

PROCESS & EQUIPMENT DESIGN

According to experience and the information we received from analysis propose the following design for your waste water treatment system:

- Curved screen
- Flocculation
- Flotation
- Single batch aerobic bio treatment

Curved screen

The static curved screen is a very simple screen since the screen itself does not contain any moving parts. The waste water is fed on top of the curved screen and flows downwards the spacings between the wedges. Solids larger than the spacings will be retained on the screening surface and will fall down into collecting skip. A spray cleaning device is installed to keep the screen clean.

Flocculator

The chemicals will be dosed into a pipe flocculator. This pipe flocculator is equipped with special mixing pipes which take care of perfect mixing of the chemicals with the waste water in such a way that dosing can be adjusted at a optimum. The pipe flocculator is designed specially for this type of waste water because mixing energies and mixing times are unique for different waste waters.

Flotation System

After the flocculator the waste water will enter the flotation unit. The particles will float to the surface and will automatically and continuously be removed by a scraper mechanism. A sludge dewatering grid is installed which will produce an optimal sludge consistency. The flotation unit is equipped with a lamella plate pack which increase the separation area and thus ensures that even the smallest flocks are removed from the waste water. The on-built recirculation /aeration system is equipped with proprietary/patented non-clogging aeration devices and its unique design ensures formation of the very fine air bubbles required. The flotation unit includes automatic drain valves for removing any settled material.

Single batch aerobic biotreater:

The mainly soluble organic matter is removed by biological treatment. Biomass converts organic matter to water carbon dioxide and new biomass with the air of oxygen. For this application a double batch biotreater is selected and considered best available technology. The treatment cycles of the two batches interchange in such a way that the total biotreater works on continuous flow.

Filter/flocculation/flotation system consisting of :

- Filter feed pump+ level
- Curved screen
- Mixer for balance tank
- Feed pump flocculator –flotation until + level controller
- Flocculator
- Chemical dosing unit for coagulant
- Chemical dosing unit for neutralizer
- Chemical dosing unit for flocculant + post –dilute station
- Flocculant
- pH measuring and control device
- flotation unit
- Pneumatical control panel
- Electrical control panel.

Biological system consisting of:

- Mixer for selector
- Influent pump biological system + level controller
- Electrical valves for tank selection
- Floating surface aerators
- Level controller aeration tank
- O₂ measuring and control systems.
- Floating discharges
- Excess sludge pump
- Electrical control panel with Siemens S7.300 PLC

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System information:

Design parameters:

Type of waste water	waste water from a Slaughterhouse processing plant
Quantity	X m ³ /day 24hr/day
Pre-treatment system	
Plant design capacity	X/ 24: 20 m ³ /hr for filter Y m ³ /hr for flocculation/ floatation system X m ³ /day for biological system
COD	5000 mg/l
BOD	2200 mg/l
TSS	1850 mg/l
Oil and grease	150 mg/l
Temperature	25-30 C (assumed)
pH	6.5-7
<u>Biological system</u>	
Type	fill & draw (SBR system)

Aeration tank

Aeration system	surface aerator
Power	approx. 30 kW total for surface aerators
Tank volume	X m ³ for each tank
Tank dimensions	rectangular A m (length) x B m (width) x C m (height)
Sludge load (K)	
Influent BOD	1275 mg/l X * BOD/ 1000 kg/day
Influent N	Y mg/l 24 kg/day
Excess sludge production	Z kg/day dry solids Wet sludge production M m ³ /day with approx. 1% dry solids
Typical SBR cycle	24hours
Filling	12hours/cycle
Aeration	20hours/cycle
Activated sludge setting	2 hours/cycle
Clean water discharge	2 hours/cycle
Clean water discharge	approx X / 4 m ³ /hr

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Plant Performance :

Based on and for the given design parameters we expect to reach the following treated water parameters after total treatment (biological treatment)

COD	$\leq 1100 \text{ mg/l}$
BOD	$\leq 600 \text{ mg/l}$
TSS	$\leq 800 \text{ mg /l}$
Oil & grease	$\leq 100 \text{ mg /l}$
pH	6.9

Flocculation – Floatation system

Compressed air for recirculation system	NI/min min press	bar
Power	approx.	kW installed
Utility water	/hr (chemicals only)	min press bar

Chemicals

Coagulant type	PAC	mg/l $\approx$	l/m ³ @100%
Flocculent type	polyelectrolyte		
Consumption		mg/l	
Neutralizer	NaOH		
Consumption		mg/ ≈ 0.3 l	l/m ³ @30%

