define technologies, sizing, design for projects according to process
- Technical support for various industries, with main focus on environment, mining and minerals, chemicals, and food





Put our 150 years of OEM experience to work for you

Need to optimize your process? Boost availability? Ensure non-stop productivity? When you work with ANDRITZ, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation. Put our in-depth knowledge of separation equipment and processing to work for you.

VAST EXPERIENCE THROUGH LARGE INSTALLED BASE

With an installed global base of more than 55,000 solid/liquid separation equipment and systems, you can imagine that we take service seriously. Wherever these customers are located, we work very closely with them to maximize uptime and boost efficiency.

WELL-KNOWN OEM BRANDS

Some customers know us as the people with ANDRITZ on our overalls. Others have come to understand that we are the OEM behind former brand names like 3Sys Technologies, Bird, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Frautech, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek, companies who all have been acquired by ANDRITZ. But frankly, we are capable of servicing and supplying spare parts for nearly all brands of solid/liquid separation equipment on the market.

LOCAL SUPPORT BACKED BY GLOBAL EXPERTISE

Our service philosophy is simple: One phone call, one contact person, one dedicated team that speaks your language and knows your equipment and process. This is not an empty promise. It is backed by a network of 550 service specialists for separation equipment and systems as well as service centers all around the world.

A TRUE FULL-SERVICE PROVIDER

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ is your service specialist in all aspects of separation. From initial consulting through to service agreements, process optimization, and training programs, we are always looking for ways to minimize downtime and increase predictability in operations while raising your overall production efficiency. In short, we've got you covered.



LOCAL SUPPORT

Responsive local service centers and field service technicians



REPAIRS & UPGRADES

Optimization of machine and process performance, repair work, retrofitting, and modernization



SECOND-HAND & RENTALS

Certified second-hand and rental machines



TRAINING

Operator training and tailored seminars for operating and maintenance personnel



OEM SPARE PARTS

Filter cloths, spare and wear parts from OEMs or with OEM level quality, all readily available



SERVICE AGREEMENTS

Preventive maintenance, contracts for spare parts, maintenance, inspections, repairs, upgrades, operation, and equipment monitoring



PROCESS OPTIMIZATION

Automation tools and process expertise to boost your profit



LAB AND ON-SITE TESTS

Lab and testing capabilities for process optimization and machine upgrades





WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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**MUNICIPAL AND INDUSTRIAL
DEWATERING APPLICATIONS**

ROTARY PRESS

OPTIMUM-CV





Advantages of operation

- Continuous process
- Equipment totally enclosed, reduced airborne contaminants & odors
- Easy start-up and shut-down procedures
- Very simple to operate
- Minimal supervision required
- Completely automated and can be remotely controlled

Maintenance

- Robust construction
- Small number of mechanical parts
- Slow rotation speed (0.2-2 rpm)
- Reduced corrosive exposure to nearby equipment
- Automated self-cleaning cycle
- Little maintenance

Economy

- Savings on final disposal costs (high dryness)
- Minimal space requirements (small footprint)
- Low maintenance costs
- Reduced labor costs
- Low energy consumption
- Low water usage



ACCESSORIES & MORE

We have developed a wide variety of **customized accessories** for virtually any layout.

Custom-engineered systems for **total plant automation**, catering to every customer's individual needs.

Our engineering team will tackle any project and provide **complete package solutions** for any biosolid handling.

With a host of features tailored to your requirements, Fournier allows you to optimize your business operations.

■ Containerized & skid mounted units

- Complete turnkey projects
- Containerized projects

■ Polymer feed systems

- Liquid or dry-feed polymer
- Manual or fully automated

■ Shaftless screw conveyors

- Screw sizes from 9" to 18"
- Lengths from 5ft to 200ft

■ Sludge pumps & other accessories

- Equipment of any size can be quickly assembled and shipped to your site.





Fournier Industries Inc. has specialized in mechanical equipment manufacturing since 1960. The company's technical abilities and expertise involve product design, lab and pilot testing, commissioning and training.

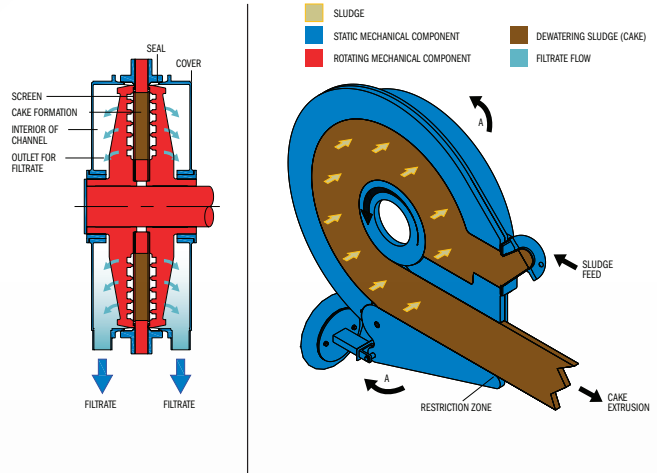
ROTARY PRESS TECHNOLOGY

Fournier Industries Rotary Press technology is at the forefront of municipal and industrial sludge dewatering, the result of continuous improvement and R&D.

Due to its reliability and simplicity, the Fournier Rotary Press requires minimal supervision. It is the only dewatering technology that is safe for stand-alone automatic operation and can be monitored and operated by remote control.

The benefits derived from using the Rotary Press have been well documented and result in lower operating costs for the customer through its high performance, easy operation, reduced polymer usage, low power consumption and low maintenance.

Principle of operation



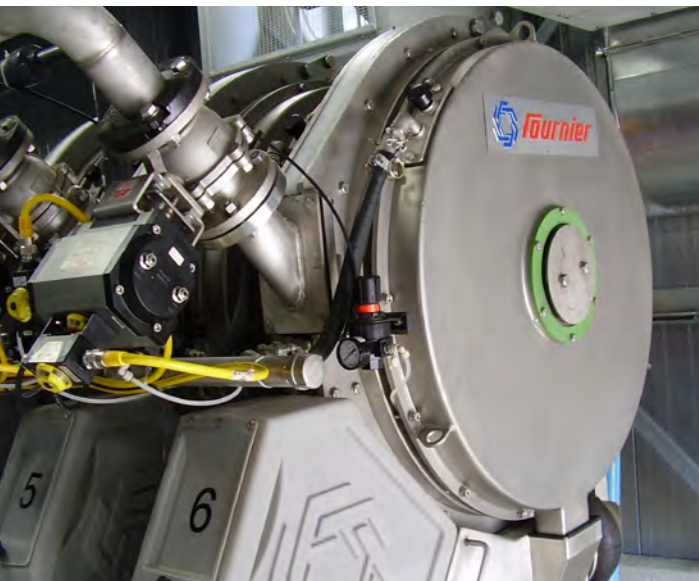
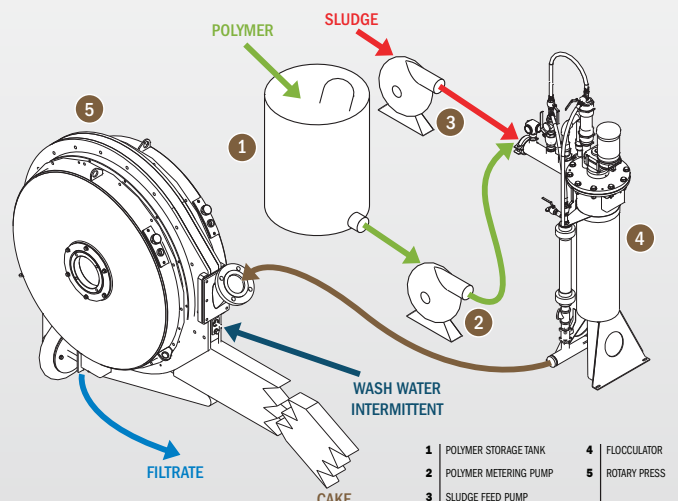
HOW IT WORKS...

