

Average reading time: 3 minutes

# Wastewater treatment with pure oxygen

Pure oxygen and the BIOX process increase the capacity of wastewater treatment plants



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# Effective treatment of industrial wastewater

Numerous challenges arise in the operation of wastewater treatment plants: New legal requirements, a changing population structure or changing operating conditions in industry demand flexible concepts that ensure reliable plant operation.

In particular, a functioning biological treatment stage, which removes most of the pollutants from the wastewater, is crucial for a constant treatment performance. The problems occurring here, such as increased COD/BOD5 effluent values, reduced nitrification performance, a high number of filamentous bacteria or deteriorated sedimentation in the secondary clarification, are often due to an insufficient supply of oxygen.





# Pure oxygen improves efficiency

Pure oxygen has a five times higher solubility in water than pure air. This can be explained by the fact that air consists of only about one-fifth oxygen (21% by volume), the rest being nitrogen (78% volume) and other gases (1% by volume). In short, pure oxygen is “concentrated air” without nitrogen ballast.

By using pure oxygen in biological wastewater treatment, the capacity of existing plants can be increased without the need for complex and costly structural expansion. In addition, further improvements can be achieved: Optimized nitrogen elimination, good sedimentation in secondary clarifiers, reduced foaming and a reduction of odor emissions.

Pure oxygen can be used as a complete replacement or in addition to conventional aeration. Typical oxygen limitations that occur, for example, in high-load basins, selector basins or with warm wastewater can thus be avoided.

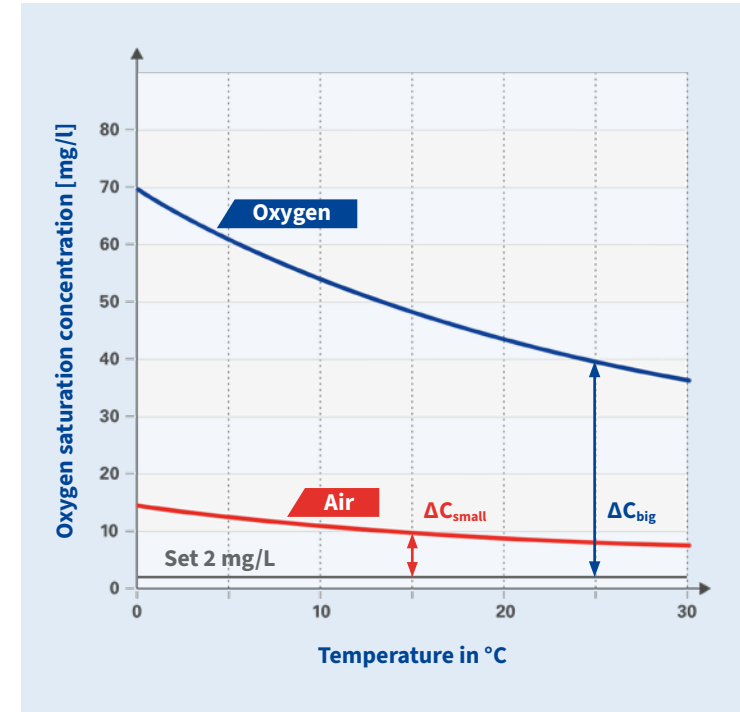


# Optimal oxygen dissolution with the BIOX process

In the BIOX process the biological purification stage is supplied with gaseous pure oxygen which is stored as a liquid in a vacuum-insulated tank on site. An enclosed air evaporator transfers the oxygen into the gaseous form. In addition, pressure and volumetric flow control as well as special aeration systems ensure efficient introduction of the pure oxygen into the water. The gas is usually dosed depending on the concentration of dissolved oxygen in the wastewater.

In emergencies or the failure of aeration systems, as well as for interim solutions or trials, Messer provides the BIOX equipment on a rental basis, so that no plant investment is required. This can be implemented at short notice and without great expense.

