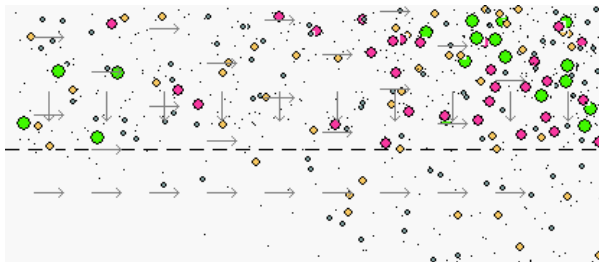


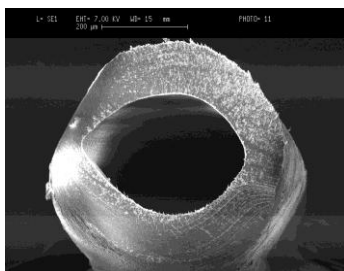
# Membranes for waste water reclamation

## Membrane Filtration

To produce wastewater in a quality superior to the minimum effluent standards the application of membrane modules is the state of art. Membrane technology belongs to the pressure driven filtration processes. In wastewater plants nanofiltration, ultrafiltration, microfiltration and reverse osmosis technology is used.



## Membrane modules

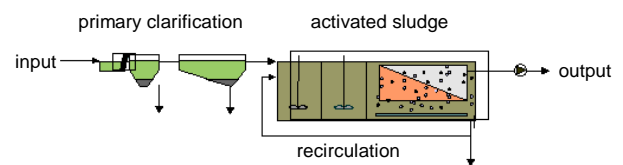


(Cross-section of a hollow fibre membrane, scanning electron microscope)

Several types of modules (hollow fibre, flat e.g.) and different types of materials (ceramic, plastic e.g.) are used in membrane filtration technology. This assures an optimal solution for any purification task.

## Membrane Bioreactor (MBR)

A Membrane bioreactor is a combination of conventional purification technology (bio-reactor) with a filtration unit, they are used both in industrial and communal wastewater treatment.



Compared to a conventional WWTP (wastewater treatment plant), the advantages are:

- Higher purification capacity
- Savings in space and construction work
- Modular design
- Lower investment costs
- Better water quality
- No pathogenic bacteria and germs
- Effluent is free of suspended solids

In addition to that the so produced pure water fulfils both default and stipulated values of the EC guideline on bathing water quality in which highest quality criteria in respect to pathogenic bacteria and germs (salmonellae, streptococcus e.g.) are requested (compared to conventional chemical/physical limits for waste water treatment in national regulations). As a result the clean water fulfills highest purification needs.

[EnviCare®](http://www.envicare.at) is offers years of knowledge in development, design, installation and operational practice of purification plants equipped with membrane technology.

## Communal wastewater

### **Austria's first membrane purification plant in operation: St. Peter ob Judenburg**

Membrane technology is becoming increasingly important for municipal systems, due to improved membranes and therefore decreased investment and operation costs.



In wastewater treatment, membranes are both used for the filtration of the discharge of conventional wastewater plants and directly in the activated sludge tank as a submerged membrane.

The municipal membrane plant in St. Peter ob Judenburg has a population equivalent of 1,500 and is equipped with hollow fibre membrane modules. The original wastewater treatment plant was built in 1989 as a ventilated pond purification plant, but the stipulated values could not be guaranteed. Therefore EnviCare® was entrusted to redesign the plant to find an innovative and efficient alternative.

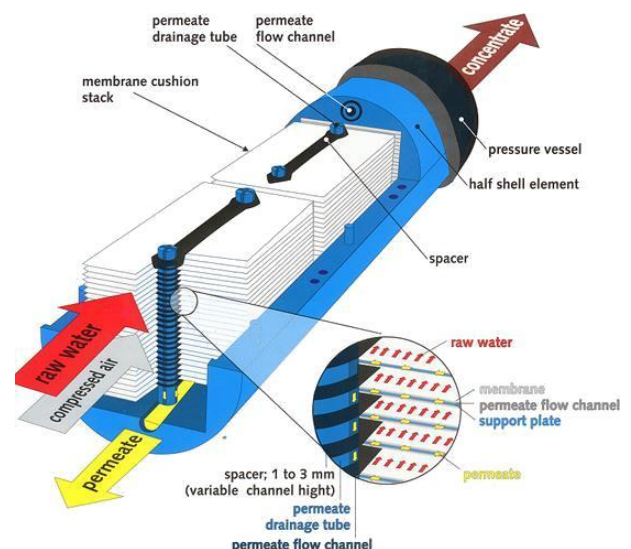
The MEMJET® process unites three membrane modules at a time, with single membranes oscillating horizontally in the wastewater. The motion is strengthened by a coarse-bubble ventilation situated below the module. The operation mode is intermittent, which allows back flushing with permeate. In addition to three standard types, modules can be adapted to customer needs.

- Innovative technology
- Low cost expansion of an existing plant
- Modular design
- All year guaranteed water quality
- Energy efficient ventilation and control technology
- Adaptable to customer needs

## Drinking water production

An increasing shortage on high quality drinking water is expected in the forthcoming century, this leads to intensive research on new water resources. One way of providing these resources is the use of innovative membrane systems in the field of communal wastewater treatment.

Different kinds of membrane technology are suitable, in this case nanofiltration modules were used.



The chemical and microbiological values of the so produced pure water were validated by an officially approved laboratory.

