

## An overview of the technology

### Introduction

The AnoxKaldnes™ MBBR technology is our implementation of the biofilm principle. This technology is our point of departure for many of the unique processes we have developed.

### More than plastics

Just to add some plastics, moulded into a peculiar shape, to a wastewater basin and see what you get is a safe way to failure.

Besides the carriers you need knowledge of microbiology, hydraulics and engineering to design a long-term solution.

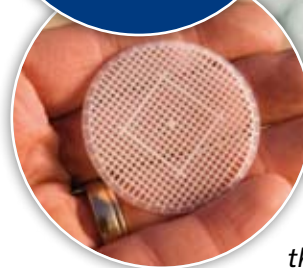
Our carriers are of course a vital ingredient in AnoxKaldnes™ MBBR technology. On their protected surfaces different microorganisms ranging from bacteria to ciliates and rotifers are established in a biofilm. These carriers are kept in motion either by the blast air injection in aerobic systems or by stirrers in anoxic or anaerobic systems. By this motion impurities in the water is transported to the biofilm and are reduced by it.

In a suspended sludge based treatment system, the sludge has to continuously be separated from the treated water and returned to the treatment basin. In an AnoxKaldnes™ MBBR, the carriers and the active biofilm are detained in the treatment tank by sieves over the outlet, which allow the treated water to pass to downstream units for further processing. It is very important to design the sieves properly not just for the retention of the carriers but also to avoid hydraulic issues. There are several benefits with a suspended biofilm system. Some of them are increased durability towards toxicity and variable loading, simple operation and a treatment system insensitive of bulking sludge.

### Features

- Compact
- Robust
- Simple operation
- Easy upgrade
- Enhances nitrification
- Low maintenance
- Patented technologies
- R&D driven

More than 500 references in more than 50 countries



*The core of the process is the biofilm carriers, which are made from polyethylene with a density slightly below of water. Several different types of carriers have been developed in order to optimize their function in different applications.*

There is a continuously ongoing research and development of AnoxKaldnes™ MBBR technology. Existing processes are improved and processes for new applications are invented. A broad range of different carriers types has been developed in order to target the specific needs of different solutions. The high number of installations spread over the whole world shows many have discovered the benefits with a biofilm process based on AnoxKaldnes™ MBBR technology.

### Flexible solution

Our processes based on the AnoxKaldnes™ MBBR technology is feasible for both industrial and municipal wastewater and are used for:

- organic removal
- nitrification
- denitrification
- detoxification

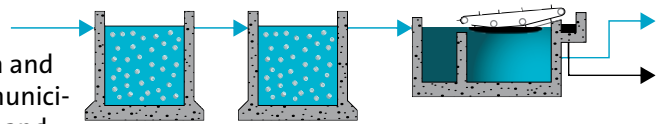
The flexibility of our MBBR processes makes them an ideal solution for new plants or upgrade and expansion of older ones.

## Wastewater treatment with microorganisms

The AnoxKaldnes™ MBBR technology is the core of our solutions. The microorganisms treating the wastewater grow on the surfaces of a carrier in the treatment reactor. The flexibility of our patented technology allows the design of very compact and efficient stand-alone MBBR solutions as well as optimal upgrades of other, existing, biological processes, often without the need for new basins. The AnoxKaldnes™ MBBR technology is patented by AnoxKaldnes.

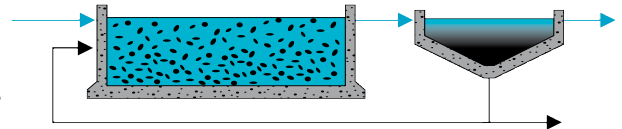
### AnoxKaldnes™ stand alone MBBR solutions

AnoxKaldnes™ pure MBBR systems are compact, simple to operate and very efficient for removal of BOD, ammonia and nitrogen. Today, solutions such as the Kaldnes™ process (municipal waste water treatment) and the Natrix™ process (pulp and paper applications) are used in hundreds of installations around the world.



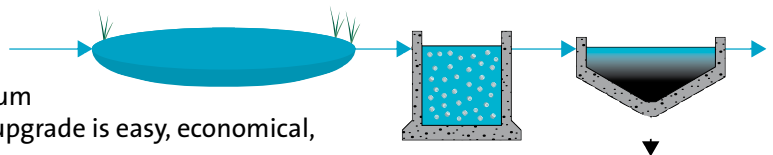
### Hybas™ combination process

Hybas™ combination process is utilizing both suspended and attached growth within one and the same reactor. Fast biological processes, such as BOD removal and denitrification, are typically carried out by the suspended phase, while slow microbial transformations, such as nitrification, take place mainly in the biofilm. Hybas™ biological process is a superior IFAS (Integrated Fixed-film Activated Sludge) from AnoxKaldnes and can be used as a very efficient upgrade of activated sludge plants for enhanced nitrification or total nitrogen removal within existing volumes. Enhanced biological phosphorous removal (EBPR) can also be included.



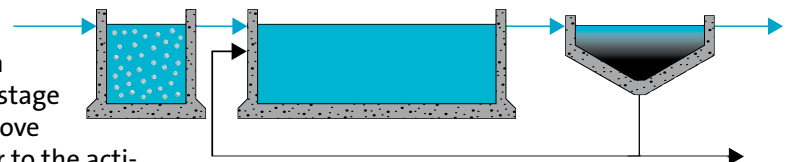
### LagoonGuard™ biological process

The LagoonGuard™ biological process entails a well designed supplementary biofilm solution after the lagoon, which will handle the ammonium and provide some additional COD removal. The upgrade is easy, economical, compact and requires a minimum level of maintenance.



### BAS™ combination process

The BAS™ combination process consists of one or more AnoxKaldnes™ MBBR:s, followed by an activated sludge system. The high rate biofilm stage is designed to pre-treat the wastewater to remove the readily bio-degradable organic matter prior to the activated sludge system. Advantages are dramatically increased capacity, improved process stability and sludge separability. Conversion to a BAS™ process is an ideal way of upgrading existing activated sludge plants for higher capacity of organic removal and better performance. Furthermore, properly operated, a BAS™ process will produce dramatically less excess biosludge than a conventional activated sludge process.



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