Roto-Bio-Reaktor

(heterotroph de-nitrification)

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Technical size made of duplex steel with 3 m^3/h flow since 2003 at the dolphinarium of Duisburg, Germany, with 3,000 m^3 volume

Small reactor RBR 50 made of plastic

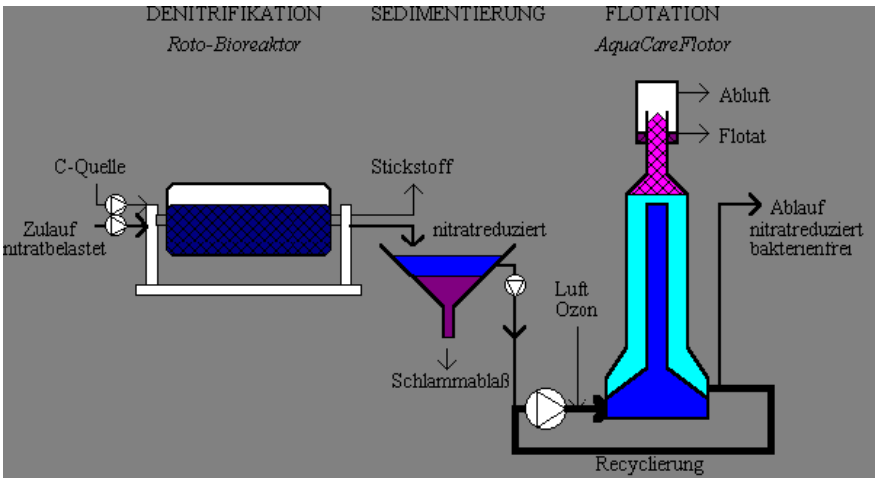
Posing the problem

Biological de-nitrification is used since several years in the water treatment. The advantages compared with physical technologies are easy handling of the process, high efficiency and a good price.
With other de-nitrifying systems you can get problems with strong growth of bacteria. So the reactor will block or toxic substances like nitrite or hydrogen sulphide are produced.
The Research Center Jülich GmbH, Germany, and F.Ambs GmbH & Co.KG, Germany have developed a very safe system. The complete content of the reactor is mixed by slow rotation of the reactor. Overload biomass will leave the reactor, so only the new produced and strong bacteria will grow on the gravels. Blocking cannot occur.
AquaCare constructs in licenses Roto-Bio-Reactors up to 150 liters in a full plastic version. So you can use all kinds of water beginning from drinking water, sea water or process water. Units bigger than 150 liters are built of a special steel 1.4462, which is absolutely resistant against sea water and ozone.
A complete de-nitrifying system consists of following components: Roto-Bio-Reactor, sediment tank for collection most of the out flowing bacteria, flotation unit (AquaCareFlotor) for destroying the rest of bacteria with ozone, pumps and controlling techniques.

Advantages

- stabiler Nitratabbau durch konstante Biofilmdicke
- keine Verblockung des Festbetts möglich
- alle Komponenten meerwassergeeignet

Function of a complete de-nitrifying plant



Technical data

De-nitrifying stage				
Size	**RBR15**	**RBR60**	**RBR150**	**Larger units**
Order number	302-015	302-060	302-150	-
Volume in liter	15	60	150	> 300
Materials	PMMA, PVC-U, NBR			1.4462, NBR
Water inlet	PE d6	PE d10	PVC d20	-
Water outlet	PVC d20	PVC d25	PVC d25	-
Water flow in l/h	3 – 30	12- 120	30 - 300	> 60 - 600
Carbon source for bacteria	ethanol, trace elements			
Nitrate elimination (T=25°C; S=0/1000)*	40	140	400	> 800
Concentration of nitrate inlet in mg/l	≤ 5000			
Concentration of nitrate outlet in mg/l	≤ 5			
Rotation frequency of reactor	typically 5 / h			
Nitrogen off-gas	automatically, continuously			solenoids
Surplus biomass	automatically, continuously			
Inlet water	0...40 ‰, pH 6...8, 0...30°C			
Measuring technique	ORP control, at larger sizes: nitrogen analyser and inlet flow control			
Footprint size in m	0.83 × 0,38	1.2 × 0,5	1.79 × 0.6	-
Height of the reactor in m	0.5	0.6	0.9	-
Diameter of reactor in mm	200	300	400	> 500
Minimum height of ground in m	0.7	0.8	0.9	-

* all information at T=25°C; S=0‰ and 60 mg N per liter inlet water and 5 mg N per liter outlet water

Sedimentation				
Diameter in mm	420	570	600	larger units
Height in m	0,8	1,0	1,1	-
Volume in liter	41	113	200	-
Footprint size in m	0.5 × 0.5	0.6 × 0.6	1.2 × 1.2	-
Outlet	PE d10	PE d10	PE d10	-
Drain	PVC d20	PVC d25	PVC d32	-
Necessary measuring technique	Level control for inlet and outlet			

Flotation unit				
Necessary skimmer	ACF 3.000	ACF 6.000 VC	ACF 16.000 VC	≥ ACF 30.000 VC
Ozone needs in mg/h	0.3 –0.5	0.5 – 1.0	1 - 2	-
Necessary internal ORP value	≥ 700 mV			
Footprint size in mm	300 × 370	400 × 600	500 × 750	
Height of the AquaCareFlotor in m	1.8	2.0	2.0	
Minimum salinity	15 ‰			
Necessary measuring technique	ORP control			
Gas flow (you need an ozone destroying system) in l / h	700	1200	3500	