Description fixed bed reactor (FBR) module

Clearfox FBR modules are fully equipped bioreactors with a high quality PE shape. All equipment is preinstalled in a cubical tank, such as aeration membranes, distributor system, blank holders and all support for positioning grid tube blocks in order to get a high performance bioreactor for waste water treatment. The typical application is reduce carbon and nitrogen concentration from any kind of pretreated (removed solids) wastewater industrial or municipal nature.

The shape of the tank and most of the equipment is made by rotomoulding in one piece, out of high resistible polyethylene or stainless steel 1.4571. The modules are designed for installation in client's tank (concrete chambers, steel frame systems, HC seacontainers (i.e. Clearfox containerised container modules). Interfaces to client are designed for a fast and simple plug&play connection onsite.

Two modules can be connected for a water flow in series, for a parallel installation the water has to be splitted. Included in the scope is a blower and airsplitters (pro rata), which are suitable to the number of units and the kind of connection. Client must provide mechanical screened wastewater (≤ 3mm). In order to reduce TSS a clarifying unit after the modules is advised. According to client's requirements (inlet concentration, effluent requirement, carbon and/or nitrogen removal) inside the modules there are different bio carriers implemented.

The design is according to DWA guidelines, the cleaning efficiency is approved in field tests, made by external waste water institutes. Test reports and certificates for static, performance, origin, DWA guidelines are available on request.

specification:

<table>
<thead>
<tr>
<th></th>
<th>50% of HC Container</th>
<th>max. operation weight: [kg]</th>
<th>15,000 (water filled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 unit biomodule:</td>
<td>1</td>
<td>inlet connection@height:</td>
<td>DN 100 @ 2.40 m</td>
</tr>
<tr>
<td>number of chambers:</td>
<td>1</td>
<td>outlet connection@height:</td>
<td>DN 100 @ 2.40 m</td>
</tr>
<tr>
<td>measures: (l,w,h) / unit [m]</td>
<td>2.74 x 2.10 x 2.57</td>
<td>inlet aeration tube:</td>
<td>DN50 @ 2.74</td>
</tr>
<tr>
<td>footprint: [m²]</td>
<td>5.75</td>
<td>roofopening:</td>
<td>60 cm x 60 cm</td>
</tr>
<tr>
<td>max. transport weight: [kg]</td>
<td>650 empty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power connected for blower class C</td>
<td>1.350 Watt</td>
<td>Power connected for blower class N</td>
<td>1.500 Watt</td>
</tr>
</tbody>
</table>
The specific surface area of the media depends on the concentration of the inflow. The degradation is calculated for municipal/domestic concentrations; higher concentration, as for industrial applications, will give higher performance rates. Units in series are working with a higher treatment efficiency, which results in a higher degradation per day. Nitrification requires COD reduction in advance. It must be secured that after every reactor, the TSS are reduced by clarifying.

**Application**

PPU Umwelttechnik installs 2x FBR modules in reinforced seacontainer. The two Biomodules are switched in series. The container has ready installed flanges IN:DN80-PN10, OUT:DN 100-PN6, @ height = 2.45m. The first Biomodule is cascade Nr. 1. The second Biomodule is cascade Nr. 2 -3. The seacontainer is including an airsplitter for all cascades individually aeration and optional backflush at high load, 3 access holes 600x600 mm with lids and a foam discharge tube.

**Benefits for Clearfox FBR modules**

- Fast startup, cost saving in installation, small footprint
- Flexible against underload and overload
- Modular system, adaptable at every application
- Industrial as well as municipal wastewater
- High performance with high quality, Made in Germany
- Stable and very robust process technology

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