The principle of operation is simple. Sludge is fed at low pressure into the channel and rotates between two parallel revolving stainless steel chrome plated filtering elements.

As free water passes through the screens, the sludge continues to dewater as it travels around the channel. The flocculated sludge builds up solids until enough pressure is generated against the outlet restricted arm.

The frictional force of the slow-moving filtering elements, coupled with controlled outlet restriction, generates enough back pressure to dewater the remaining solids, resulting in the extrusion of a very dry cake.

Process schematic



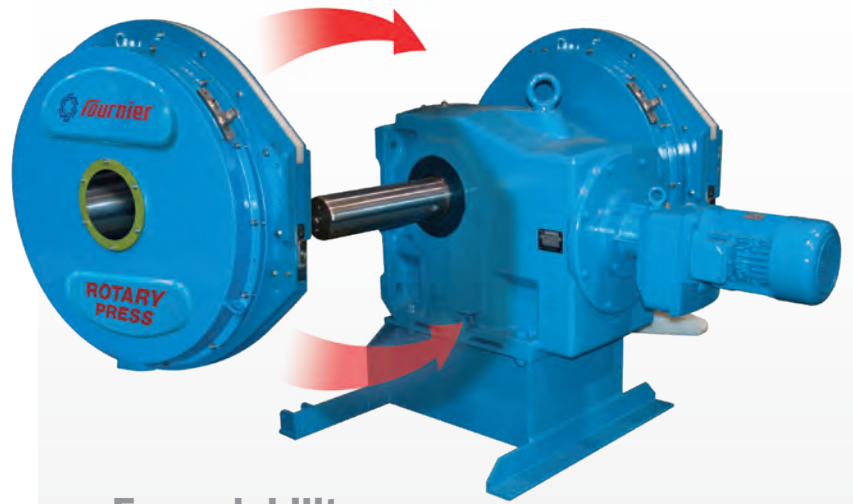
THE ROTARY PRESS CV-OPTIMUM

The Fournier Rotary Press, CV-optimum is the latest development in dewatering technology.

Winner of the 2002 WEF Innovative Technology Award, this Canadian invention has undergone several upgrades over the years.

A single-width channel is able to dewater all varieties of sludge, allowing a single press to be used anywhere, without any physical modification.

To ensure that our customers always get the parts they need quickly & affordably, Fournier Industries maintains a large inventory of spare parts.



Expandability

Another unique feature of the Rotary Press is the ability to order units that can be expanded at a future date. This allows customers to benefit from lower capital costs at time of purchase and expand according to need. Any combination of channels can be obtained, up to maximum of 8 channels per press.

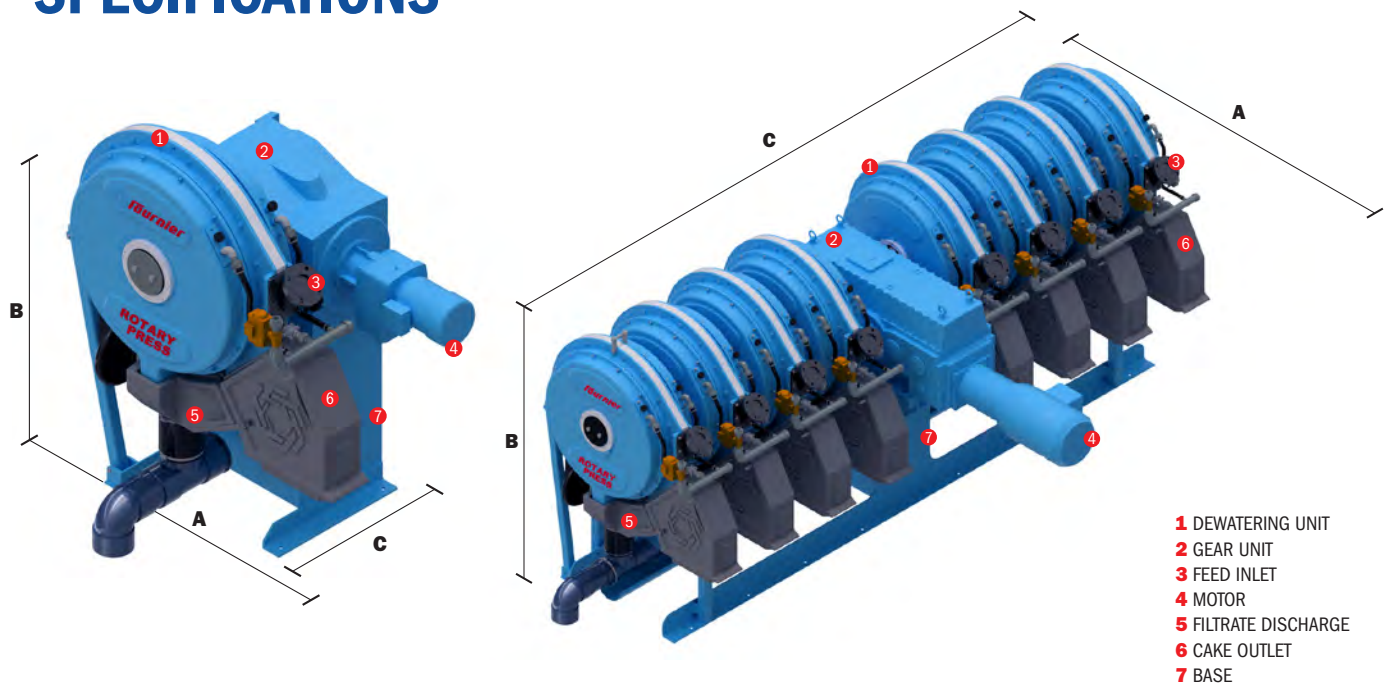


**TURNKEY SYSTEMS DELIVERED ON SKID, FOR SIMPLE,
FAST AND ECONOMIC INSTALLATION**





SPECIFICATIONS



- 1** DEWATERING UNIT
- 2** GEAR UNIT
- 3** FEED INLET
- 4** MOTOR
- 5** FILTRATE DISCHARGE
- 6** CAKE OUTLET
- 7** BASE

MODEL NO.	MODEL	DIMENSIONS In. (mm)			WEIGHT Lb (kg)	MOTOR HP (kW)
	CHANNEL	A	B	C		
1-900/1000CV	1	69 (1745)	72 (1830)	40 (1028)	3966 (1799)	1.5 (1.1)
2-900/2000CV	2	74 (1874)	72 (1830)	65 (1646)	6854 (3109)	3 (2.2)
3-900/3000CV	3	75 (1899)	72 (1830)	86 (2180)	8498 (3855)	5 (3.7)
4-900/4000CV	4	84 (2135)	75 (1915)	102 (2580)	10280 (4663)	5 (3.7)
5-900/5000CV	5	88 (2240)	75 (1915)	123 (3124)	12235 (5550)	7.5 (5.5)
6-900/6000CV	6	88 (2240)	75 (1915)	144 (3668)	13649 (6191)	7.5 (5.5)
7-900/7000CV	7	90 (2280)	79 (2007)	176 (4471)	17409 (7913)	10 (7.5)
8-900/8000CV	8	90 (2280)	79 (2007)	187 (4750)	18820 (8555)	10 (7.5)

