AquaSust

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AquaSust--Advection Air Flotation Tank Calculator

Blue block is the design datameter : be filled in

Brown: calculate process data

Red : last result for your process

Known				
Q=	1800	m^3/d	Amount of wastewater to be treated	
SS=	700	mg/L	Suspended solids concentration	
A_0/S=	0.02		Gas-solid ratio	
P=	4.2	atm	Dissolved air pressure	
C_a=	18.5	mg/L	Saturated solubility of air in water	
T_1=	3	min	Dissolved air tank residence time	
T_2=	5	min	Contact time in air flotation tank	
T_3=	30	min	Residence time in separation chamber	
v_1=	0.09	m/min	Rising flow rate in flotation tank	

(1) Determination of The Amount of Dissolved Gas Water QR

Q_R=	A_0/S*S_a*Q/(C_a(fP-1)=	896.1593172	m^3/d
	Dissolved gas efficiency f= 0.6		
	Take the return flow volume Q_R= 900	m^3/d	

(2) Air Flotation Tank Design

①Contact zone volume Vc			
Vc=	(Q+Q_R)*T_2/(24*60)=	9.375	m^3
② Volume of separation area Vs			
Vs=	(Q+Q_R)*T_3/(24*60)=	56.25	m^3
③Air flotation tank effective water depth H			
H=	v_1*T_1=	2.7	m
④ Area of separation zone As and length L2			
A_s=	Vs/H=	20.83333333	m^2
Take the pool width B =	4	m	
Then the length of the separation zone L2=	As/B=	5.208333333	m
⑤ contact area Ac and length L1			
A_c=	Vc/H=	3.472222222	m^2
L_1=	A_c/B=	0.868055556	m
⑥Flotation cell inlet pipe: Dg=200,v=0.9947m/s			
⑦Flotation Cell Outlet Pipe，Dg=150			
⑧Collector pipe small hole area S			
	Take the small hole flow rate v_1= 1	m/s	
S=	(Q+Q_R)/24/3600/v_1=	0.03125	m^2
	Take the diameter of the small hole D_1= 0.015	m	
Then the number of holes n=	4*S/3.14*D_1^2=	176.9285209	个

The number of holes is taken as an integer, the mouth of the holes is downward, at an angle of 45° to the level, and is staggered in two rows.

⑨Float tank width L3:				
取L3=	0.8	m		

浮渣槽深度h′ 取1m。槽底坡度i=0.5，坡向排泥管，排泥管采用Dg=200。

(3)溶气罐设计

①溶气罐容积V_r

V_r= Q_R*T_1/(24*60)=	1.875	m^3

溶气罐直径D=1.1m，溶气部分高度2m(进水管中心线)，采用椭圆形封头，曲面高为275mm，直边高为25mm，溶气罐耐压强度10×10^5Pa，溶气罐顶部设放气管Dg=15mm，排出剩余气体，并设置安全阀、压力表。

②进出水管管径，进出水管均采用100mm管径，管内流速为1.24m/s。