BIOLAK® GROUP
COMPETENCE IN WATER

System BIOLAK®

A multistage Wastewater Treatment Plant including biological Nitrogen and Phosphate Removal and Biofilter

Municipality - waste water treatment plant 40.000 m^3/d - 165.000 $p.e._{60}$

More than 750 plants for industry and municipalities, ranging from 300 to 3.000.000 p.e., are operating worldwide with great success. You too can benefit from our experience!

VON NORDENSKJÖLD • VERFAHRENSTECHNIK GMBH

BIOLAK® REFERENCE PLANTS

Industrial BIOLAK® Plants

Due to generous dimensioning of **BIOLAK®** plants and their multistage system even the toughest wastewater problems can be handled. Plants for various trade lines, as given below, illustrate the versatility of the system and comprehensive experience acquired. Capacities from 0,5 up to 200 t COD/d were realized.

Food industry

- Breweries / Malt houses
- Soft drink industries
- Fruit processing
- Dairy / Cheese production
- Protein production
- Yeast production
- Potato processing
- Starch factories
- Slaughterhouses
- Canneries

Other industries

- Textile industries
- Pulp and paper
- Waste disposals
- Rendering industries
- Petrochemical industries
- Chemical industries

Wastewater treatment plant pulp industry 60.000 m^3/d - 156.000 kg COD/d

BIOLAK® municipal plants

Municipal wastewater is easy to treat, however, the hydraulic, especially in case of combined water, has to be sufficiently dimensioned. **BIOLAK®** is, due to its hydraulic buffer and the integrated final clarification, extremely efficient. **BIOLAK®** was realized for municipal plants of sizes from 500 to over 3.000.000 $p.e._{60}$.

Integrated final clarification
The integrated final clarification is extremely intensive and reliable. Even in cold climate zones (-30°) it is working perfectly.

BIOLAK® plants are working perfectly in all kinds of climate zones,
i.e. Saudi Arabia (extremely hot)
Or Inner Mongolia-China, (extremely cold).

BIOLAK® RESEARCH AND DEVELOPMENT

Since 1972 the **BIOLAK®** system has been systematically developed with the assistance of 9 research projects. The first plants were only designed for a few hundred p.e. and due to subsequent development plants of sizes up to 3.000.000 p.e.$_{60}$ (1 p.e.$_{60}$ ≙ 0,06 kg BOD_5/d) were constructed. Meanwhile more than 750 **BIOLAK®**-plants have been installed worldwide. The **BIOLAK®**-Process is worldwide protected by several patents.

According to Antoine de Saint-Exupery, "Technique always develops from the primitive via the complicated to the simple", **BIOLAK®** has the following advantages:

1. **High standards of treatment** even with smaller plants
2. **Reliable cleaning** due to **multistage system** and high process stability
3. **High buffering capacity** against water- and pollution peaks
4. **Biological** phosphate- and nitrogren elimination
5. **Low sludge production** due to clever dimensioning
6. **Favourable investment costs** due to the integrated construction type
7. **Favourable operating costs** due to low personnel costs, low energy consumption and low excess sludge
8. **Variable volume in the activated basin** for adaption to long-term load variations
9. **Low space demand** due to the integrated construction type
10. **Construction that fits nicely into the landscape** (earth basins)
11. **High developed, reliable and solid technique** in MAT (mechanical assembly technique)

BIOLAK® BASIN LINING

Flexible and earthquake-proof

High-quality and reliable sealing is of great importance when earth basins are being used for wastewater treatment plants. As in the case of dumps for toxic disposal **BIOLAK®** is working with HDPE-lining. Welding is carried out by certified welders according to strict regulations with a number of tests by the German Technical Institution. The flexible layer is earthquake-proof and unaffected towards settlement.

Stability

HDPE-lining is designed to have a lifetime of at least 50 years; guarantee periods, which by far exceed the guarantee periods for concrete, are quite common (conventional concrete plants can also be re-organized with HDPE).
The basin edges could be stabilized by using L-stones and this is quite an advantageous alternative.

