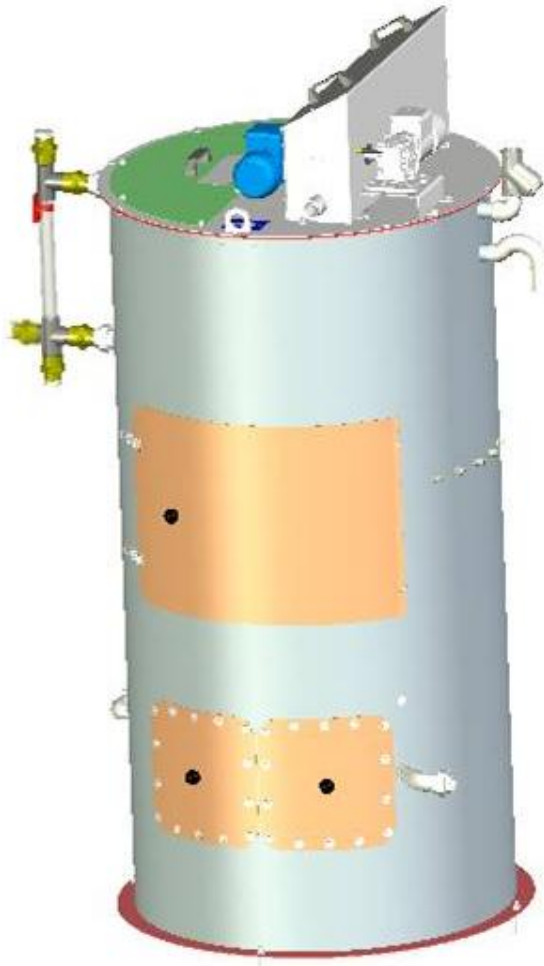


HUBER Precipitation Reactor



HUBER SE

Industriepark Erasbach A1

D-92334 Berching

July 2010

Content:

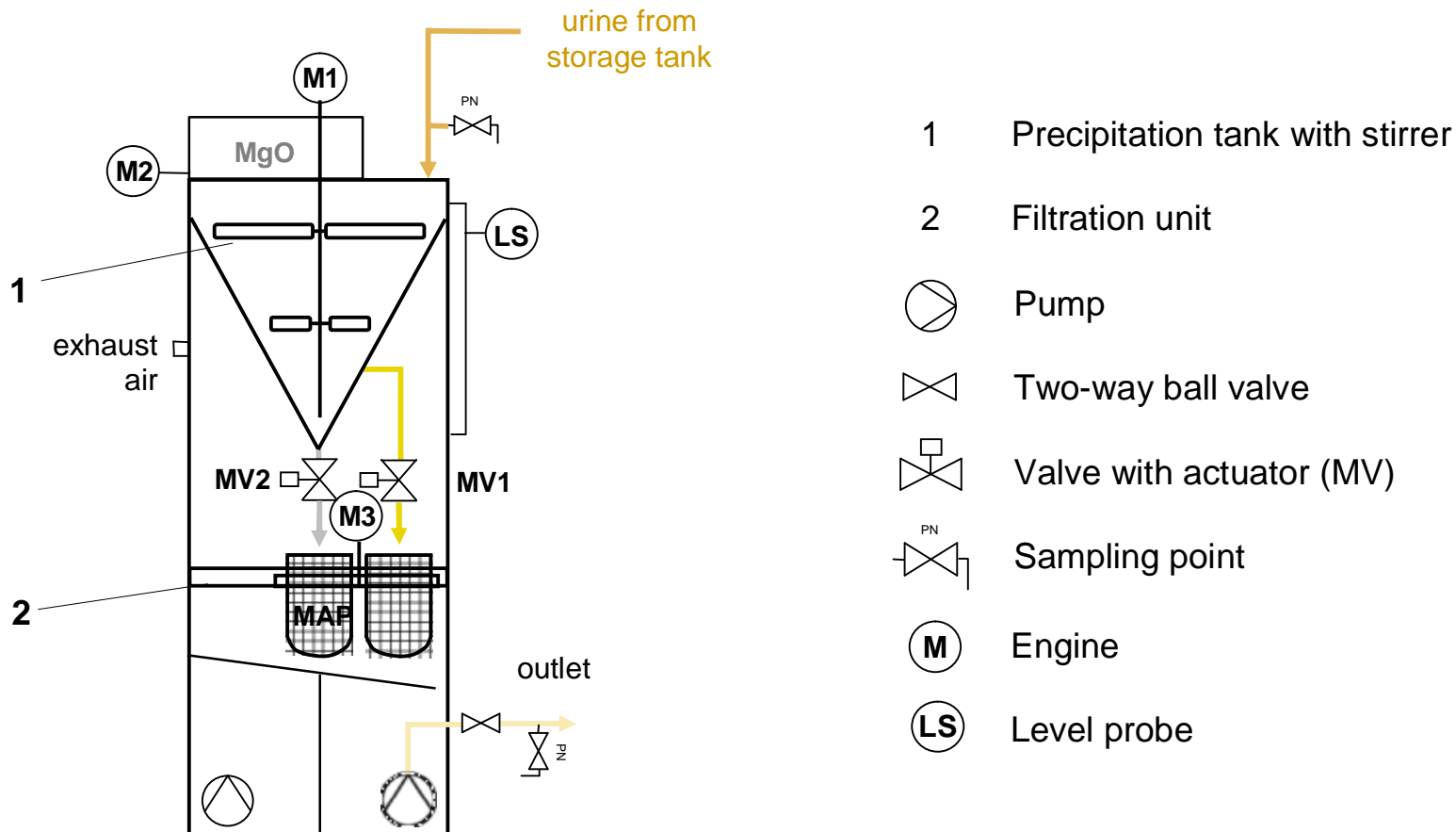
- Definiton of terms and setup
- Definiton of design
- Description of Setup and Function

