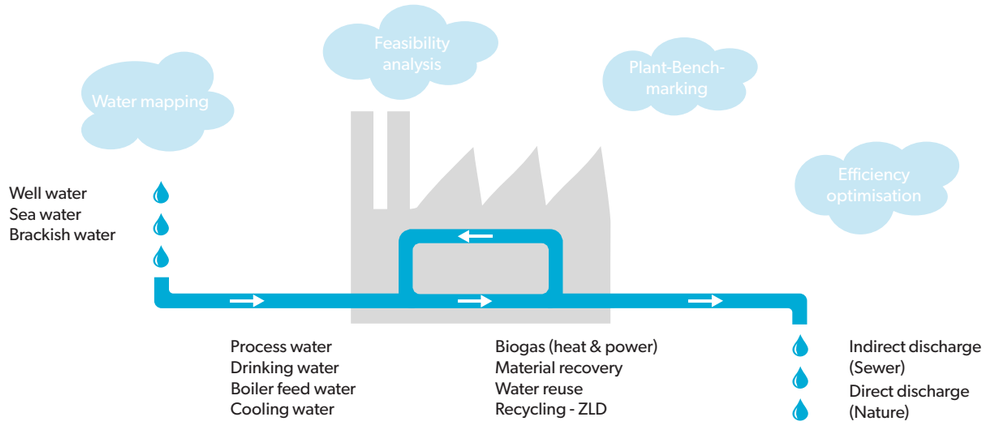
Services for the Treatment of Process Water and Wastewater

In addition to process water and wastewater technology, WEHRLE offers a full service and technology package for the production factor water:

- Consulting & water mapping
- Feasibility analysis & piloting
- Plant benchmarking
- Plant efficiency optimisation
- Plant operation
- Plant modernisation
- Plant performance increase
- Rental plants for production peaks or maintenance shutdowns

Do not hesitate to contact us – we are glad to support you!



WEHRLE-WERK AG

Plant engineering and services from one source

Since 1982 WEHRLE sets benchmarks as pioneer and technology leader for the treatment of complex process water and wastewater. The wide range of available process technologies allows intelligent process combinations to fulfil the requirements and expectations of the client in the best possible way. WEHRLE consults, plans and builds plants and offers corresponding services such as piloting, efficiency optimisation and retrofitting of existing plants.

Especially for applications in the industry, factors beyond the used technology are important:
• a reliable performance to cater for variations of wastewater volume and loading
• a modular design for future upgrades
• a simple operation
• high efficiency.

WEHRLE plants are often used for raw and process water treatment as well as for wastewater treatment and water recycling, reducing operation costs of the production.

WEHRLE is dedicated to the company's history: As family-owned company, reliability, longevity and openness with our clients and partners are our top priorities. The clients of WEHRLE trust this philosophy – in over 45 countries and on 5 continents.

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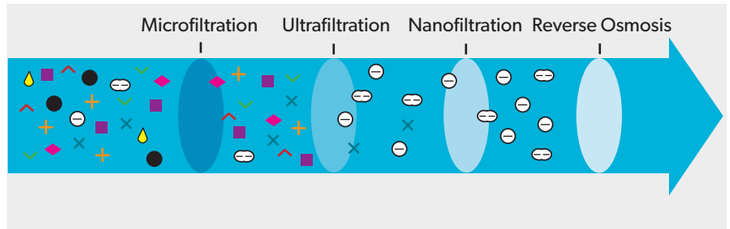
MEMBRANE TECHNOLOGIES FOR THE INDUSTRY

WEHRLE

Increase in concentration, filtration and material recovery from water and solutions

Water used in production cycles absorbs pollutants in the course of the process. Depending on the type of production, this rinsing effect is desired. However, this may also lead to a loss of resource materials. Oils, solvents, metals and also heat from the water – as well as the water itself – are of value to the company, which should not just be „washed down the drain". The recovery of those substances could be of interest for the company, not only to achieve sustainability goals but also for economic reasons.
Other processes require an increase in concentration of substances within the water or process solutions – e.g. pigments in the colour and painting industry, the thickening of brines in the food industry – or the filtration and/or purification of liquids – e.g. in water softening or lye purification in the food industry.

Membrane technologies offer a wide range of technical solutions. Compared to other technologies, membrane processes require less chemicals and less energy. The operation is automated and stable, whilst installation of the prefabricated and compact membrane skids allow an easy and quick installation.
By combining different membrane types, even complex separations are possible, also in aggressive media such as acids and lye.
As engineering company and plant supplier, WEHRLE does not always choose standard solutions but takes into consideration the customer's individual requirements by designing and constructing a suitable plant ideally adapted to the user's technical and economic needs.