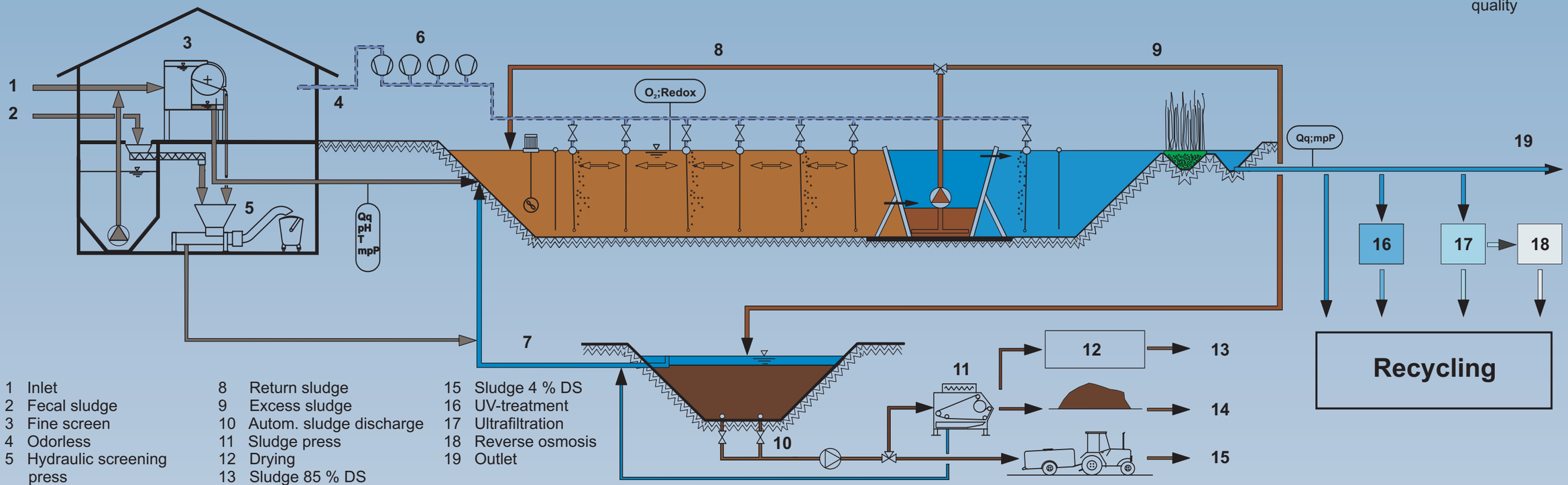
BIOLAK® uses the earth-basin construction in order to obtain inexpensive, solid and completely sealed reaction basins. The inexpensive type of construction allows „generous" dimensioning creating reserves that ensure best cleaning efficiency even with inflow variations and short-term overloads. Furthermore, earth basin plants look fine, fit nicely into the landscape and meet the requirements of environmental protection.

ADVANTAGES OF BIOLAK®

BIOLAK®-plants operate in multiple stages and often in multiple lines. This guarantees high process stability and excellent cleaning. However, the installation is quite simple and can be carried out “in one stretch”. Maintenance is very simple and failures are minimized. The excess sludge can be stored in thickening and storage basins up to 6 months and after this time it can be used in different ways; its volume is due to correct dimensioning quite low. The sludge can be used in wet form (fertilizer), drainage or drying. **BIOLAK®**-plants are designed according to the latest technical standards; the dimensioning fulfills all official requirements. They do not smell and operate without making any noise.

MASTER PLAN BIOLAK® INTEGRAL

Stage I	Stage II	Stage III	Stage IV	Stage V	Stage VI	Stage VII
Speed-controlled combined fine screening for separation and thickening of fine and coarse solids and sand with full odor control.	Biological-P-Zone	Activated sludge stage with sludge stabilization, advanced treatment and simultaneous nitrification/denitrification and biological hygienisation.	Post-aeration and polishing: the „safety stage”	Biofilter: root layer and sand filter for very fine separation	Advanced hygienisation for our environment and recycling	Total treatment for industrial water and drinking water quality



1 Inlet
2 Fecal sludge
3 Fine screen
4 Odorless
5 Hydraulic screening press
6 Blower station
7 Supernatant
8 Return sludge
9 Excess sludge
10 Autom. sludge discharge
11 Sludge press
12 Drying
13 Sludge 85 % DS
14 Sludge 20 - 25 % DS
15 Sludge 4 % DS
16 UV-treatment
17 Ultrafiltration
18 Reverse osmosis
19 Outlet

PROCESS ALTERNATIVES

1. BIO-P-ZONE
for increase of the biological phosphate elimination.

For advanced biological phosphate elmininations, a Bio-P zone is installed in front of stage III. With complete Bio-P elimination the following values can be achieved

	inlet:	outlet:
1. example	21 mgP/l	0,7 mgP/l
2. example	4,9 mgP/l	0,31 mgP/l

Municipality - waste water treatment plant 40.000 m^3/d - 165.000 $p.e._{60}$

2. BIOLAK®-WOX
for nitrogen removal

Alternating action of the aerator chains in stage III in combination with the **BIOLAK®** own basin hydraulic establish at least 20 alternating nitrification and denitrification phases. This multicascade leads to highest effectiveness concerning nitrogen removal.