*VARIES AS PER INSTALLATION LAYOUT



LABORATORY AND PILOT TESTING

In order to determine the size that meets your needs, we strongly recommend taking advantage of our **Free** laboratory tests.

These steps allow us to characterize sludge samples and to anticipate the performance of your Rotary Press, based on previous results in the same operation field.



WHAT YOU SEE IS WHAT YOU GET!

Fournier Rotary Press performance testing can be demonstrated by means of our mobile units. Our use of a full-scale pilot unit defines the performance of the Rotary Press on your typical sludge. Using the information from the pilot gives us the exact performance data needed for any final installation design.



OVER 500 INSTALLATIONS WORLDWIDE



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US Patent 7,166,229
ISO-9001:2015



**Johnson
Screens**

Passive Intake Screens



The world's most efficient passive intake screen system

Johnson Screens' passive intake screen system provides uninterrupted water withdrawal from lakes, rivers and oceans. Johnson Screens' passive intake screen operates continuously and requires no downtime for cleaning or routine maintenance. Moreover, the system can be configured to meet US Environmental Protection Agency (USEPA) regulations for protecting aquatic life.

To provide maximum efficiency, Johnson Screens' passive intake screen is custom designed and engineered to each unique environment, resulting in a system which costs less to install, operate and requires less maintenance.

Maximum Efficiency

The combination of the non-plugging Vee-Wire® design and the patented internal flow modifier, provides a high open area while maintaining the lowest entrance velocity and pressure drop. This delivers a maximum water capacity with minimal entrainment and impingement.

Custom Designed and Engineered

With over 30 years of intake screen experience and hundreds of installations covering a variety of conditions, application engineers from Johnson Screens can provide design and application assistance. From shallow rivers to deep oceans, the Johnson Screens passive intake screen systems can meet site requirements anywhere in the world.

Less Maintenance

Johnson Screens' passive intake screen system has no moving parts that can break down or wear out. This eliminates the need to replace worn parts or make other costly repairs. The controlled entrance velocity on the passive intake screen, along with the specially matched Hydroburst™ air backwash, keeps the system clean and operating properly.

Lower Cost

The unique and flexible design of the passive intake screen system results in lower initial costs, no moving parts, less maintenance needs and a simplified installation — allowing for a reliable, inexpensive water supply.



The Johnson Screens passive screens intake systems

Proven and reliable technology

Patented Internal Flow Modifier: Highest Efficiency and Lower Costs

The open pipe flow modifier is at the heart of the Johnson Screens passive intake screen system. This internal flow modifier development improves the design with a patented dual pipe flow modifier.

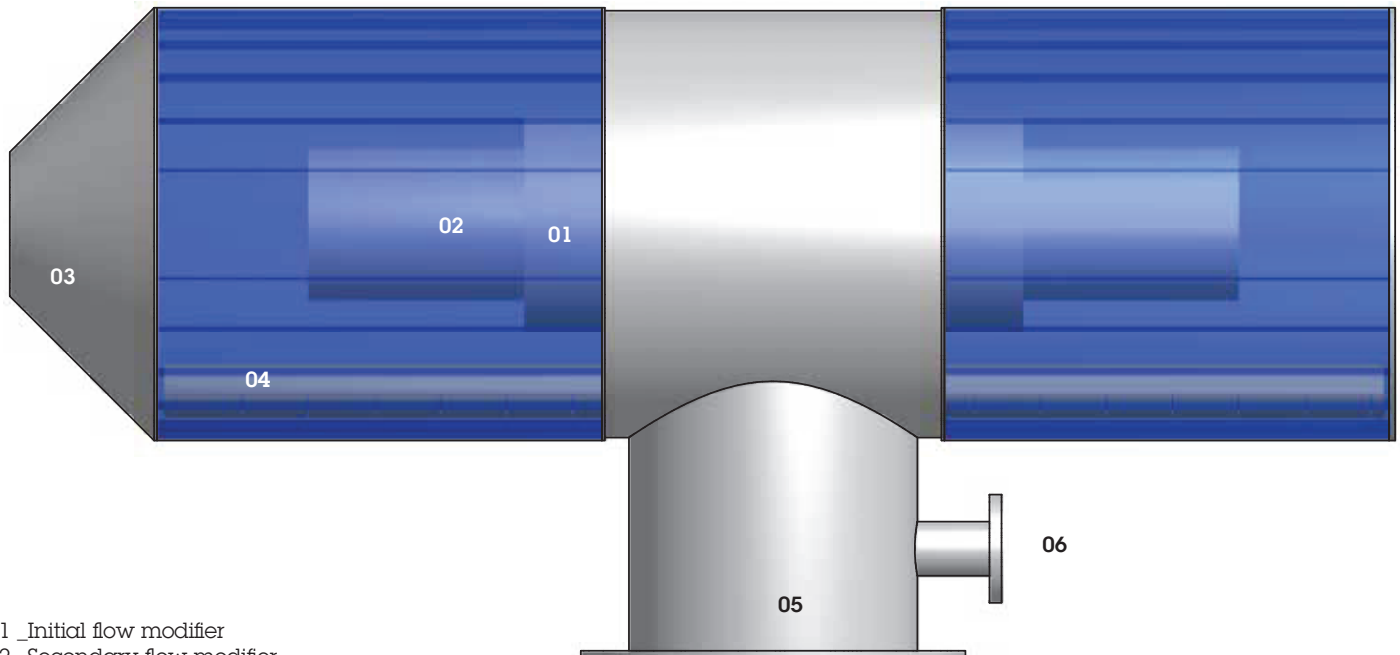
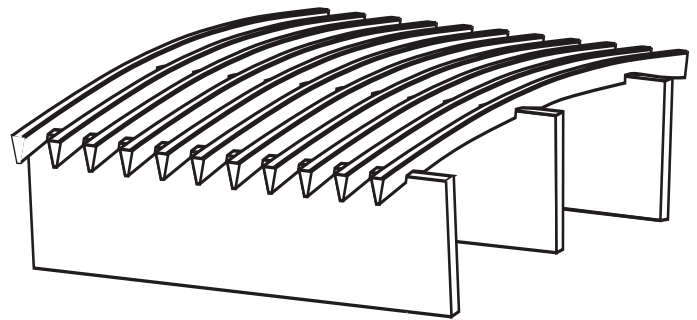
The dual pipe flow modifier does two things: it produces an even flow across the entire screen surface, while not increasing the pressure drop.

