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## Example  (Alum requirement, sludge generated)

A raw water supply is treated with an alum dosage of 25 mg/L. Calculate the

followings:

1. The amount of alum required to treat a flow of 1 MGD (million gallon /day)

2. The amount of natural alkalinity required to react with the alum added in

terms of CaCO3

3. The volume of sludge produced per MGD if it is collected at 2% solids.

Assume that the sludge has a specific gravity of 1.011 ( at 4°C )

## Example (Paddle wheel flocculator design )

A cross flow horizontal shaft, paddle wheel tapered flocculation basin with 3 compartments square

in profile having equal depths are to be designed for a flow of 6.5 MGD. Each horizontal shaft will

have 4 paddle wheels and each paddle will have 6 blades each having a width of 6 inch and length

of

10 ft. 12in space will be left between each blade.

Detention time is 50 min. The G values determined from lab. tests for 3 compartments are; $G_1=50$

$sec^{-1}$, $G_2=25$ $sec^{-1}$, $G_3=15$ $sec^{-1}$. These give an average G value of 30 $sec^{-1}$. The compartments

are to

be separated by baffle fences. The basin should be 50ft in width. The speed of blades relative to

the water is 3 quarters of the peripheral blade speed. Determine:

**a)**The Gt value, **b)**The basin dimensions, **c)**The paddle-wheel design, **d)**Power to be imparted to the

water in each compartment, **e)**The rotational speed of each horizontal shaft in rpm

$\mu=2.72\times10^{-5}$ lb.sec/ft2
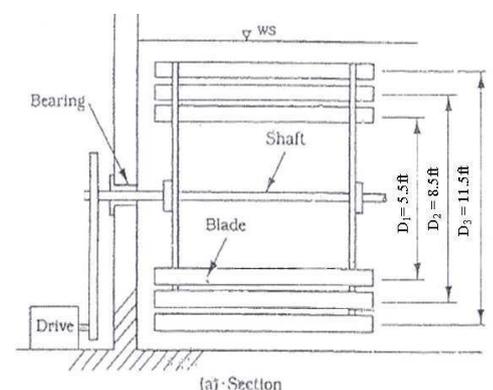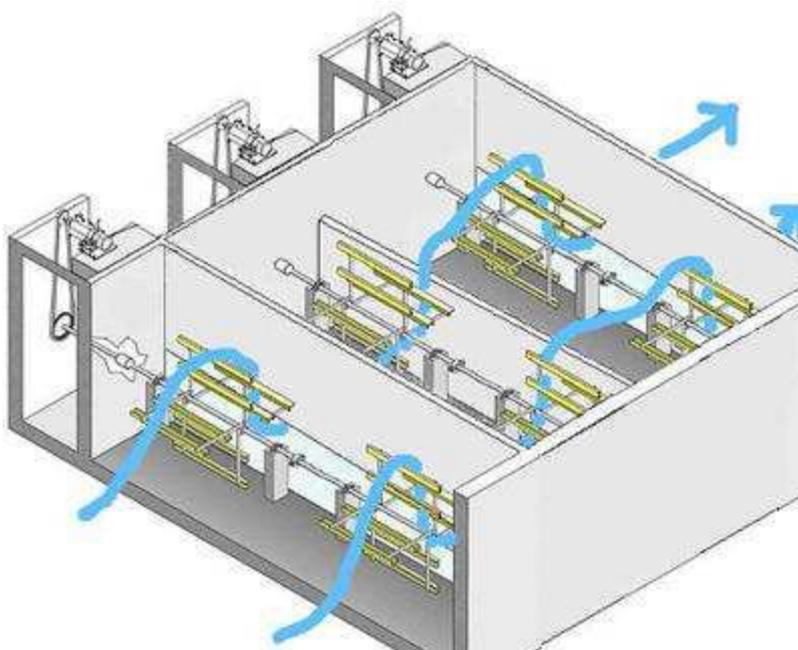


(a)·Section

| L/W | $C_D$ |
|-----|-------|
| 5   | 1.2   |
| 20  | 1.5   |
| ∞   | 1.9   |

## EXAMPLE (Baffled flocculator)

Design a horizontal flow baffled channel flocculator for a treatment plant of 10000m3/day capacity. The flocculation basin is to be divided into 3 sections of equal volume, each section having constant velocity gradients of 50, 35, 25 s-1, respectively. The total flocculation time is to be 21 min and the water temperature is 15° C. The timber baffles have a roughness coefficient of 0.3. A common wall is shared between the flocculation sedimentation basins, hence the length of the flocculator is fixed at 10m. A depth of 1m is reasonable for horizontal flow flocculators.

At 15°C $\rho$ = 1000 kg/m3 $\mu$ = 1.14×10-3 kg/msec



HORIZONTAL FLOW BAFFLED FLOCCULATOR