

## REFERENCE LIST

SEMICONDUCTOR

SOLAR

PHARMA

**POWER GENERATION**

FOOD & BEVERAGE

PULP AND PAPER

CHEMICAL

OIL AND GAS

MINING

AEROSPACE AND TRANSPORT



HAGER+ELSASSER

An **aquarion** Group Company

# STEAG AG Lunen

## Wastewater Treatment for a Power Station



STEAG AG, Essen, built a wet-type flue gas desulphurisation plant at the Lünen power station. The wastewater removed from the process has to be treated before it is discharged into the River Lippe.



## 1 Basic Parameters

### Raw Water Data

Waste water flow 89 m<sup>3</sup>/h  
pH 4.5 to 7.0  
Solids ≤ 3 g/l  
Sulphate ≤ 2.5 g/l  
Fluoride ≤ 30 mg/l

Plus: Heavy metals from coal and limestone

### Treated wastewater quality

Suspended Solids 30 mg/l  
pH 7.0 to 9.0

Plus: Heavy metals, Fluoride and Sulphate according to local requirements.

## 2 The Treatment Processes

The main process tasks are:

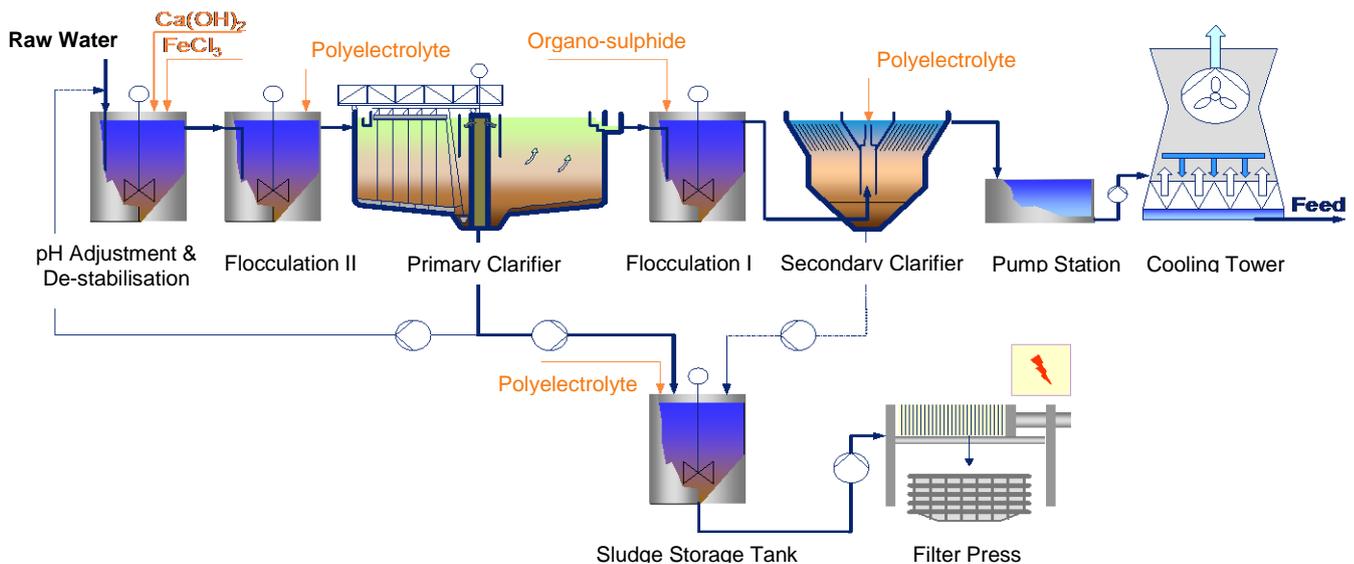
- pH adjustment & precipitation
- Gypsum de-saturation
- Fluoride precipitation
- Separation of solids
- Sludge handling

### 3 Requirements:

- The reaction rate for gypsum de-saturation must be increased if further precipitation later on is to be avoided.
- The solids content in the first stage is 50-100g/l. Over 90% separation of solids in only one sedimentation stage is neither practically nor economically achievable.
- The residual heavy metals concentration in the discharge absolutely must be achieved.
- Frequent changes in incoming flow and concentration of contaminants means that a high degree of design flexibility is required.

### 4 Treatment Concept

These basic requirements led to the specification of a two-stage treatment system.



#### First stage:

pH adjustment and gypsum de-saturation step: The pH value is raised by lime slurry, and sludge from Sedimentation stage 1, is added, which substantially reduces the time required for Gypsum de-saturation.

- Flocculation step: A polyelectrolyte addition to ensure highly efficient solids flocculation and ensure efficient removal during settlement.
- Primary settlement & thickening stage with sludge scraper.
- In the thickening step the excess sludge is temporarily stored.
- Sludge containing Gypsum is pumped from the thickener back to the de-saturation step.

#### Second stage:

- Secondary dosing with a coagulant (e.g.  $\text{FeCl}_3$ ) and an organo-sulphide decomplexant.
- Secondary lamella clarification incorporating the patented RPS system.
- In the integrated flocculation section, wastewater, flocculants and contact sludge from the cone are carefully mixed. The surplus sludge from the first and second stages are mixed before pre-conditioning with lime slurry before being dewatered in a chamber filter press.

## **5 Particular features of the two-stage process**

- Improved and reliable solid and metal hydroxide separation.
- Almost no post-crystallisation of gypsum in the treated water.
- Maximum sludge thickening.
- Flexible use of the plant at any time.
- The speed-adjustable agitators in all flocculation stages provide economic, optimal consumption of treatment chemicals.

## **6 Result**

Steag's Lünen power station has a physico-chemical wastewater treatment facility, which ensures the waste water limit values are met in all operating conditions thereby protecting the receiving stream.

H+E ranks among the world's leading suppliers in the fields of: water & wastewater treatment, and energy efficiency. Based on its global presence, the **H+E GROUP** has completed projects in over 50 countries.



HAGER+ELSASSER

An aquarion Group Company

Tel: +44 1403 272772

[sales@he-water.co.uk](mailto:sales@he-water.co.uk)  
[www.he-water.co.uk](http://www.he-water.co.uk)