The even flow raises the overall efficiency of the screen to over 90%, allow for smaller screen cylinders and Hydroburst components to be used.

The low pressure drop across the screen surface reduces the amount of energy required to pull water through the screen, creating significant operating cost savings.

Vee-Wire Screen Design

- Controls the entrance velocity, or speed, of the water passing through the screen surface
- Has very high open area, allowing vast quantities of water to flow through
- Non-plugging design is easy to maintain
- Wide range of corrosion-resistant materials available
- Protects aquatic life from entrainment and impingement.



- 01 _Initial flow modifier
- 02 _Secondary flow modifier
- 03 _Debris deflector
- 04_ Air backwash header
- 05_ Outlet flange
- 06_ Air backwash pipe and flange

Dual pipe internal flow modifier

The key to success

Open Pipe Flow Modifiers: The Industry Standard

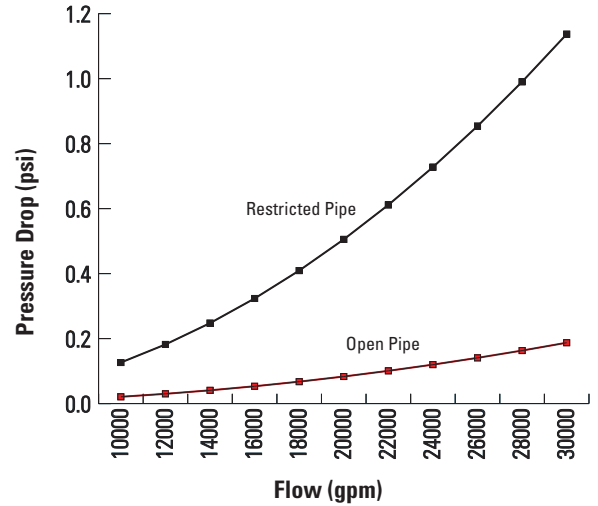
Early flow modifier designs, which included restrictive pipes using slots and holes, plugged easily and experienced a very high pressure drop across the screen surface area. The Johnson Screens passive intake screen systems has an open pipe design that is much more effective, and is now the industry standard.

In Figure _01, the pressure drop difference between a restrictive pipe and an open pipe flow modifier illustrates the significant improvement of the Johnson Screens patented dual pipe internal flow modifier design. As more water is pumped through a restrictive pipe flow modifier, the pressure drop increases dramatically.

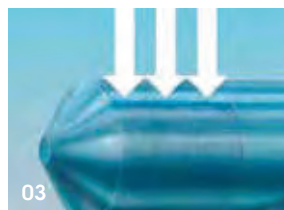
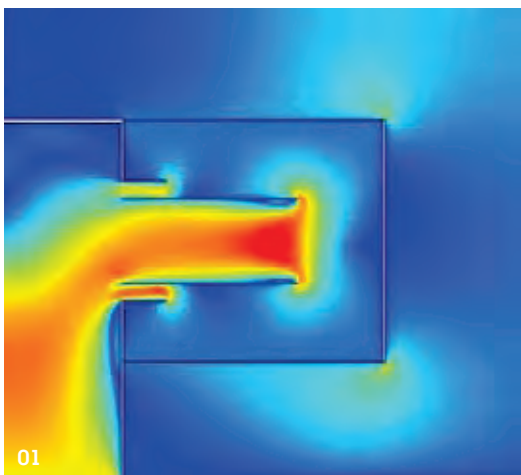
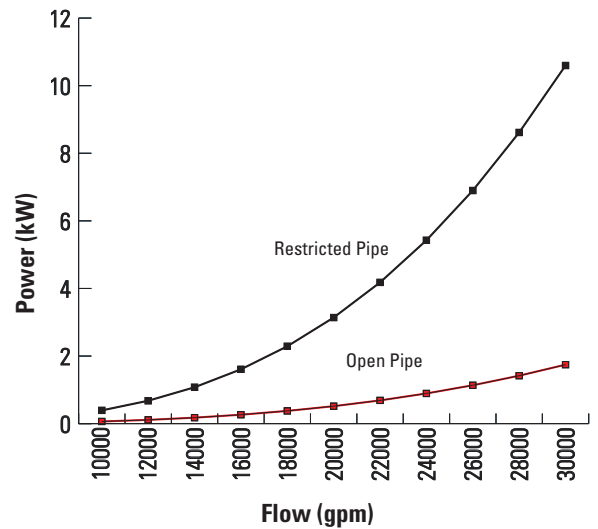
Open Pipe Flow Modifiers: Lower Operating Costs

When the pressure drop increases on a passive intake screen, the pumping unit has to work much harder. Figure _02 shows a comparison between restrictive pipe and open pipe flow modifiers and the amount of energy required to pump water through a passive intake screen. As water is pumped, greater energy is required for the restrictive pipe designs, resulting in an increase in operating costs.

Pressure Drop Comparison - Figure_01



Electricity Demand Comparison - Figure_02



- 01 _ Computation Fluid Dynamic (CFD) Analysis shows the uniformity of the flow velocity across the entire passive intake screen surface area when using a dual pipe low modifier.
- 02 _ Conventional Intake. The conventional passive intake design allows variation in entrance velocity across the screen face.
- 03 _ High Capacity Intake. The Johnson Screens passive intake screens, have uniform flow rates at 90 percent of the maximum allowable velocity.

Typical Hydroburst air backwash cleaning system

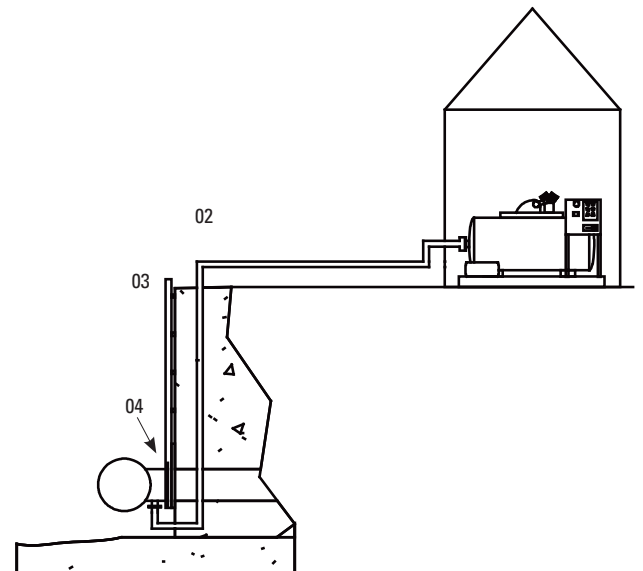
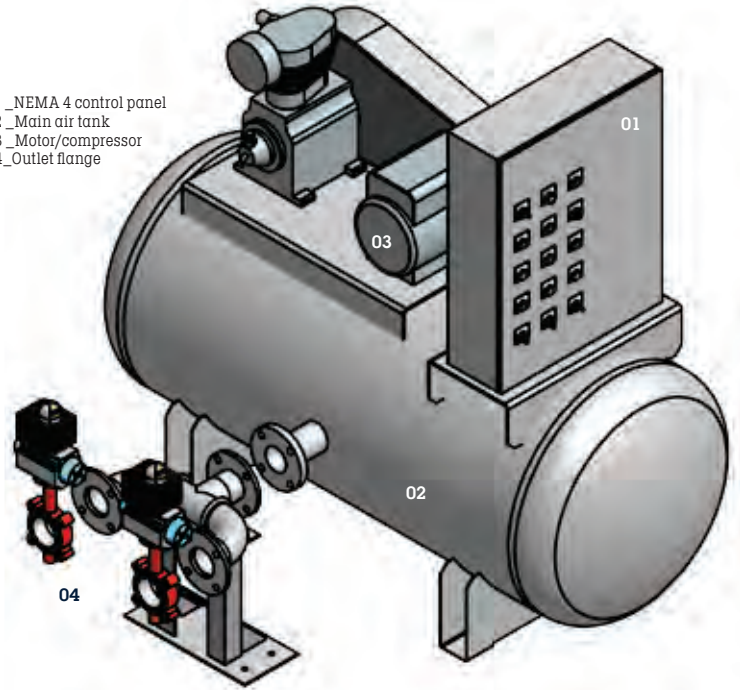
Hydroburst Maximizes Intake System Efficiency

