HM 142
Separation in sedimentation tanks

Description

- **transparent sedimentation tank for observation of the separation process**
- **illumination for optimum visualisation of the flow conditions**
- **possible to use lamellas in the sedimentation tank**

In sedimentation tanks, solids are separated out from suspensions under the influence of gravity. In this process the density of the solid particles must be greater than that of the liquid. HM 142 makes it possible to investigate the separation of solids from a suspension in a sedimentation tank.

First a concentrated suspension is prepared in a tank, comprising water and the solid to be separated. A pump transports the concentrated suspension to the sedimentation tank. Upstream of the sedimentation tank the suspension is mixed with fresh water. The raw water generated in this way flows into the sedimentation tank via an inlet weir. A stirring machine is located upstream of the inlet weir. This prevents solids sedimenting before entering the sedimentation tank. The treated water first flows under a baffle and then over a weir to the outlet.

The height of the weir on the outlet side is adjustable and allows the water level in the sedimentation tank to be changed. The water level above the inlet weir can also be adjusted. This affects the flow velocity over the inlet weir.

A lamella unit can be inserted into the experimental section. This makes it possible to study how lamellas affect the separation process. The flow through the lamellas occurs from bottom to top. Above the lamellas is an outlet channel. The side walls of the outlet channel are designed as a serrated weir.

The flow rates of the concentrated suspension and the fresh water are adjusted via valves. This means the mixing ratio, and thus the concentration of solids in the inlet to the sedimentation tank, can be adjusted. An electromagnetic flow rate sensor measures the flow rate in the inlet of the sedimentation tank. Flow rate and speed of the stirring machine are displayed digitally. The sedimentation tank is equipped with lighting to better observe the flow conditions.

Learning objectives/experiments

- basic principle for the separation of solids from suspensions in a sedimentation tank
- determine the hydraulic loading rate
- influence of the following parameters on the separation process:
  - concentration of solids
  - flow rate
  - flow velocity in the inlet
  - water level in the sedimentation tank
- investigation of the flow conditions
- how lamellas affect the sedimentation process

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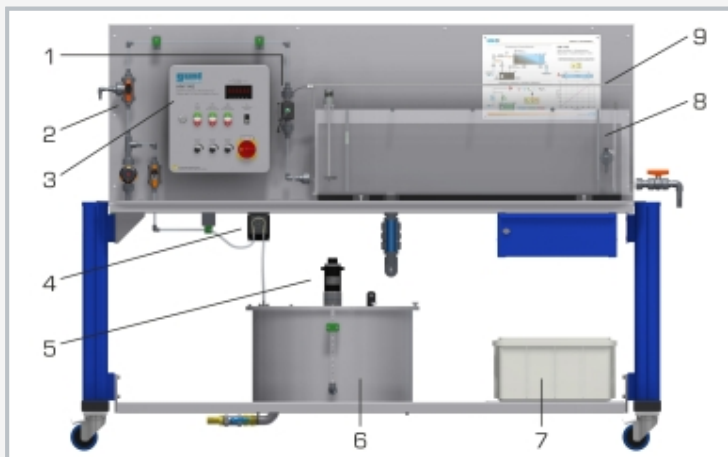
1 elctromagnetic flow rate sensor, 2 sampling point, 3 switch box, 4 pump, 5 stirring machine, 6 suspension tank, 7 storage bin, 8 sedimentation tank, 9 illumination
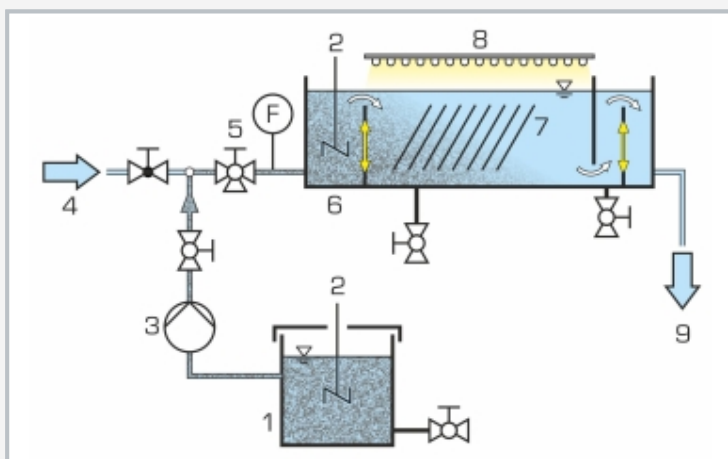
1 suspension tank, 2 stirring machine, 3 pump, 4 fresh water, 5 sampling point, 6 sedimentation tank, 7 lamellas (optional), 8 illumination, 9 outlet; F flow rate
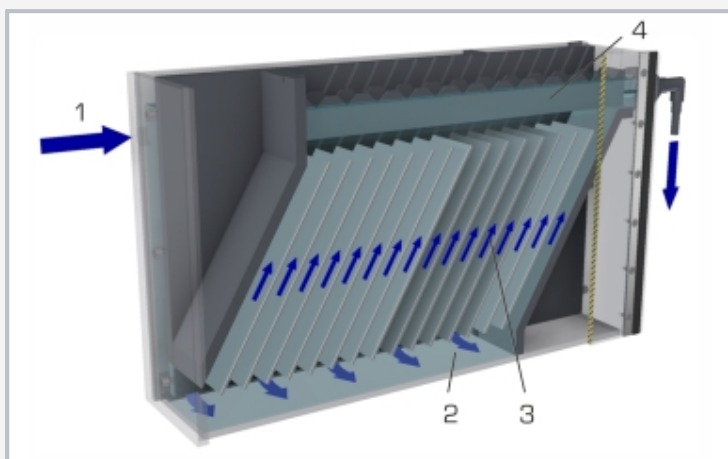
Functional principle of the lamella unit
1 raw water inlet, 2 raw water passes under the partition wall, 3 raw water flows up between the lamellas, solids sink onto the lamellas and slide down on the lamellas, 4 purified water flows into the drain channel

Specification

[1] separation of suspensions by sedimentation in the sedimentation tank
[2] transparent sedimentation tank with lighting for visualisation of the flow conditions
[3] stirring machine in the inlet area of the sedimentation tank
[4] lamella unit can optionally be inserted into the sedimentation tank
[5] tank with pump and stirring machine to create and transport a concentrated suspension
[6] mixture of the concentrated suspension with fresh water gives the raw water to be studied
[7] adjustment of the concentration of solids via valves for fresh water flow rate and suspension flow rate
[8] adjustable water level in the sedimentation tank and adjustable flow velocity in the inlet
[9] electromagnetic flow rate sensor for raw water
[10] Imhoff cones for determining settleable substances of a water sample

Technical data

Sedimentation tank (experimental section)
- LxWxH: 900x110x300mm
- max. filling capacity: approx. 25L
- material: plexiglass

Lamella unit
- angle of inclination of lamellas: 60°
- number of lamellas: 16

Suspension tank
- capacity: approx. 85L
- material: stainless steel

Pump
- max. flow rate: 75L/h

Stirring machines (max. speed)
- suspension tank: $600min^{-1}$
- sedimentation tank: $330min^{-1}$

Measuring ranges
- flow rate: 30...600L/h

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 2200x790x1540mm
Weight: approx. 220kg

Required for operation

water connection, drain

Scope of delivery

1 trainer
1 set of accessories
1 packing unit of solids
1 set of instructional material

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