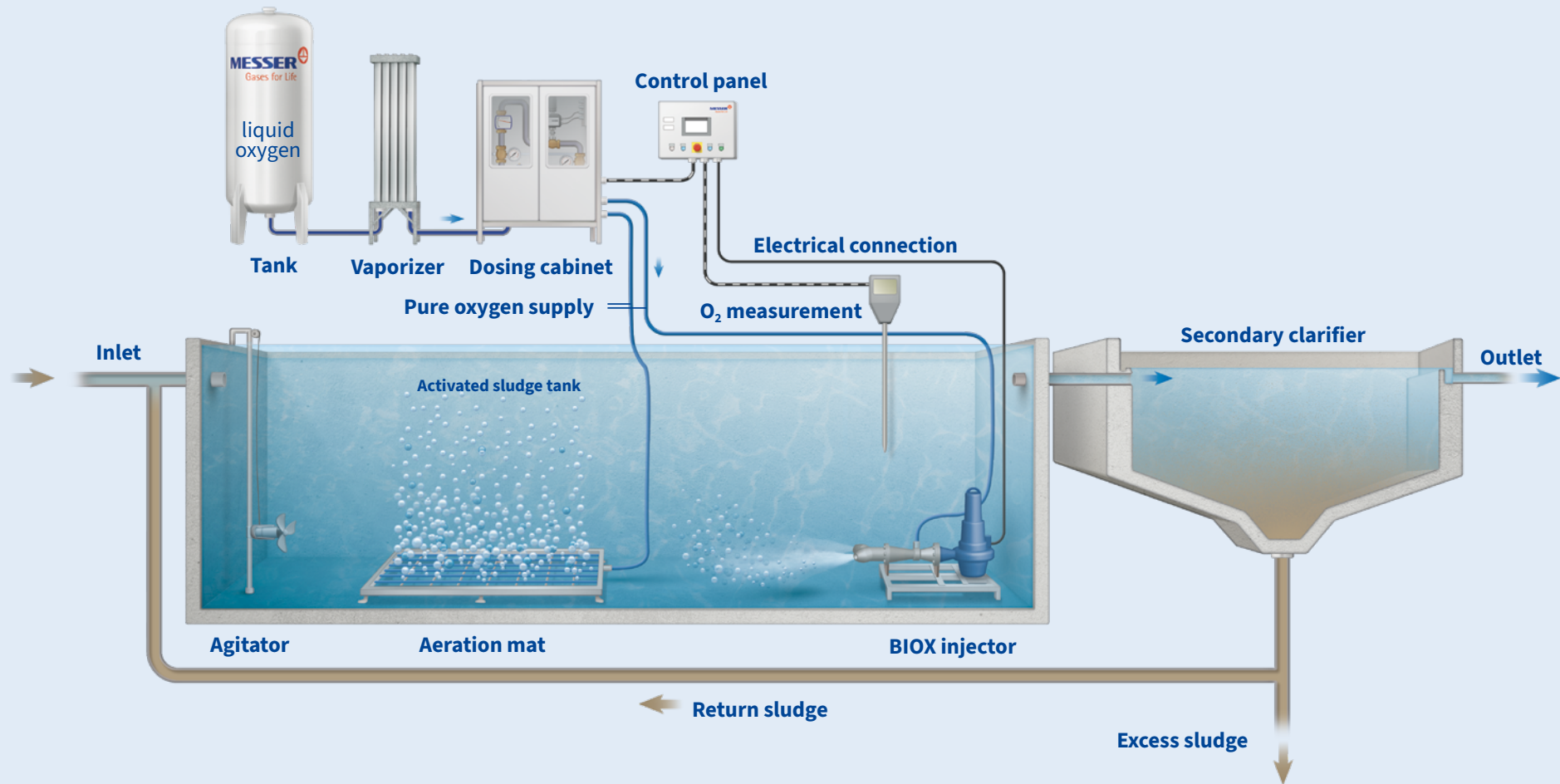
Pure oxygen and the BIOX process can be used successfully not only in classic aeration tanks, but also in biological filters, fixed-bed plants or membrane bio-reactors. These types of plants are often an interesting addition to conventional plant concepts when it comes to space-saving expansion or replacement of existing plants. Here, too, the potential is only fully tapped with pure oxygen.