When debris in the water is high, the Hydroburst system provides fast and effective cleaning of the screen cylinders.

- Air volume is precisely matched to the intake screen cylinder size for maximum delivery
- Measured air burst forces debris away and scours the screen surface for highly effective cleaning
- Specially designed manifold distributes air inside the screen cylinder for optimal performance.

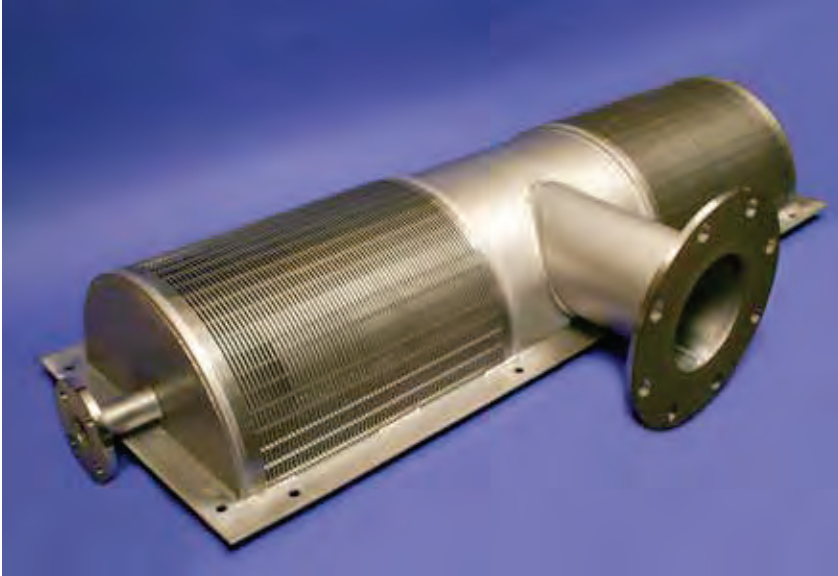
Varieties of controls are available, including manual, automatic activate on headloss and time activate. This includes the Delta Tracker, which automatically monitors blockage, ensuring screen performance will remain constant over time. The Delta Tracker also enables the passive screen intake system to meet USEPA 316(b) guidelines.

- 01 _NEMA 4 control panel
- 02 _Main air tank
- 03 _Motor/compressor
- 04 _Outlet flange



- 01_Hydroburst system cleaning
- 02_The Hydroburst is designed for a specific distance and depth of screen
- 03_Optional intake screen rail
- 04_ABW connection can also be on top of the screen

Proven technology for shallow water resources



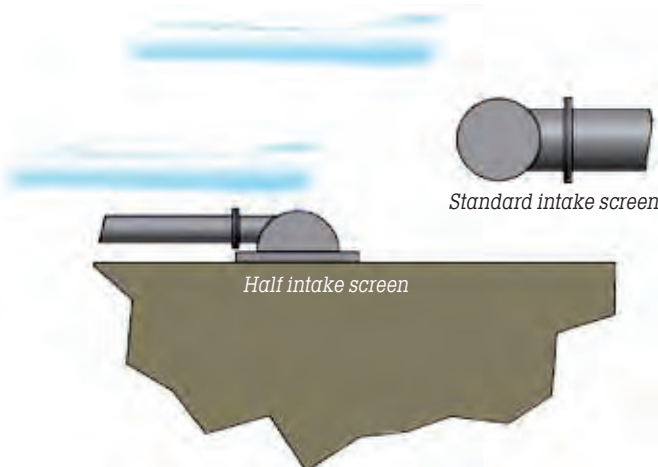
Based on the design of Johnson Screens' passive intake screen systems, the patent half screen intake system provides uninterrupted, environmentally safe water withdrawal from lakes, rivers and oceans. The half screen intake system allows for the screen to be used in half the operational depth of water of the traditional passive intake screen system.

Design features include:

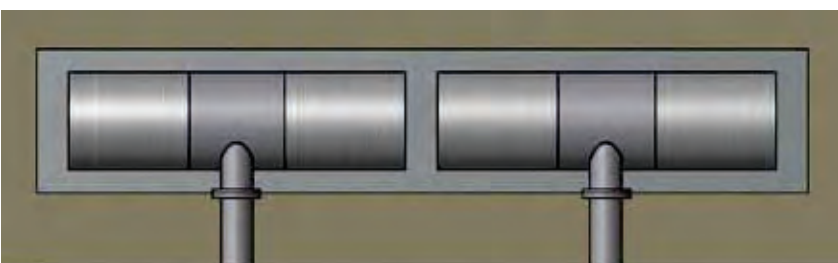
- Low profile – half the water depth needed
- Hydroburst cleaning system option
- Passive intake screen – no maintenance
- Vee-Wire construction

As water demands expand for cities and towns, water resources previously harder to withdraw from, due to their shallow depth, now have become a more viable option. The general rule-of-thumb for proper intake screen depth has been to allow a half diameter of operational depth clearance from top and bottom, to prevent silt from being sucked up from the bottom and creating a vortex on the top of the water.

