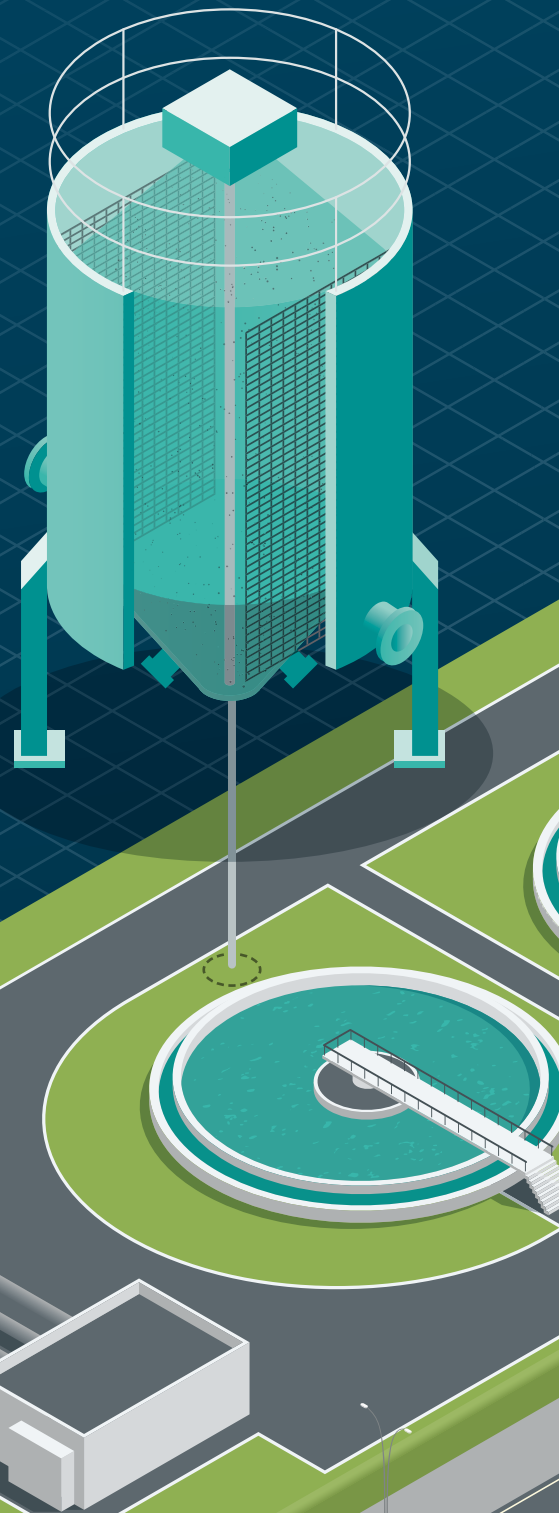


Passavant®  
**Horizontal  
Filtration  
Horizand®**  
Activated Carbon  
Filtration  
Denitrification Filter  
Sand Filter

Removal of suspended solids  
and particulate material  
through patented technology



## Our Solution

# Passavant® Horizand®

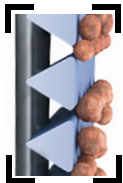
Aiming to provide a filtration solution that saves valuable space, a new approach was taken – Horizontal Filtration

## Technology

The pre-treated wastewater passes through the filter units typically after the secondary clarifiers as a tertiary treatment step. In this reactor the water flows horizontally (parallel flow). Uniform flow distribution and retention of coarse particles is ensured by means of special wedge wire screens with small slot openings, installed as inlet and

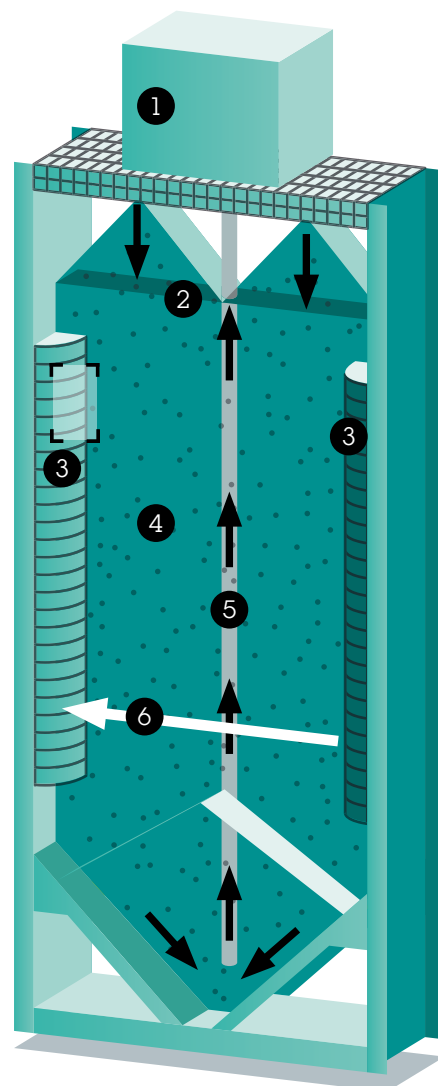
outlet of the reactor. During continuous filter operation, the medium is intermittently transported upwards through a compressed air lifting system. At the washing unit at the top it is washed and returned to the filter bed. The reactor bed cleans the slotted screens during the rinsing process.

