



VEAS installations are all situated inside the mountain

## Vestfjorden Wastewater Treatment Plant (Veas) Filtralite®, an extremely durable media for biofilters



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Øystein Moursund  
Advisor of Veas

In Norway's largest wastewater treatment plant, Veas in Oslo, Filtralite® has proven extremely durable as both biosubstrate and wastewater filtering medium. After 25 years of operation with daily backwashing there is no need for replenishing.

Vestfjorden Wastewater Plant (Veas), at the entrance of the beautiful Oslo fjord cleans the wastewater from 600 000 people, including large part of Oslo, capital of Norway.

**A river of wastewater** of maximum 11 m<sup>3</sup> per second runs in a 42-kilometer underground tunnel, collecting sewage from Oslo centre to Slemmestad in Asker, where the plant's large treatment basins hide inside the mountain. Annual volume of wastewater is 100 million m<sup>3</sup>. Removal of nitrogen is a major objective before leaving the effluent to the popular Oslo fjord, and Filtralite plays a leading role in the nitrification and de-nitrification. These two steps of biofilters work downstream of chemical flocculation with sedimentation.

**The unique biofiltering** process consists of eight «nitrification» bio-filters, each followed by «de-nitrification» biofilters. The nitrification step is an aerobic biofilter which consume dissolved organics, converting to sludge, carbon-dioxide and nitrate. The substrate is Filtralite HC 2,5-5 [high density, crushed material].

In the subsequent aerobic biofilter the nitrates are converted to nitrogen gas. In this process Filtralite HR 3-6 [high density, crushed material] acts both as substrate and filtering medium.

“ **These filters** are a result of great innovation in the past, and we are proud that this design has proven very successful for us. Filtralite was designed especially for this task by Norwegian researchers, trying to imitate and multiply natural processes. The special porosity of expanded clay enables the biofilters both to host bacteria and act as filter at the same time,” explains senior advisor Øystein Moursund of Veas. All filters are back-washed daily and the sludge goes to processing and agricultural uses. Veas has decided to engage more filters of the same kind to keep up with an increasing load.

**It is the porous** nature of Filtralite that enables the dual function, working both as a particle trap and housing bacteria inside the pores maintaining a robust bioculture.

Each **nitrification filter** at Veas measures 87 m<sup>2</sup>, with a bottom layer of Filtralite of 4 m. Average level of ammonium entering nitrification is 20 mg/l and 6 mg/l leaving. Less than 1 mg/l nitrate will pass nitrification. Between 800 and 1400 m<sup>3</sup>/h of air is added to the nitrification filter. **Denitrification filters** measure 65 m<sup>2</sup>, and has a bottom layer of Filtralite of 3 m. The level of nitrate entering the denitrification is 15 mg/l and 1 mg/l leaving. Maximum water flow to the filters is 300 l/s. To facilitate the biofilters methanol is added as carbon supplement.

Filtralite is a lightweight ceramic particle aggregate made from expanded clay, proven to be an excellent material for water and wastewater purification. The low density granules have large pore volumes with large surface areas, which are ideal characteristics for conventional filtration. Filtralite is also an ideal medium for biofilm growth.



Filtralite biofilters are backwashed every day.



Due to climate conditions, all VEAS installations, including Filtralite nitrification and denitrification biofilters are situated inside the mountain



Nitrification and denitrification filters at VEAS use Filtralite products as media.