PROCESS

SEMICONDUCTOR
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CHEMICAL
OIL AND GAS
MINING
AEROSPACE AND TRANSPORT

HAGER+ELSÄSSER

FLOTTOPAC®

Air flotation for purifying wastewater from industrial processes

Below the basin cone the feed and the pressurized water are fed into the central mixing chamber

The FLOTTOPAC® flotation in industrial water treatment

Effective treatment without any rough edges

H+E's brand name FLOTTOPAC® refers to a space saving method that is highly effective in the removal of oils, fats and finely suspended solids in industrial wastewater from various industries and production processes. Therefore, the FLOTTOPAC® can be used in the food and beverage industry as well as in the oil and gas and the paper industry.

The FLOTTOPAC® is based on the principle of induced air flotation, a process that is traditionally used for the separation of finely dispersed solids or fats and oils from water. As well as that, the separation and thickening of biomass is becoming increasingly important. Compared to alternative separation processes such as sedimentation and filtration, the flotation process has various benefits. It has three main important advantages over sedimentation; first of all, a significantly lower system size and thus a saving on construction costs and footprint; second, the lower water content of the separated sludge; and third, a greater tolerance to fluctuations of the inlet stream. If the density of the material to be separated is less than or similar to that of water (for example, oil, grease and algae), the option of sedimentation is no longer an alternative.

The process of filtration is only applied with low concentrations and is therefore more likely to be used as a complement to the flotation process. Therefore, the FLOTTOPAC® stage is often a crucial step within a water treatment plant. Proven applications of FLOTTOPAC® include:

- the separation of oils and fats and fine solids in a pretreatment
- the separation and thickening of bio sludge
- the post-treatment of water from a biological stage

Benefits

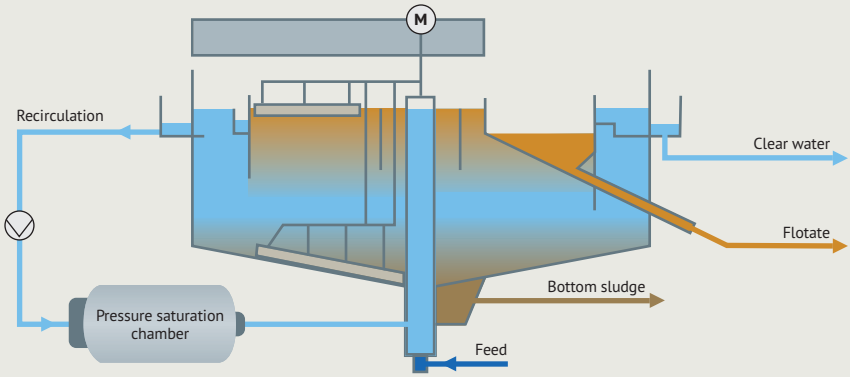
The special design of the mixing chamber ensures an intensive mixing of the waste water with the microbubbles, giving FLOTTOPAC® an exceptionally good separation rate.

In the circular version, the horizontal flow velocity decreases steadily and is on average smaller than in a rectangular configuration. This extends the degree of contact time so important for separation.

Bottom and flotate scrapers in circular basins have proven to be particularly robust and low maintenance.

The flotate material has a solids content of up to 6%, which will usually make a further thickening treatment step redundant

FLOTTOPAC® at the SHELL refinery Hamburg-Harburg built by HAGER+ELSÄSSER



Process components

The FLOTTOPAC® process can be divided into three functional steps: the mixing zone, the separation zone and the recirculation for the production of supersaturated water.

In the central **mixing chamber**, the basis for an effective flotation is established. Here microbubbles and particles or droplets must join. Sufficient resident time and an optimal flow design result in high probability of contact between microbubbles and particles, without destruction of already formed particle-bubble aggregates due to shear forces.

In the **separation zone**, the aggregates accumulate as flotate on the surface while the clarified water flows downward and is drawn off as clear water. The flotate and bottom sludge accruing in smaller amounts are removed via robust scrapers.

A partial flow of the clarified water is brought into contact with gas in a **saturation system** at a pressure of 4–7 bar, at which the point the gas is dissolved. Typically, air is used; but in hazardous areas, nitrogen can also be used as a substitute. The water is then depressurised via special valves directly upstream of the mixing chamber. The combination of strong supersaturation and an abrupt depressurisation leads to the formation of microbubbles usually within a size range of 40–80 microns in diameter. After mixing with the feed water of the mixing chamber, more than 80 million microbubbles per litre are available to adhere to particles and droplets.

HAGER + ELSÄSSER® ranks among the world's leading suppliers in the fields of water & wastewater treatment. Based on its global presence, the HAGER + ELSÄSSER® has completed projects in more than 50 countries.

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