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Biological Wastewater Treatment

ARA Nordhorn

Bamag AQUATOR® Biofiltration Technology

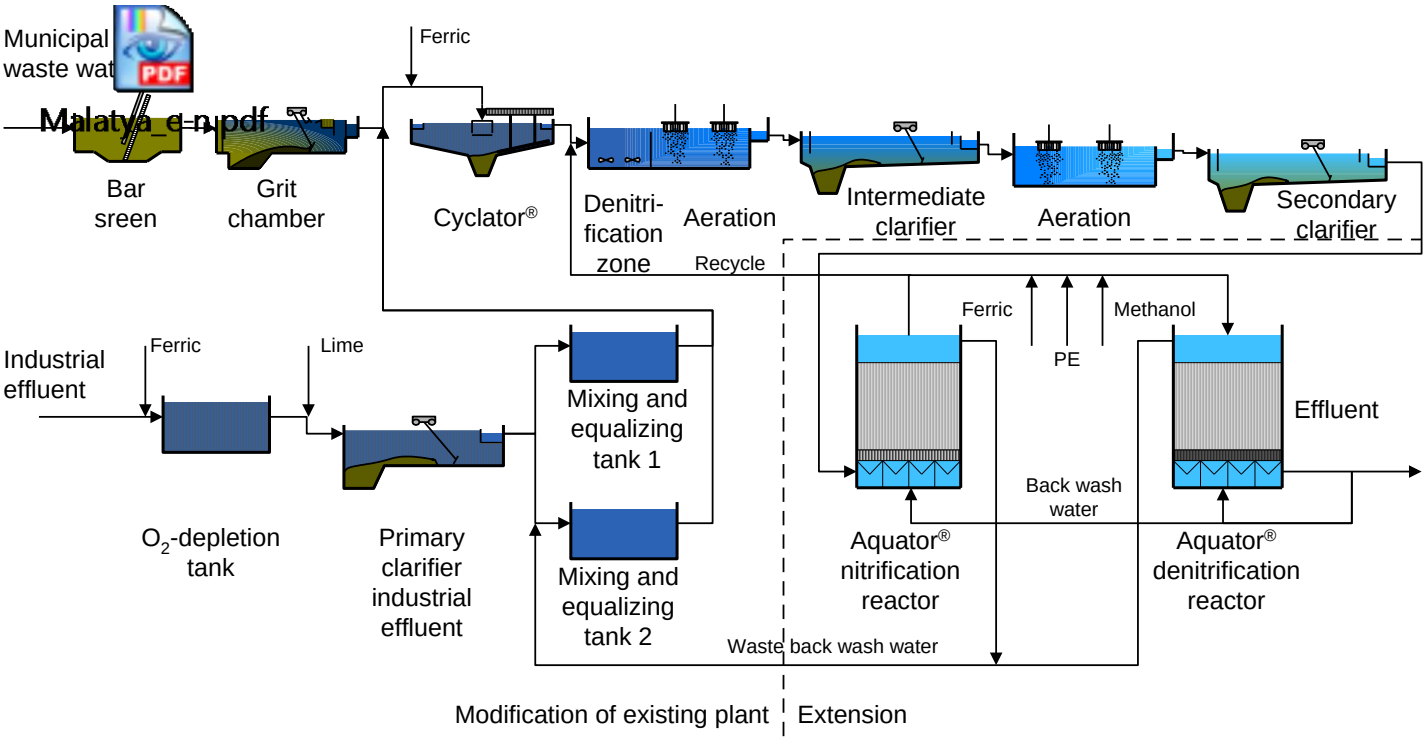
The wastewater treatment plant operated by the Municipality of Nordhorn, Germany treats municipal wastewater in conjunction with industrial effluents from the local textile industry.

To meet the tightened effluent discharge standards, the existing sewage treatment plant has been optimised and complemented with a fixed-bed bio-reactor and bio-filtration system based on the AQUATOR® process.

Bamag is an international EPC contractor for water and wastewater treatment plants as well as thermal processes.
We design, supply and operate your plant.
We are...

... the experts

Bamag
6. El Terra St. Hadayek El Ahram - Giza, Egypt
Tel . +2 (02) 3377 2082 Fax. +2 (02) 3376 2465
www.bamagllc.com



1. Objective

Treatment of municipal and industrial wastewater

- Design data

Throughput	27,000 m³/d
BOD_5 load	8,100 kg/d
COD load	16,200 kg/d
TKN	1,540 kg/d
Total P	270 kg/d

- Treatment criteria

BOD_5	≤ 15 mg/l
COD	≤ 140 mg/l
Total $N_{inorganic}$	≤ 15 mg/l
Total P	≤ 1 mg/l

2. Plant concept

- Process steps

Mechanical pre-treatment, high-load biological stage, intermediate clarification, nitrification, denitrification, aerobic sludge stabilisation, sludge dewatering

- Brief description

After removal of the coarse matter in the bar screen and grit chamber, the sewage is mixed and pre-treated together with the mechanically/ chemically pre-treated industrial effluent in a Cyclator®.

In the Cyclator®, the primary sludge is settled and removed before the mixed waste water is routed to the biological treatment stages.

Following biodegradation of the organic pollutant load in the aeration tanks, the ammonium nitrogen is converted to nitrate in the down-stream fixed-bed reactors.

Nitrate conversion to elemental nitrogen is accomplished in the subsequent denitrification filters using methanol as an external carbon source. At the same time, residual solids contained in the waste water are removed.

The waste activated sludge from biological treatment is subjected to aerobic stabilisation before being routed to landfarming.

3. Characteristic plant data

Existing plant

- 1 Cyclator®

Ø	34 m
Clarification area	840 m²
Depth of water	3.7 m

- Partial denitrification

Volume	650 m³/tank
Solids loading	2 kg DS/m³

Submerged motor agitators

- Aeration tanks

Volume	2,000 m³/tank
Solids loading	2 kg DS/m³
Space loading	2 kg BOD_5/m³d

Gyrox surface aerators

- Intermediate clarifiers

Clarification area	750 m²/tank
Depth of water	2 m

- Aeration tanks

Volume	3,000 m³/tank
Space loading	0.4 kg BOD_5/m³d

Fine-bubble diffused aeration

- Secondary clarifiers

Clarification area	1,200 m²/tank
Depth of water	2 m

- 2 pre-treatment tanks for industrial effluents

Volume	5,000 m³/tank
Depth of water	4 m

Submerged motor agitators

- O_2 depletion tank

Volume	700 m³
Depth of water	2.4 m

Submerged motor agitators

Extension

- 8 fixed-bed nitrification reactors, upflow mode

Area	35 m²/reactor
$Q_{max.}$	1,900 m³/h

Nozzleless filter bottom (M blocks)

- 8 denitrification filters, downflow mode

Area	22.5 m²/filter
$Q_{max.}$	1,400 m³/h

Nozzleless filter tray (M blocks)
Dosing equipment.

4. Operating experience

After only a short running-in period, the guaranteed effluent discharge levels were clearly outperformed. Stepwise optimisation of the existing plant will result in a further improvement in the effluent quality attainable.

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