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Design of a Circular Settling Tank Formulas

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List of 15 Design of a Circular Settling Tank Formulas

Design of a Circular Settling Tank

1) Actual Solid Loading Rate of Circular Settling Tanks

Open Calculator

fx $$SL_r = \frac{S_p}{SA}$$

ex $$20.0025\text{kg/d*m}^2 = \frac{80.01\text{kg/d}}{4\text{m}^2}$$

2) Assumed Solid Loading Rate of Circular Settling Tanks

Open Calculator

fx $$SL_r = \left(\frac{S_{max}}{SA}\right)$$

ex $$20\text{kg/d*m}^2 = \left(\frac{80\text{kg/d}}{4\text{m}^2}\right)$$

3) Average Daily Load using Peak Discharge in Circular Settling Tanks

Open Calculator

fx $$Q_d = \left(\frac{Q_p}{f}\right)$$

ex $$15\text{MLD} = \left(\frac{37.5\text{MLD}}{2.5}\right)$$

4) Design Surface Loading Rate given Surface Area of Circular Settling Tank

Open Calculator

$$S_l = \left(\frac{Q_p}{SA}\right)$$

$$0.108507\text{kg/s*m}^2 = \left(\frac{37.5\text{MLD}}{4\text{m}^2}\right)$$

5) Influent Flow Rate given Return Activated Sludge Flow Rate

Open Calculator

$$Q = \left(\frac{RAS}{1.25}\right)$$

$$8\text{m}^3/\text{d} = \left(\frac{10\text{m}^3/\text{d}}{1.25}\right)$$

6) Maximum Solids given Solid Loading Rate

Open Calculator

$$S_{max} = SA \cdot SL_r$$

$$80\text{kg/d} = 4\text{m}^2 \cdot 20\text{kg/d*m}^2$$

7) Mixed Liquor Suspended Solids in Aeration Tank using Maximum Solids

Open Calculator

$$X = \left(\frac{S_a}{(Q_p + RAS) \cdot 8.34}\right)$$

$$10495.04\text{mg/L} = \left(\frac{38\text{kg/s}}{(37.5\text{MLD} + 10\text{m}^3/\text{d}) \cdot 8.34}\right)$$

8) Peak Discharge given Surface Area of Circular Settling Tank

Open Calculator

fx $Q_p = (SA \cdot S_l)$

ex $37.3248\text{MLD} = (4\text{m}^2 \cdot 0.108\text{kg/s*m}^2)$

9) Peak Discharge in Circular Settling Tanks

Open Calculator

fx $Q_p = Q_d \cdot f$

ex $37.5\text{MLD} = 15\text{MLD} \cdot 2.5$

10) Peaking Factor using Peak Discharge in Circular Settling Tanks

Open Calculator

fx $f = \left(\frac{Q_p}{Q_d}\right)$

ex $2.5 = \left(\frac{37.5\text{MLD}}{15\text{MLD}}\right)$

11) Return Activated Sludge Flow Rate

Open Calculator

fx $RAS = 1.25 \cdot Q$

ex $10\text{m}^3/\text{d} = 1.25 \cdot 8\text{m}^3/\text{d}$

12) Solids Processed given Actual Solid Loading Rate

Open Calculator

fx $S_p = (SL_r \cdot SA)$

ex $80\text{kg/d} = (20\text{kg/d*m}^2 \cdot 4\text{m}^2)$

13) Surface Area given Solid Loading Rate

Open Calculator

fx $$SA = \frac{S_{max}}{SL_r}$$

ex $$4m^2 = \frac{80kg/d}{20kg/d*m^2}$$

14) Surface Area of Circular Settling Tank

Open Calculator

fx $$SA = \left(\frac{Q_p}{S_l}\right)$$

ex $$4.018776m^2 = \left(\frac{37.5MLD}{0.108kg/s*m^2}\right)$$

15) Total Settling Tank Surface Area given Actual Solid Loading Rate

Open Calculator

fx $$SA = \frac{S_p}{SL_r}$$

ex $$4.0005m^2 = \frac{80.01kg/d}{20kg/d*m^2}$$

Variables Used

- **f** Peaking Factor
- **Q** Average Daily Influent Flow Rate *(Cubic Meter per Day)*
- **Q_d** Average Daily Load *(Million Liters per Day)*
- **Q_p** Peak Discharge *(Million Liters per Day)*
- **RAS** Return Activated Sludge *(Cubic Meter per Day)*
- **S_a** Maximum Solids in Aeriation Tank *(Kilogram per Second)*
- **S_l** Surface Loading Rate *(Kilogram per Second Square Meter)*
- **S_{max}** Maximum Solids *(Kilogram per Day)*
- **S_p** Solid Processed *(Kilogram per Day)*
- **SA** Surface Area *(Square Meter)*
- **SL_r** Solid Loading Rate *(kilogram per Day Square Meter)*
- **X** Mixed Liquor Suspended Solids *(Milligram per Liter)*

Constants, Functions, Measurements used

- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Million Liters per Day (MLD), Cubic Meter per Day (m³/d)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Mass Flow Rate** in Kilogram per Day (kg/d), Kilogram per Second (kg/s)
  Mass Flow Rate Unit Conversion
- Measurement: **Density** in Milligram per Liter (mg/L)
  Density Unit Conversion
- Measurement: **Solid Loading Rate** in kilogram per Day Square Meter (kg/d*m²), Kilogram per Second Square Meter (kg/s*m²)
  Solid Loading Rate Unit Conversion

Check other formula lists

- **Design of a Chlorination System for Wastewater Disinfection Formulas**
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