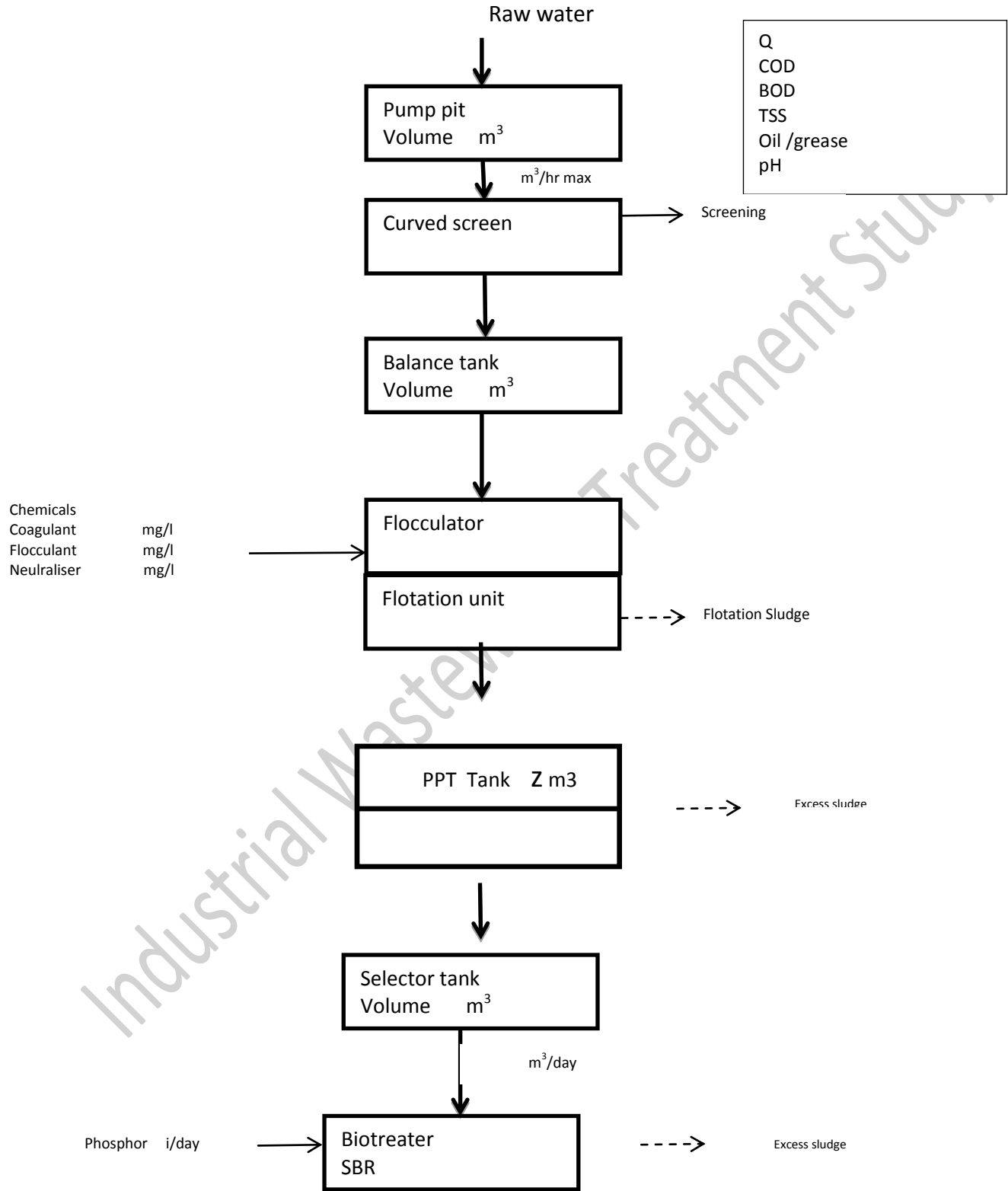
Single batch aerobic bio treatment system

Power	approx. 56 kw installed
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Chemicals

Phosphor type	H ₂ PO ₄
Consumption	l/day @ 75% to be dosed manually

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Some important accessories processing unit

Utility consumptions:

Filter system

Utility water for cleaning system

average m^3/hr min pres bar with
temp 40-60 C

COAGULATION FLOCCULATION SYSTEM

Feed Pump flocculator – Floatation unit

Coagulant dosing unit

Dosing unit for neutralizer

Flocculant dosing unit

Manual flocculant make-up station

pH measuring and control device

Flotation Unit:

Plate Pack

Skimmer system for floating sludge (top scraper)

Dewatering grid for floating sludge :

Recirculation pump/aeration system

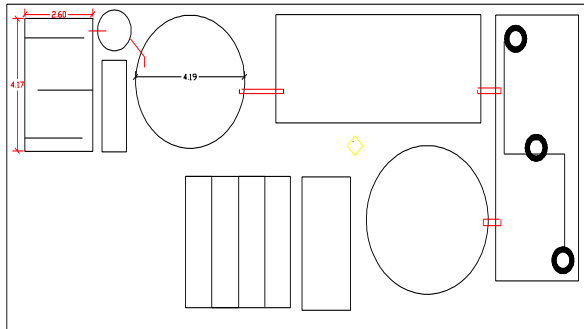
Aeration system:

Pneumatical control panel:

Mixer for selector tank:

Influent pump biological system

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