- Sits on a concrete pad and eliminates half the depth needed for the same flow
- Functions identically to the standard Johnson Screens passive intake screen system
- Uses the same control of flow distribution, with the patented multiple flow modifier design and Hydroburst system to keep the screen surface clean of debris
- Standard sizes range from 1/2T - 12HC to 1/2T - 96HC intake screens, and are typically applied in pairs



The half screen intake system is able to operate at half the water depth of traditional intake screen systems



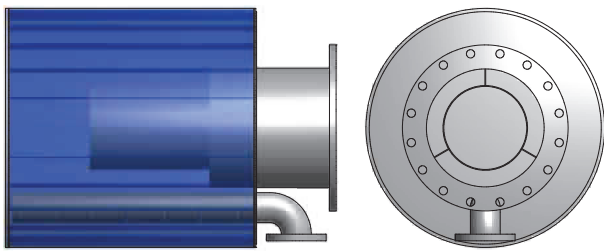
The half screen intake sits on a concrete pad and eliminates half the depth needed for the same flow

Passive intake screen systems

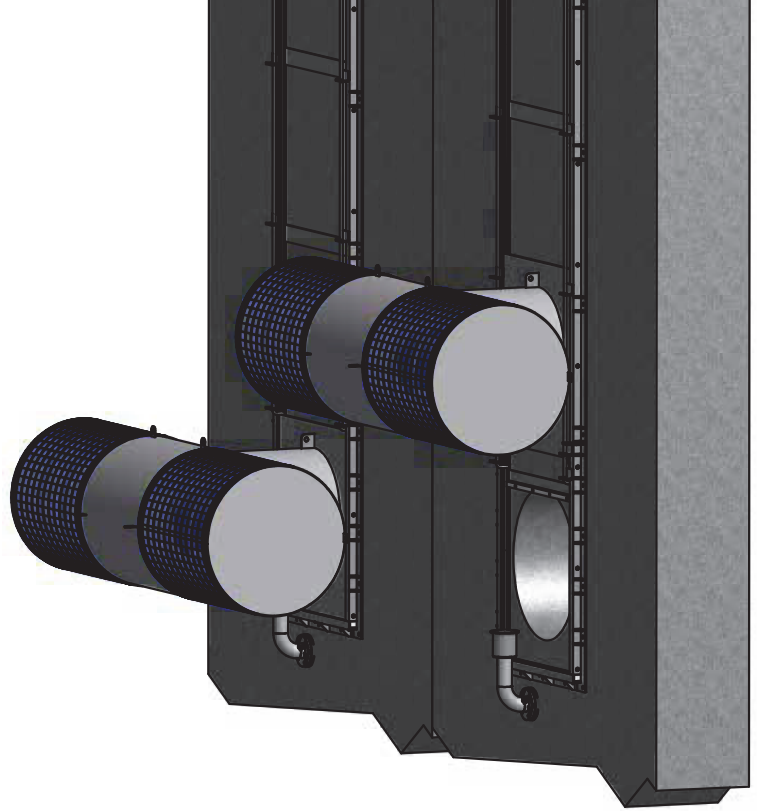
Optional designs, installation layout examples



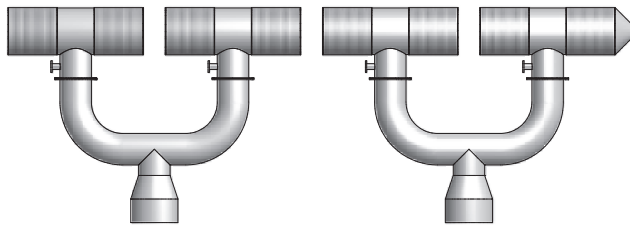
Z-Alloy materials repel Zebra mussels, resists biofouling and minimizes corrosion in sea water



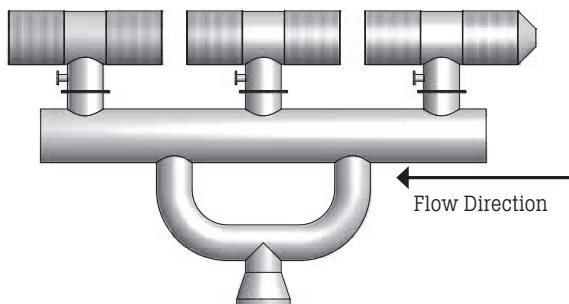
Single or Drum Intake Screen



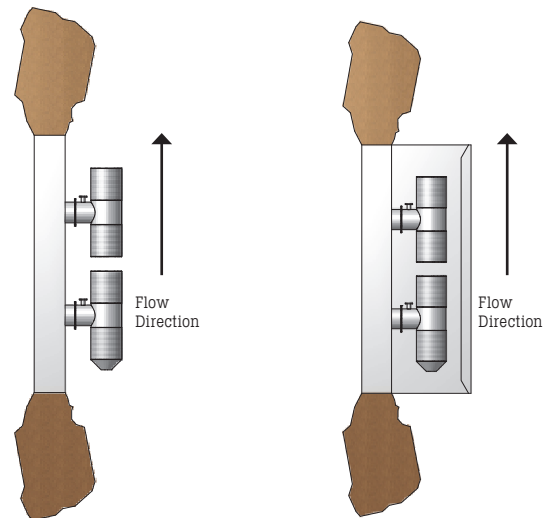
Slide rails make raising and lowering of intake cylinders simple and easy



Multiple Screen Array Option



Manifold Installation Option



Typical Installation in faster moving, deeper rivers

Typical Installation in slower moving rivers with high sediment

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**Johnson
Screens**

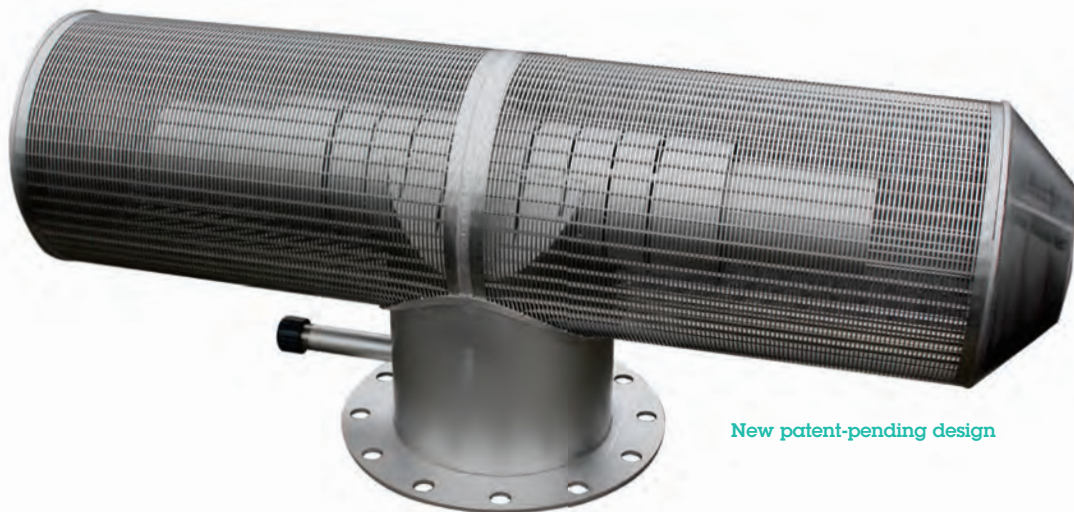
**A brand of
Aqseptence Group**

New Passive Intake System Design

Johnson Screens' next generation Passive Intake Screen, the Max-Flow™ design, increases flow capacity of the previous designs by up to 40% more.

The new patent-pending design offers significant capital savings in any intake project by using smaller and or

less number of intake screens. Additionally, a smaller Hydroburst System and significant less costs for the piping and civil work on a project will further increase project savings.



