KLINGER Portugal

Biodisks

Biodisks Technology
For the Treatment of Wastewater

Biodisks have the peculiarity that apart from having a rotor that makes them rotate around the main axis or joint axis, the mini-disks that compose it, in turn rotate on themselves during the investment in black water, obtaining as a result a increase in organic matter removal performance. Likewise, the morphology of the minidisc itself gives it a greater contact surface for biomass, increasing its purification capacity.

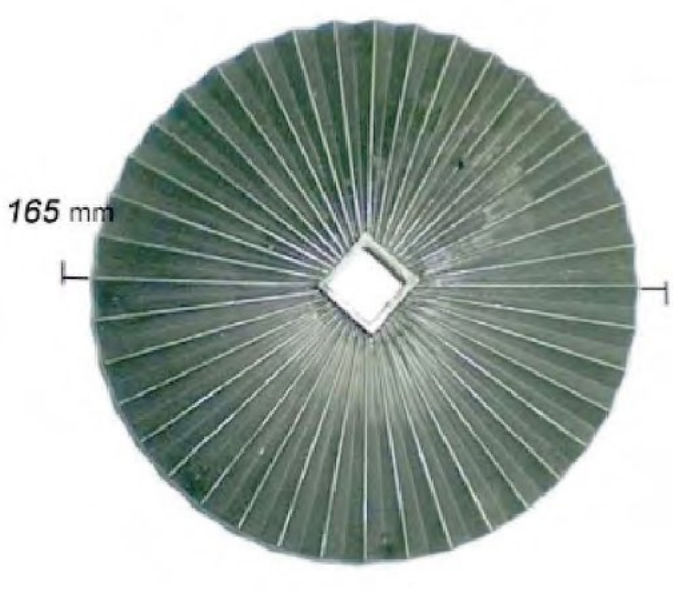
These mini-discs offer separators that maintain a permanent distance between each mini-disc, avoiding with this system shorter distances than recommended, thereby clogging the system, and consequently a malfunction of the Bidisco system.

Another peculiarity of this proposed purification system is the configuration in several stages (1,2,3 or 4 stages), which allows increasing the adaptability of load fluctuations, in addition to adding an increase in purification performance and nitrification-denitrification of wastewater for those cases in which the WWTP is dimensioned for nutrient removal.

This product is totally MODULAR, that is to say, it allows to easily size the product to the client's needs and its easy maintenance.

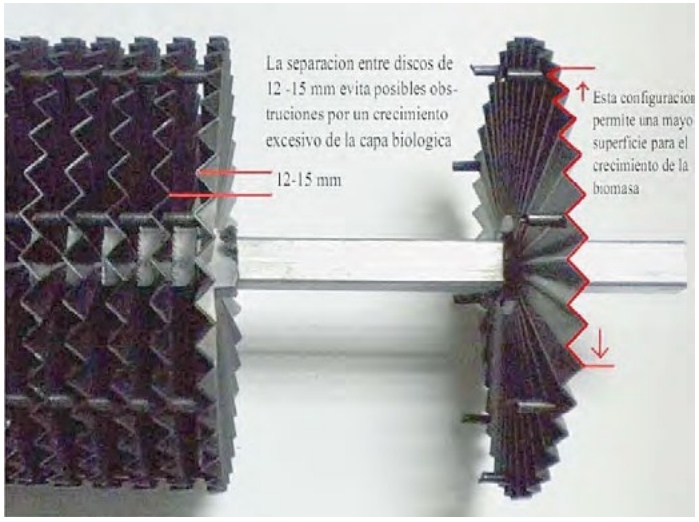
1. PRINCIPLE OF OPERATION

The operating principle of the Biodisk is conceptually connected to that of the tricklers: while in the trickling the black water flows through a fixed support, in the biodisks, both the black water and the support are in motion.
Biodisk rotors consist of a unit consisting of mini discs made of plastic (polypropylene) material placed next to each other and mounted on a horizontal axis.
The shaft rotates slowly while 40% of the rotor surface remains submerged in sewage during rotation. The series of mini-discs that make up the biological rotor are immediately covered with a layer of biomass that transports a thin layer of effluents that, upon contact with air, the effluent seeps onto the surface of the plastic material, absorbing the oxygen contained in the air.