Legend to picture left:
1 = Bio-P-zone
2 = oxic zone
3 = anoxic zone
4 = integrated clarifier

3. BIOFILTER
for removal of suspended solids (SS<10 mg/l)

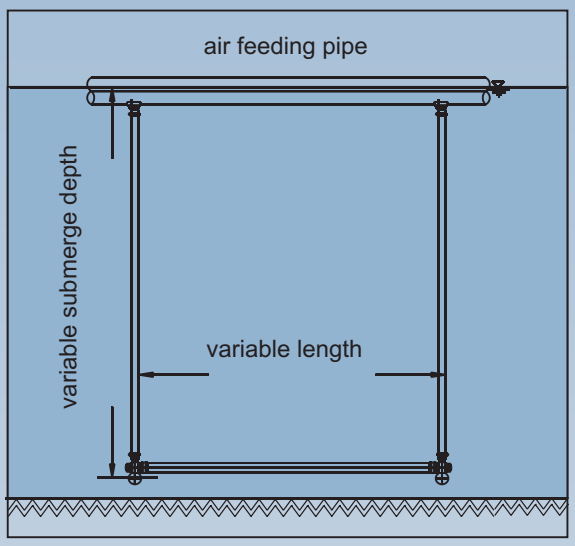
As stage V, the Biofilter with an active root layer and „vertical“ sandfilter proved to be very good. With low investment costs and a minimum of current costs best outlet values are reached.

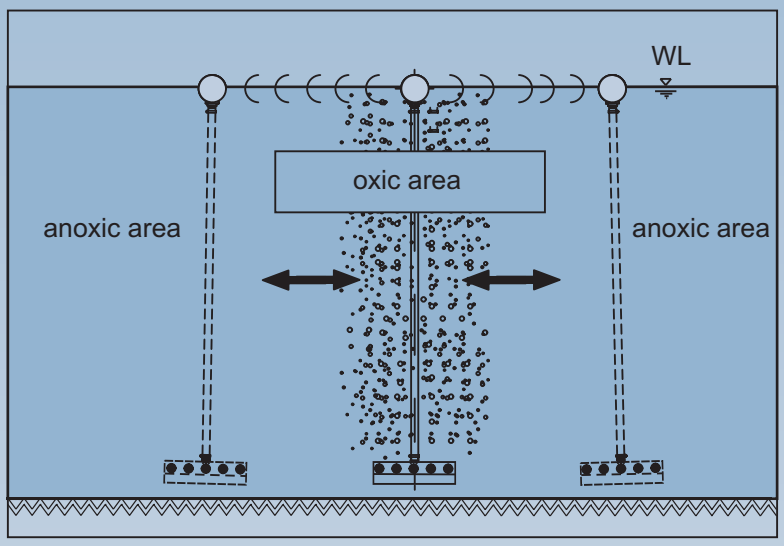
BIOLAK® REGULATION AND CONTROL

BIOLAK® combines the extremely simple configuration with a control system according to the latest technical standards. On request a general, robust control system with time switches and relays or the latest fully computerized control technique may be used.

THE BIOLAK® AERATION SYSTEM

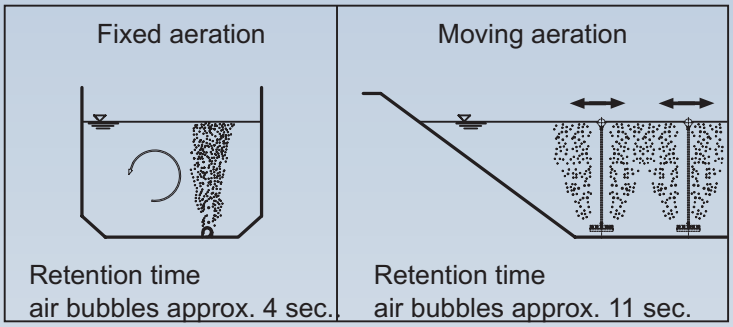
The main issue of the **BIOLAK®** System are the moving aeration chains covering each section of the activated sludge basin and provide equal and economical oxygen supply with guaranteed odorlessness permitting process alternatives as **BIOLAK®-WOX** and **BIOLAK®-INTEGRAL.**





Undulating aerator chains cause the fine air bubbles to remain in the water almost three times longer than it is the case with fixed aerators; oxygen transfer efficiency is thereby improved and energy is saved.