New patent-pending design

New features include:

- 1.4 times more capacity than the previous design
- Newly redesigned internal modifier
- An efficient means to withdraw water by evenly distributing flow and reducing the velocity to a 0.5 feet per second or less
- Non-plugging design is easy to maintain using Johnson Screens patented Hydroburst screen cleaning system
- 316b compliant intake screens

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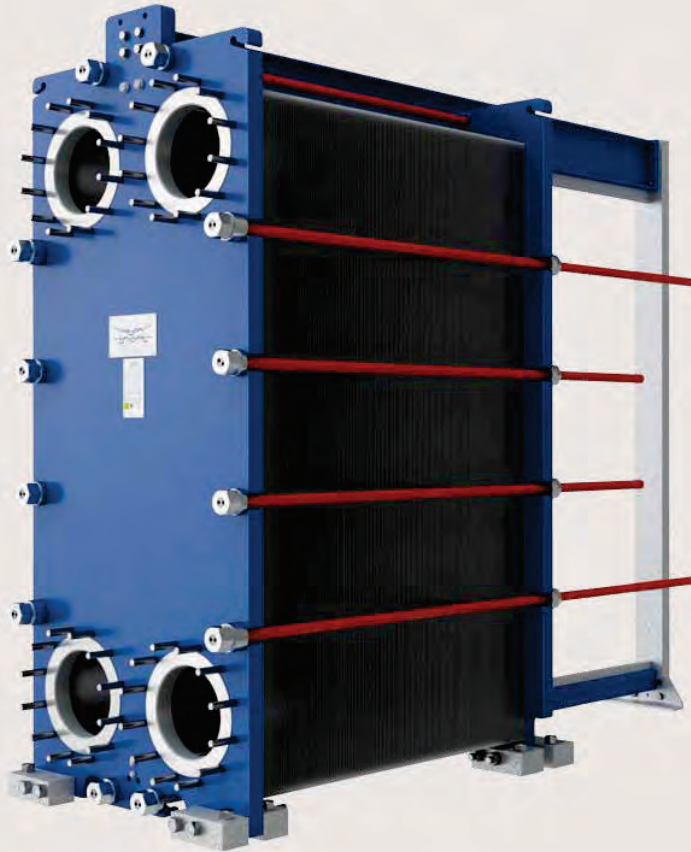
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Performance at heart

Alfa Laval T35/TS35 gasketed plate heat exchanger





The next generation heat exchanger

Alfa Laval's all-new T35/TS35 gasketed plate heat exchanger offers many advantages:

- High uptime
- Low maintenance costs
- Energy savings due to minimum fouling
- Low investment costs
- Easily expandable capacity
- Maximum operational reliability



Broad range of applications

Alfa Laval T35/TS35 is a very versatile heat exchanger. A wide selection of available plate and gasket materials makes it suitable for use in many different positions – from basic water-to-water duties to tough applications with high temperatures, aggressive media and high pressures.

T35/TS35 is the perfect choice when you need a closed-loop cooler, utility or process heat exchanger in industries such as:

- Nuclear power
- Conventional power
- Renewable/clean power
- Steel
- Mineral processing
- Petrochemicals
- Ethanol
- Sugar
- Fertilizers

Contact your local Alfa Laval representative for more information on how you can benefit from Alfa Laval T35/TS35.





High productivity and low lifecycle costs

Performance, reliability and lifecycle costs are critical factors when investing in a new heat exchanger and often impact on plant profitability. Alfa Laval T35/TS35 focuses on these factors and features several innovations that reduce maintenance costs, maximize heat transfer and increase uptime.

Less fouling ...

The new, patented Alfa Laval CurveFlow heat transfer plates give Alfa Laval T35/TS35 a highly uniform flow distribution, which eliminates stagnant zones and reduces fouling.

CurveFlow plates have an exceptionally low pressure drop over the distribution area. This makes it possible to operate with a higher pressure drop over the main heat transfer area, which increases turbulence and prevents fouling.

... means higher profitability

Reduced fouling leads to longer intervals between cleaning and more uptime, as well as lower costs for labour, cleaning chemicals and spares.

Less fouling can also result in substantial energy savings when the heat exchanger is used in interchanger and heat recovery duties.

Quick and easy maintenance

Servicing a T35/TS35 is simple and effortless thanks to:

- Alfa Laval's new, patented ClipGrip gaskets. These offer totally glue-free attachment and stay firmly in place during opening and closing.
- The Five Point Alignment System, making sure all plates hang straight and minimizing plate pack misalignment.
- Swing Foot and Bearing Box. Our unique solutions that make opening and closing a T35/TS35 easy.
- Securely attached glue type gaskets. Alfa Laval's oven-cured two-component epoxy glue makes certain our glue type gaskets do not detach when opening the T35/TS35 or during mechanical cleaning.
- Full access to all plates and gaskets.
- High mechanical strength of the plates, minimizing damage.



The new Alfa Laval ClipGrip glue-free gaskets make regasketing faster than ever. The attachments grip both sides of the plate and hold the gasket firmly in its groove.

Lifelong support for high ROI

Alfa Laval offers many services that help maximize return on investment throughout the entire lifetime of your heat exchangers. Our global network of service centres and field service engineers makes sure your heat exchangers operate at optimum conditions and deliver peak performance.



Maximum efficiency and flexibility

Each Alfa Laval T35/TS35 is custom built and optimized for its operating conditions. Our engineers help pick the perfect plate and gasket materials and tailor the unit to your specific needs.

High thermal efficiency

Alfa Laval T35/TS35 has very high thermal efficiency. The counter-current flow allows it to operate with crossing temperatures and a temperature approach as small as 2°C (3.6°F).

The unique Alfa Laval CurveFlow distribution area gives T35/TS35 a

highly uniform flow across the plate, resulting in superior heat transfer and minimum required heat transfer area.

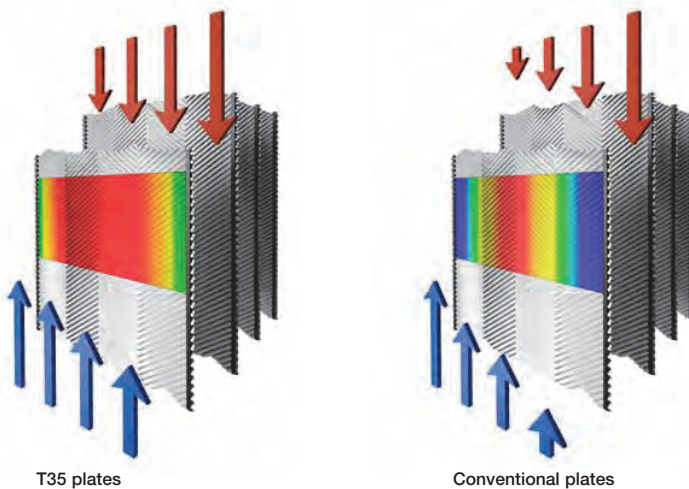
The high thermal efficiency makes T35/TS35 very suitable for interchanger and heat recovery duties.

Compact size

T35/TS35 is also an excellent utility heat exchanger and central cooler. Besides high reliability and low maintenance costs, high thermal efficiency makes T35/TS35 smaller than comparable units.

This makes T35/TS35 easy to fit into existing structures, keeping installation costs down, and making it possible to expand capacity in limited space.

