INWATEC Sp. z o.o.
ul. Pastewna 25, 02-954 Warszawa
Tel. (22) 642 95 66, fax (22) 642 21 95
NIP: 526-00-17-247; REGON: 002042652

WASTEWATER TREATMENT

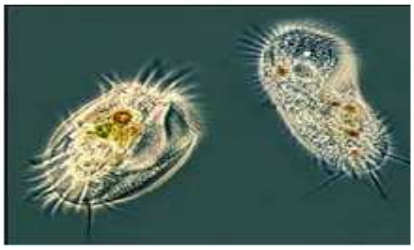
MOVING BED BIOFILM REACTOR

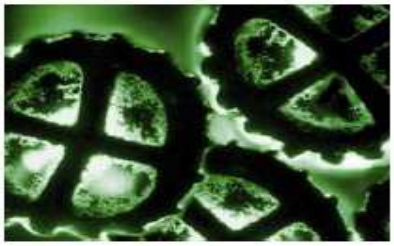
Moving bed biofilm reactor technology (MBBR) is a high performance wastewater treatment technology which is gaining more and more recognition in the world.

TECHNOLOGY

MBBR process is based on bacterial membrane (biofilm) which is formed on the specially designed plastic elements immersed in the entire volume of the reactor eg. tank made from HDPE. Elements of MBBR are designed to create the greatest active surface (from 200 to 1200 m^2/m^3) for bacterial membrane and optimal conditions for different microorganisms cultures.

Biofilm begins to grow a few minutes/hours after the start of the biological treatment. Microorganisms which are involved in the treatment process produce sticky substances, whereby stick up for carrier and begin to create a highly

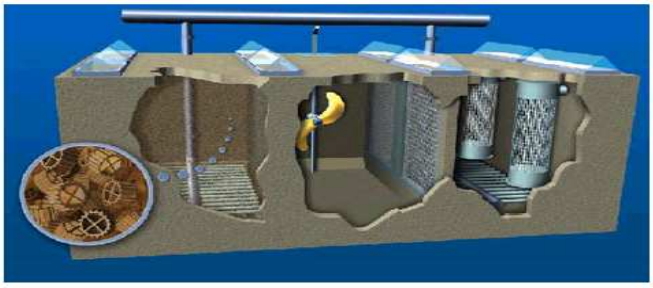




efficient biofilm.

Biofilm suspended on cylindrical carriers is mixed in the biological reactor with:

– compressed air (aerobic reactors),
– mechanical agitator (anaerobic reactors),



Biofilm which covers the cylindrical surface of the carrier have optimal growth conditions, optimal oxygen supply and organic substances to bacteria and higher microorganisms.

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Good conditions to growth bacteria, high concentrations of biofilm and high concentrations of oxygen in MBBR technology, causes removal of pollutants several times more during the day than in the traditional waste water tretment plant using activated sludge.

Presence of higher microorganisms will reduce the amount of excess sludge by half. Microorganisms in biofilm are more resistant to shock changes of COD, BOD_5, pH and temperature. MBBR technology is often used for treatment wastewater on existing plants which have too low capacity or when it is necessary to treatment wastewater at the end of the technological system eg. when the sewage quality requirements will be increased.

WHY MBBR TECHNOLOGY?

MBBR technology guarantees:

- stable work of the wastewater treatment plant,
- possibility of receiving higher pollution loadings,
- approximately five times less capacity bioreactors,
- removal time BOD_5 (5000 BOD_5 g/d m^3 for 15°C and nitrogen (400 NH_4-N g/d m^3, 670 Nox-N g/d m^3 for 15°C),
- no sludge recirculation,
- self cleaning,
- high resistance to changes in pH and temperature,
- technology can be used in each shape of the reactor,
- high resistance carriers to 20 years,
- reduction of excess sludge up to 50 %.

TREATMENT EFFICIENTY

Here are results of removing COD, BOD_5 and phosphorus from several wastewater treatment plans in Norway.

Treatment plant	BOD_5			COD			PHOSPHORUS		
	Inlet	Outlet	%	Inlet	Outlet	%	Inlet	Outlet	%
Steinsholt									
Avg	398	10	97.4	833	46	94.4	7.1	0.30	95.8
Max	1720	38	99.7	2760	130	98.4	12.0	0.72	98.8
Min	120	5	93.5	190	30	93.5	4.0	0.12	92.6
Tretten									
Avg	361	4	98.9	-	-	-	7.3	0.10	97.9
Max	695	16	99.7	-	-	-	15.5	0.44	99.8
Min	125	2	97.7	-	-	-	4.2	0.03	89.4
Svarstad									
Avg	-	-	-	403	44	89	5.1	0.25	89
Max	-	-	-	850	83	94	13.0	0.78	94
Min	-	-	-	230	30	78	2.0	0.10	78
Frya									
Avg	181	5	97.7	-	-	-	8.6	0.21	97.6
Max	290	20	99.0	-	-	-	12.0	0.53	99.5
Min	85	2	93.1	-	-	-	6.0	0.06	95.1

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APPLICATION

Moving bed biofilm reactor technology is used in municipal and industrial wastewater treatment plants. Technology may be used in the food industry, fruit and vegetable processing industry, dairy, fishing industry, pulp and paper industry, chemical and brewing industry. Currently in more than 40 countries around the world is about 450 large and 110.000 small and average wastewater treatment plants which are using highly efficient MBBR technology.