

Expanded clay has proven to be extremely durable in two-step biofilters

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

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

A river of sewage of maximum 11 m³ 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 sewage is 100 million m³. 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 consist 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 (chrushed fragment). In the subsequent aerobic biofilter the nitrates are converted to nitrogen gas. In this process Filtralite HR 3-6 (whole extruded sphaeres) 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 backflushed dayly and the sludge goes to processing and agricultural uses. Veas has decidet to engage more filters of the same kind to keep up with an incresing load.

It is the porous nature of Filtralite that enables the dual function, working both as a particle trap and housing bacteria inside the



Øystein Moursund of Veas showing samples of Filtralite used in the plant

Biofilters produce carbon dioxide froth from organics besides nitrification



De-nitrification biofilters release steady volumes of pure nitrogen



pores maintaining a robust bioculture. Each nitrification filter at Veas measures 87 m², 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 m³/h of air is added to the nitrification filter. Denitrification filters measure 65 m², 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.



Elegant Veas building with all processes situated inside the mountain.