2. DESCRIPTION OF THE MINIDISKS

The size of the minidiscs is approximately 165 mm and its exclusive fanned design allows reaching a greater contact surface for biomass growth than a flat disk, also due to its configuration without any fins or propellers mounted horizontally in the minidisc and its vertical mounting position on a horizontal axis, avoids jamming and silting problems by facilitating the good detachment of the biofilm.
The distance between the minidisks should be between 12–15 mm.



3. BIO-DISC SCHEME

The Biodisk rotor operating scheme is conceived in one, two, three or four stages according to the recommendations contained in the "Manual for the implementation of purification systems in small populations" for the removal of carbonaceous matter and NTK
Each stage operates as a reactor in consideration of itself, in which the growth of the biomass and its distance from the plastic medium are in a situation of dynamic equilibrium.
The treated water and biomass pass through each stage through windows that are located at the bottom of each partition or wall that physically separate the different stages of the main tank, where the biodisco is installed. a progressive increase in the degree of discharge of the organic substance is carried out, carried out by specific bacteria present in each stage, which differ depending on the progressive modification of the characteristics of the effluent, thus obtaining a purification performance of more than 90% .
In minidiscs, a biofilm layer with a thickness ranging from one to four millimeters is developed and maintained, when this biofilm thickness reaches five millimeters diffusion of oxygen and substrate to the deepest bacterial layers is very difficult, producing fermentation and gaseous bubbling in these areas. Under these conditions, the constant effort produced by the rotation of the main axis and the mini-discs is sufficient to cause the biofilm to detach and prevent the mini-discs from clogging. Once a portion of the bacterial film has been detached, the growth of the new biomass begins there, repeating the process indefinitely, thus regulating the thickness of the biofilm.

BIODISC INSTALLATION IN THREE STAGES

4. SIZING

Source: ATV-DVWK-A 281E (2001) Standard, supplemented by other contributions (Metcalf & Eddy, 2000) and experience of the authors of the manual for the implementation of purification systems in small populations.

Design recommendations:

» BOD5 removal only (no nitrification)
Total organic load
» 2 stages ≤ 8 g BOD5 /m2.d
» 3-4 stages ≤ 10 g BOD5 / m2.d Minimum number of stages
» For BOD5 in effluent between 15 and 25 mg / l: 2 stages
» For BOD5 in effluent between 10 and 15 mg / l: 3 stages
» For BOD5 removal and nitrification
Total organic load
3 stages: ≤ 8g BOD5 /m2.d ≤ 1.6g NTK /m2.d
4 stages: ≤ 10g BOD5 /m2.d ≤ 2g NTK /m2.d

Contactor Design:

» Empirical methods for the design of CBRs.
» Fundamental design parameter:
Organic load applied per unit surface area of the rotor (kg BOD5 / m2.d).
» In general, at least two stages are recommended.
» If nitrification is required, at least three stages are required.

5. ADVANTAGES

The advantages of the Biodisk biological rotor, compared to the types currently on the market, are due to the fact that the rotor is made up of numerous disks that go side by side, forming, in turn, many small rotors that, In addition to rotating around the main axis of the biodisk, during immersion they also rotate on themselves, increasing agitation and oxygen absorption by the biological film.
In addition to these conformations, it avoids jamming possible due to the excessive growth of the biological thin layer, which should not cross the entire width of the rotor, as happens in traditional biodiscs, but only detach the minidisks with a diameter of 165 mm.

» Ease in controlling the debugging process
» Adequacy of the product against overloads
» Energy saving due to low electrical consumption of the motors used and as a consequence there is an economic saving in addition to environmental sustainability
» High purification yields; reduction of BOD5; 80… 90%
» Compact product; requires little installation space, resistant, accessible, versatile, easy to transport and assemble
» Nitrification and denitrification possible
» Short hydraulic retention period
» Direct transfer with oxygen
» Easy dehydration of the sludge
» Absence of noise, aerosol, and nuisance odors
» Environmental impact: LOW

KLINGER Portugal

Klinger Portugal, Lda.
Via José Régio, 36
Centro Empresarial Vilar do Pinheiro
4485-860 Vila do Conde
T: +351 22 947 0910
E-mail: geral@klinger.pt

Delegação Lisboa
Rua de Cabo Verde, 8
Prior Velho 2685-316
T: +351 21 940 6620
E-mail: lisboa@klinger.pt