- 1 Cleaning unit for filter medium (external, with grating for easy inspection)
- 2 Water surface (within the filter medium)
- 3 Wedge wire screens (approx. 0.3 mm) as inlet and outlet distributors



- 4 Filter medium: GAC or sand
- 5 Airlift pump for filter medium
- 6 Flow direction

Video:



## Overview

# Advantages of Horizontal Filtration

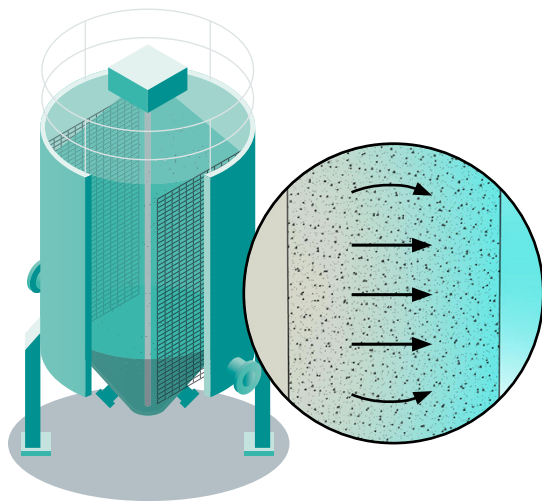
- Smaller Footprint: effective utilization of the entire height
- Higher throughput rates with same load capacities due to improved design
- Continuous Operation: even during back-washing
- No stagnant water above the filter medium: no algae formation

### Detailed information using the example of the Standard Model GAC100

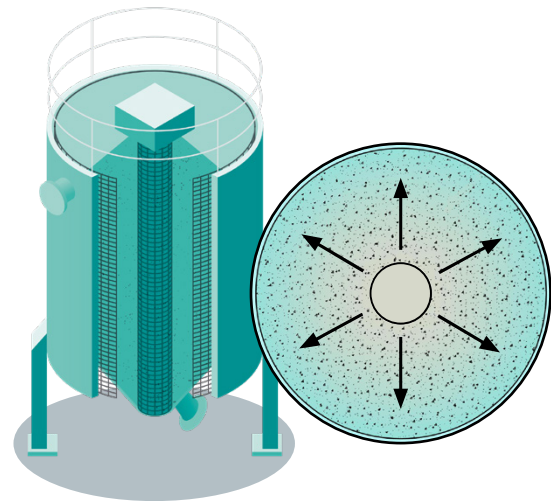
Dimensions (D × H)	3 m × 9 m
Capacity (max.)	100 m <sup>3</sup> /h
Retention Time	20–30 min
Pressurized Air Volume	40 m <sup>3</sup> /h
Filter Bed Volume	50 m <sup>3</sup>
(Effective) Filter Area of Inlet / Outlet Screens	17 m <sup>2</sup>
(Effective) Filtration Velocity	6 m/h

The values shown are indicative and may differ in individual cases.

## Flow Direction



**Parallel Flow\*** (steel tank option)



also available with **Radial Flow\*** as a Sand Particle Filter (steel tank option)

\*\*Design and flow direction proven by CFD analysis

OPTIONS			
Construction Type	Steel or concrete		
Filter Medium	GAC or Sand Other adsorbent matrices possible		
Summary of horizontal filtration alternatives	<b>Granular Activated Carbon</b> (Tertiary treatment step)	<b>Denitrification Filter</b> (after aeration tank)	<b>TSS Filter</b> (Total Suspended Solids)
	<ul style="list-style-type: none"> <li>▪ Medium: Granular Activated Carbon (GAC)</li> <li>▪ Parallel Flow</li> </ul>	<ul style="list-style-type: none"> <li>▪ Medium: Sand</li> <li>▪ Parallel Flow</li> </ul>	<ul style="list-style-type: none"> <li>▪ Medium: Sand</li> <li>▪ Radial Flow</li> </ul>

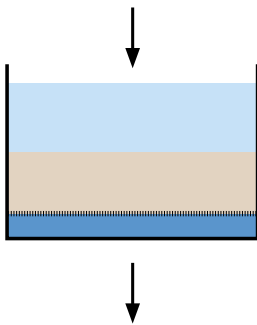
# The patented horizontal filtration technology Horizand® is the (flow) direction of the future

## Distinctive features compared to other technologies

Compared to **continuously operated upflow bed filters**, horizontal filtration requires considerably smaller space for the same filtration area. Among other things, this is possible mainly due to our external washing unit, which means that no additional space is needed inside the reactor for expansion or backwashing.

As opposed to **conventional (discontinuous) vertical filtration** as well, in Horizand no space is wasted for expansion/backwashing. Therefore the footprint is significantly smaller and costs for civil construction in greenfield projects are considerably lower.

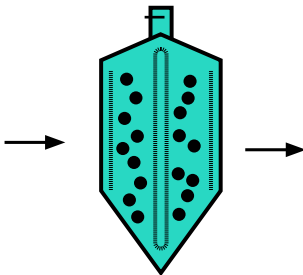
## Conventional Vertical Filtration



### Disadvantages

- Larger footprint
- Ineffective height harnessing
- Permanent filtrate above the filter medium
- Uncontrolled oxygen input (for nitrification filters)
- Algae formation upon exposure to sunlight
- Large air volume required for backwashing
- Interruption of filter operation for backwashing

## Horizontale Filtration



### Advantages

- Smaller footprint & lower facilities volume
- Optimal height exploitation
- Improved oxygen input control
- Less air required for backwashing
- Continuous operation
- Easy operation and handling
- Less space required due to external washing unit for backwashing
- Filter capacity expansion possible by redesigning existing filter tanks

### Disadvantages

- More components, but simple basin construction (concrete tank)

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