Fine screen removes snail shells from aeration tank

The trickling filters used in municipal wastewater treatment are in most cases one-stage systems for the elimination of organic pollutants with/without nitrification. If used in multi-stage plants trickling filters are frequently applied as second clarification stage for nitrification.

In the latter case, they are used as an additional treatment step downstream of a higher loaded first stage. In the first stage, which is in most cased designed according to the activated sludge principle, mainly the carbon compounds are reduced. After the wastewater has passed an intermediate settling tank it flows into the trickling filter for nitrification and final treatment, i.e. removal of the still contained organic pollutants. To achieve denitrifcation, the nitrate-containing effluent from the nitrogen-fixing trickling filter must be recirculated into an upstream anoxic system (denitrification tank). The biomass that is growing in the trickling filter is continuously washed out and separated in a downstream secondary clarification tank.

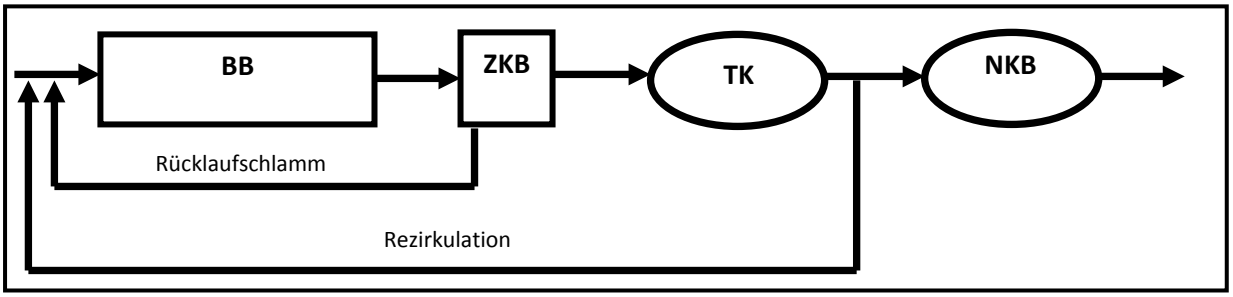

Fig. 1: Activated sludge process with upstream denitrification and downstream nitrogen-fixing trickling filter

Operating experience has shown that not only the desired biomass growth takes place in the trickling filter, also mass propagation of freshwater snails occurs sometimes.

Fig. 2: Snails like physella heterostropha cause operating problems in trickling filter plants.

The operating problems they cause can sometimes be so severe that the nitrification in a sewage treatment plant collapses when the snails have grazed most of the biofilm from the trickling filters. In most cases, however, the snails cause the biggest problems in the aeration tank. Snails that are flushed out of the trickling filter are with the recirculation flow returned to the inlet to the aeration tank / denitrification tank. Due to sedimentation more and more snails gradually accumulate in the aeration tank. This can lead to the failure of the aeration system. The tank must be cleaned and the snails removed. Both can be very laborious and cost-intensive.

Fig. 3: Labour-intensive removal of sedimented snail shells from an aeration tank

The aim must be to separate the snails as simply as possible from the recirculation flow to prevent that they end up in the aeration tank. The solution to achieve this is fine screening of the flow. On STW Karlsruhe we have conducted pilot tests with the HUBER Rotary Drum Screen RoMesh®.

The HUBER Rotary Drum Screen RoMesh® consists in a horizontally installed screen basket. The screen drum is covered with a 1 mm square mesh. Due to the two-dimensional effect of the mesh the very small snail shells (< 1 mm) are retained.

The wastewater to be cleaned, containing the shells, is directed into the screen basket. The water flows through the screen basket from inside to outside. The screened wastewater exits through the vertically mounted outlet. Due to the rotation of the drum the snail shells are transported horizontally to the outlet, see figure 4. The cleaning system for screens with 1 mm mesh consists of an external spray nozzle bar and an intensive cleaning system that combines external high-pressure cleaning (at 120 bar) and an internal spray nozzle bar, which is operated twice a day as standard. With the use of a 1 mm mesh the screened effluent can be reused for cleaning.

Fig. 4: Seperated snail shells in the discharge of the RoMesh® trial plant

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