

System Solutions for Efficient Aeration

AERZEN Water Treatment System



AERZEN
EXPECT PERFORMANCE

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Aeration as an Integrated System

Aeration, blowers and process control – seamlessly aligned

Many wastewater treatment plants still operate with outdated or oversized equipment, leading to avoidable energy losses and underutilized capacity. At the same time, requirements for efficiency, operational reliability, and sustainability continue to increase. Addressing these challenges requires a new approach to aeration—one that considers the entire process and integrates modern technologies intelligently. The AERZEN Water Treatment System delivers exactly that.

Unlocking Energy Saving Potential

The biological treatment stage is the largest energy consumer in wastewater treatment. Typically, 60-70% of a plant's total energy demand is used for aerating activated sludge tanks. This represents a major opportunity for optimization and one of the most effective ways to improve overall plant energy efficiency.

Integrated Aeration Solutions

The AERZEN Water Treatment System combines aeration technology, blower systems, and process control into a fully integrated solution. The intelligent integration of all system components ensures precise, demand-driven air supply and significantly improves overall energy efficiency. Additional efficiency gains come from optimizing of the machine room, using waste heat effectively, and applying data-driven analysis of aeration processes. Overall, energy savings of up to 55% and a reduction of CO₂ emissions by up to 65% can be achieved.

Tailored to Your Process

Each project is individually engineered based on influent load, wastewater characteristics, and plant-specific process requirements. Based on this, the required oxygen demand is determined, forming the basis for the number and arrangement of aeration elements as well as the design of the blower system.

Support Across the Entire Lifecycle

We go beyond delivering the optimal aeration solution. From initial design through long-term operation, we support you across the entire lifecycle. Our tailored service and maintenance concepts, combined with continuous operational support, ensure that your aeration system operates reliably and efficiently at all times. For temporary requirements, we also offer flexible rental solutions.

One Partner for Complete System Expertise

Future-ready solutions require experience, a broad perspective, and a deep understanding of system interactions. This is what AERZEN brings together. By combining blower technology, aeration systems, and process control, we deliver solutions that increase the efficiency of biological treatment and enhance the performance and long-term viability of wastewater treatment plants. We are here to help answer questions like:

- How can energy costs in wastewater treatment be reduced?
- How can stable treatment performance be ensured under varying load conditions?
- What role do digital solutions play in optimizing wastewater treatment plants?
- How can existing plants be upgraded to meet current technical standards?

On the following pages, we present our solutions for efficient aeration.

LET'S TALK

„... about **process reliability, operational security,** and the **efficiency** of your aeration system.”





Engineering Expertise and
Continuous Innovation

A Global Leader in Aeration for Biological Treatment

For more than 160 years, AERZEN has been a trusted partner to wastewater treatment plant operators and industrial customers worldwide, delivering innovative solutions to improve energy efficiency, process reliability, digitalization, resource utilization, and plant capacity. Today, AERZEN technology is in operation in more than 100,000 wastewater treatment plants worldwide, helping treat water for over 2.5 billion people—approximately one-third of the global population.

Specialists in Activated Sludge Aeration

With AERZEN, you are well prepared for both current and future challenges in wastewater treatment. As a globally recognized provider of aeration solutions for activated sludge systems, we understand the complex requirements of modern biological treatment processes and the realities of plant operation: stable processes, low energy demand, high operational reliability, consistent treatment performance, and cost-efficient operation.

With decades of experience, advanced technologies, and a comprehensive portfolio, we deliver intelligent aeration concepts that combine efficiency, reliability, and low lifecycle costs, tailored to local conditions and specific process requirements. By consistently viewing aeration as part of an overall system, we unlock maximum energy-saving potential.

Our global sales and service network, with 52 subsidiaries in 104 countries, ensures reliable support and competent local contacts wherever you operate.



! AERZEN: Your Trusted Partner in Wastewater Treatment

- ✓ Global player with more than 50 subsidiaries worldwide
- ✓ Optimally aligned blower, aeration, and control technologies
- ✓ Comprehensive portfolio with highly efficient system solutions
- ✓ Extensive engineering and application expertise
- ✓ Digital services for process optimization
- ✓ AERZEN Rental: flexible rental solutions with a full-service package
- ✓ Comprehensive service support – anytime, worldwide
- ✓ One interface. One partner.

One Partner for All Services

We deliver complete aeration solutions for biological wastewater treatment in municipal and industrial applications. Our portfolio covers all relevant areas and addresses the key challenges of wastewater treatment. Each component is precisely coordinated and can be combined as required, ensuring seamless system interaction. This allows the full potential for efficiency improvements to be realized.

As Individual as Your Plant

Every wastewater treatment plant is unique. Process design, infrastructure, location, influent flow, load characteristics, discharge requirements, and sludge treatment all vary and cannot be standardized. What all plants have in common, however, is the need for oxygen in the biological treatment process—precisely matched to the specific conditions on site.

This places high demands on aeration systems. Only when air flow, oxygen transfer, and energy input are optimally aligned with the biological process can stable and cost-efficient operation be achieved.

Efficient, Sustainable, and Future Ready

The key challenge lies in managing significant fluctuations in load conditions and varying levels of pollution by providing a demand-driven air supply. At the same time, topics such as environmental protection, energy efficiency, sustainability, and CO₂ reduction are becoming increasingly important. In many regions, ongoing urbanization is adding further pressure to wastewater treatment systems.

AERZEN addresses this complexity with tailored solutions that ensure high reliability and efficiency. A central element is dynamic oxygen setpoint control, which continuously adjusts aeration to actual process demand.

Integrated System Solutions for Activated Sludge Aeration



Supporting Your Biological Treatment Process

- Expansion, refurbishment, and modernization of aeration systems in activated sludge tanks
- Increased operational reliability, availability, and process stability
- Reduced energy, operating, and maintenance costs
- Capacity increase and adaptation to future load and influent conditions
- Performance optimization of aeration systems and blower technology
- Automation, condition monitoring, and remote monitoring
- Compliance with discharge and emission limits
- Design of new systems and optimization or retrofit of existing aeration systems
- Service, maintenance, and lifecycle support concepts

System Solutions: The Key to Maximum Resource Efficiency

Maximum resource efficiency is not achieved through optimizing individual components, but through system intelligence. To reach optimal performance, aeration must be considered as a complete system. Only a highly efficient, system-based approach can fully unlock the available savings potential. Compared to conventional, component-focused solutions, energy savings of 50% or more can often be achieved.

Resource-Efficient Activated Sludge Aeration

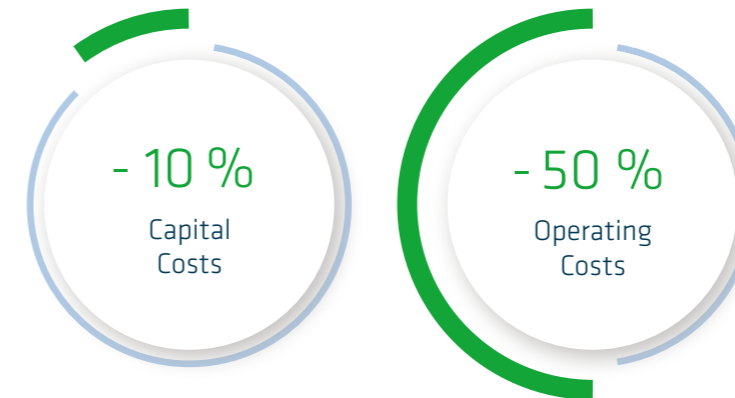
Aeration of activated sludge tanks can account for 60–70% of the total energy demand of a wastewater treatment plant. As a result, the biological treatment stage is the largest energy consumer in wastewater treatment, and also offers significant potential for optimization.

With the right expertise, modern technologies, and intelligent control systems, aeration can be made substantially more resource-efficient. Beyond this, other process air applications, such as grit chambers and digesters, can also be designed for energy-efficient operation. Aeration panels are additionally used in ozone injection processes in advanced treatment stages.

Aeration as a Complete System

The key is to move beyond thinking in individual components and instead consider the aeration process as a complete system. What matters is the interaction between oxygen demand, air supply and distribution, measurement and control technology, the biological process, process engineering requirements, and site-specific conditions.

Only when all these elements and their interactions are taken into account and intelligently aligned can significant energy savings and sustainable cost reductions be achieved.



