E+B

Umwelttechnik GmbH

HDLC - Technology

State-of-the-Art Clarifier

Challenge

Water clarification from different sources such as

- groundwater,
- surface water (e.g. river water, sea water, etc.)

as well as pre-clarification of

- wastewater

has always been a challenge for water treatment engineers to produce excellent

- ✓ **potable water** high standard
- ✓ **effluent water** for all regulations and laws
- ✓ **process water** for all kind of technologies.

Applications

- Drinking water
- Industrial process water
- Municipal Wastewater
- Industrial Wastewater

Improvement of existing technologies

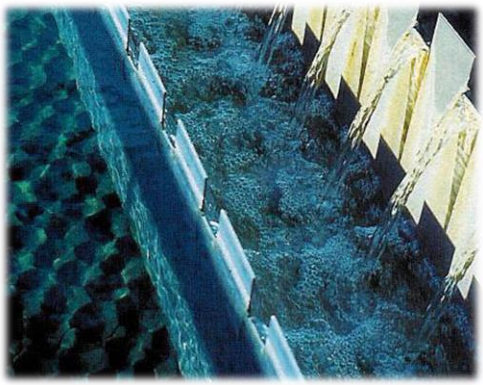
E+B Umwelttechnik GmbH presents an optimized clarification reactor, which combines all required treatment steps with characteristics:

» Cost efficiency related to investment and operating cost

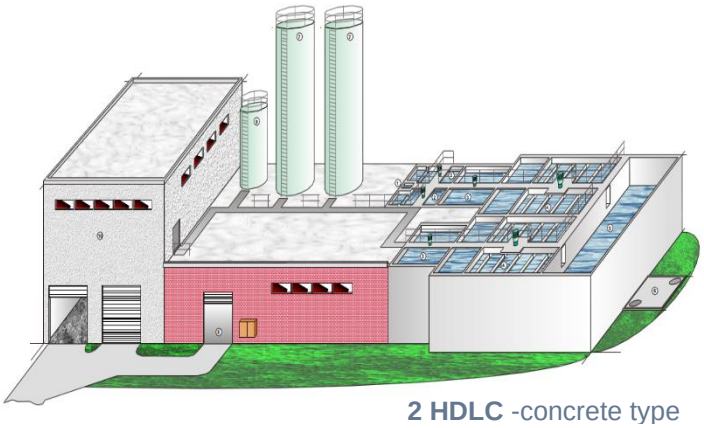
» High quality of the treated effluent related to the removal of Suspended Solids and TOC

» Small footprint of the treatment plant in order to reduce the requirement for land

» High concentration of the settled sludge for cost efficient sludge treatment



H High rate
D Density
L Lamella
C Clarifier



2 HDLC -concrete type

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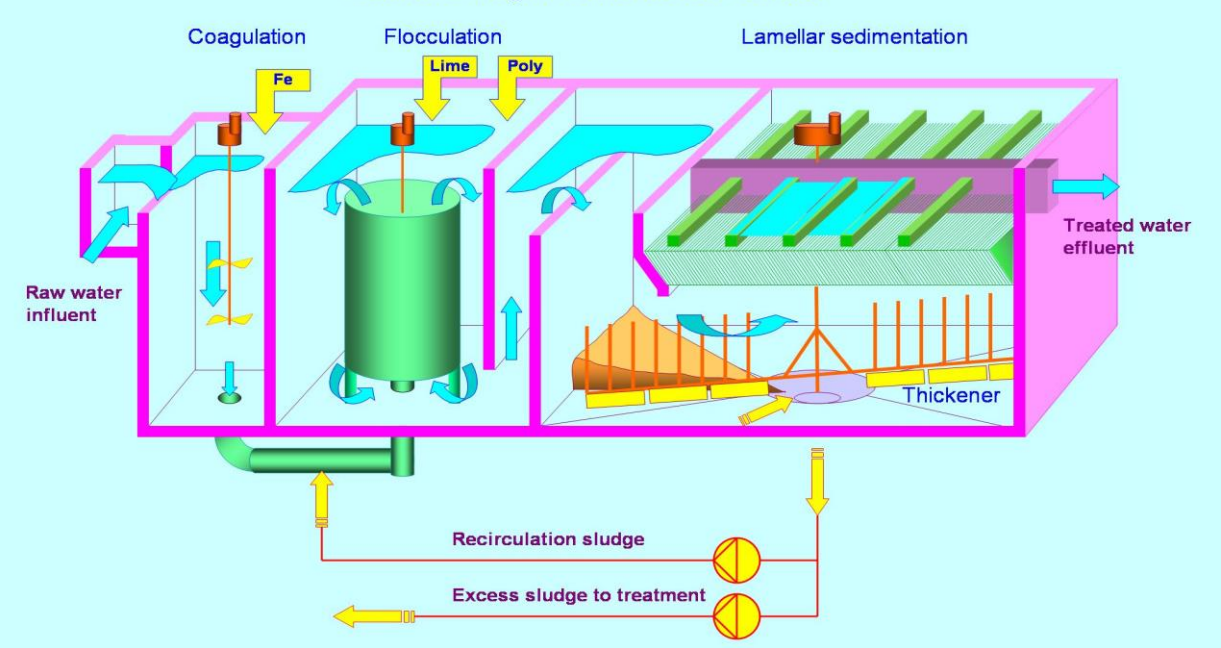