Due to the moving aeration approx. 20 % more oxygen is achieved resp. corresponding energy saving.



WHAT MAKES BIOLAK® SO ECONOMICAL?

BIOLAK®-Integral
Actual construction costs and dimensioning with respect to „advanced treatment“ make the classic treatment systems uneconomic. **BIOLAK®** is designed as an aerobic stabilizing plant with simple automatic pre-treatment. With **BIOLAK®**-Integral the construction costs can be drastically reduced.

Savings by construction - water flow - operation building
Earth construction, integration of biological nutrient elimination, as well as post-clarification and safety stage in one reactor lead to **approx. 20% savings in construction costs** compared to the usual concepts.The operation buildings contain pre-treatment, compressor station etc. including all operating rooms and combine them in a functional way (i.e. Odor control, heating .....) contributing to further savings.

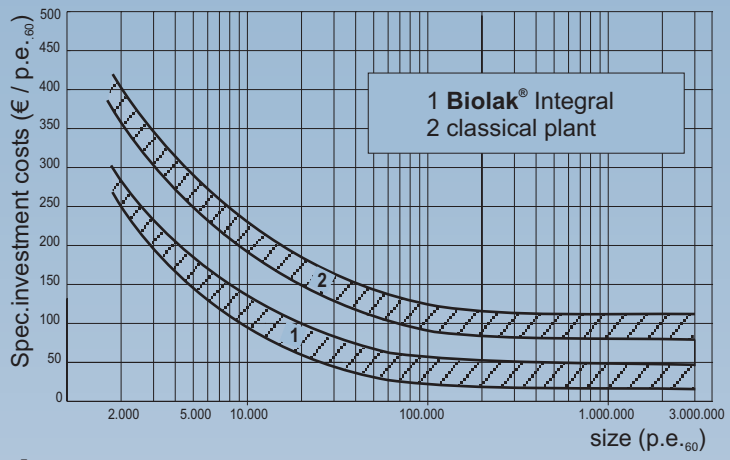
Much additional equipment without additional costs
Compared to common plants **BIOLAK®** is offering, for safety purposes, a second aeration stage with polishing and a biological double-stage filter. Smaller plants often have a sludge thickening- and storage basin with a storage capacity of one year.

Costs of BIOLAK®-Plants

BIOLAK®-plants offer considerable cost advantages due to a combination of well-chosen configuration, latest technical developments „ingenious technology“ and earth basin construction. Even the choice of top quality equipment and generous dimensioning do not detract from these advantages.

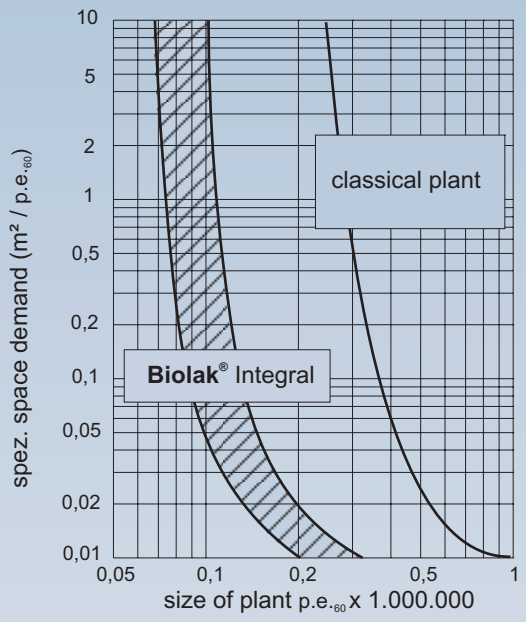
Economical operation (e.g. compressor heat recovery) and simple assembly, result in operating **costs of up to 30% below usual ones.**

Specific investment costs



Space demand and standardization

Specif. space demand



BIOLAK® has developed from non-aerated lagoons. In 1972 the first **BIOLAK®** unit was installed. Already 1978/79 **BIOLAK®** became a full up-to-standard “activated sludge plant” in earth-basin construction.

For even more efficient treatment the **BIOLAK®** „WOX system“ with a Bio-P-zone and the Biofilter was developed in 1985.

The space requirement of a **BIOLAK®**-Integral plant is lower as for a conventional plant, despite safety stages and full stabilization.

ATTRACTIVE TYPE OF CONSTRUCTION NICELY INTEGRATED INTO THE LANDSCAPE

Wastewater treatment plants do not have to be „ugly“. Even when erected at environmentally sensitive sites, **BIOLAK**® can be ideally integrated into the landscape.

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BIOLAK® GROUP

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