Overview Membrane Technologies

Membrane type	Cut point	Typical use
Microfiltration	> 0.1 µm > 5,000 kDa	Separation of particles, bacteria, yeast, e.g. in surface water treatment or the treatment of effluents from surface finishing processes
Ultrafiltration	> 0.01 µm > 50 kDa	Separation of macromolecules, proteins, e.g. in biological wastewater treatment, sterilisation or oil emulsion treatment
Nanofiltration	> 0.001 µm > 0.5 kDa	Separation of viruses, bivalent ions, e.g. for water softening, desalination of bases, decolourisation of solutions
Reverse osmosis	> 0.0001 µm > 0.05 kDa	Separation of salts, small organic molecules, e.g. sea water desalination, cooling water or condensate treatment

Energy Technology • Environmental Technology • Manufacturing

Material Recovery from Polymers and Macromolecules

Especially in the pharmaceutical, chemical and petrochemical industry, substances consisting of big molecules are produced. Those substances can be proteins, polymers or other macromolecules, which may thus also occur in the process water or wastewater of the factory.

Material recovery offers two advantages:

1. The substance can be reused in the process.
2. A possible subsequent wastewater treatment does not have to cope with those persistent substances

Both factors help to reduce the process costs.
For example, a **client from the chemical industry** in Germany – Production of nitrous additive, a textile auxiliary agent – The WEHRLE Nanofiltration retains the persistent polymers and helps to preserve the wastewater treatment.

Flow rate	20 m³/d
Inlet/ N bound	2,000 mg/l
Outlet/ N bound	< 400 mg/l
Performance	80 %

Separation of Nanoparticles and Suspended Solids from Liquids

In some applications of the paper and colour/painting industry, partly also in the food industry or in grinding processes, particles are produced in the process water or wastewater. Depending on the requirements, those particles are removed either for disposal or reuse.

For example, a client from the photo industry in England – Recovery of silver from photographic paper coating by using a WEHRLE Ultrafiltration. Due to the recovery and reuse of the precious metal, the plant investment was amortized within a few weeks.

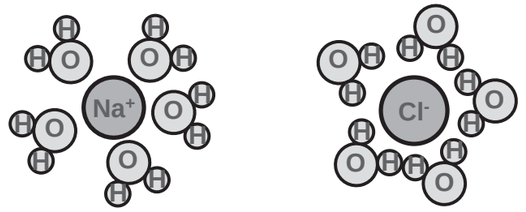
Flow rate	500 m³/d	
	TSS	**COD**
Inlet	300 mg/l	2,000 mg/l
Outlet	< 2 mg/l	< 250 mg/l
Performance	> 99 %	> 88 %

Separation of Dissolved Solids

Separation by using membrane technology is also possible for dissolved solids from process water or wastewater. In such cases, WEHRLE chooses the most suitable technology combinations from a range of different membrane types and manufacturers.

For example, **Omnicane, Mauritius** – The salt solution used in the sugar industry to indirectly bleach the sugar is treated by a WEHRLE Nanofiltration. Whereas the molasses pigments are retained in the concentrate, the salt solution may be reused as permeate, saving up to 80 % of the client's procurement costs for salt.

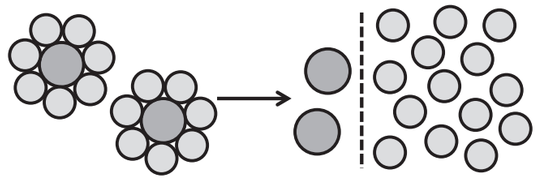
Flow rate	70...100 m³/d
Inlet/ COD	18,000 mg/l
Outlet / COD	4,000 mg/l
Performance	80 %



Emulsion Separation

Even emulsions can be separated by using membrane technology, being thus an interesting economic factor for the recovery of oils in the petrochemical or automotive industry.

For example, **Decal Espana S.A.** – Separation of an oil/water emulsion by using an UF: The emulsified oil drops are retained and their concentration is increased, whereas the water free of oil and grease passes the membrane and can be discharged directly. The compact containerised plant allows a flexible and economic treatment of the strongly varying wastewater volumes.



Flow rate	200 m³/d
	COD
Inlet	3,500 mg/l
Outlet	250 mg/l
Performance	> 92 %