



Training of Trainers Training program for Operators in textile effluent treatment plants

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

Blower capacity calculation

Suppose the flow is 2000 m³/d, inlet BOD to aeration tank is 400 mg/l, Outlet BOD is 30 mg/l, SOTE of diffuser 20%. Alpha factor 0.8 & 0.8

Sl. No.	Item	Value	Value in load
1	BOD removed	370 mg/l	740 kg
2	Oxygen needed	1.5 kg/kg BOD	1100 kg
3	Oxygen supply need with diffuser	1100/0.2	5550 kg
4	Practical oxygen needed	5550/0.8/0.8	8672 kg
5	Air needed (@23% in air)	8672/0.23	37703 kg,
6	Total air needed (5% extra)		say 40000
7	Air flow per hour	40000/24	1667 kg/h
8	No. of blowers (+ 1 standby)	555 x 3	4 Blowers of 555 m ³ /h

Sludge Calculation for Primary ETP

The sludge generation depends on kind & purity of chemicals used and efficiency of primary treatment. A rule of thumb calculation of sludge from primary textile ETP is:

Total Sludge (TS), kg/d dry wt = flow (m³) x [{TSS removed (g/m³)/1000} + {Total chemicals dosed (g/m³) x 0.3}/1000}]

Sludge Calculation for Primary ETP

Exercise 1: If flow is 800 m³/d, TSS at inlet of primary is 350 mg/l, outlet is 75 mg/l, and ferrous sulphate dosed is 300 mg/l + lime dosage is 250 mg/l.

Parameter	Calculation	Value	Unit
Total sludge	$\text{flow (m}^3\text{)} \times \{[\text{TSS removed (g/m}^3\text{)/1000}] + \{[\text{Total chemicals dosed (g/m}^3\text{)} \times 0.3]/1000\}\}$		
Sludge dry wt, kg/d	$800 \times \{[(350-75)/1000] + \{(300+ 250) \times 0.3\}/1000\}$	352	kg/d.
Liquid sludge @3%	$352 \times 100/3$	11700	litres/day
Dewatered sludge @40%	$352 \times 100/40$	880	kg/d

Sludge Calculation for biological ETP

Sludge generation depends on the volatile portion of the solids. A rule of thumb calculation of sludge from an all-biological textile ETP is:

Total Sludge (TS), kg/d dry wt = flow (m³) x [{TSS removed (g/m³) x 0.4/1000} + {COD removed (g/m³) x 0.2}/1000

Sludge Calculation for Primary ETP

Exercise 2: If the flow is 1200 m³/d, TSS at inlet of biological treatment is 270 mg/l, outlet is 50 mg/l, and COD at inlet is 850 & outlet is 200 mg/l.

Parameter	Calculation	Value	Unit
Total sludge	$\text{flow (m}^3\text{)} \times \{ \{ \text{TSS removed (g/m}^3\text{)} \times 0.4/1000 \} + \{ \text{COD removed (g/m}^3\text{)} \times 0.2 \} / 1000$		
Sludge dry wt, kg/d	$1200 \times \{ \{ (270-50) \times 0.4/1000 \} + \{ (850-200) \times 0.2 \} / 1000$	261.6	kg/d.
Liquid sludge @2%	$261.6 \times 100/2$	13100	litres/day
Dewatered sludge @40%	$352 \times 100/40$	654	kg/d

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