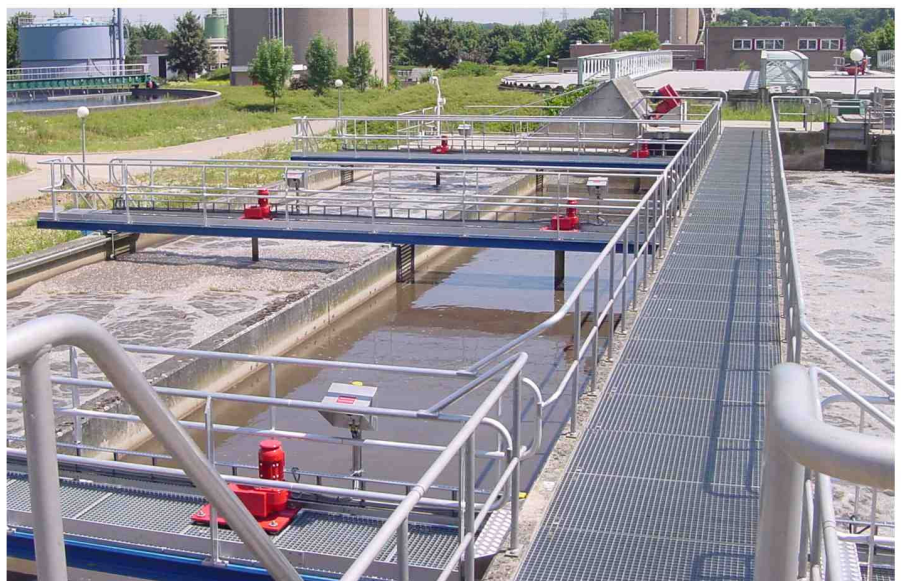


Entec Holland, powerful in odour and wastewater treatment

The hyperboloid mixer,
unique and outstanding performance



 **entec holland**
environmental engineering products and services



Functional description of the hyperboloid mixer

In order to demonstrate the functionality of the hyperboloid mixer stirring system, figure 1 shows a schematic representation of the system installed in a tank typical of wastewater treatment plants, which can be rectangular or round in shape. One can see the typical characteristics of the system, such as the hyperboloid shape, the simple construction and the design of the drive. In the example displayed, the hyperboloid stirrer is driven via a shaft by a drive installed in a dry environment. Furthermore, the current induced by the stirring system during stirring mode is represented by flow lines.

The special shape of the stirrer creates a current in the tank that lies close to the surface of the stirrer. Flow cut-offs and respective energy losses are thus kept to a minimum. The transport ribs integrated at the stirrer surface cause the corresponding medium to flow off in a radial direction, thus enhancing the total mixing of the tank contents. Furthermore, outward flowing micro-eddies are created near the tank bottom which improve the whirling of particles.

Due to the energy induction close to the tank bottom and the related high bottom velocities, the hyperboloid stirrer possesses excellent suspending properties with low energy consumption. Stronger movements on the water surface are avoided in order to eliminate additional oxygen transfer during denitrification mode or during the biological phosphate elimination. For the same reasons undesired aerosol emission cannot take place, which eliminates odor inconveniences.

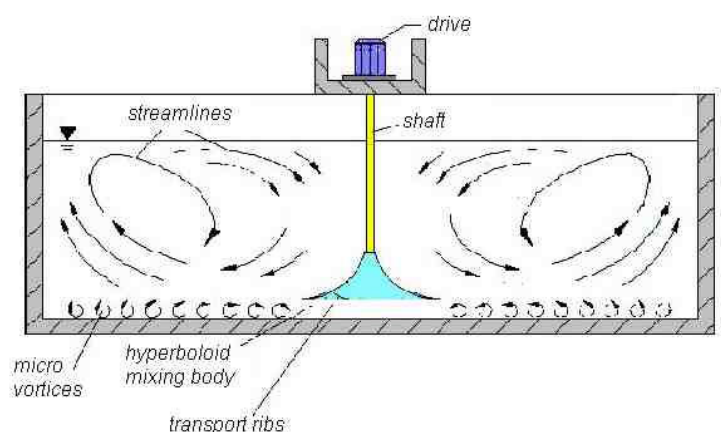


Figure 1: Schematic representation of the hyperboloid mixing system

With the many years of experience in providing products and services for the Dutch wastewater treatment plants, it is justified for Entec Holland to talk about the innovations in the field of purification. Saving of energy and strict results are some of the important issues that are a part of the increasing demands.

