

1 INTRODUCTION

The system design is based on our many years of experience in waste water treatments for printing & dyeing mills. The effluents contain insoluble organic matters & large molecular soluble organic matters, fibers, dyes. For a proper biological treatment, our experience is to have a separate Anaerobic Biological Treatments to break down the molecules of the organic matters in order to prepare for a very effective Aerobic Biological Treatment. Due to the high ambience temperature in Pakistan, we also install the cooling tower to cool down the water before the biological treatments.

Our company recommended our separate process for Biological Treatments, which is proven to solve the environment pollution & least impact to the environment.

1.1 Design Criteria

- Proven & Practical Solution
- Reliable technology & steady discharge quality.
- Reasonable investment with low running & maintenance cost
- Compact design
- Low noise, no offensive smell & no contamination to the environment.
- Reliable equipments.

1.2 Scope of design

Our scope of design included all structures include civil, electrical & automation. The civil drawing shall be rework by a local architecture in order to meet local authority standards, rules & regulations. Buyer has to install & connect all the water piping, drains, electrical cables to the Effluents Treatment Plant.

2 DESIGN CAPACITY, INFLUENTS PARAMETERS REQUIRED QUALITY STANDARDS OF THE TREATED EFFLUENTS

2.1 Design Capacity

Design Capacity per hour is : 140m³/h

2.2 Influent Parameters

The parameters are supplied by customers:

Item Type of Effluent	COD _{cr} (mg/L)	BOD ₅ (mg/L)	SS (mg/L)	pH	Colority	Effluent Temp (C)
Untreated Effluent	≤1200	≤570	≤940	7~9	≤800	≤45

2.3 Required Quality of Treated Effluent

The treated effluent shall meet the following standards:

Item Discharge	COD _{cr} (mg/L)	BOD ₅ (mg/L)	SS (mg/L)	pH	Colority
Discharge Effluent	≤150	≤80	≤200	6~9	≤40

3. STRUCTURE DESIGN

3.1 System Description

- ★ Bar Filter – Cooling Tower - 1st Clarifier – Anaerobic Biological Treatment – Aerobic Biological Treatment – 2nd Clarifier is the most properly treatment nowadays.
- ★ The coagulant polymer shall dose & mix with the effluent before entering into 1st Clarifier to coagulate the suspend solids, color, organic matters & separate the settled matter as sludge.
- ★ Anaerobic Biological Treatment Tank – The anaerobic bacteria will decompose the large molecules of the organic matters into simple small molecules which shall be further decomposed in the aerobic biological process.
- ★ Aerobic Biological Treatment Tank – The aerobic bacteria shall break down the organic matter further into water & carbon dioxide, lower the parameters COD_{cr}、BOD₅. The advantage of using Biological Media including no excessive or insufficient activated sludge, simple to run, large tolerance in loading, reliable effluents treatment quality etc.
- ★ 2nd Clarifier – this process is to settle down the excessive biological media
- ★ The sludge from the clarifier shall be flow to the Sludge Tank & the thicken sludge would be pumped to the Sludge Conditioning Tank. The Sludge would be further pressed to remove the excessive water by

