

Z-MBBR

Adding a new dimension
to biofilm technology



ANOXKALDNES

by  **VEOLIA**
Water Technologies

Z-MBBR

A new dimension to biofilm technology

Z is a new family of carriers, enabling biofilm thickness control. Where traditional MBBR designs focus on the area available for biofilm growth, we now introduce the third dimension, Z, where we also control the biofilm thickness. By doing this, we facilitate engineered and controlled biofilms especially targeting challenging applications and/or processes where high stability and top performance is a priority.

Innovation never ends at AnoxKaldnes

Since 1986 AnoxKaldnes has been constantly optimizing and innovating their MBBR technologies. A significant part of this innovation has been in the engineering and development of different carrier types.

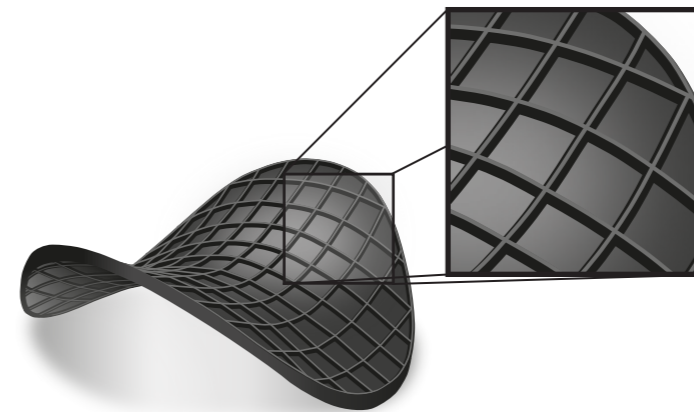
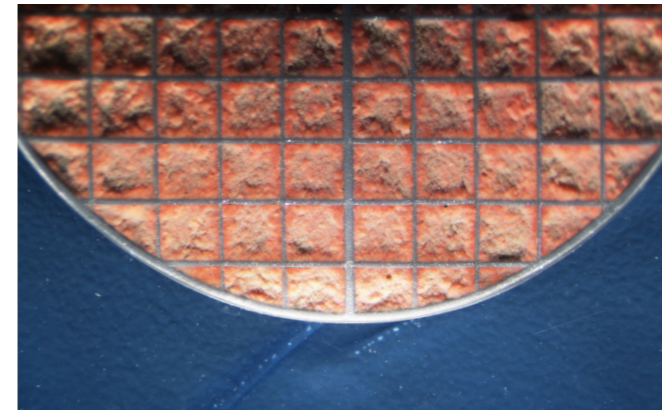
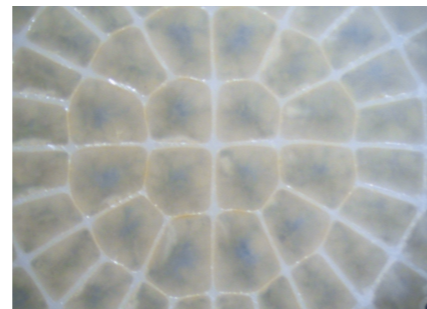
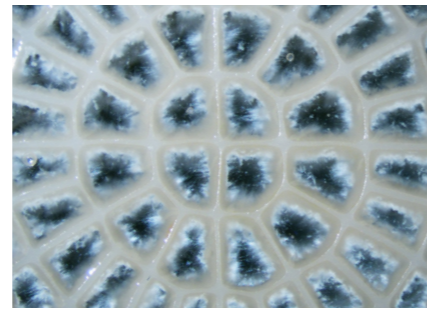
Traditionally, carrier development has aimed at increasing the protected surface area of the carriers, but in 2014, AnoxKaldnes breached this trend by launching a completely new carrier design which enables biofilm thickness control. With the Z-carrier, the biofilm thickness can be maintained below a predefined grid height, where the carriers clean themselves in the process through the constant carrier scouring the MBBR reactor.

Why biofilm control?

