



# BIOFOR<sup>®</sup>

## BIOLOGICAL AERATED FILTRATION SYSTEM



### DESCRIPTION AND PROCESS

The BIOFOR<sup>®</sup> Biological Active Filter (BAF) is a high rate, biological, up-flow filtration system used for secondary and tertiary treatment for BOD Removal (BIOFOR C), Nitrification (BIOFOR N) and Denitrification (BIOFOR DN) along with simultaneous Suspended Solids Removal. The BIOFOR<sup>®</sup> process involves up-flow of the influent through a bed of the proven high surface area media Biolite™, wherein the suspended solids get captured in the bed and the pollutants are removed by the high concentration of microbial biomass growing on the media surface. Given the high concentration of micro-organisms supported in the media, significantly high flows and loads are treated within the BIOFOR<sup>®</sup> system as compared to conventional systems leading to a significantly reduced process footprint. The filter is regularly backwashed with a precision designed and controlled automatic backwash sequence improving filter run times and keeping a functioning, active biofilm growth on the media. The fully automated and proven system has thus been a technology of choice for plants across the world for producing effluent conforming to limit of technology pollutant removal goals.

### DESIGN CRITERIA

#### APPLICATION:

- BOD Removal
- TSS Removal
- NH<sub>3</sub>-N Removal (Nitrification)
- NO<sub>3</sub>-N Removal (Denitrification)
- Total Nitrogen Removal

#### SOURCE:

Municipal Wastewater  
Industrial Wastewater

#### EFFLUENT REQUIREMENTS:

BOD < 10 mg/L  
TSS < 10 mg/L  
NH<sub>3</sub>-N < 1 mg/l  
NO<sub>3</sub>-N < 1 mg/L  
Total Nitrogen < 3 mg/L

FEATURES	BENEFITS
<b>HIGH RATE PROCESS</b>	Significantly high flows and loads can be treated in a small footprint as compared to conventional and competing technologies
<b>MODULAR DESIGN</b>	Ease of expansion, operation and flexibility of treatment options including carbon removal, nitrification, and denitrification
<b>STANDALONE SYSTEM</b>	No need for secondary clarifiers as biological treatment and solid-liquid separation occurs in a single step
<b>MONOLITHIC UNDERDRAIN</b>	Construction-friendly, safe and proven in plants across the world
<b>TREATED WATER ALWAYS ABOVE MEDIA BED</b>	Community friendly and virtually odor-free
<b>FULLY AUTOMATED BACKWASH SEQUENCE</b>	Maintains a thin, active biofilm while effectively removing excess solids, improving filter runs and preserving treatment capabilities; Reduced Operator time hence reduced OpEx
<b>HANDLES WIDE FLOW, LOAD &amp; TEMPERATURE VARIATIONS</b>	Robust and resilient process which quickly adapts to sudden changes in flows, loads and temperatures without reduction in performance
<b>MORE THAN 180 OPERATING INSTALLATIONS WORLDWIDE</b>	Huge experience and confirmed treatment efficiency in diverse applications

## COMPETITIVE DIFFERENCES

PARAMETER	BIOFOR®	KRUGER BIOSTYR	BENEFIT
Peak Filtration Rate	8.2 gpm/ft <sup>2</sup> for BIOFOR® C and N 14.3 gpm/ft <sup>2</sup> for BIOFOR® DN	5 – 7 gpm/ft <sup>2</sup>	Higher flow rates per cell; Smaller footprint
Tank Height (Total)	30 ft	50 ft	Significantly higher CapEx due to higher concrete and civil structural requirements
Media	Heavier than water	Lighter than water and floats	Significantly lower media loss
Media Compression over time	No	Yes	Increased head loss
Backwash	Pumped	Gravity	More efficient cleaning of bed leading to longer filter run times
Media Type	Expanded Shale or Clay	Polystyrene	Larger surface area for more biofilm growth; Environmentally friendly

## FREQUENTLY ASKED QUESTIONS

### What types of process configurations are possible for BIOFOR®?

For a complete secondary and tertiary treatment, Biofor C, Biofor N and Biofor DN can be used in series. For existing secondary treatment plants, Biofor N and Biofor DN can be used in series as well as in MLE configuration (Biofor DN followed by Biofor N). Of course, each of the three types of Biofor C, Biofor N and Biofor DN can be used as stand-alone treatment stages as well.

### What is the typical media bed height in a BIOFOR® BAF unit?

12.2 ft in case of BIOFOR® C and N and 9.5 ft in case of BIOFOR® DN.

### What is the backwash sequence used in the BIOFOR®?

The BIOFOR automated backwash sequence uses a series of air and water washes precision timed to ensure optimal bed scour and clean.

### What is the type of media used in the BIOFOR®?

High surface area media (Biolite) which is an expanded shale/clay material of particle size 2 to 5 mm is used in the filter bed.

### How often does the Biolite media have to be replaced?

The typical life of the media is in excess of 20 years and hence replacement would not be required. Some excess media is required to top-up the filter cells due to minor losses during operation (mainly backwash).

### What is the typical filter backwash frequency?

Typically every 24 to 72 hours depending on the influent and type of application.

### Is the BIOFOR® constructed in concrete or steel tanks?

Both concrete and steel tank construction can be used. It is more economical to build the BIOFOR® units in concrete for medium to large flow capacities.

### How is the loading rate calculated in the BIOFOR®?

Volumetric loading rates in terms of lbs/1000ft<sup>3</sup>/d are used for pollutants while surface loading rates in terms of gpm/ft<sup>2</sup> are used for the influent and backwash flows.