

COUGAR COATINGS Estd. 1988 **WASTEWATER DIVISION**

Supplying unique solutions for the water and waste water industry



BIO-BLOK® INTELLIGENT FIXED FILM BIOLOGICAL FILTER MEDIA

2.2.6. Air Diffusers

In all biological wastewater treatment plants, air diffusers cause problems. Air diffusers are expensive and they are quickly worn out and thus need to be replaced. In order to exploit the pumped in air most possible, air diffusers have been developed that produce micro bubbles.

Today this type of air diffusers is with success being used mainly in activated sludge systems. The same type of air diffusers is also applied in systems with the fixed film technology, however, without showing the same good results.

The reason for this is that the micro bubbles do not transport as much water as desired up through the filter. The wastewater then does not get in contact with the bacteria on the filter and the treatment capacity is reduced.

This phenomenon increases because when applying fixed filters, generally about 30% less air is used when compared to treatment by means of activated sludge.

Above fact has been proven in various wastewater treatment plants and aquaculture systems.

It is important to us that our BIO-BLOK® products function optimal. In this connection, the choice of air diffusers is extremely important, because air diffusers can be expensive - both to buy and to operate - and because air diffusers have a big influence on the capacity of our BIO-BLOK® products.

For companies that are not able to get hold of air diffusers with the described qualities, we can offer a complete system so that it is easy to build up an effective submerged aerated system with the BIO-BLOK® filter media.

Please find below pictures showing how the system is constructed.

The system consists of top beams and bottom gratings in which the air diffusers are built in so that they function as a complete unit. All the parts, except the air diffusers, are made of stainless steel (AISI 304). The air diffusers are shaped of PVC pipes (10 bar) in which a reasonable number of suitable holes are made fitting to the calculated volume of air. This shape will make the air diffusers last very long.

The system is also available as filter chairs so that it is possible to lift the air diffusers, bottom grating, BIO-BLOK® products and top grating by means of a crane. If requested, a lifting bar made of electroplated steel can also be delivered.

If the above mentioned system is chosen, an effective carpet aeration is achieved resulting in the fact that an optimal water flow up through the BIO-BLOK® and a good aeration of the wastewater are attained.

By each blowing point big air bubbles will appear from the holes. Naturally, these air bubbles will emerge through the BIO-BLOK®. In that way, a heavy water movement starts up through the BIO-BLOK® because each blowing point will act as a mammoth pump.

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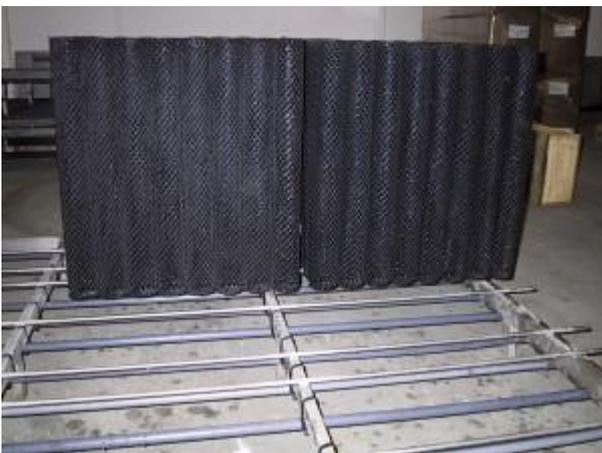


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On its way up through the filter, the air bubble will split up into many micro bubbles and big bubbles. In that way there will be a good contact to the microorganisms that live on the surface of the BIO-BLOK® and the oxygen transfer, and the contact to the bacteria will be optimal. It is obvious that the higher the BIO-BLOK® filter is, the better is the efficiency because the way up through the filter is longer for the air bubble.

By using the above mentioned aeration system, the following advantages are achieved:

- Very long life span because the big holes in the air diffusers do not clog as easily because of impurities in the air as small holes do.
- It is very likely that the aeration system never needs to be replaced.
- Small counterpressure because there are no membranes to be penetrated by the air.
- Effective oxygen transfer to the wastewater.
- Optimal water flow through the filter. In that way a good contact to the microorganisms is created and the treatment efficiency increases.
- Energy-conserving.
- Economically attractive.



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Comparison of air consumption for activated sludge system with air consumption for BIO-BLOK® technology

Decomposition in bioreactor: 1,000kg BOD / day

Activated sludge system:

Power consumption for aeration of bioreactor: 1 kW / kg decomposed BOD

Total power consumption: 1,000 kWh/day

BIO-BLOK® technology:

Air consumption for aeration of bioreactor: 30m³ air / kg decomposed COD x day

Or 60m³ air / kg decomposed BOD x day in the BOD / COD proportion 1/2.

If it is a matter of industrial wastewater with high organic loads, 40m³ air / kg decomposed COD is normally chosen.

Air consumption: 30 x 2 x 1000 = 60,000m³ air / day corresponding to about 42m³ air / minute. The water depth is estimated to be 3m resulting in a power consumption of about 34 kW.

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Total power consumption: 24 x 34

816 kWh / day

or

0.816 kW / kg decomposed BOD

In this case the power consumption is about 19% smaller than the power consumption in the activated sludge system.

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