The compact size minimizes investment costs when exotic materials such as titanium or special nickel alloys are needed.



Heat transfer efficiency



Flow velocity



The new CurveFlow distribution area gives T35/TS35 a highly uniform flow distribution. This eliminates stagnant zones and reduces fouling. It also improves heat transfer efficiency since heat transfer is at its peak when the hot and cold streams flow evenly over the plates.

Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Contact details for all countries are continually updated on our web site. Please visit www.alfalaval.com to access the information.





Alfa Laval T35

Gasketed plate-and-frame heat exchanger for a wide range of applications

Alfa Laval Industrial line is a wide product range that is used in virtually all types of industry.

Designed for high throughput, this model delivers excellent thermal performance. A large selection of plate and gasket types is available.

Applications

- Biotech and Pharmaceutical
- Chemicals
- Energy and Utilities
- Food and Beverages
- Home and Personal care
- HVAC and Refrigeration
- Machinery and Manufacturing
- Marine and Transportation
- Mining, Minerals and Pigments
- Pulp and Paper
- Semiconductor and Electronics
- Steel
- Water and Waste treatment

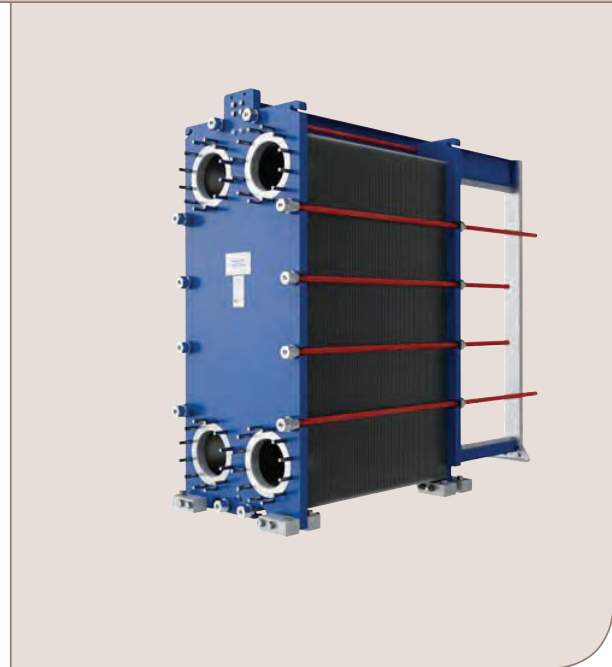
Benefits

- High energy efficiency – low operating cost
- Flexible configuration – heat transfer area can be modified
- Easy to install – compact design
- High serviceability – easy to open for inspection and cleaning and easy to clean by CIP
- Access to Alfa Laval's global service network

Features

Every detail is carefully designed to ensure optimal performance, maximum uptime and easy maintenance. Selection of available features:

- 5-point alignment system
- Reinforced hanger
- CurveFlow™ distribution area
- Glued gasket
- ClipGrip™ gasket
- Leak chamber
- Bearing box
- Fixed bolt head
- Key hole bolt opening
- Lifting lug
- Lining
- Lock washer
- Pressure plate roller
- Swing feet
- Tightening bolt cover



Extending performance with Alfa Laval 360° Service Portfolio

Our extensive services ensure top performance from your Alfa Laval equipment throughout its life cycle. The availability of parts and our team's commitment and expertise bring you peace of mind.

Start-up

- Installation
- Installation Supervision
- Commissioning

Maintenance

- Cleaning Services
- Reconditioning
- Repair
- Service Tools
- Spare Parts

Support

- Exclusive Stock
- Technical Documentation
- Telephone Support
- Training
- Troubleshooting

Improvements

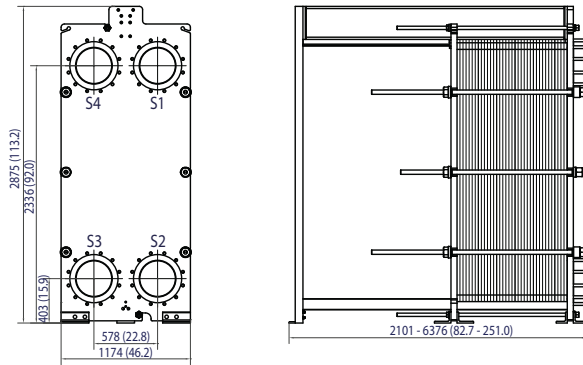
- Equipment Upgrades
- Redesign
- Replacement and Retrofit

Monitoring

- Condition Audit
- Performance Audit

Dimensional drawing

Measurements mm (inches)



The number of tightening bolts may vary depending on pressure rating.

Technical data

Plates

Name	Type	Free channel, mm (inches)
T35-P	Single plate	3.4 (0.13)

Materials

Heat transfer plates	304/304L, 316/316L, 904L, 254 C-276, C-2000 G-30 Ti, TiPd
Field gaskets	NBR, EPDM, FKM
Flange connections	Carbon steel Metal lined: stainless steel Alloy 316, titanium
Frame and pressure plate	Carbon steel, epoxy painted

Other materials may be available on request.

All option combinations may not be configurable.

Operational data

Frame, PV-code	Max. design pressure (barg/psig)	Max. design temperature (°C/°F)
FL, pvcALS	6.0/87	100/212
FM, pvcALS	10.3/150	120/248
FM, PED	10.3/150	180/356
FG, pvcALS	16.0/232	180/356
FG, ASME	10.3/150	250/482
FG, PED	16.0/232	180/356
FD, pvcALS	25.0/363	180/356
FD, ASME	20.7/300	250/482
FD, PED	25.0/362	180/356
FS, ASME	27.6/400	250/482
FS, PED	30.0/435	180/356

Extended pressure and temperature rating may be available on request.

Flange connections

FL, pvcALS	EN 1092-1 DN350/DN300 PN10 ASME B16.5 Class 150 NPS 14/NPS 12 JIS B2220 10K 300A/350A
FM, pvcALS	EN 1092-1 DN350/DN300 PN10 ASME B16.5 Class 150 NPS 14/NPS 12 JIS B2220 10K 350A/300A
FM, PED	EN 1092-1 DN350/DN300 PN10 ASME B16.5 Class 150 NPS 14/NPS 12
FG, pvcALS	EN 1092-1 DN350/DN300 PN16 ASME B16.5 Class 150 NPS 14/NPS 12 JIS B2220 16K 350A/300A
FG, ASME	ASME B16.5 Class 150 NPS 14/NPS 12
FG, PED	EN 1092-1 DN350/DN300 PN16 ASME B16.5 Class 150 NPS 14/NPS 12
FD, pvcALS	EN 1092-1 DN350/DN300 PN25 ASME B16.5 Class 300 NPS 14/NPS 12 JIS B2220 20K 350A/300A
FD, ASME	ASME B16.5 Class 300 NPS 14/NPS 12
FD, PED	EN 1092-1 DN350/DN300 PN25 ASME B16.5 Class 300 NPS 14/NPS 12
FS, ASME	ASME B16.5 Class 400 NPS 14/NPS 12

Standard EN1092-1 corresponds to GOST 12815-80 and GB/T 9115.

How to contact Alfa Laval

Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information direct.