Perfect Interaction is Key

Aeration elements, blowers and compressors, the blower room, piping and control valve arrangement, oxygen monitoring systems, process-relevant measurement technology, and overall plant control must work together seamlessly in both design and operation. The effects of this interaction can be illustrated using ultrafine bubble diffusers. They generate a fine and uniform bubble pattern, allowing higher oxygen transfer with the same air volume. This reduces the required air flow and enables smaller and fewer blowers and compressors, directly lowering total energy demand. The blower room, piping system, and control valves can also be designed more compactly. In many cases, the volume of activated sludge tanks can be reduced, and in some instances, entire tanks can be eliminated.

10% Lower Capital Costs, 50% Lower Operating Costs

A high-performance, dynamic oxygen monitoring and control system is equally essential. It enables demand-driven operation and forms the basis for flexible, load-dependent oxygen supply based on incoming load conditions.

A system-based approach typically results in reduction of capital costs of around 10% and operating costs of up to 50%.



Key Factors for Efficient Activated Sludge Aeration

- Aeration concept
- Blowers and compressors
- Plant and process control
- Aeration strategies
- Piping and control valve arrangement
- Oxygen monitoring system
- Process-relevant instrumentation and control
- Heat recovery
- Machine room ventilation
- Wastewater treatment process design
- Site conditions and plant infrastructure



Benefits of a System Approach

- ✓ Optimized system design and demand-driven air supply
- ✓ Improved process and operational reliability
- ✓ Lower investment, energy, and operating costs
- ✓ Reduced engineering, coordination, and commissioning effort
- ✓ Shorter project timelines
- ✓ Enhanced foundation for digitalization and future optimization

AERZEN Water Treatment System

Think in Systems, Act Individually

AERZEN aeration concepts are designed as complete systems, taking into account the entire process, from installation and wastewater treatment to control systems and power supply. This holistic approach sets AERZEN apart. It's what defines AERZEN.

The AERZEN system solution for water and wastewater treatment consists of four core modules: system engineering, diffusers, blowers and compressors, and process control. These modules are seamlessly aligned and form a complete system. Each module can also be used individually. However, maximum efficiency is achieved when all four elements work together.

1) System Engineering: Comprehensive technical planning and design, including simulation of the activated sludge process and software-based modeling to determine actual oxygen demand in the biological reactor.

2) Diffuser Technology: Selection and layout based on the determined oxygen demand, with a choice of three diffuser types: tube diffusers, disc diffusers, and panel diffusers.

3) Blower & Compressor Technology: Selection of the optimal machine combination from rotary lobe blowers (Delta Blower), screw blowers (Delta Hybrid), and turbo blowers (Aerzen Turbo), based on calculated air flow and system pressure, ensuring maximum efficiency and optimal energy performance.

4) Process Control: Application-specific control and optimization of the biological treatment process, including the use of AI-based algorithms (AERprocess).



The four modules of the AERZEN Water Treatment System can be used individually or combined as needed.

! AERZEN Water Treatment System (AWTS) – A System Approach to Activated Sludge Aeration

Products and Services:

- Determination of oxygen demand profile based on long-term (annual) load variations
- Optimized selection and layout of panel, disc, and tube diffusers
- Efficient combination of screw, rotary lobe, and turbo blowers tailored to specific load profiles
- AERprocess: load-dependent, intelligent control system with load sharing to ensure optimal machine combination at maximum efficiency
- Digital services, including efficiency optimization, process monitoring and control, and predictive maintenance
- Optional containerized solutions for blowers and compressors to minimize pressure losses in long piping systems, enabling fast and cost-effective plug-and-play installation
- Support in the design and implementation of room ventilation, acoustic concepts, and heat recovery solutions for the utilization of thermal energy
- Tailored services with strong logistics and reliable spare parts supply

! Your Benefits

- ✓ Maximum energy savings and reduced CO₂ emissions
- ✓ Reduced investment and operating costs
- ✓ Increased capacity within limited space
- ✓ Maximum process reliability
- ✓ User-friendly plug-and-play technology
- ✓ Minimal machine footprint
- ✓ Digital-ready for future transformation
- ✓ Fast return on investment

System Engineering

The Spine of the System

Anyone familiar with AERZEN knows that we do not compromise. This applies especially to system engineering. Our iterative approach results in a solution precisely tailored to your requirements, balancing efficiency, performance, cost, and operational reliability. Digital tools, including AI, machine learning, and advanced process control, support the evaluation of different scenarios and ensure that all system components are optimally aligned for maximum efficiency.

From Oxygen Demand to Optimal System Design

System engineering follows a structured, multi-step approach. The starting point is always the determination of the process-specific oxygen demand of the biological treatment stage. This is primarily influenced by influent flow, wastewater composition such as COD, BOD, ammonia, and solids, as well as load and temperature variations over the course of the day, season and year.

Calculations can be performed using either static or dynamic methods. While the static approach is based on individual design points and average values, the dynamic approach uses real operational data and simulates plant operation over a typical year using software-based modeling.

This produces realistic oxygen demand profiles that reflect daily variations, peak loads, and seasonal effects, enabling reliable predictions of energy demand, CO₂ savings potential, and return on investment.

Iterative Engineering-Loop

We design the diffuser system based on the determined oxygen demand. The type, number, and loading of the diffusers define both the efficiency of oxygen transfer and, consequently, the required air flow and operating pressure. Air flow and pressure requirements then determine the selection and sizing of blowers and compressors. The design of the aeration system and the selection of machines are closely interdependent. Changes in diffuser design affect air flow and pressure levels, which in turn require adjustments to the machine configuration. This engineering loop is repeated until an energy and cost optimized overall system is achieved. The key advantage lies in the integrated design approach. Diffusers and blowers are not treated separately but are precisely matched to each other. This is made possible by AERZEN's ability to combine all relevant technologies within one portfolio. As a result, system interactions can be taken into account at an early stage, enabling technically and energetically optimized solutions.

System Design - The AERZEN Engineering-Workflow

Continuous optimization loop until diffuser and blower technologies are optimally aligned with specific process requirements.



1. Oxygen demand is influenced by influent characteristics and load variations over time, and can be determined using static or dynamic methods.

2. Selection and sizing of diffusers determine the required air flow and resulting operating pressure.

3. Blowers and compressors are selected based on the required air flow and system pressure.



! Our Services

- Analysis and evaluation of operational data from existing wastewater treatment plants
- Development of a bioreactor model based on the existing or planned plant design
- Calibration of the model using proprietary AI-based tools to ensure maximum accuracy
- Generation of process-based oxygen demand profiles
- Targeted optimization for denitrification, nitrification, and carbon removal within defined process limits
- Definition of dynamic dissolved oxygen setpoints for different influent scenarios

Diffuser

The Lungs of the System

Diffusers supply the oxygen required in activated sludge systems to enable the biological degradation of organic matter and ensure compliance with discharge limits. The efficiency of oxygen transfer is largely determined by the performance of the diffuser elements used. AERZEN covers the full spectrum, from cost-effective to high-efficiency solutions, and from standard applications to highly specialized systems, delivering optimal performance across the entire load range.

The Oxygen Transfer Efficiency is Key

Oxygen transfer efficiency is primarily influenced by bubble size and diffuser distribution within the tank. Fine bubbles with a diameter of one to three millimeters provide a highly favorable surface-to-volume ratio, enabling highly efficient oxygen transfer.