Definiton of terms and setup

HUBER Precipitation Reactor

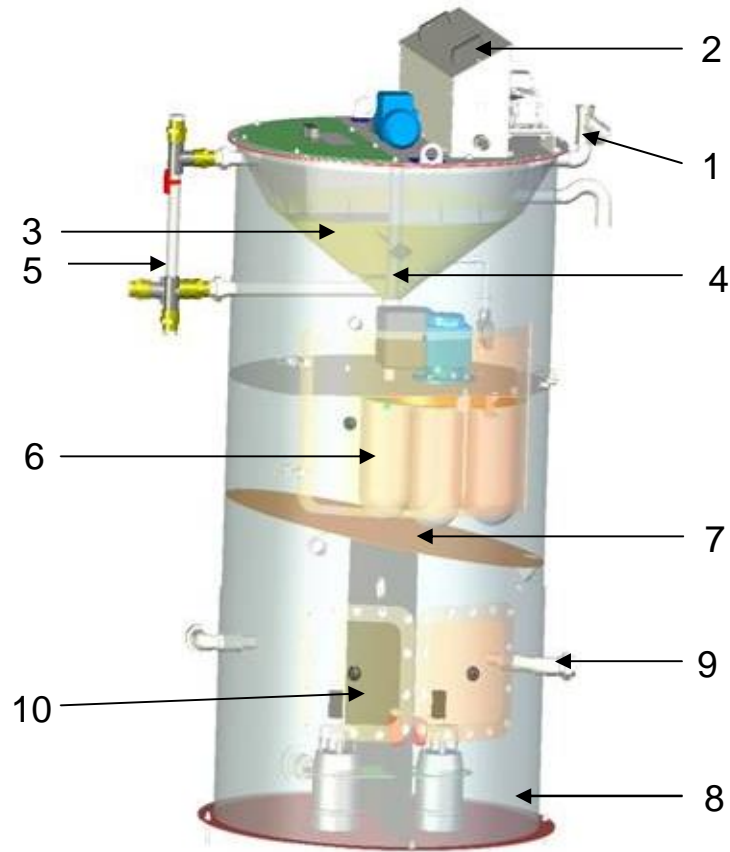
With addition of magnesium oxide (MgO), for recovery of phosphorus and part of the nitrogen in the form of MAP (solid).