In the meanwhile the number of hyperboloid mixers is endlessly growing for the Netherlands. Large wastewater treatment plants as well as small ones have already been completed with these mixers to their basins equally. The hyperboloid mixer did not earned its reputation by the unusual mixing body shape, but also thanks to its unique function. The mixer has proven its advantage over and over again. Because of this the mixer is a well appreciated product at the wastewater treatment plants due to the optimized efficiency.





Technical information

The design of the hyperboloid mixer is based on fundamental potential theory flow calculations. Through the special shape of the stirrer a flow is achieved which, as far as possible, lies at the stirrer surface and thus minimizes separations and the associated energy losses. An extensive flow is achieved which guarantees a complete mixing of the tank contents. The energy is deliberately concentrated at the tank bottom where high bottom velocities are needed to prevent the settlement of activated sludge.

For the denitrification basins it is desirable to generate separate sections. Therefore basins are often constructed in smaller basins by concrete walls. Because of the special mixing flow of the hyperboloid mixer it is possible to create a virtual separation wall between two mixers. The current obtains the same shape as a real (concrete) separation wall. The virtual separation wall will be created as a result of the flow and should not have to be build.

Already at the at the first steps of designing a water treatment plant the hyperboloid mixer can save a lot of expenses by losing the concrete separation walls between the separate compartments.

The hyperboloid mixer

The hyperboloid mixer consists of a hyperboloid stirrer body driven by a shaft and a motor installed in a dry environment. Hyperboloid mixer bodies are made from fiberglass-reinforced plastic. The sizes of the stirrers are designed to achieve the required minimum bottom velocity at a minimum power input in order to prevent the activated sludge flakes from settling.

The parallel shaft helical gear motor for the hyperboloid mixer drive is installed on the bridge with the help of a gear plate. The gear plate can be mounted on either vibration isolators or centre bonded mounts that prevents possible vibrations or noises to be transmitted to the bridge.

Standard sizes

Mixer bodies made from fiberglass-reinforced plastic are available with the following diameters:
300mm • 500mm • 750mm • 1000mm
1500mm • 2000mm • 2300mm • 2500mm





Materials used

During development and construction of the hyperboloid mixer, the main emphasis was laid upon the realization of a simple, robust, corrosion-safe and low-maintenance system with a high lifespan. In order to reach these aims only high-quality materials are selected and used.

The stirrer body is made from fiber glass-reinforced plastic. The surface of the stirrer body is coated with a biologically neutral gel-coat in order to guarantee the bacteria's uninhibited decomposition performance.

Advantages of the hyperboloid mixer

- **Complete stirring**
Conventional mixers generate a horizontal flow. For the carousel processes this can be a good alternative. In rectangular and round basins it is better to generate a vertical flow like the hyperboloid does.
- **No settlement**
Due to the high energy input near the bottom and a radial flow is caused there will be no settlement of solid parts and activated sludge.

- **Low maintenance requirements**
The motor will be mounted above the water level on a steel bridge or concrete deck, this makes the gear easy reachable for maintenance. Below the water level there are no sensitive maintenance parts.
- **Forces on the concrete deck or steel bridge**
The static forces on the deck or the steel bridge are almost reduced to none because the hyperboloid mixer centers itself and has a vibration resisting system.
- **Long lifetime**
The gear as well as the shaft is prepared with only high-quality materials, this results in a long lifetime of the stirrer.
- **Energy saving**
Due to the special shape of the hyperboloid mixing body and because of the energy input takes place on the bottom of the basin, the hyperboloid mixer has a higher stirring efficiency compared with conventional stirring bodies. This results in a much lower installed and consumed power.
- **Low operating expenses**
The hyperboloid mixer has very low company costs due to the low energy costs and the low maintenance.

