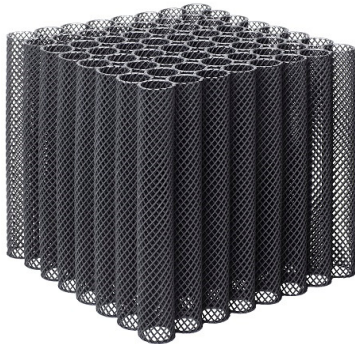




Why BIO-BLOK[®]?

Biological Wastewater Treatment with BIO-BLOK[®]



BIO-BLOK[®]

As a result of many years of R&D and extensive experience with polyethylene extrusion techniques, EXPO-NET Danmark A/S has developed a structured filter media.

The media has proven extremely efficient in biological treatment of domestic sewage, industrial wastewater and process water within the aquaculture field.

The media is made from the environmentally friendly material polyethylene and consists of net tubes, which are welded together to form a square block. The unique surface structure of the many net tubes provides a large accessible surface area for enhanced biological growth on the filter media.

The filter media is called BIO-BLOK[®] and the surface acts as a substrate for specialised bacterial strains, which in turn are able to treat and degrade a wide range of wastewater qualities.

The treatment capacity of a biological filter basically depends on the quantity of bacteria that the filter can sustain. In other words, the larger a specific surface area, the larger the bacterial population.

Future construction, refurbishment or upgrading of biological wastewater treatment plants is merely a matter of creating optimal "living conditions" for the bacteria i.e. the bacteria must thrive on the substrate in order to work well and "do the job". BIO-BLOK[®] has excellent properties in this respect, and the result is an increase in treatment capacity.

Table 1: BIO-BLOK[®] media – overview

Type	Application	Surface structure	Area of flow	Void percentage	Outer tube diameter	Standard module form
BIO-BLOK [®] 100	BOD	Rough	70%	90%	67.5mm	54x54x55cm
BIO-BLOK [®] 125	BOD	Rough	67%	89%	55mm	55x55x55cm
BIO-BLOK [®] 150	Ammonia/BOD	Rough	64%	88%	55mm	55x55x55cm
BIO-BLOK [®] 200	Ammonia/BOD	Rough	60%	82%	55mm	55x55x55cm
BIO-BLOK [®] 300	Ammonia/BOD	Rough	51%	72%	36.6mm	55x25x55cm

Due to the natural characteristics of extruded products, all measurements are approximate.

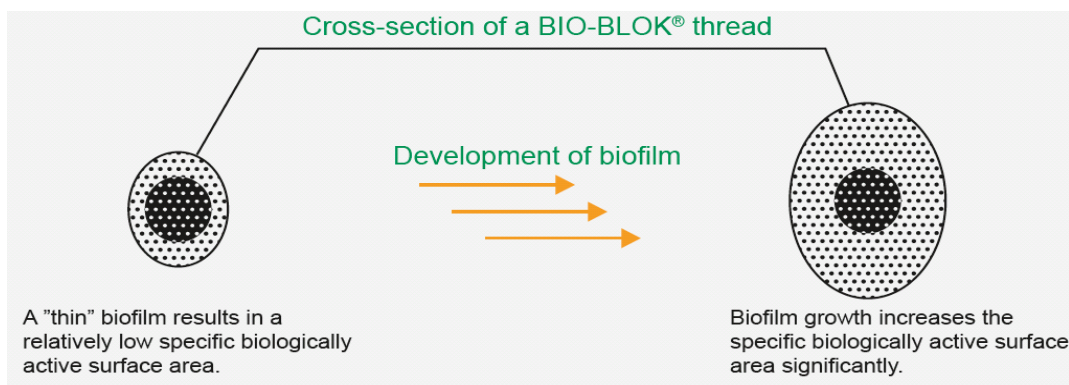
Above filter media can be produced with densities from 0.6 to approx. 0.95 g/cm³.

By request the BIO-BLOK[®] elements are available in heights (lengths of block tubes) from 40 to 120cm, however, BIO-BLOK[®] 300 excluded. Also available, individual tubes of all types of filter media can be delivered in requested tube lengths.

Specific surface area for biological activity

When bacteria (biological film or biofilm) grow on a level surface, the specific surface area will remain constant even with the establishment of a thicker biofilm.

BIO-BLOK[®], however, is designed as a helical structure, based on oval threads with a defined diameter. If these threads become thicker due to growth in the thickness of the biofilm, the specific biologically active surface increases correspondingly.



