



# Important Formulas of Design of Continuous Flow Type of Sedimentation Tank

Calculators!

Examples!

Conversions!

Bookmark calculatoratoz.com, unitsconverters.com

Widest Coverage of Calculators and Growing - 30,000+ Calculators!

Calculate With a Different Unit for Each Variable - In built Unit Conversion!

Widest Collection of Measurements and Units - 250+ Measurements!

Feel free to SHARE this document with your friends!

<u>Please leave your feedback here...</u>





# List of 22 Important Formulas of Design of **Continuous Flow Type of Sedimentation Tank**

# Important Formulas of Design of Continuous Flow Type of Sedimentation Tank

1) Cross-section Area of Tank with known Velocity of Flow of Water 🛂



Open Calculator

$$oldsymbol{\Lambda}_{
m cs} = rac{
m Q}{
m V_w}$$

$$oxed{ex} 0.3 \mathrm{m}^2 = rac{3.0 \mathrm{m}^3/\mathrm{s}}{10 \mathrm{m/s}}$$

2) Depth of Tank given Detention Time



$$\mathbf{f}\mathbf{z} = rac{\mathrm{T_d} \cdot \mathrm{Q}}{\mathrm{L} \cdot \mathrm{w}}$$

Open Calculator

$$\mathbf{ex} \ 3.00309 \mathrm{m} = rac{6.9 \mathrm{s} \cdot 3.0 \mathrm{m}^3 / \mathrm{s}}{3.01 \mathrm{m} \cdot 2.29 \mathrm{m}}$$

3) Depth of Tank given Flow Velocity

$$\textbf{fx} d = \left( \frac{Q_d}{V_f \cdot w} \right)$$

Open Calculator 6

$$oxed{3.19713 ext{m} = \left(rac{8.2 ext{m}^3/ ext{s}}{1.12 ext{m}/ ext{s} \cdot 2.29 ext{m}}
ight)}$$





## 4) Detention Time for Circular Tank

Open Calculator 🗗  $\left. \mathbf{T}_{\mathrm{d}} = \left( (\mathrm{D})^2 \right) \cdot \left( rac{\left( 0.011 \cdot \mathrm{D} 
ight) + \left( 0.785 \cdot \mathrm{d} 
ight)}{\mathrm{Q}_{\mathrm{d}}} 
ight)$ 

# 5) Detention Time for Rectangular Tank

 $\left| \mathrm{T_{d}} = rac{\mathrm{V}}{\mathrm{Q_{d}}} 
ight|$ 

Open Calculator 🖸

 $= 6.826829 s = \frac{55.98 m^3}{8.2 m^3 / s}$ 

# 6) Detention Time given Discharge

 $\mathbf{T}_{\mathrm{d}} = \left( \frac{\mathrm{w} \cdot \mathrm{L} \cdot \mathrm{d}}{\mathrm{O}} \right)$ 

Open Calculator

## 7) Discharge Entering Basin given Flow Velocity 🗗

fx  $|\mathrm{Q_v} = (\mathrm{V_f} \cdot \mathrm{w} \cdot \mathrm{d})|$ 

Open Calculator 2

ex 7.6944m<sup>3</sup>/s = (1.12m/s · 2.29m · 3.00m)





Open Calculator 🚰

# 8) Discharge given Detention Time for Circular Tank

 $egin{aligned} \mathbf{R} \ \mathrm{Q_d} = \left( \mathrm{(D)^2} 
ight) \cdot \left( rac{\left( 0.011 \cdot \mathrm{D} 
ight) + \left( 0.785 \cdot \mathrm{d} 
ight)}{\mathrm{T_d}} 
ight) \end{aligned}$ 

 $= \times 8.039958 \text{m}^3/\text{s} = \left( (4.8 \text{m})^2 \right) \cdot \left( \frac{(0.011 \cdot 4.8 \text{m}) + (0.785 \cdot 3.00 \text{m})}{6.9 \text{s}} \right)$ 