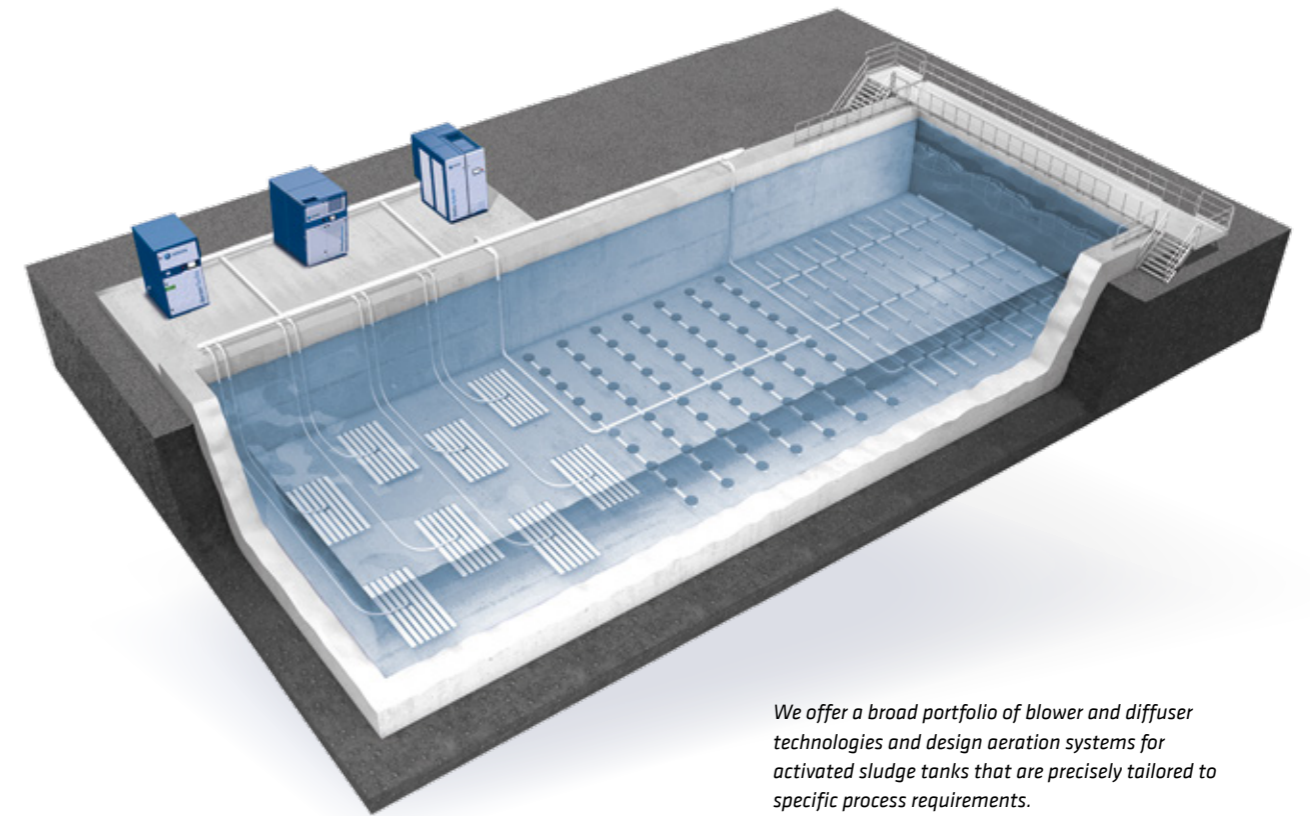
Key performance indicators include SOTR (Standard Oxygen Transfer Rate), SSOTR (Standard Specific Oxygen Transfer Rate), SOTE (Standard Oxygen Transfer Efficiency), and SAE (Standard Aeration Efficiency). In addition, factors such as submergence depth, bubble shape, gas-liquid contact time, and bubble rise velocity significantly influence oxygen transfer performance. A uniform, diffuser layout promotes consistent mixing and consistent oxygen distribution throughout the tank.

Tailored Diffuser Design

Diffuser layout and design are always specific to each plant. Key parameters include tank shape and volume, water depth, oxygen demand, and wastewater composition. In addition, the operating ranges of different diffuser types, as well as membrane materials and perforation design, the control and operating strategy, and the overall cost framework (CAPEX, OPEX, TOTEX) must be considered. Diffuser design is an integral part of the overall system and is closely linked to system engineering and process control.

Retrofit for Existing Plants

Retrofits are generally feasible but depend on a range of site-specific factors. Existing piping systems, tank internals, and the actual condition of the plant must be carefully assessed, as they can significantly influence both feasibility and performance. A thorough evaluation of these conditions is essential to ensure that retrofits are implemented successfully and cost-effectively.



We offer a broad portfolio of blower and diffuser technologies and design aeration systems for activated sludge tanks that are precisely tailored to specific process requirements.

! AERZEN Scope of Services

We provide a complete diffuser and piping system design, including control valve sizing, to ensure optimal control performance.

- Optimized layout of diffusers within the activated sludge tank, based on the oxygen demand profile determined through modeling
- Design and supply of the piping system, including detailed drawings, to ensure full controllability of the aeration system
- Sizing and positioning of control valves to maximize system performance, ensuring linear control characteristics and optimal alignment with blower performance curves
- Development of load profiles (annual air flow curves) based on the diffuser and piping system design

! Our Portfolio

Diffuser Elements:

- High-efficiency fine bubble panel diffusers for maximum energy performance
- Fine bubble disc and tube diffusers for standard applications, cost-optimized concepts, and retrofit solutions
- Coarse bubble diffusers for specialized applications and demanding operating conditions

Accessories and Services:

- Design support and technical consulting
- One-to-one replacement of existing diffuser elements
- High-pressure cleaning
- Acid dosing systems
- Process Control systems
- Pressure monitoring systems
- Testing facilities for oxygen transfer measurement

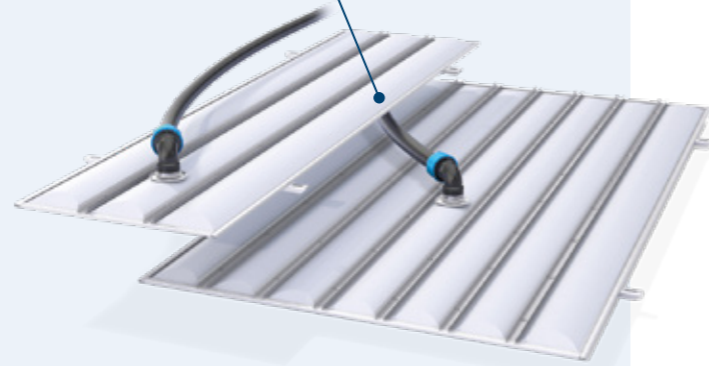
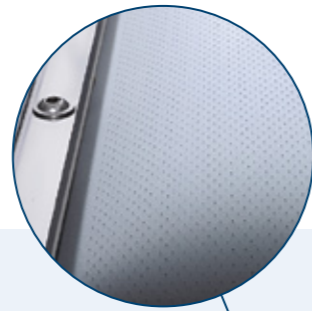
Diffuser Types

The Right Diffuser for Every Application

Aeration solutions as individual as your plant: AERZEN offers the full range of diffuser technologies, from costoptimized to high-efficiency, from standard to high-end, and from plastic to stainless steel. Designed to suit any tank configuration, process requirement, and load profile.

Selecting the right diffuser type is critical to the efficiency and economic performance of your wastewater treatment plant. Aeration panels are characterized by outstanding oxygen transfer efficiency and exceptional service life. They are ideally suited for plants with high energy efficiency requirements and long-term operation. Despite higher initial investment costs, they typically achieve rapid payback due to significantly lower operating costs. The efficiency of disc and tube diffusers is comparable, but does not reach the level of panel diffusers. While initial costs are lower, the increased air demand results in higher energy consumption, which can lead to higher operating costs, particularly in energy-intensive load profiles. Disc and tube diffusers are therefore well suited for investment-driven concepts, retrofit projects, or applications with moderate energy efficiency requirements.





Based on your specific load profile and economic objectives, we determine the optimal diffuser solution. In doing so, we consider not only capital expenditure and long-term operating costs, but also factors such as energy efficiency, plant configuration, and maintenance requirements. This ensures a solution that is both technically and economically sustainable and efficient.



