# Phosphorus reduction with the HUBER RoDisc® Rotary Mesh Screen

## Simple and low-cost method of phosphorus removal from wastewater

The nutrients we discharge into water courses (phosphorus, nitrogen) severely impairs water quality in the long run. Even phosphate contents in the lower microgram range can already have a negative effect on the oxygen content in waters and thus increase their eutrophication potential.

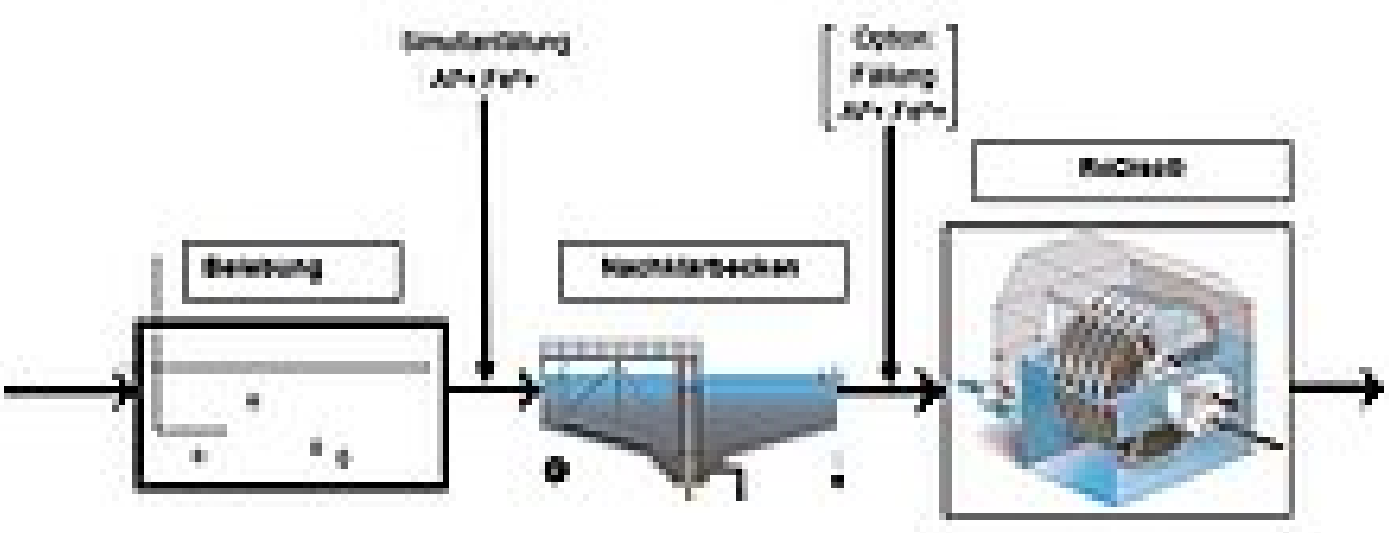

*Fig. 1: The HUBER RoDisc® Rotary Mesh Screen is installed downstream of the secondary clarification tank to ensure maximum removal of solids from the wastewater prior to its discharge to the receiving water course.*

Eutrophication is referred to as the enrichment of a water body by plant nutrients (overfertilation). These nutrients lead to increased algae growth, and algae make the water turbid. After some time, only the surface-near layer still has sufficient light for photosynthesis. As a result of reduced photosynthesis the oxygen concentration in the water decreases. In addition, degradation of dead algae by microorganisms takes place, a process that consumes oxygen. So, eutrophication results in a very low oxygen concentration in the water which can finally lead to (anaerobic) decomposition processes and fish death, i.e. "dying of the water body".

The plague of algae even threatens drinking water supply in some countries, such as China or Russia. In June last summer, for example, the algae in the Lake Taihu in China had grown so much that the drinking water supply to the connected population in the city Wuxi in the Jiangsu province had to be interrupted and five million people were dependent on bottled water.

As nitrogen, sulphur, etc. are usually present in waters in greater amounts due to human influences, phosphorus content is considered to be the limiting factor for excessive algae growth. Removal of phosphorus therefore plays a key role for the protection of our waters as any additional discharge further increases the growth of plants.

In terms of wastewater treatment phosphorus is removed from wastewater in the solid aggregation state along with the sludge. Phosphorus is converted into solids and integrated into the sludge either through being absorbed into the biomass or through additional chemical precipitation. As the biological integration of the phosphorus (bio-P-process) is limited, most sewage treatment plants use a combination of biological and chemical phosphorus reduction. During the process of chemical phosphorus elimination multivalent metal ions form insoluble compounds with the phosphate ions that are present in the wastewater as dissolved ions. Especially as the phosphorus is converted into an undissolved form in these partly complex process steps, the reliable separation of solids plays an important role. The HUBER RoDisc® screen is a cost-effective and reliable filtration solution for this purpose, it ensures extensive solids removal from the effluent from the secondary clarification tank. Due to its small space requirements, low pressure loss, modular design and feeding by gravity the RoDisc® screen can easily be tailored to suit any specific site requirements and keeps the structural alteration work required to a minimum.

The major part of the residual contaminants in the sewage treatment plant effluent are dissolved substances, another part are suspended sludge flocks. Each milligram of suspended activated sludge that runs off along with the treated wastewater increases phosphorus effluent values by approximately 0.02 to more than 0.04 mg/l (ATV-DVWK-A131). This means for example that phosphorus concentration can already be reduced by approximately 0.4 to 0.8 mg/l with the use of a downstream disc filter screen that removes 20 mg/l of filterable solids. Phosphorus removal efficiency can be further improved by adding more precipitants in the upstream process steps (simultaneous precipitation). The use of precipitants leads to an increase in the amount of inorganic substances that are bound to

*Fig. 2: Two RoDisc® 8 screens installed on STP Winsen an der Aller, Germany*

the sludge flock through agglomeration, these are also removed from the wastewater through filtration. Normally, phosphorus effluent values below 1 mg/l can reliably be met with filtration and addition of a sufficient amount of precipitants in the upstream treatment stages, even effluent values below 0.5 mg/l phosphorus can be achieved.

Where especially extensive phosphorus elimination is required the RoDisc® screen can be used as flocculation filtration system. In this case, simultaneous precipitation and biological phosphorus elimination should be used in the upstream wastewater treatment stage to ensure that the phosphorus concentration in the secondary clarification tank is relatively low already and the disc filter screen can be operated economically. The precipitant is dosed into the effluent from the secondary clarification tank. After a short flow distance (reaction distance) it is passed into the disc filter screen. The screen is equipped with needle felt as filter material to ensure that the very fine flocks produced with the use of precipitants are removed. Due to the three-dimensional design of the needle felt filter the separation effects are virtually the same as those of a conventional deep-bed filter, and these are the effects which are necessary to reliably remove the micro flocks. Retrofitting of this additional treatment stage makes it possible to achieve monitoring values below 0.3 mg/l phosphorus.

A disc filter screen is a simple yet efficient solution which can be used to meet various specific requirements of phosphorus reduction and is therefore a decisive contribution to the protection of our waters. The minimal pressure loss combined with small space requirements permit the problem-free integration of downstream filtration stages in existing wastewater treatment plants.

**Related Products:**

- HUBER Disc Filter RoDisc®
- Microscreens

**Related Solutions:**

- HUBER Solutions for Filtration of Biologically Treated Wastewater
- HUBER Solutions for Removal of very fine Solids by Micro-Screening and Filtration

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