It fulfills both default and stipulated values of the EC guideline on bathing water quality, in which higher quality criteria with regards to pathogenic bacteria and germs (salmonellae, streptococcus e.g.) than normal chemical/physical limits for waste water treatment in national regulations are requested.

| Wasserlabor der Grazer Stadtwerke  |                   |  |           |                      |
|--|-------------------|--|-----------|----------------------|
| Nach LMG § 50 Abs.2 autorisiertes Labor für Trinkwasser und Mineralwasser<br>Wasserkassengasse 10, A-8045 GRAZ Tel.:(0 31 6) 887 / 1071 Fax: (0 31 6) 887 / 1078 |                   |  |           |                      |
| TRINKWASSERUNTERSUCHUNG  |                   |  |           |                      |
| Auftraggeber: DI. Dr.techn Mayr Bernhard<br>Wittekweg 9<br>A-8010 Graz   |                   | Prüfbericht: 02-1612                               |           |                      |
| Bezeichnung der Probe  | Probenahmestelle  | Probenehmer  |           |                      |
| Permeat der Mikrofiltration  | Ablauf Kläranlage | Buchmüller<br>Wasserlabor der Grazer Stadtwerke AG |           |                      |
| Datum der Probenahme   | Entnahmeart       | Labornummer  |           |                      |
| 5. September 2002  | Direktentnahme    | 102743   |           |                      |
| Standarduntersuchung<br>nach Trinkwasserverordnung BGBl.Nr. 304/2001   |                   |  |           |                      |
| Parameter  | Messwert          | Mes  |           | Verfahren            |
| Temperatur   | °C                | 19,9   | +/- 0.2   | DIN 38404 Teil 4     |
| elektr. Leitfähigkeit bei 25 °C  | µS/cm             | 760  | +/- 10.0  | ÖNORM EN 27888       |
| pH-Wert (Laborwert)  |                   | 7,0  | +/- 0.1   | ÖNORM M 6244         |
| Sauerstoff   | mg/l              | 4,8  | +/- 0.2   | ÖNORM EN 25814       |
| TOC (organisch geb. Kohlenstoff)   | mg/l              | 6,30   | +/- 0.02  | EN 1484              |
| Färbung (SAK bei 436 nm)   | m <sup>-1</sup>   | 0,67   | +/- 0.02  | DIN 38404 Teil 3     |
| Säurekapazität bis pH 4,3  | mmol/l            | 0,85   | +/- 0.05  | DIN 38409 Teil 7     |
| Gesamthärte  | °dH               | 8,5  | +/- 0.5   | Ionenchromatographie |
| Carbonathärte  | °dH               | 2,4  | +/- 0.5   | DIN 38409 Teil 7     |
| Natrium  | mg/l              | 67,80  | +/- 0.5   | Ionenchromatographie |
| Kalium   | mg/l              | 18,30  | +/- 0.2   | Ionenchromatographie |
| Magnesium  | mg/l              | 7,50   | +/- 1.0   | Ionenchromatographie |
| Calcium  | mg/l              | 48,80  | +/- 2.0   | Ionenchromatographie |
| Chlorid  | mg/l              | 71,5   | +/- 1.0   | ÖNORM EN 30304-1     |
| Nitrat   | mg/l              | 169  | +/- 1.0   | ÖNORM EN 30304-1     |
| Sulfat   | mg/l              | 55,6   | +/- 1.0   | ÖNORM EN 30304-1     |
| Ammonium   | mg/l              | 0,96   | +/- 0.02  | ÖNORM ISO 7150-1     |
| Nitrit   | mg/l              | 0,170  | +/- 0.002 | ÖNORM EN 27027       |
| Eisen gesamt (gelöst)  | mg/l              | 0,05   | +/- 0.02  | ISODIS 15586         |
| Mangan gesamt (gelöst)   | mg/l              | 0,025  | +/- 0.003 | ISODIS 15586         |
| Phosphat (gesamt); PO <sub>4</sub>   | mg/l              | < 0,02   |           | ÖNORM EN 30304-1     |
| Bor  | mg/l              | 0,72   | +/- 0.05  | ÖNORM M 6606         |
| KBE bei 22 °C  | pro ml            | 0  |           | ÖNORM EN ISO 6222    |
| KBE bei 37 °C  | pro ml            | 0  |           | ÖNORM EN ISO 6222    |
| coliforme Bakterien  | pro 100 ml        | 0  |           | ISO 9308-1           |
| Escherichia coli   | pro 100 ml        | 0  |           | ISO 9308-1           |
| Enterokokken   | pro 100 ml        | 0  |           | ISO 7899-2           |



Taking the rapid technological progress into account it can be expected that membrane processes will become a key technology in the market of drinking and wastewater during this decade.

### Further Information:

Take a visit to our homepage <http://www.envicare.at> for further information.

Some advantages....

- Innovative adaptable technology
- Barrier against pathogenic bacteria and germs
- Drinking water out of domestic wastewater
- Modular design
- Guaranteed highest water quality
- Adaptable to customer needs

EnviCare® supports you in

- Process concepts
- Design - Basic Engineering
- Authority proceedings
- Biddings
- Guarantees
- Order placing
- Contractions
- Construction supervision
- Installation
- research and process development.

EnviCare® offers years of knowledge in development, design, installation and operational practice in environmental technology.

**We take care of your environment!**