Oxic chamber

s.w.d. 4.7 m **Ejemplo Industrial**
CM tank model

		mgd			U.S. GPM		
wastewater flow	43200 m3/day	11.413			7926.0		
BOD in (mg/L)	400		38075.4 lbBOD/day		57113.0 lbO2/day		
TKN in (mg/L)	14		1332.6 lbTKN/day		6130.1 lbO2/day		
				AOR	63243.2 lbO2/day	2635.1 lbO2/hr	

cell I

length	110 m			HP/mg	HP for mixing	if CFM for mixing	
width	110 m	tank volume	residence (days)	50	751.3	15624 CFM	
s.w.d.	4.7 m	56870.0 m3	1.32	60	901.5		
	15.416 (feet)	15.025 mg		70	1051.8		

lbBOD/day 1000 cu.ft.	19.0	MLSS	3500
lbBOD/day acre	12734.8	f/m	0.087

hi speed	low speed
1505.8	1158.3

total tankage volume 15.025 mg
total residence time 1.32 days

							referencia		*actual*
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.
2635.1	0.7	3764.5	**1505.8**	1585.0	1673.1	1771.5	80	1202.0	0.75
2635.1	0.6	4391.9	**1756.8**	1849.2	1951.9	2066.8	90	1352.3	0.87
2635.1	0.5	5270.3	2108.1	2219.1	2342.3	2480.1	100	1502.5	1.05

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen transfer 28051 CFM AOR/SOR = .37 1.7% per feet **36466** CFM **61957 m3/h**
HP estimate for oxygen 1378.2 HP with 1.3 safety factor
7.76 psig 535 mbar
8.26 psig(PeakOverdesign) 570 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 **1238.2** HP if low speed units
about **4558** 1-m tubes at 8 CFM per tube with 1.3 safety factor or suitable disc make/model
1791.7 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **67.1** m 3534.6 **72663** 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*	12 *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	2.0350	2035033	1413.2	84759.1	17.8	%	19.6197	171.9	%	353.3		44.8	269893 ft lb torque
10	0.9833	983276	682.8	40953.4	8.6	%	23.1256	202.6	%	170.7		31.1	130406 ft lb torque
14.5	0.6569	656869	456.2	27358.6	5.8	%	24.2136	212.1	%	114.0		25.5	87116 ft lb torque
15	0.6327	632690	439.4	26351.6	5.5	%	24.2942	212.9	%	109.8		25.0	83910 ft lb torque
25	0.3522	352222	244.6	14670.0	3.1	%	25.2291	221.0	%	61.1		18.6	46713 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 25438.7 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

141.4	3%	101795 gpd
121.2	3.5%	87253 gpd
106.0	4%	76347 gpd

sludge yield (lb/day dry / lbBOD/day) = 0.67

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 low/high
retrievable tubes & blowers local sourcing of PE/PVC pipe/panel/other