A biological wastewater treatment plant in which BIO-BLOK[®] filter media has been installed has thus unique flexibility and, if necessary, the ability to increase its capacity to handle flow variations and load changes, which inevitably occur in the inlet to all wastewater treatment plants.

Our BIO-BLOK[®] products are named with reference to the specific surface per m³ filter media in dry condition. In practice, this condition will never occur because the BIO-BLOK[®] filter media will always be covered with a biological film of bacteria (biofilm) as soon as it gets in contact with the waste water.

The thickness of the biofilm depends on the load in question and on the exact function which the BIO-BLOK[®] filter media is planned to perform. When it comes to deciding on which BIO-BLOK[®] type to apply for a specific function it is therefore important to estimate the expected final size of the biofilm layer and based on this choose the BIO-BLOK[®] type which is most fitting.

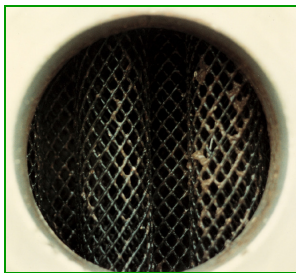
When it is a matter of ordinary waste water, we normally calculate with a thickness of biofilm of 2mm when it regards reduction of BOD. If it is a matter of reduction of ammonia, we normally calculate with a thickness of biofilm of 1mm.

Table 2: Specific biologically active surface area for BIO-BLOK[®] filter media

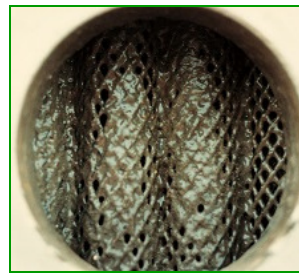
Filter type	Application	Thickness of biofilm			
		1mm	2mm	3mm	4mm
BIO-BLOK [®] 100	BOD		233m ² /m ³	299m ² /m ³	366m ² /m ³
BIO-BLOK [®] 125	BOD		291m ² /m ³	374m ² /m ³	457m ² /m ³
BIO-BLOK [®] 150	Ammonia/BOD	268m ² /m ³	387m ² /m ³	507m ² /m ³	
BIO-BLOK [®] 200	Ammonia/BOD	312m ² /m ³	426m ² /m ³		
BIO-BLOK [®] 300	Ammonia/BOD	360m ² /m ³	460m ² /m ³	560m ² /m ³	

Depending on the load on the filter media the following comparison can be made between BIO-BLOK® and a traditional, smooth and flat sheet media:

BIO-BLOK® 100 with filter media from 165 to 366 m² surface
BIO-BLOK® 125 with filter media from 206 to 457 m² surface
BIO-BLOK® 150 with filter media from 268 to 507 m² surface
BIO-BLOK® 200 with filter media from 312 to 426 m² surface
BIO-BLOK® 300 with filter media from 360 to 560 m² surface



Biological growth on
BIO-BLOK® with
smooth surface



Biological growth on
BIO-BLOK® with
rough surface

General requirements for biological filter media in order to achieve optimal treatment results:

1. The filter media should have a relatively rough surface in order to enhance rapid establishment of a biologically active surface (biofilm).
2. The filter media must have a structure that makes back wash and cleaning operations on site possible. Canals have to be vertical and through the entire media column.
3. The filter media must have a structure that ensures optimal oxygen transfer to the bio-film i.e. it must have sufficiently high porosity.
4. The filter media must never clog and it must have self-cleaning properties. The structure must allow shed biofilm fragments to pass unhindered throughout the filter.
5. The filter media modules should be constructed with circular or oval threads. Bacterial growth on a circular or oval surface increases the diameter, thus increasing the specific biologically active surface area.
(Please note! This is in opposition to media with flat surfaces on which the specific biologically active surface area is constant).
6. The filter media has to be biologically and chemically non-degradable.
7. The filter media must be self-supporting and mechanically strong. It must be able to carry overlying material and personnel should be able to walk freely and perform service tasks without deformation of the media.
8. The filter media must be UV stable and it must tolerate potential variations in temperature.
9. The filter media should be made from an environmentally compatible material (i.e. no PVC compounds or glue).
10. The filter media must be modular and easy to handle. This will ease installation and potential temporary removal in order to perform service tasks below the filter.
11. The filter media must be easy to fit into any type of tank or bio-reactor without any waste of space and material.

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