Depending on the type of wastewater and operating conditions, MBBR carriers tend to develop biofilms with different thicknesses. Although for most MBBR processes the biofilm remains relatively thin, there are applications where carriers can clog up completely due to the overgrowth of biofilm. Carrier clogging may also occur due to inorganics precipitating on the carrier surface (i.e. "scaling") or due to the physical entrapment of solids or foreign particles present in the wastewater.

In conventional MBBR carriers, biofilm clogging drastically reduces the available protected surface area of the biofilm. This, in turn, affects the performance of the process, as well as the microbial community in the biofilm, where unwanted species may thrive and compete for valuable oxygen and substrates. In addition, clogged carriers are heavier, especially if there is scaling, requiring higher intensity mixing and/or carrier cleaning by mechanical or chemical means, in order to maintain the carriers in suspension.

Overall, uncontrolled biofilm growth, biomass entrapment and/or scaling in conventional MBBR carriers may result in reduced/less stable performance, higher mixing and/or aeration demands as well as the introduction of unwanted microbial species.



How does it work?

Through high-precision moulding, the Z-carrier is covered in a detailed grid. As the carriers move in the reactor they will scrape off any exposed biofilm, thus resulting in a biofilm thickness that is maintained beneath the grid wall height. With our unique AnoxK™Z-200 and AnoxK™Z-400 carriers, we can provide MBBRs in which biofilm thickness remains below a pre-defined height of 200 or 400 µm.

Providing high stability and top performance

The Z-MBBR targets challenging applications and/or processes where high stability and top performance is a priority. There are several examples where the Z-MBBR has been applied in both municipal and industrial projects to meet specific challenges such as scaling, clogging and microbial control. For many cases, the Z-MBBR is applied to replace conventional carriers in MBBRs with problems related to clogging and/or scaling, but our design experts can also foresee the green-field projects for which the Z-MBBR is more suitable than conventional MBBR solutions.

Benefits of the Z-MBBR versus uncontrolled biofilm growth includes:

Higher security and less maintenance

- No need for carrier cleaning by mechanical and/or chemical means
- Stable treatment performance

Lower OPEX

- Less mixing demand for biofilm control and/or for maintaining carriers in suspension
- Less oxygen demand by competing species/endogenous activity

Stable performance

- Stable biofilm area = stable removal rates
- Controlled and specialized microbial community, less microbial competition

Unique features

- The Z-carrier is at the front edge of biofilm technologies with features that cannot be found in any other MBBR

Market applications



Food and Beverage

For the food and beverage industry we have applied Z-MBBR for several sectors, including dairy, snacks and beverages production. These wastewaters typically contain sticky solids, high calcium concentrations and/or high concentrations of easily available organics, which may all cause clogging and/or scaling issues in a conventional MBBR. Z-MBBR is also the carrier of choice for anaerobic treatment of food and beverage waters via the Anoxthane™ MBBR process.



Municipal

In the municipal sector, the Z-MBBR can be applied in reject-water treatment using the ANITA™ Mox technology, for those reject waters where there is a risk of scaling. In the main line, Z-MBBR has been applied in treatment steps where a thin and controlled biofilm is advantageous, such as for nitrification. Finally, we use the advantages of Z-MBBR in our eXeno™ M technology, where biofilm control has shown to influence differently the degradation of micropollutants in municipal wastewaters.



Pulp & paper

Many pulp and paper plants (for example those for cardboard, tissue and/or fibres production) are using Z-MBBR to prevent issues with scaling and/or issues related to high load (clogging). Pulp and paper plants may also have high contents of fibres in the wastewater, which can clog conventional MBBR carriers. In our BAS™ technology, generally applied for pulp and paper wastewaters, Z can be applied in the initial MBBR stage without any risk of overgrowth.



Petrochemical

In the Petrochemical industries there may be a risk of scaling due to high concentration of inorganic substances (for example calcium) in the wastewater. Our first Z-MBBR in the oil and gas market is applied at an Olefin cracker plant in Spain.

**To learn more about the Z-MBBR, or any other AnoxKaldnes technology,
Feel free to contact us!**

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