# 9) Discharge given Detention Time for Rectangular Tank 🛂

Open Calculator  $\left| \mathbf{R} \right| \mathbf{Q} = \left( rac{\mathbf{w} \cdot \mathbf{L} \cdot \mathbf{d}}{\mathbf{T_d}} 
ight) \right|$ 

 $(2.996913 \text{m}^3/\text{s} = \left(\frac{2.29 \text{m} \cdot 3.01 \text{m} \cdot 3.00 \text{m}}{6.9 \text{s}}\right)$ 

# 10) Flow Velocity given Length of Tank

 $V_{
m f} = \left( rac{{
m v}_{
m s} \cdot {
m L}}{
m d} 
ight)$ 

Open Calculator

ex  $1.505 \text{m/s} = \left(\frac{1.5 \text{m/s} \cdot 3.01 \text{m}}{3.00 \text{m}}\right)$ 

# 11) Flow Velocity of Water Entering Tank

 $\left|\mathbf{r}_{\mathrm{w}}
ight|\mathbf{v}_{\mathrm{w}}=\left(rac{\mathrm{Q}}{\mathrm{w}\cdot\mathrm{D}_{^{\star}}}
ight)$ 

Open Calculator

 $0.262009 ext{m/s} = \left( rac{3.0 ext{m}^3/ ext{s}}{2.29 ext{m} \cdot 5 ext{m}} 
ight)$ 





## 12) Height of Tank given Flow Velocity 🗹

 $\mathrm{d} = rac{\mathrm{L} \cdot \mathrm{v_s}}{\mathrm{V_f}}$ 

Open Calculator

=  $4.03125 ext{m} = rac{3.01 ext{m} \cdot 1.5 ext{m/s}}{1.12 ext{m/s}}$ 

# 13) Length of Tank given Overflow Rate

 $\mathbf{L} = \left( \frac{\mathbf{Q}}{\mathbf{SOR} \cdot \mathbf{w}} \right)$ 

Open Calculator 🗗

# 14) Length of Tank given Settling Velocity

 $\mathbf{f}\mathbf{x}$   $\mathbf{l}_{\mathrm{t}} = \left(rac{\mathbf{Q}}{\mathbf{v}_{\mathrm{s}}\cdot\mathbf{w}}
ight)$ 

Open Calculator 🖸

15) Overflow Rate given Discharge

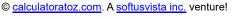
ex 0.873362m =  $\left(\frac{3.0$ m<sup>3</sup>/s}{1.5m/s. 2.20m} $\right)$ 

$$SOR = \frac{Q}{w \cdot L}$$

Open Calculator

 $ext{ex} 0.43523 ext{m/s} = rac{3.0 ext{m}^3/ ext{s}}{2.29 ext{m} \cdot 3.01 ext{m}}$ 







## 16) Plan Area given Settling Velocity

 $ext{SA}_{ ext{Base}} = rac{ ext{Q}}{ ext{v}_{ ext{s}}}$ 

Open Calculator 🗗

 $\boxed{ 2m^2 = \frac{3.0m^3/s}{1.5m/s} }$ 

# 17) Rate of Flow given Detention Time

 $\mathbf{fx} \left[ \mathbf{q}_{\mathrm{flow}} = \left( rac{\mathrm{V}}{\mathrm{T}_{\mathrm{d}}} 
ight) 
ight]$ 

Open Calculator 🖸

 $ext{ex} 8.113043 ext{m}^3/ ext{s} = \left(rac{55.98 ext{m}^3}{6.9 ext{s}}
ight)$ 

# 18) Settling Velocity of Particular Sized Particle

 $extbf{v}_{ ext{s}} = rac{70 \cdot ext{Q}_{ ext{s}}}{100 \cdot ext{w} \cdot ext{L}}$ 