Treatment Steps

1. Rapid Mix
   Coagulation
2. Flocculation
   Polymer injection - pH control and possible decarbonization
3. Sedimentation Zone
   Lamella clarification
4. Sludge Thickening
5. Sludge Recirculation

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Rapid Mix/Coagulation

The water to be treated first reaches the rapid mix chamber where metal salt (for example $FeCl_3$) is injected as coagulant and intensely and rapidly mixed with the water. In this treatment step so called “micro flocs” composed of the suspended solids and the coagulant are formed.

HDLC (500 m³/h) -**Steel** Type

Flocculation

Coming from the rapid mix tank the water flows into the flocculation reactor via a pipe at the base of the agitated tank. This pipe introduces the raw water in the centre line of the flocculation turbine. Also recirculation sludge from the sedimentation tank is injected into this pipe.

The purpose of the recirculation sludge is to enhance the formation of “macro flocs” by multiple contacts between raw water, suspended solids and fresh sludge already in the system.

To enhance formation of dense, robust and yet large flocs polymer is injected directly at the base of the agitating and mixing turbine.

Lime Softening

If decarbonisation is required, lime is added to raise the pH and trigger the precipitation of raw water carbonates. This reaction occurs in the flocculation reactor making use of the high turbulence for intensive mixing and optimum usage of chemicals.

Sedimentation

Leaving the flocculation tank the water is distributed over the total width of the sedimentation tank. The “macro flocs” composed of suspended solids, coagulant, polymer and adsorbed dissolved organic matter settle and are collected in the lower thickener part of the tank. The settled sludge is moved to the centre of the tank using a scraper with central drive and falls into the central hopper.

From the sludge hopper the recirculation sludge is extracted by sludge recirculation pumps. The excess sludge is also drawn off from here by excess sludge pumps and is pumped to further sludge treatment.

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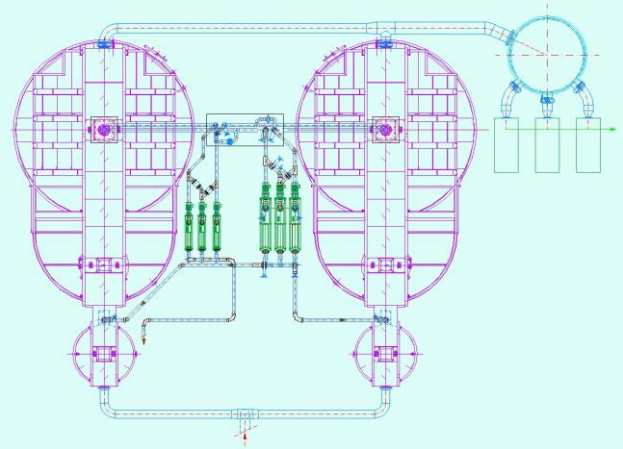
The pre-treated water with residual flocs then enters the **lamellar settling zone** in an upward stream. Here laminar flow conditions are present and allow an effective settling of residual particles and a high treated water quality is granted.

The lamellar settling – **LS** - modules are of honeycomb type.

After leaving the lamellar settling at their upper end the clear water is collected by effluent weirs. From these weirs the water flows to the central collection channel which finally leads the treated water out of the system.



HDLC Steel Type General Layout

Sludge Thickening, Recirculation and Extraction

Sludge thickening occurs inside the sedimentation reactor by gravity. The thickening is enhanced by the scraper which has an additional thickening effect by the shear stress on the sludge.

The above mentioned optimum conditions under which the micro and macro flocs have been formed in the reaction chambers result into a very high sludge concentration in the thickening zone. Therefore, the size and the cost of the further sludge handling and dewatering systems are reduced in comparison to traditional systems.

Main references of HDLC Reactor*

Christ AG	Surface Water	15,000 m³/d	Power Plant	Poland
City of Thalheim	Municipal WW	20,000 m³/d	WWTP	Germany
City of Bijie	Municipal WW	120,000 m³/d	WWTP	China
Biowanze	Surface Water	14,500 m³/d	Sugar Factory	Belgium
Malcenize	Surface Water	8,000 m³/d	Power Plant	Slovakia
Dezhou	Surface Water	30,000 m³/d	Power Plant	China
Wuhan	Surface Water	240,000 m³/d	Recycling	China
Wuhan	Surface Water	30,000 m³/d	Power Plant	China
Sinopec GPC	Surface Water	36,000 m³/d	Refinery	China
Langley Gulch	Surface Water	15,000 m³/d	Power Plant	USA
MalanHe	Municipal Water	120,000 m³/d	WWTP	China
Pailles Port Louis	Surface Water	80,000 m³/d	PWTP	Mauritius

* Implemented by BHU Umwelttechnik GmbH

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