

Important Design of a Circular Settling Tank Formulas PDF



Formulas
Examples
with Units

List of 15 Important Design of a Circular Settling Tank Formulas

1) Actual Solid Loading Rate of Circular Settling Tanks Formula

Formula

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

Example with Units

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

Evaluate Formula

2) Assumed Solid Loading Rate of Circular Settling Tanks Formula

Formula

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

Example with Units

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

Evaluate Formula

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

Formula

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

Example with Units

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

Evaluate Formula

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

Formula

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

Example with Units

$$0.1085 \text{ kg/s} \cdot \text{m}^2 = \left(\frac{37.5 \text{ MLD}}{4 \text{ m}^2} \right)$$

Evaluate Formula

5) Influent Flow Rate given Return Activated Sludge Flow Rate Formula

Formula

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

Example with Units

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

Evaluate Formula

6) Maximum Solids given Solid Loading Rate Formula

Formula

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

Example with Units

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

Evaluate Formula



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

Formula

Example with Units

Evaluate Formula 

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

$$10495.043 \text{ mg/L} = \left(\frac{38 \text{ kg/s}}{(37.5 \text{ MLD} + 10 \text{ m}^3/\text{d}) \cdot 8.34} \right)$$

8) Peak Discharge given Surface Area of Circular Settling Tank Formula

Formula

Example with Units

Evaluate Formula 

$$Q_p = (SA \cdot S_l)$$

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

9) Peak Discharge in Circular Settling Tanks Formula

Formula

Example with Units

Evaluate Formula 

$$Q_p = Q_d \cdot f$$

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

10) Peaking Factor using Peak Discharge in Circular Settling Tanks Formula

Formula

Example with Units

Evaluate Formula 

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

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

11) Return Activated Sludge Flow Rate Formula

Formula

Example with Units

Evaluate Formula 

$$RAS = 1.25 \cdot Q$$

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

12) Solids Processed given Actual Solid Loading Rate Formula

Formula

Example with Units

Evaluate Formula 

$$S_p = (SL_r \cdot SA)$$

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

13) Surface Area given Solid Loading Rate Formula

Formula

Example with Units

Evaluate Formula 

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

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

14) Surface Area of Circular Settling Tank Formula

Formula

Example with Units

Evaluate Formula 

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

$$4.0188 \text{ m}^2 = \left(\frac{37.5 \text{ MLD}}{0.108 \text{ kg/s} \cdot \text{m}^2} \right)$$



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

Formula

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

Example with Units

$$4.0005 \text{ m}^2 = \frac{80.01 \text{ kg/d}}{20 \text{ kg/d} \cdot \text{m}^2}$$

Evaluate Formula 



Variables used in list of Design of a Circular Settling Tank Formulas above

- **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 Aeration 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 in list of Design of a Circular Settling Tank Formulas above

- **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 



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7/8/2024 | 8:14:45 AM UTC