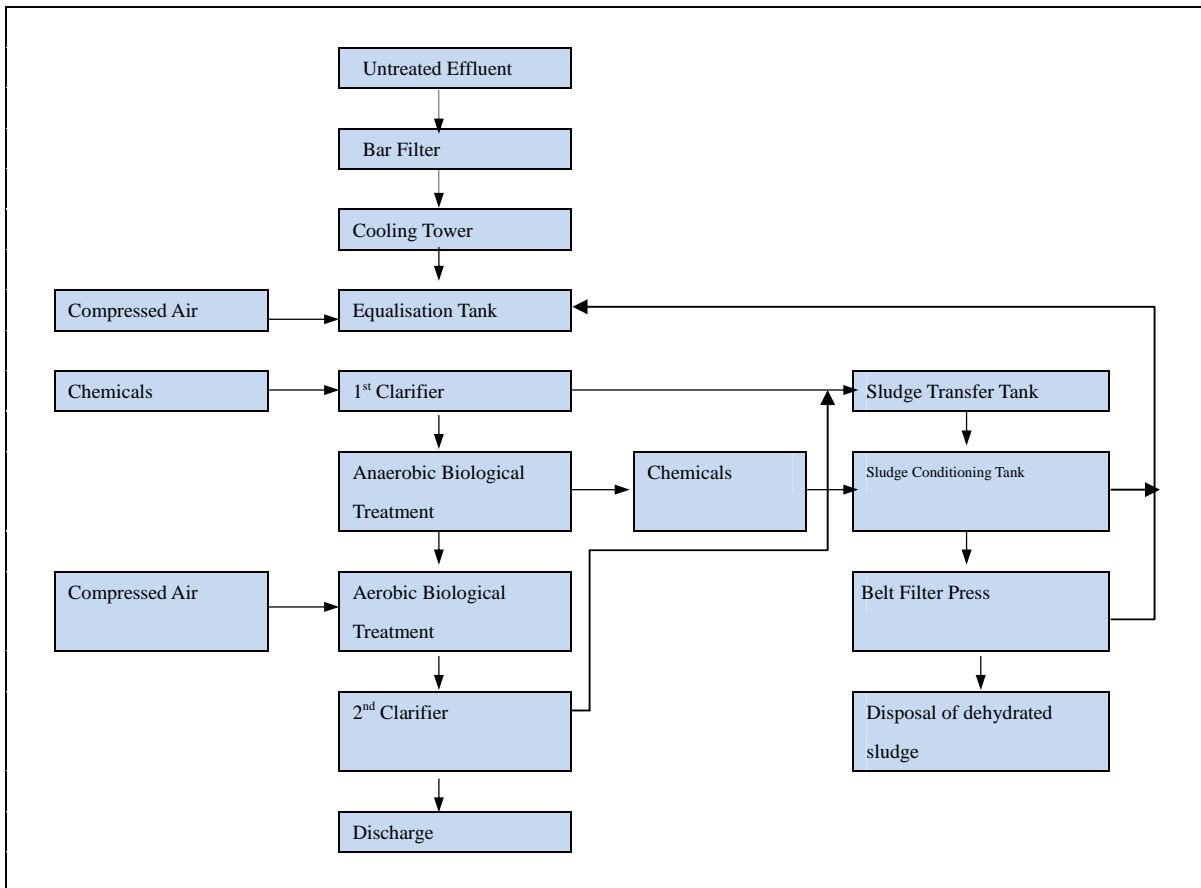
the Filter Press

★ The filter press would dehydrate the sludge for easy disposal.

3.2 Technical Features:

- 1) Simple to operate, cost effective solution, reliable discharge quality
- 2) Only require one set of lifting pump to lift the effluent from the equalization tank below the ground level. Then the effluent shall flow or overflow tank to tank by gravity & energy saving.
- 3) Less Moving Parts & Simple to Maintain
- 4) Minimal Sludge Production

3.3 Flow Chart



3.4 Description of the flow

(1) The effluent from the printing & dyeing mills contains lot of loose fibre & shall be removed by bar filter before

entering into the Equalization Tank.

(2) The effluents shall flow into the Equalization Tank by gravity & the conditions of the effluents shall be equalized before entering into the 1st Clarifier. The cooling tower is built on the top of the equalization tank to circulate the effluent to cool down the temperature of the effluent.

(3) The effluent shall be flowed to the 1st Clarifier. Coagulation polymer shall be added to mix with the effluent to react with the color, suspended solids & organic matters to form cloudy matters. The cloudy matters shall be flow slowly from the bottom to the top of the clarifier & the sludge would be settled down & the treated effluent shall be overflow to the Anaerobic Biological Treatment Tank.

(4) Anaerobic Biological Treatment is using bacteria to digest the high molecular weight matters like protein, grease, carbohydrates into smaller molecules to be treated by Aerobic Biological Treatment.



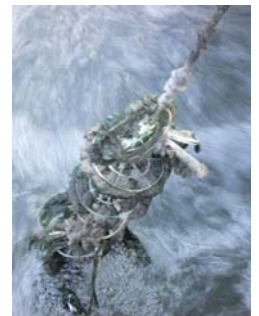
(5) Aerobic Biological Treatment Tank is the main treatment & most of the COD_{cr}, BOD₅ & organic pollutants shall be removed to ensure the effluent shall meet the discharge standards of COD_{cr}, BOD₅



(6) The effluent shall be further pass through the Secondary Clarifier to remove the excessive biological media



(7) The sludge from all the clarifier shall be flow & collected in the Sludge Conditioning Tank. The thickening sludge shall be pumped to Belt Filter Press for dehydration. The dehydrated sludge is ready for disposal.



4 PREDICTION:

The Removal Rate of the Biological Pollutant : Unit: mg/L

Item		COD _{Cr}	BOD ₅	SS	Colority
Prediction		1200	570	940	800
1 st Clarifier	Removal Rate	30%	20%	70%	85%
	Discharge Concentration	840	456	280	120
Anaerobic Biological Treatment	Removal Rate	30%	20%	10%	30%
	Discharge Concentration	600	365	252	84
Aerobic Biological Treatment	Removal Rate	75%	80%	10%	30%
	Discharge Concentration	150	73	227	59
2 nd Clarifier	Removal Rate	10%	10%	50%	40%
	Discharge Concentration	135	66	114	35.4
Final Discharge Concentration		≤150	≤80	≤200	≤40

5 NOISE POLLUTION CONTROL

Most of the noise is generated by the operating of pumps, Root Blower, air compressor. The noise of the pumps are low, however, the noise pollution of Root Blower & air compressor are high & recommended the following:

- To install silencer in front of the air inlet of the Root Blower to reduce the noise pollution.
- To use soundproof building material.

6. CIVIL DESIGN

6.1 Design Principle

- Comply with the structure design
- Comply with local requirements & regulations

- Integrated with customer's main buildings.
- Practical structure & foundation
- Comply to Earthquake Protection Regulations
- Comply to Fire & Flooding Hazard.

6.2 Structure Design

The foundation shall be design after soil test. Main Building & tanks are fabricated from reinforced concrete.

6.3 Finishing

Indoor recommended to lay Anti-Slip Floor Tiles & outer wall of the building shall be printed. Inside the tanks shall be lined with waterproof cement & the outer walls of the tank shall be printed or laid ceramic tiles

Water-stop shall be put during pre-cast the water tank & water proof cement shall be used.

6.4 Overall Design

Overall design shall be compact & integrated to the environment.