Oxic chamber

s.w.d. 3.6 m **EJEMPLO PEQUEÑA PLANTA LODO ACTIVADO**
CM tank model

			mgd			U.S. GPM	
wastewater flow	1704	m3/day	0.450			312.6	
BOD in (mg/L)	50			187.7	lbBOD/day	281.6	lbO2/day
TKN in (mg/L)	12			45.1	lbTKN/day	207.3	lbO2/day
					AOR	488.9	lbO2/day

20.4 lbO2/hr

cell I

						HP/mg	HP for mixing	if CFM for mixing
length	16	m				50	6.1	165 CFM
width	8	m	tank volume	residence (days)		60	7.3	
s.w.d.	3.6	m	460.8 m3	0.27		70	8.5	
	11.808	(feet)	0.122 mg					

lbBOD/day 1000 cu.ft. 11.5 MLSS 3000
lbBOD/day acre 5935.6 f/m 0.062

hi speed	low speed
11.6	9.0

total tankage volume 0.122 mg
total residence time 0.27 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.
20.4	0.7	29.1	**11.6**	12.3	12.9	13.7	80	9.7	0.72
20.4	0.6	33.9	**13.6**	14.3	15.1	16.0	90	11.0	0.83
20.4	0.5	40.7	16.3	17.2	18.1	19.2	100	12.2	1.00

quick-and-dirty diffused aeration estimates
CFM for diffused aeration/oxygen transfer 289 CFM AOR/SOR = .37 1.7% per feet **376** CFM **639 m3/h**
HP estimate for oxygen 11.5 HP with 1.3 safety factor
6.20 psig 428 mbar
notes: 6.70 psig(PeakOverdesign) 462 mbar

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 **9.6** HP if low speed units
about **47** 1-m tubes at 8 CFM per tube with 1.3 safety factor or suitable disc make/model
14.9 HP blowers

other related calcs: area (m2)
secondary clarifier diameter at 300 gpd/sq.ft. **13.3** m 139.4 **2866** 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)					*RAS (see foot note #2)*			*tentative at*	8 *hr/day*	*thickener*	
age days	Qw mgd	Qw gpd	Qw gpm	lb/day dry	Qw/flow in	Qr mgd	Qr/Q		BFP gpm at 4%	*regime*	*diam. (m)*	*thickener*
5	0.0119	11908	8.3	496.0	2.6 %	0.6388	141.9 %		3.1		3.4	1579 ft lb torque
10	0.0046	4603	3.2	191.7	1.0 %	0.6570	145.9 %		1.2		2.1	611 ft lb torque
14.5	0.0023	2336	1.6	97.3	0.5 %	0.6627	147.2 %		0.6		1.5	310 ft lb torque
15	0.0022	2169	1.5	90.3	0.5 %	0.6631	147.3 %		0.6		1.5	288 ft lb torque
25	0.0002	221	0.2	9.2	0.0 %	0.6680	148.4 %		0.1		0.5	29 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
lb/day dry 120.0 2 * K * mgd * 8.33 * BOD5 mg/L differ considerably if industrial ww
tentative BFP gpm for possible inlet SS settings ballpark/alternate figures at above specified *net* BFP hours per day

1.0	3%	480 gpd
0.9	3.5%	412 gpd
0.8	4%	360 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