Aeration Panels

Durable fine bubble diffuser with high floor coverage, maximum oxygen transfer, and uniform air distribution





- Low maintenance, service life of up to 20 years
- High-efficiency oxygen transfer
- Maximum performance: SSOTE > 10%/m
- Durable, clog-resistant TPU membrane
- Bottom-mounted for max. submergence depth
- PFAS-free and CO₂-neutral (net zero)
- Available in 2 x 1 m (Classic) and 2 x 0.5 m (Compact)
- Optional removable grid system

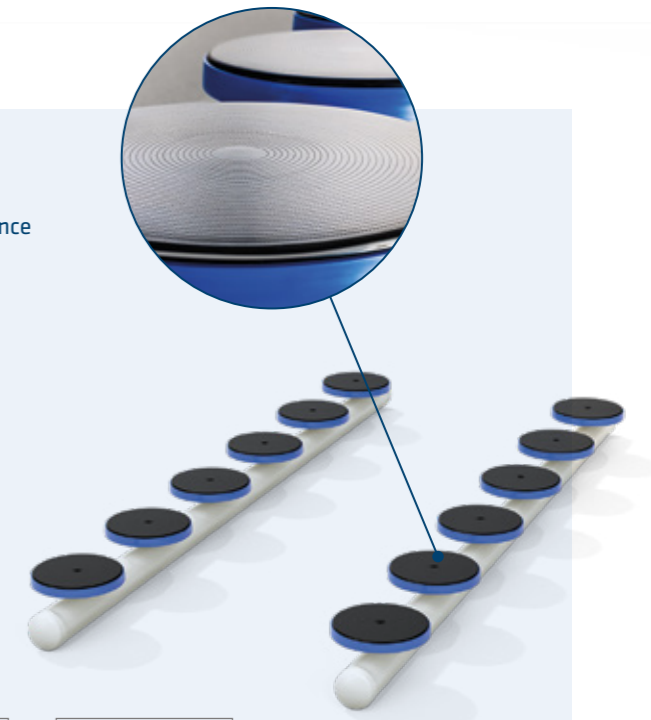
			
Base Material: Stainless Steel (AISI 316L)	Membrane: Thermoplastic Polyurethane (TPU)	Volume flow: 0 to 90 Nm ³ / (m ² *h)	Sizes: 2 x 1 m (Classic) 2 x 0.5 m (Compact)

Disc Diffuser

Proven all-around performers: Efficient, flexible, low maintenance

- Easy maintenance through one-to-one replacement
- Efficient oxygen transfer
- High performance with long service life
- Robust installation for operational reliability
- Membranes available in EPDM or ceramic
- Available pre-mounted on distribution racks
- Long service life with low pressure loss
- PFAS-free
- Available in 9" and 12" diameters
- Optional removable grid system





			
Base Material: PVC	Membrane: EPDM or Ceramic	Volume flow: per diffuser 0 to 15 Nm ³ /h	Sizes: Available in 9" and 12" diameter

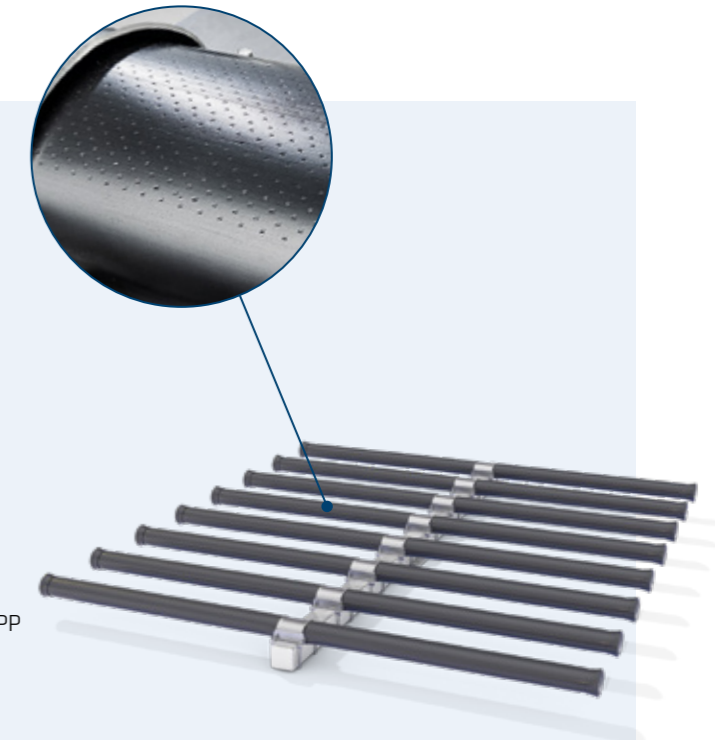


Tube Diffuser

Cost-effective standard solution: Stable operation and good scalability

- Easy maintenance through one-to-one replacement
- Efficient oxygen transfer
- High performance with long service life
- Available in stainless steel or PP construction
- Standard with EPDM membranes
- Robust installation for enhanced operational reliability
- PFAS-free
- Available pre-mounted on frames in stainless steel or PP
- Available in lengths of 1 m, 1.5 m, and 2 m
- Optional removable grid system

			
Base Material: Stainless Steel or PVC	Membrane: EPDM	Volume flow: per diffuser 0 to 24 Nm ³ /h	Sizes: Available in 1 m, 1.5 m and 2 m



Blower Technology

The Heart of the System

AERZEN blowers and compressors rank among the most advanced solutions on the market. They deliver 100% oil-free and PFAS-free process air and stand for outstanding performance, reliability, and cost efficiency. A unique feature is the combined technology concept: by integrating different technologies, machine sizes, and operating points, we create one of the most efficient, powerful, and flexible solutions for demand-driven oxygen supply in activated sludge tanks.

Handling variable load conditions

Depending on region, time of day, season, and rainfall, both wastewater volume and pollution load can vary significantly. As a result, air demand in activated sludge tanks is constantly changing. Traditionally, these fluctuating load profiles have been addressed using a single machine concept designed to cover the entire operating range. In practice, however, this approach rarely allows operation at the optimal efficiency point, as machines frequently run outside their most energy-efficient range. This leads to reduced energy efficiency, increased power demand, and avoidable operating costs.

Not too much, not too little – always the right fit

The key to maximum efficiency lies in precisely managing load variations. The decisive factor is aligning blower technology with the specific load profile of each wastewater treatment plant. No two plants are alike: influent flow, pollution load, and operating conditions vary and require tailored solutions. That is why AERZEN relies on a combination of different technologies and machine sizes. Rotary lobe blowers (Delta Blower), screw blowers (Delta Hybrid), and turbo blowers (Aerzen Turbo) are each deployed within their respective performance strengths and, depending on plant configuration and load conditions, operated either individually or in combination to achieve optimal efficiency. The objective is clear: handle base load efficiently while responding precisely to peak demand.



! AERZEN Scope of Services

- Broad portfolio of premium technologies with a unique technology mix
- 100% oil-free and PFAS-free process air (oil-free according to ISO 8573-1, Class 0), optional: adsorption-free
- High energy efficiency with significant savings potential, including at part load
- Optional integration of variable frequency drives for precise, continuous adjustment of air flow rate to actual demand
- High controllability for dynamic process requirements
- High reliability and long service life, even under continuous operation
- Condition monitoring and predictive maintenance for planned servicing
- Low-maintenance, user-friendly design with a wide range of accessories
- Acoustically optimized design for sensitive environments
- Retrofit-friendly integration into existing plants
- Low lifecycle costs

Tailored Technology Mix

The optimal system configuration depends on the specific daily load profile as well as seasonal variations. Turbo blowers offer maximum energy efficiency at the design point, where their efficiency is significantly higher than that of rotary lobe or screw blowers. The air bearing design provides additional advantages, including very low maintenance requirements, a theoretical service life of more than 80,000 operating hours independent of start-stop cycles, and high process reliability even under pressure fluctuations.

However, the operating range of turbo blowers is typically limited to 40-100%, which reduces efficiency under partial load conditions. This is where positive displacement machines demonstrate their strengths. They offer a wide control range (Delta Blower: 25-100%, Delta Hybrid: 20-100%) and maintain a nearly constant efficiency even at part load. Rotary lobe and screw blowers are therefore ideally suited to reliably handle peak loads and low-load conditions.

High Energy Savings

The Delta Hybrid combines the advantages of blower and compressor technology in a single system. Its innovative low-pressure screw profile with internal compression ensures high efficiency even under varying air flow rates and pressure requirements. Energy savings of up to 37% compared to conventional blowers can be achieved. In contrast, the Delta Blower rotary lobe blower stands out for its robust design, ease of maintenance, and cost-effective operation.

! Our Portfolio

- Robust Rotary Lobe Blowers
- Innovative Screw Blowers
- High-efficiency Turbo Blowers

High-efficiency Trio

Precise control of load variations

Maximum energy savings with optimal controllability and minimal investment: AERZEN rotary lobe, screw, and turbo blowers have been continuously refined over the years and deliver top-tier performance and efficiency.

AERZEN blowers and compressors combine more than 160 years of technological expertise and innovation. They deliver 100% oil-free and PFAS-free process air (oil-free according to ISO 8573-1, Class 0) and stand for highest quality and long service life. Outstanding energy efficiency and uncompromising reliability ensure stable availability. Designed for continuous operation, these machines often run for decades with minimal maintenance.

Integrated variable frequency drives enable precise, continuous adjustment of air flow rate to actual demand, maintaining high efficiency even at part load. This allows process air supply to be precisely aligned with changing load conditions. In addition, the units offer high controllability, a user-friendly design, and a compact footprint.



