

	Oxic chamber		s.w.d.	3.2 m	C-1446					
					CM tank model					
	wastewater flow	50 m3/day	mgd	0.013	U.S. GPM	9.2				
	BOD in (mg/L)	200		22.0 lbBOD/day		33.1 lbO2/day		biofabrics 3.5 - 8 g per kgBOD5/day		
	TKN in (mg/L)	0		0.0 lbTKN/day		0.0 lbO2/day		3.5	2856 m	
				AOR		33.1 lbO2/day		1.4 lbO2/hr		
cell I	length	4 m				HP/mg	HP for mixing	if CFM for mixing		
	width	4 m	tank volume	residence (days)		80	1.1	21 CFM		
	s.w.d.	3.2 m	51.2 m3	1.02		90	1.2			
		10.496 (feet)	0.014 mg			100	1.4			
			lbBOD/day 1000 cu.ft.	12.2		MLSS	3000			
			lbBOD/day acre	5573.3		f/m	0.065			
								hi speed	low speed	
								0.8	0.6	
	total tankage volume	0.014 mg								
	total residence time	1.02 days								
	AOR	AOR/SOR	SOR	HP at 2.5 lb/h per HP	de-rate 5	de-rate 10	de-rate 15	HP/mg	HP for mixing	HP per 1,000 cu.ft.
	1.4	0.7	2.0	0.8	0.8	0.9	0.9	80	1.1	0.44
	1.4	0.6	2.3	0.9	1.0	1.0	1.1	90	1.2	0.51
	1.4	0.5	2.8	1.1	1.2	1.2	1.3	100	1.4	0.61

quick-and-dirty diffused aeration estimates
 CFM for diffused aeration/oxygen transfer 22 CFM AOR/SOR = .37 1.7% per feet 29 CFM
 HP estimate for oxygen 0.8 HP with 1.3 safety factor 49 m3/h
 5.63 psig 388 mbar
 6.13 psig(PeakOverdesign) 423 mbar

notes:
 2. I'm adding some token TKN, used at full value for HP calculation, although some nitrogen would be used up for normal biological/BOD processes
 3. approach would be extended/activated sludge alternative using f/m= c. 0.1 and 300 gpd/sq.ft. for a secondary clarifier
 4. Possible preliminary quote:

about 0.6 HP if low speed units
 about 4 1-m tubes at 8 CFM per tube with 1.3 safety factor or suitable disc make/model
 1.1 HP blowers

other related calcs:

	secondary clarifier diameter at 300 gpd/sq.ft.	2.3 m	4.1	84 ft lb torque								
	waste sludge flow Qw for various sludge age values, 30 mg/L SSout, underflow SS at			0.5 %	Hammer.412							
	WAS (see footnote # 1)											
	age days	Qw mgd	Qw gpd	Qw gpm	lb/day dry	Qw/flow in	Qr mgd	Qr/Q	tentative at	8 hr/day	thickener	
	5	0.0015	1544	1.1	64.3	11.7 %	0.0158	119.3 %	BFP gpm at 4%	regime	diam. (m)	thickener
	10	0.0007	732	0.5	30.5	5.5 %	0.0178	134.6 %	0.4		1.2	205 ft lb torque
	14.5	0.0005	480	0.3	20.0	3.6 %	0.0184	139.4 %	0.2		0.8	97 ft lb torque
	15	0.0005	462	0.3	19.2	3.5 %	0.0185	139.8 %	0.1		0.7	64 ft lb torque
	25	0.0002	245	0.2	10.2	1.9 %	0.0190	143.9 %	0.1		0.5	61 ft lb torque
												33 ft lb torque

dry weight sludge as predicted by Hammer.440 Figure 11-40 as a function of f/m known to be "reasonable" for municipal but may differ considerably if industrial ww
 lb/day dry 14.2 2 * K * mgd * 8.33 * BOD5 mg/L
 tentative BFP gpm for possible inlet SS settings ballpark/alternate figures at above specified net BFP hours per day
 0.1 3% 57 gpd
 0.1 3.5% 49 gpd
 0.1 4% 43 gpd
 sludge yield (lb/day dry / lbBOD/day) = 0.64
 dewatering block subject to review/actual operating regime

foot note # 1 Assuming treated wastewater exits clarifier with say 30 mg/L SS and using entered/calculated tank MLSS,V solving for Qw in sludge age equation (11-12- Hammer.412) for various age settings results in WAS estimates as shown

foot note # 2 Tentative Qr's result from performing somewhat crude mass balance around secondary clarifier (solving for RAS):
 (Q+Qr) * MLSS = Q * 30 mg/L + (Qw+Qr) * underflow SS in mg/L
 Return sludge rates to be fine tuned as will probably operate in an A2/O fashion - more later
 (It all depends how lucky we are with underflow SSs: 0.5 - 2%)

Although not shown, it is assumed some thickener/DAF is used to concentrate settler underflow up to 4%
 (Hammer.443: "As a general rule, the solids content must be at least 4 percent for feasible dewatering")

quotables/summary (tentative)

surface aerators
 retrievable tubes & blowers local sourcing of PE/PVC pipe/panel/other

- www.Aireadores.Net
- www.VirtualGuild.Net
- www.balestie.com
- www.LodosActivados.com