



Design of an Aerated Grit Chamber Formulas

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Examples!

Conversions!

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List of 16 Design of an Aerated Grit Chamber Formulas

Design of an Aerated Grit Chamber

1) Air Supply required in Grit Chamber 🗗

$$\left| \mathbf{A}_{\mathrm{s}} = rac{\mathrm{A}}{\mathrm{L}}
ight|$$

Open Calculator

$$m ex = 0.007659m^3/s = rac{0.053m^2/s}{6.92m}$$

2) Assumed Grit Quantity given Volume of Grit

$$\mathbf{fx} egin{pmatrix} \mathbf{Q}_{\mathrm{g}} = rac{V_{\mathrm{g}}}{V} \end{bmatrix}$$

Open Calculator

$$\boxed{25 = \frac{500 \mathrm{m}^3}{20}}$$

3) Chamber Length using Air Supply required

$$\mathbf{L} = \left(rac{A}{A_s}
ight)$$

Open Calculator 🗗

$$oxed{f ex} 6.973684 {
m m} = \left(rac{0.053 {
m m}^2/{
m s}}{0.0076 {
m m}^3/{
m s}}
ight)$$





4) Chosen Air Supply given Air Supply required

fx $A = A_s \cdot L$

Open Calculator 🚰

Open Calculator 2

Open Calculator 2

Open Calculator G

- $0.052592 \mathrm{m}^2/\mathrm{s} = 0.0076 \mathrm{m}^3/\mathrm{s} \cdot 6.92 \mathrm{m}^3$
- 5) Chosen Depth given Width of Grit Chamber
- $D = \frac{W}{R}$
- $2.524272 \text{m} = \frac{2.6 \text{m}}{1.03}$
- 6) Depth given Length of Grit Chamber
- $\mathbf{D} = \left(rac{\mathrm{V_T}}{\mathrm{L} \cdot \mathrm{W}}
 ight)$
- $oxed{ex} 2.501112 \mathrm{m} = \left(rac{45 \mathrm{m}^3}{6.92 \mathrm{m} \cdot 2.6 \mathrm{m}}
 ight)$
- 7) Detention Time given Volume of Each Grit Chamber
- $\mathbf{T}_{\mathrm{d}} = rac{\mathrm{V}_{\mathrm{T}}}{\mathrm{Q}_{\mathrm{p}}}$
- $\boxed{\mathbf{ex} \text{ 3min} = \frac{45\text{m}^3}{0.25\text{m}^3/\text{s}}}$





8) Length of Grit Chamber

 $\mathbf{L} = \left(rac{\mathrm{V_T}}{\mathrm{W} \cdot \mathrm{D}}
ight)$

Open Calculator 🗗

 $= \left(\frac{45 \text{m}^3}{2.6 \text{m} \cdot 2.501 \text{m}} \right)$

9) Peak Flow Rate given Volume of Each Grit Chamber

 \mathbf{f} $\mathbf{Q}_\mathrm{p} = rac{\mathrm{V}_\mathrm{T}}{\mathrm{T}_\mathrm{d}}$

Open Calculator

 $0.25 {
m m}^{
m 3}/{
m s} = rac{45 {
m m}^{
m 3}}{3 {
m min}}$

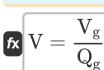
10) Selected Width-Ratio given Width of Grit Chamber

 $\mathbb{R} = \frac{W}{D}$

Open Calculator

 $\boxed{1.039584 = \frac{2.6 \text{m}}{2.501 \text{m}}}$

11) Volume Flow Rate given Volume of Grit



Open Calculator

 $20 = \frac{500 \text{m}^3}{25}$







12) Volume of Each Grit Chamber

fx $V_{
m T} = \left({
m Q}_{
m p} \cdot {
m T}_{
m d}
ight)$

Open Calculator

 $45 \text{m}^3 = (0.25 \text{m}^3/\text{s} \cdot 3 \text{min})$ 13) Volume of Grit

Open Calculator 2

fx $V_{
m g} = Q_{
m g} \cdot V$

ex $500 \text{m}^3 = 25 \cdot 20$

14) Volume of Grit Chamber given Length of Grit Chamber 🛂

fx $V_{
m T} = ({
m L} \cdot {
m W} \cdot {
m D})$

Open Calculator

ex 44.99799m³ = (6.92m · 2.6m · 2.501m)

15) Width of Grit Chamber 🛂

Open Calculator 2

 $\mathbf{ex} \ 2.57603\mathbf{m} = (1.03 \cdot 2.501\mathbf{m})$

16) Width using Length of Grit Chamber 🗗

 $\mathbf{f} \mathbf{x} \mathbf{W} = (\mathbf{R} \cdot \mathbf{D})$



Open Calculator

 $W = \left(rac{V_{\mathrm{T}}}{\mathrm{D}\cdot\mathrm{L}}
ight)$

ex $2.600116 \text{m} = \left(\frac{45 \text{m}^3}{2.501 \text{m} \cdot 6.92 \text{m}}\right)$









Variables Used

- A Chosen Air Supply (Square Meter per Second)
- **A**_S Air Supply Required (Cubic Meter per Second)
- **D** Depth of Grit Chamber (Meter)
- L Length of Grit Chamber (Meter)
- Q_q Assumed Grit Quantity in Cubic Meter per MLD
- Qp Peak Flow Rate (Cubic Meter per Second)
- R Selected Width Ratio
- T_d Detention Time (Minute)
- V Volumetric Flow Rate in Million Litres per Day
- V_a Volume of Grit (Cubic Meter)
- V_T Volume of Grit Chamber (Cubic Meter)
- W Width of Grit Chamber (Meter)





Constants, Functions, Measurements used

- Measurement: Length in Meter (m)
 Length Unit Conversion
- Measurement: Time in Minute (min)

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

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





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