Positive Displacement Blower | Delta Blower

Proven endurance performer: more innovative and reliable than ever

- Extremely robust blower package
- Belt drive for optimal system configuration
- User-friendly, low-maintenance design
- Wide range of modifications and options
- 17 sizes

				
Volume flow: 30 to 15.000 m ³ /h	Differential pressure (Δp): -500 to 1.000 mbar	Conveying medium: Air, Neutral Gases	Compression: Oil free	Motor power: 7,5 to 500 kW

Screw Blower | Delta Hybrid

Direct or belt-drive efficiency for maximum performance and sustainability

- Compact plug-and-play solution with direct drive for demanding applications
- Exceptional energy efficiency
- Up to 37% energy savings compared to conventional rotary lobe blowers
- Digital ready with integrated AERtronic control, including monitoring and cloud connectivity
- Available in 20 sizes



				
Volume flow: 100 to 9.000 m ³ /h	Differential pressure (Δp): 300 to 1.500 mbar	Conveying medium: Air	Compression: Oil free	Motor power: 55 to 400 kW

Turbo blower | Aerzen Turbo

Air foil bearing turbo blowers: compact performance for activated sludge tanks

- Maximum energy efficiency with minimal footprint
- Up to 10% higher energy efficiency compared to conventional turbo technology
- Extended bearing lifetime of > 80,000 operating hours
- Ready-to-connect package: high process stability, insensitive to pressure fluctuations
- 19 sizes



				
Volume flow: 300 to 16.200 m ³ /h	Differential pressure (Δp): 1.500 mbar	Conveying medium: Air	Compression: Oil free	Motor power: 250 to 330 kW

Process Control

The Brain of the System

Oxygen demand in activated sludge tanks is constantly changing, depending on load, temperature, and process conditions. AERprocess manages this dynamic in real time. Through continuous monitoring, the control system always understands what the biology requires and automatically adjusts the air flow rate to match actual demand. This is aeration, precisely controlled.

Best-in-class Aeration Management

AERprocess is an application-specific control and regulation system, precisely tailored to the requirements of aeration in activated sludge tanks. It continuously monitors all relevant process parameters, determines the actual oxygen demand, and controls air flow rate and pressure in real time. This ensures that air and pressure are supplied exactly as needed, enabling demand-driven and energy-efficient oxygen transfer while consistently maintaining treatment performance and compliance with discharge limits. In simple terms: diffusers and blowers are the tools – AERprocess is the brain.

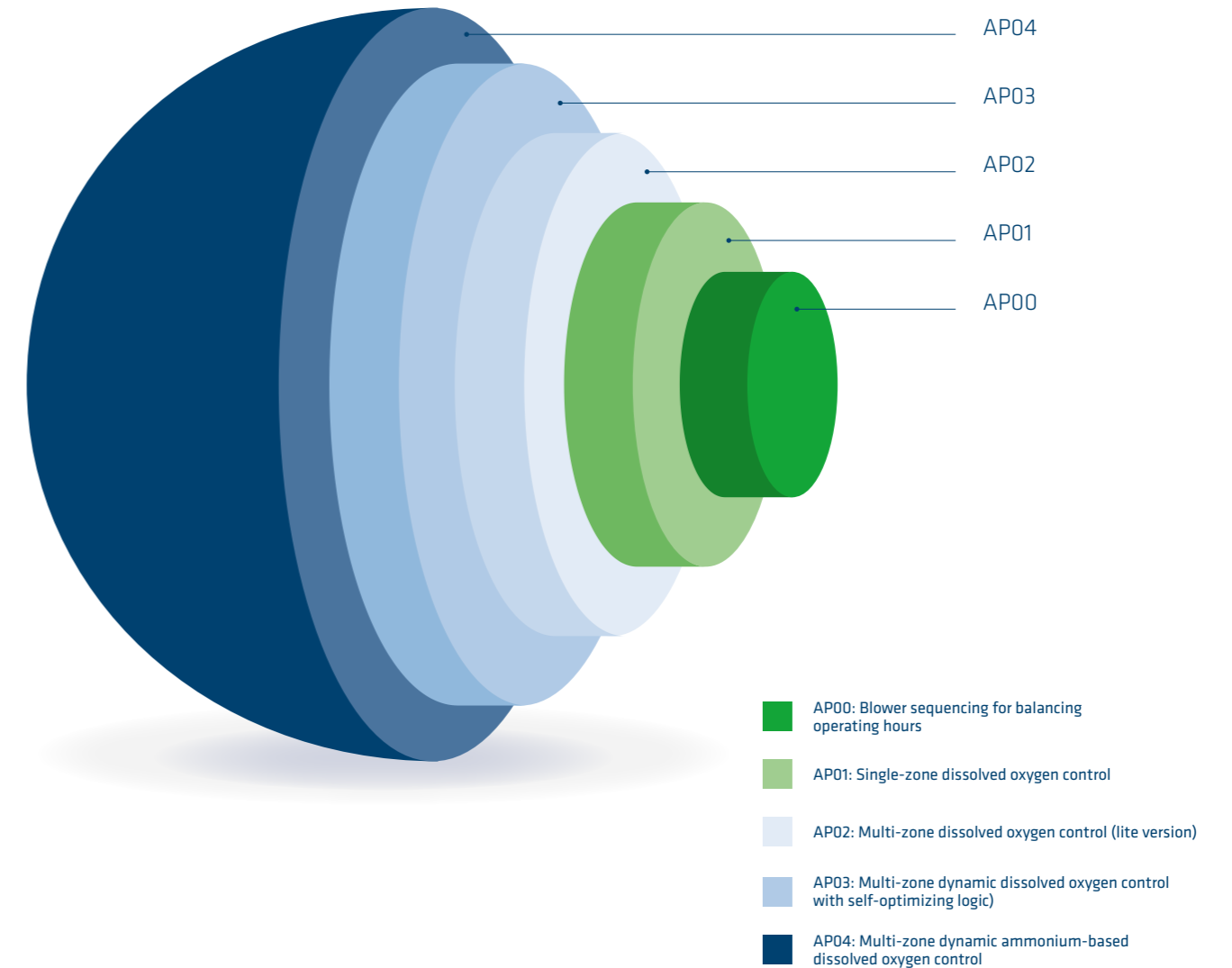
Implemented Control Concepts:

- Control of dissolved oxygen in activated sludge tanks using a dynamic setpoint based on measured influent concentrations
- Intermittent and alternating aeration
- Impulse mixing for homogeneous mixing of activated sludge
- Blower control using sliding pressure control
- Optimized control of blower groups for load balancing

Modularity and Flexibility

AERprocess features a modular design and offers flexible solutions tailored to specific requirements. A range of configurations is available, from a basic setup with straightforward oxygen control functions to a fully dynamic solution that continuously adapts to changing load conditions.

Core modules: AERprocess offers a range of core configurations that build on one another:



Key Features

- Dynamic and interactive control and regulation system
- Load-dependent control based on real-time sensor data
- Open, modular system architecture
- Based on real-time sensor measurements (O_2 , NH_4 , NO_3 , ...)
- Compatible with all PLC platforms



Added value for operators

- ✓ Optimal process control
- ✓ Efficient operation
- ✓ Maximum operational reliability
- ✓ Minimal operating costs

In addition to the core modules, AERprocess offers further options:

- Dynamic calculation of the dissolved oxygen setpoint based on influent load and required NH_4 and NO_3 effluent limits
- Dynamic control of nitrification and denitrification phases using step control, based on influent load and required NH_4 and NO_3 effluent limits
- Control of impulse mixing for activated sludge homogenization, including pulse frequency and duration
- Determination of dynamic or sliding pressure setpoints for blower and valve control
- Load Balancing for energy-optimized control of the blower station
- Control optimization to minimize nitrogen oxide (NO_x) emissions
- Influent-dependent control of return sludge and recirculation flows
- Load-dependent dosing of precipitation agents for phosphorus removal
- Dosing of lime or external carbon sources

Heat recovery

Utilising heat energy sensibly

Waste heat from process air generation remains unutilised at many wastewater treatment plants. With suitable concepts, it can be recovered efficiently and utilised economically. This reduces energy costs, improves the efficiency of the system and usually pays for itself in a short time.