Comparison of the solubility of pure oxygen and air

# Mode of operation of the Messer BIOX process

for increasing the capacity of wastewater treatment plants

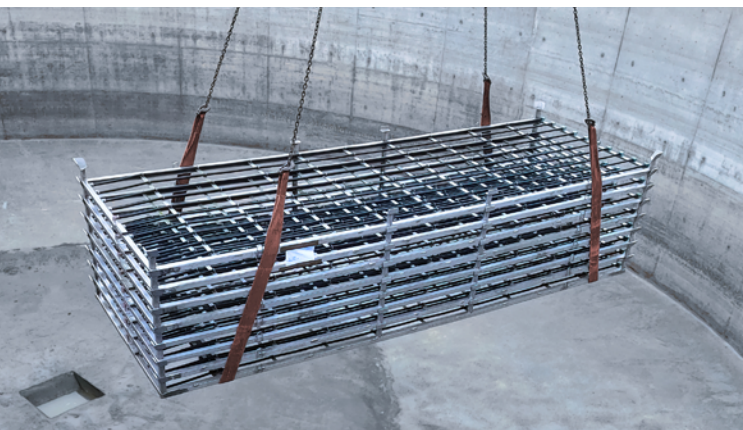




# Technical solutions tailored to your requirements



*Messer BIOX injector for efficient dissolution of oxygen in water*



*Messer aeration mats - the simple and effective solution for oxygen input.*

The choice of the right oxygen transfer system is crucial for efficient and economical operation with pure oxygen. For this purpose, Messer offers its own aeration hoses, injectors and other oxygenation systems individually tailored to your requirements.

Our application specialists will help you select the right technology and develop an optimum concept solution for your wastewater treatment. We determine the oxygen demand for you, create an individual process concept and design the required hardware depending on the site-specific conditions. In addition, we support you during commissioning and are available to you at any time with our service.

If required, Messer can also provide you with a complete mobile system for the aeration with pure oxygen. In this way, you can fully convince yourself of the advantages of pure oxygen injection or use it, for example as an interim solution for the replacement of defective aeration systems, even over a longer period of time.

# Your advantages of using pure oxygen





- Efficient oxygen dissolution
- Increased oxygenation capacity
- Constant oxygen supply even at high peak loads
- Suitable for high wastewater temperatures
- No odor emissions and aerosol formation
- No foam formation
- Safe nitrification
- No disturbance of settling processes by outgassing of nitrogen (especially in deeper basins)
- No time- and cost-intensive constructional extensions necessary



# About Messer



 Messer is the world's largest privately owned specialist for industrial, medical and specialty gases. Under the brand, **Messer - Gases for Life**, the company offers gases and services in Asia, Europe and America. The cooperation between the more than 11,500 highly qualified international employees is based on mutual respect. Messer pays particular attention to diversity and inclusion.

 Messer's 'Gases for Life' are used in industry, environmental protection, medicine, the food industry, the electronics industry, welding and cutting technology, 3D printing, construction, research and science. Messer offers one of the largest product portfolios on the market and develops application technologies for gases in state-of-the-art competence centers. 'Gases for

Life' are as important as water and electricity in most industrial processes and can play a significant role in their decarbonization, for example through the use of green hydrogen, CCUS or oxyfuel technology. In its customers' processes, Messer's customized gas solutions ensure greater safety, efficiency, quality, capacity and environmental compatibility and/or reduce the associated emissions and costs.

As a pharmaceutical company, Messer is also a provider of medical and pharmaceutical gases and complete solutions and has proven itself to be a reliable supplier of vital products.

[Messer Image film >](#)

**The company was founded in 1898 and is majority-owned by the Messer family.**

# Service and Advice



**Take advantage of the experience of our application specialists. We will be happy to show you the potential of using pure oxygen in your wastewater treatment.**

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