Open Calculator

ex  $1.049964 \mathrm{m/s} = rac{70 \cdot 10.339 \mathrm{m}^3/\mathrm{s}}{100 \cdot 2.29 \mathrm{m} \cdot 3.01 \mathrm{m}}$ 

# 19) Volume of Tank given Detention Time

fx  $V = T_{
m d} \cdot q_{
m flow}$ 

Open Calculator

 $\mathbf{ex} \ 55.959 \mathrm{m}^{_3} = 6.9 \mathrm{s} \cdot 8.11 \mathrm{m}^{_3} / \mathrm{s}$ 





## 20) Width of Tank given Height to Length Ratio

 $\mathbf{f}\mathbf{x} \mathbf{w} = \left( rac{\mathrm{Q}}{\mathrm{v_s} \cdot \mathrm{d}} 
ight) \cdot (\mathrm{HL})$ 

Open Calculator 🗗

( 2 2 2 /

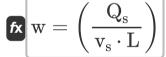
$$2.3 ext{m} = \left(rac{3.0 ext{m}^3/ ext{s}}{1.5 ext{m}/ ext{s} \cdot 3.00 ext{m}}
ight) \cdot (3.45)$$

# 21) Width of Tank given Overflow Rate

 $\mathbf{w} = \left(rac{\mathrm{Q}}{\mathrm{SOR}\cdot\mathrm{L}}
ight)$ 

 $\mathbf{ex} = 2.29016 \mathrm{m} = \left( rac{3.0 \mathrm{m}^3 / \mathrm{s}}{0.4352 \mathrm{m/s} \cdot 3.01 \mathrm{m}} 
ight)$ 

## 22) Width of Tank given Settling Velocity



 $oxed{ex} 2.289922 \mathrm{m} = \left(rac{10.339 \mathrm{m}^3/\mathrm{s}}{1.5 \mathrm{m/s} \cdot 3.01 \mathrm{m}}
ight)$ 



#### Variables Used

- A<sub>cs</sub> Cross-Sectional Area (Square Meter)
- **d** Depth (Meter)
- **D** Diameter (Meter)
- **D**<sub>t</sub> Depth of Tank (Meter)
- **HL** Ratio of Height to Length
- L Length (Meter)
- It Length of Tank given Settling Velocity (Meter)
- Q Discharge (Cubic Meter per Second)
- Q<sub>d</sub> Discharge in Tank (Cubic Meter per Second)
- Q<sub>flow</sub> Rate of Flow (Cubic Meter per Second)
- Q<sub>S</sub> Discharge entering Basin given Settling Velocity (Cubic Meter per Second)
- Q<sub>v</sub> Discharge entering Basin given Flow Velocity (Cubic Meter per Second)
- SA<sub>Base</sub> Base Surface Area (Square Meter)
- SOR Overflow Rate (Meter per Second)
- T<sub>d</sub> Detention Time (Second)
- V Volume of Tank (Cubic Meter)
- **V**<sub>f</sub> Flow Velocity (Meter per Second)
- V<sub>S</sub> Settling Velocity (Meter per Second)
- V<sub>w</sub> Flow Velocity of Water (Meter per Second)
- **V**<sub>w</sub> Velocity of Flow of Water (Meter per Second)
- w Width (Meter)





## Constants, Functions, Measurements used

- Measurement: Length in Meter (m)
   Length Unit Conversion
- Measurement: Time in Second (s)

  Time Unit Conversion
- Measurement: Volume in Cubic Meter (m³)

  Volume Unit Conversion
- Measurement: Area in Square Meter (m²)
   Area Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
   Speed Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Second (m³/s)

  Volumetric Flow Rate Unit Conversion





## **Check other formula lists**

• Important Formulas of Design of Sedimentation Tank Continuous Flow Type of

Feel free to SHARE this document with your friends!

### **PDF Available in**

English Spanish French German Russian Italian Portuguese Polish Dutch

7/30/2024 | 5:39:09 AM UTC

Please leave your feedback here...