Energy potential of waste heat

For thermodynamic reasons, in the case of compressed air applications, heat is generated (electrical energy of the drive power is converted into heat). It is produced both in the generated air flow and at the bottom of the acoustic hood by the waste heat from the compressor stage, the motor and the silencer. With smart concepts for heat recovery based on tube bundle heat exchangers and attached ventilation ducts for discharging the warm air under the acoustic hood, a large part of it can be recovered, thereby increasing the overall efficiency of the process air generation.

Customised for your processes

The basis for optimal waste heat utilisation is the determination of the available heat quantity. This depends on the usable temperature difference, the mass or volume flow, the time availability and the specific heating or cooling capacity of the heat transfer medium. We therefore match our heat recovery solutions precisely to the customer's individual application. By adding heat exchangers in the compressed air system, the temperature differential can be used for different heating or cooling purposes.

Diverse fields of application

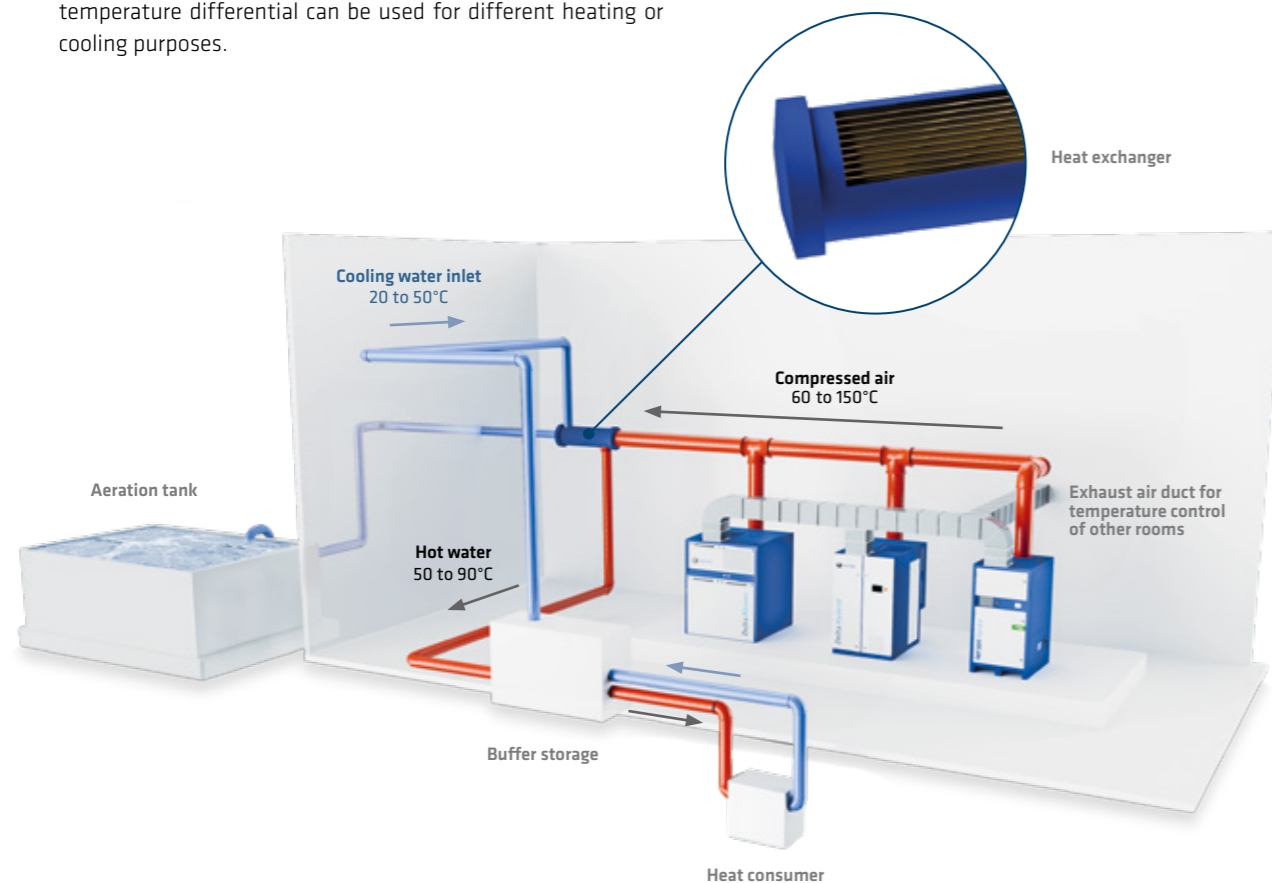
The waste heat can be used sensibly wherever a sufficient temperature delta exists.

Typical fields of application for heat recovery:

- Heating/Cooling of office, workshop & process buildings
- Hot/Cold water generation
- Additional heat for the sludge drying process

Quickly amortised

The investment costs for a heat recovery system and cooling systems are relatively low and quickly offset by the energy savings. Older systems can also be retrofitted and optimised without great effort. AERZEN is happy to support you with individual solutions.



Machine room ventilation

Efficiency begins in the machine room

Blower and compressor efficiency is not defined by the machines alone—it is shaped by the installation environment. Integrating the machine room into the overall efficiency concept from the outset ensures optimal performance and long-term reliability.

Focus on oxygen input

Aeration performance is not defined by the volume of air delivered, but by the amount of oxygen effectively transferred to meet the biological demand for nitrification. Changes in operating conditions—such as pressure losses or elevated intake temperatures—reduce the oxygen density of the air, meaning less oxygen is supplied even at the same airflow rate. As a result, maintaining consistent and sufficient oxygen input becomes critical for stable and efficient nitrification.

If the machine room is too warm or there is underpressure, the ventilation time must be extended for the same amount of air with a lower oxygen content. This increases the energy consumption of the blowers, compressors and turbos used. These reductions in efficiency add up to a noticeable loss of energy efficiency and thus to rising electricity costs. For example, a temperature increase of 3 degrees reduces efficiency by around one per cent. That quickly adds up to more than €10,000 per year.

The ideal room ventilation:

An optimal machine room takes several aspects into account: sufficiently dimensioned ventilation openings, alignment of the inlet air to the north (colder air with a higher oxygen content per cubic metre) and the exhaust air to the south, the use of louvre silencers, exhaust fans at ceiling height (where the air is warmest) and regular cleaning and maintenance of the suction filters. AERZEN has the relevant expertise and provides comprehensive advice to customers and engineering companies.

! Your Benefits

- ✓ 3 Kelvin warmer = 1 % efficiency loss
- ✓ Shorter machine service life
- ✓ Lower oxygen input