Fig. 1 shows the setup of the HUBER Precipitation Reactor.

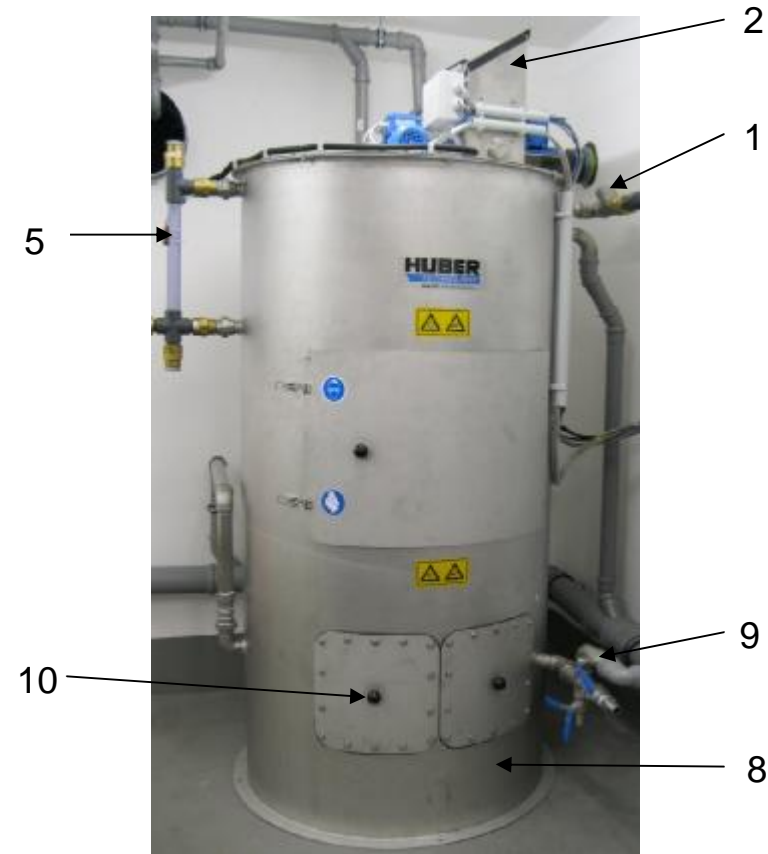


Definiton of design

Fig. 2 and 3 define the individual plant parts.



- 1 Filler
- 2 Dosing unit
- 3 Precipitation tank (trough-shaped)
- 4 Stirrer
- 5 Level probe



- 6 Filter bag
- 7 Collecting tray for process water
- 8 Chamber for process water
- 9 Outlet
- 10 Inspection opening

Description of Setup and Function

Setup

The precipitation reactor is a closed circular stainless steel tank. It is made up of two main components:

- 1) Precipitation tank (max. 50 L urine) with a dosing unit for magnesium oxide and a stirrer
- 2) Filtration unit consisting of a filter bag revolver with five filter bags and a collecting tray

All components are made of V2A stainless steel.

Function

The separated urine flows in charges (max. 50 l) into the interior trough-shaped precipitation tank (max. 6 start times maximum). In the following process step magnesium oxide is added via a dosing unit and well mixed by means of the stirrer. The phosphates and part of the ammonium are precipitated due to a chemical reaction. After a sedimentation phase of approx. 3h (MAP requires approx. 3 hours until crystals are forming), the supernatant is let down by means of a solenoid valve (MV1) to the first filter bag (e.g. 1 μ m pore size) of the filtration revolver. Via the solenoid valve (MV2) the MAP (magnesium ammonium phosphate) product settled in the trough and is passed into the filtration unit. The reject tray located below the filter bag collects the filtered urine and directs it to the process water chamber, which directs it out to the outflow connection. After four cycles, the first filter bag revolves automatically and is “replaced“ by a second bag. Exchange of the filter bags is recommended after 20 cycles at the latest. The filters can be exchanged via an inspection opening. The filter bag ring which fixes each bag at the revolver provides for easy filter replacement.