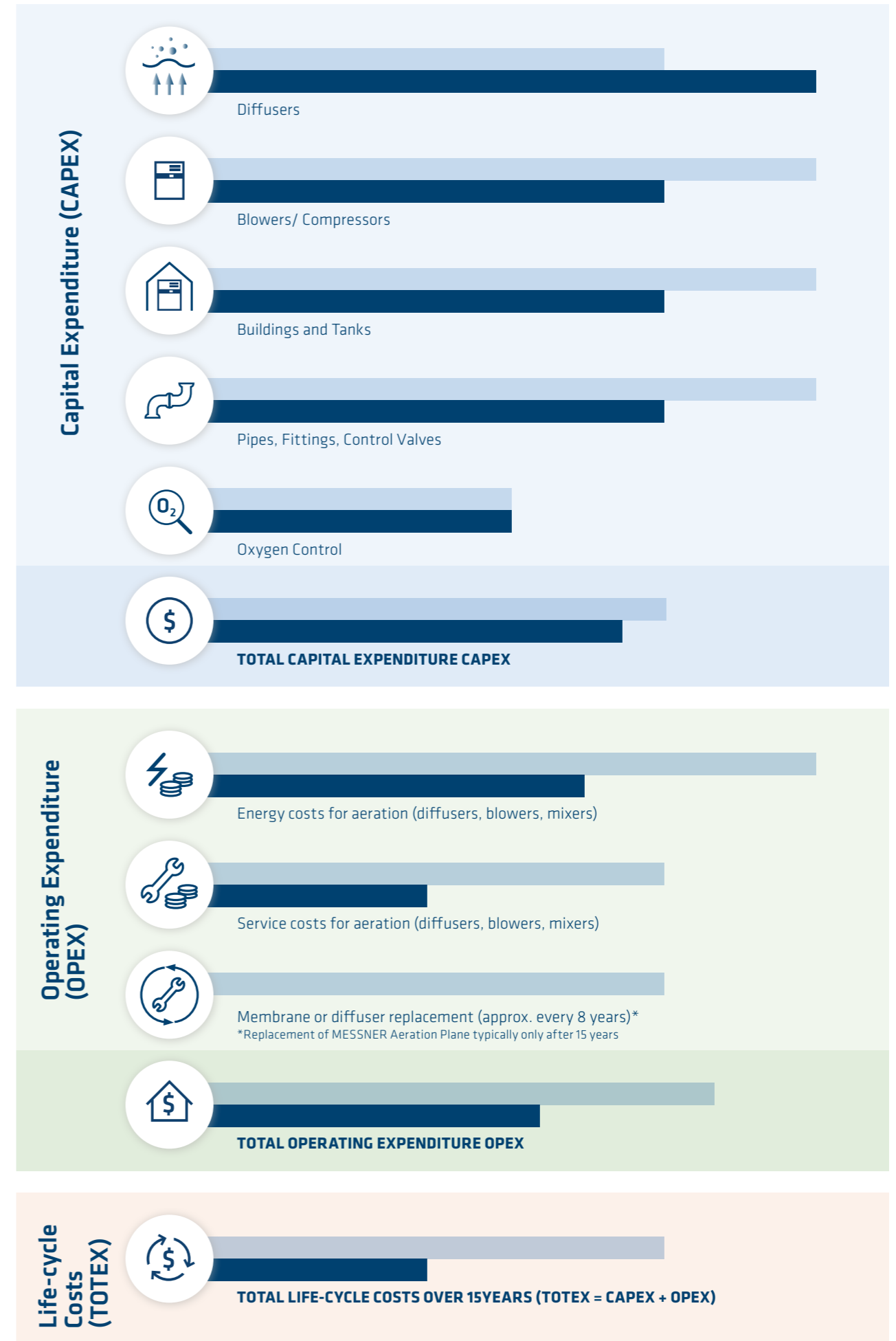
Best-in-Class

Maximum Efficiency, minimum Investment

The AERZEN Water Treatment System (AWTS) represents advanced technology, is unique as a complete system, and sets benchmarks in energy efficiency, operational reliability, cost-effectiveness, and process control. This enables optimal aeration performance and future-proofs your plant.

System engineering, diffusers, blowers and process control: in the AERZEN Water Treatment System (AWTS), all components of aeration in activated sludge tanks work seamlessly together – from air supply and oxygen transfer to intelligent control and regulation. This creates a powerful opportunity for maximum energy efficiency with minimal investment cost.

Our in-depth system understanding and extensive application experience elevate your aeration performance to the next level. Benefit from sustained energy and cost efficiency with maximum process control.



Implementation

Operational Reliability

The importance of smooth and reliable plant operation often becomes most evident during implementation. AERZEN's wastewater specialists bring extensive experience across all industry requirements. Whether commissioning new systems or upgrading existing plants, you can rely on competent support at every stage.

Commissioning – a smooth start

Commissioning by an experienced AERZEN service engineer ensures that errors are avoided from the outset. The integration of new diffusers and machines into your plant is carried out both mechanically and at process control level. This eliminates potential risks associated with improper commissioning and establishes the foundation for a long service life of both diffusers and machines.

Particular attention is given to integration into the control system, including start-up and shutdown sequences as well as the coordinated operation of diffusers and machines, all precisely tailored to the specific requirements of your plant.

! Our Services

- Installation check and alignment using laser measurement
- Preparation of machines for operation (oil filling, coolant, etc.)
- Verification of all safety-related functions, including alarms, shutdown limits, and signals to the control system
- Commissioning of the equipment
- Extended test run under operating conditions
- Preparation of handover documentation
- Commissioning of the control system, including integration into existing control architecture, connection of instrumentation, and parameterization of process control



Other Applications

From Grit Chamber to Biogas System

AERZEN takes a plant-wide approach. Beyond aeration in activated sludge tanks, our solutions play a key role across multiple stages of wastewater treatment. They provide reliable aeration in grit and grease chambers and support efficient biogas utilization in sludge treatment. The result is improved overall plant performance and stronger operational efficiency.

Efficient aeration for grit and grease chambers

In grit and grease chambers, mineral and organic fractions are separated through controlled flow patterns and aeration. While heavier materials such as sand and gravel settle, lighter substances like fats and oils are lifted to the surface by the induced air flow and removed. A uniform and stable air supply is essential for this process. Coarse bubble diffusers made of stainless steel or EPDM provide robust, low-maintenance aeration with a defined bubble pattern, ensuring optimal flow conditions within the tank. This enables reliable separation of settleable and floatable substances.

Combined with high-performance AERZEN blowers, the required air flow rate is delivered efficiently and in line with process demand. The blower technology ensures stable and precise air delivery, even under fluctuating inlet conditions, significantly contributing to operational reliability.

The interaction between efficient air generation and optimal air distribution forms the basis for stable, cost-effective, and long-lasting operation of grit and grease chamber systems.

Grit Chamber Delta Blower

- Reliable aeration in grit chambers
- Energy-efficient operation
- Robust, low-maintenance design



Coarse Bubble Diffuser

- Wide flow rate range
- Low differential pressure
- Robust stainless steel design



Sludge treatment - turning wastewater into energy

In the digester, anaerobic digestion of sewage sludge produces valuable biogas—a renewable energy source that significantly improves plant energy efficiency and can even support energy self-sufficiency. Microorganisms convert organic matter into a methane-rich gas mixture without the presence of oxygen, which can be effectively used for heat and power generation. Combined heat and power (CHP) units convert this gas into electricity and thermal energy, transforming sludge from a by-product into a valuable resource. AERZEN biogas blowers ensure reliable and efficient gas transfer from the digester to the CHP unit. Specifically engineered for conveying and compressing biogas and landfill gas, they deliver high performance and efficiency. The GM series is available in a wide range of sizes and has been developed specifically for the biogas market.

Compliant with ATEX Directive 94/9/EC, DIN EN 1012-3 for compressors and vacuum pumps, and DVGW regulations, these blowers are suitable for use in explosion protection zones 1 and 2.

Biogas-Blower Delta Blower GM

- Oil free compression of biomethane and biogas
- High availability and efficiency
- TÜV-certified explosion pressure resistance up to 12 bar



Aerzen Rental

Process air for rent – 24/7

Aerzen Rental, a member of the AERZEN Group, has an extensive and comprehensive rental programme, consisting of machines, aerators and accessories, which allows us to offer complete solutions for every requirement. In an emergency, we deliver our products from our European depots all year round, 7 days a week, 24 hours a day.

! Your Benefits

- 24/7 service and delivery
- Depots throughout Europe, North America (USA) and Asia
- 100 % oil-free blower and turbo solutions
- Pressure and volume flow ranges perfectly tuned to municipal and industrial wastewater treatment plants
- Wide range of aeration technologies
- Mobile Plug-&-Play systems for quick connection to existing aeration systems
- Reliability and redundancy, revisions, conversions or capacity expansions
- Large selection of accessories and modifications

Rental service – short-term use of machines or accessories

Should a machine fail, AERZEN is available 24/7 at short notice with an extensive machine portfolio. In this way, bottlenecks or revision work can be bridged and process reliability ensured. Especially for the wastewater treatment, AERZEN offers a new trailer solution with mounted turbo blower, which is flexible, efficient and immediately ready for use. You can also receive the AERZEN rental service as a turnkey total service - including transport, installation, commissioning and connected maintenance concepts.



Contact us
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Sustainability in the wastewater industry

Saving resources, shaping the future

Being awarded the EcoVadis Silver certificate is an important milestone for AERZEN. For operators of wastewater treatment plants, this creates real added value in order to connect maximum efficiency with demonstrable responsibility in the supply chain.

Proven sustainability: AERZEN secures EcoVadis Silver

Wastewater treatment is one of the most energy-intensive processes in municipal and industrial infrastructure across all sectors. The aeration of the aeration tanks in particular requires a massive amount of energy. As a manufacturer of the essential technology for this, we at AERZEN bear a special responsibility for the environment and climate. Our aim is therefore not only to formulate sustainability as a strategic goal, but to anchor it as a measurable and transparent part of all our corporate processes.

AERZEN has now objectively proven this claim and has been outstandingly honoured with the EcoVadis silver medal. EcoVadis is recognised as the world's leading standard for corporate sustainability assessments. The in-depth analysis requires concrete evidence in the four core areas of environment, labour and human rights, ethics and sustainable procurement. The result confirms our course and clearly indicates that AERZEN is among the top 15 per cent of more than 100,000 companies rated worldwide across all sectors.

Fact-based sustainability in an industry comparison

The benchmark within the manufacturer of general machinery is particularly meaningful. We are clearly positioned in the top group here and are among the top 6 per cent of all companies listed in a direct industry comparison in the overall assessment and in the environmental range. We are sending a particularly strong signal in the category of sustainability procurement, where we achieved the top 3 per cent. In practice, this means



that we set the highest standards for the origin of our materials and consistently check the ecological and social standards within our entire supply chain.

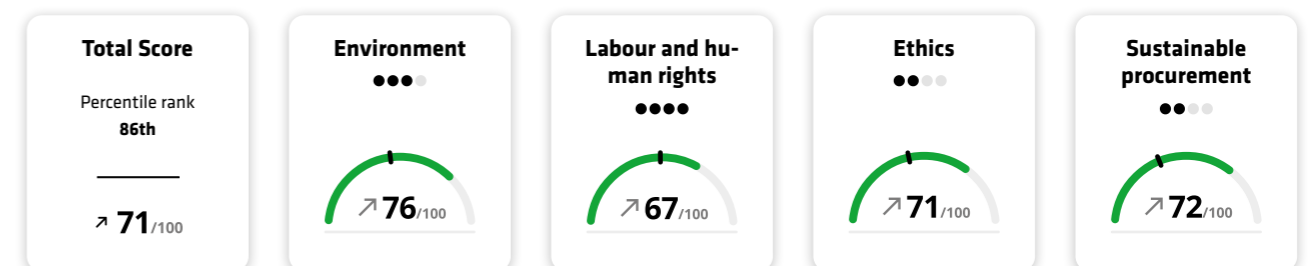
Strategic added value for system operators

When a wastewater treatment plant is equipped with blowers and compressors from AERZEN, the operator benefits from far more than just maximal plant availability, and energy efficiency. In times when regulatory requirements such as supply chain laws and ESG reporting are becoming increasingly mandatory for operators, our EcoVadis certification provides a reliable data basis.

Our customers have the safety of relying on technology that has been produced responsibly along the value chain. In this way, we actively support system operators in fulfilling their own sustainability goals and compliance requirements in a legally compliant and transparent manner.

Award as an incentive for the future

The silver medal is a confirmation of our work to date, but no reason to rest on our laurels. We understand sustainability as a continuous improvement process. We are therefore working consistently to further optimise our processes for even more efficient wastewater treatment plants, the protection of our water resources and a sustainable industry.



●●●● Effect on ratings
 | Average of all rated Companies

Matured to perfection over 160 years: The service world of AERZEN

The best service is the one you don't need. But every technology has its wear and tear. Our machines are engineered to do their job as long and efficiently as possible. If necessary, for decades. AERZEN services are designed to extend availability and service life - pure added value for your investment!



Original Equipment Manufacturer quality pays off

We have been manufacturing quality products for over 160 years. At the same time, the corresponding world of services has developed. With customised proposals for every phase of your machine's life. With AERZEN original parts, reliable logistics and excellent service at its core. And with decentralised service centres in your vicinity, which guarantee fast availability of spare parts and competent services - worldwide.

The AERZEN on-site service

Our service teams work where our machines are. All over the world. Onshore or offshore. Often under extreme conditions. How do we achieve this? With short distances. AERZEN has established for you a dense network of service centres and decentralised parts warehouses around the globe. More than 200 excellently trained service technicians are available to assist you from there. Anytime and wherever you need us.



Contact around the world

2.900 employees work for AERZEN. On all continents. With six sales offices, we are there for you in Germany alone. And with over 50 subsidiaries in more than 100 countries around the world. This ensures short distances to you - wherever you need us. Give us a call:
+49 5154 81 0

Service Infoline

Our German Service Centre is available for customers and operators. We are happy to help you. Find your local contact here:

www.aerzen.com/services



Customer Net

Where you can learn more about the company and the leading compressor technologies from AERZEN? Simple: using the Customer Net on our homepage. We have stored everything you need to know there:

www.aerzen.com



LET'S TALK
Find your local contact

www.aerzen.com/worldwide

LET'S TALK

Let's unlock your aeration potential

How energy-intensive is your aeration system? Are your diffusers, blowers, and control system truly aligned? Are you fully leveraging the potential of your aeration? Efficiency is no coincidence. It is the result of a deep understanding of biological and technical processes, combined with strong technological expertise and the ability to optimize systems as a whole.

Balancing efficiency and process stability

Aeration in activated sludge tanks is the single largest energy consumer in a wastewater treatment plant. At the same time, it must reliably meet strict discharge limits while remaining flexible under fluctuating load conditions. Rising energy costs, climate targets, and increasing regulatory requirements are placing additional pressure on operators to optimize performance. What is needed are solutions that combine energy efficiency, sustainability, and process stability.

One System – One Solution

The AERZEN Water Treatment System (AWTS) represents a new dimension in aeration for activated sludge tanks. True efficiency is not achieved through individual components or isolated measures. It is realized when processes are understood, technologies are intelligently combined, and systems are optimized as a whole.

Competence
More than 160 years of experience with a proven track record in over 100,000 treatment plants worldwide. Trusted partner to contractors, engineers, and operators with a global presence.

System Understanding
Deep understanding of biological processes, oxygen demand, and air supply. Enables precise coordination of blowers, diffusers, and control for stable and efficient operation.



Technology
Integrated aeration concepts combining diffuser & blower technologies with intelligent control systems. Complemented by heat recovery and optimized machine room ventilation.

AERZEN takes a 360° view of the entire aeration process

Digitalization
Condition monitoring, predictive maintenance, and remote monitoring. Digital tools for process optimization, modeling, and simulation.



Sustainability
Maximum energy efficiency and reduced CO₂ emissions. Extended asset lifetime and solutions designed for long-term environmental and climate targets.

Services
End-to-end support from planning to operation. Tailored service concepts, lifecycle support, and flexible rental solutions.



! AERZEN – Setting new standards in aeration

✓ We rethink aeration.

For wastewater treatment plants ready for the future.

✓ Efficiency starts with the system.

We approach aeration as a whole, from process to machine.

✓ Technology that makes the difference.

High-efficiency diffusers, blowers, and control systems, precisely aligned.

✓ Experience shapes the future.

More than 160 years of engineering expertise define every AERZEN solution.



System-Id Engineering - Redefining Efficiency

For us, a strong solution does not begin with the machine, but with the process. Only when biology, air supply, and control work seamlessly together can aeration reach its full efficiency potential. AERZEN therefore consistently approaches aeration as a complete system. We understand your process, select the appropriate blower technology, optimize aeration in the activated sludge tanks, and ensure reliable long-term operation of your plant. Integrated systems instead of individual components, integration instead of isolated solutions, collaboration instead of fragmented approaches, and process expertise instead of standard solutions – this is the AERZEN approach.

One Team - from concept to operation

AERZEN works hand in hand with contractors, engineers, and operators. We contribute our aeration expertise from the earliest project stages and develop solutions tailored to your plant and its biological process. From concept to operation, we ensure all elements are technically aligned to deliver reliable and efficient performance.

How can we support you? Discuss the right solution for your plant with our experts. Let's Talk.



Find your local contact
www.aerzen.com/company/request-and-contact

AERZEN. Compression is the key to our success

The Aerzener Maschinenfabrik GmbH was founded in 1864. In 1868, we built Europe's first positive displacement blower. The first turbo blowers followed in 1911, the first screw compressors in 1943, and in 2010 the world's first rotary lobe compressor package. Innovations "made by AERZEN" keep driving forward the development of compressor technology. Today, AERZEN is among the world's longest established and most significant manufacturers of positive displacement blowers, rotary lobe compressors, screw compressors and turbo blowers. And among the undisputed market leaders in many areas of application.

In more than 50 subsidiaries around the world, more than 2,900 experienced employees are working hard on shaping the future of compression technology. Their technical competence, our international network of experts and the continual feedback from our customers are the basis of our success. By adding aeration experts to the group, AERZEN brings together extensive expertise in aeration and integrated system solutions. AERZEN products and services set standards. In particular, with regard to reliability, stability of value and efficiency. Challenge us.



LET'S TALK

Find your local contact

www.aerzen.com/worldwide

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EXPECT PERFORMANCE