calculatoratoz.com

unitsconverters.com

Design of Trickling Filter using NRC Equations Formulas

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!

Please leave your feedback here...

© calculatoratoz.com. A softusvista inc. venture!

List of 21 Design of Trickling Filter using NRC Equations Formulas

Design of Trickling Filter using NRC Equations

1) Area given Hydraulic Loading

Open Calculator

fx $$A = (1+\alpha)\cdot\frac{W_w}{H\cdot 1440}$$

ex $$52.5\text{m}^2 = (1+1.5)\cdot\frac{1.4\text{m}^3/\text{s}}{4\text{m}^3/\text{d}\cdot 1440}$$

2) Hydraulic Loading to each Filter

Open Calculator

fx $$H = (1+\alpha)\cdot\frac{W_w}{A\cdot 1440}$$

ex $$4.2\text{m}^3/\text{d} = (1+1.5)\cdot\frac{1.4\text{m}^3/\text{s}}{50\text{m}^2\cdot 1440}$$

BOD Loading

3) BOD Loading for First Stage Filter

Open Calculator

fx $$W' = Q_i\cdot W_w\cdot 8.34$$

ex $$2.8\text{E}\text{^}\text{-}5\text{kg/d} = 0.002379\text{mg/L}\cdot 1.4\text{m}^3/\text{s}\cdot 8.34$$

© calculatoratoz.com. A softusvista inc. venture!

4) BOD Loading for First Stage Filter using BOD Loading for Second Filter Stage

Open Calculator

$$W = \frac{W'}{1 - E_f}$$

$$3.428571\text{kg/d} = \frac{2.4\text{kg/d}}{1 - 0.3}$$

5) BOD Loading for Second Stage Filter

Open Calculator

$$W' = (1 - E_f) \cdot W$$

$$2.45\text{kg/d} = (1 - 0.3) \cdot 3.5\text{kg/d}$$

6) BOD Loading to Second Filter Stage given Efficiency of Second Filter Stage

Open Calculator

$$W' = V_T \cdot F \cdot \left(\left(\frac{1 - E_f}{0.0561} \right) \cdot \left(\left(\frac{100}{E_2} \right) - 1 \right) \right)^2$$

$$1.921506\text{kg/d} = 0.0035\text{m}^3 \cdot 0.4 \cdot \left(\left(\frac{1 - 0.3}{0.0561} \right) \cdot \left(\left(\frac{100}{99} \right) - 1 \right) \right)^2$$

Efficiency of Filter

7) Efficiency of First Filter given BOD Loading for Second Filter

Open Calculator

fx $$E = 1 - \left(\frac{W_{,}}{W^{,}}\right)$$

ex $$0.825 = 1 - \left(\frac{0.42\text{kg/d}}{2.4\text{kg/d}}\right)$$

8) Efficiency of First Filter Stage

Open Calculator

fx $$E_1 = \frac{100}{1 + \left(0.0561 \cdot \sqrt{\frac{W^{'}}{V_T \cdot F}}\right)}$$

ex $$99.21598 = \frac{100}{1 + \left(0.0561 \cdot \sqrt{\frac{2.4\text{kg/d}}{0.0035\text{m}^3 \cdot 0.4}}\right)}$$

9) Efficiency of First Filter Stage using Efficiency of Second Filter Stage

Open Calculator

fx $$E = 1 + \left(\left(\frac{0.0561}{\frac{100}{E_2}} - 1\right) \cdot \sqrt{\frac{W^{'}}{V_T \cdot F}}\right)$$

ex $$0.866964 = 1 + \left(\left(\frac{0.0561}{\frac{100}{99}} - 1\right) \cdot \sqrt{\frac{2.4\text{kg/d}}{0.0035\text{m}^3 \cdot 0.4}}\right)$$

© calculatoratoz.com. A softusvista inc. venture!

10) Efficiency of Second Filter Stage

Open Calculator

fx $$E_2 = \frac{100}{1 + \left(\left(\frac{0.0561}{1 - E_1} \right) \cdot \sqrt{\frac{W'}{V_T \cdot F}} \right)}$$

ex $$100.008 = \frac{100}{1 + \left(\left(\frac{0.0561}{1 - 100} \right) \cdot \sqrt{\frac{2.4\text{kg/d}}{0.0035\text{m}^3 \cdot 0.4}} \right)}$$

11) Overall Efficiency of Two Stage Trickling Filter

Open Calculator

fx $$E = \left(Q_{ie} - \frac{Q_o}{Q_{ie}} \right) \cdot 100$$

ex $$2.390158 = \left(24\text{mg/L} - \frac{0.002362\text{mg/L}}{24\text{mg/L}} \right) \cdot 100$$

Influent and Effluent BOD

12) Effluent BOD given Overall Efficiency of Two-Stage Trickling Filter

Open Calculator

fx $$Q_o = \left(1 - \left(\frac{E}{100} \right) \right) \cdot Q_i$$

ex $$0.002322\text{mg/L} = \left(1 - \left(\frac{2.39}{100} \right) \right) \cdot 0.002379\text{mg/L}$$

© calculatoratoz.com. A softusvista inc. venture!

13) Influent BOD given BOD Loading for First Stage Filter

Open Calculator

fx $$Q_i = \frac{W'}{W_w \cdot 8.34}$$

ex $$0.002379\text{mg/L} = \frac{2.4\text{kg/d}}{1.4\text{m}^3\text{/s} \cdot 8.34}$$

14) Influent BOD given Overall Efficiency of Two-Stage Trickling Filter

Open Calculator

fx $$Q_i = \frac{100 \cdot Q_o}{100 - E}$$

ex $$0.00242\text{mg/L} = \frac{100 \cdot 0.002362\text{mg/L}}{100 - 2.39}$$

Recirculation Factor

15) Recirculation Factor

Open Calculator

fx $$F = \frac{1 + \alpha}{\left(1 + \frac{\alpha}{10}\right)^2}$$

ex $$1.890359 = \frac{1 + 1.5}{\left(1 + \frac{1.5}{10}\right)^2}$$

Recirculation Ratio

16) Recirculation Ratio given Hydraulic Loading

Open Calculator

fx $$\alpha = \left(\frac{H \cdot A \cdot 1440}{W_w}\right) - 1$$

ex $$1.380952 = \left(\frac{4\text{m}^3/\text{d} \cdot 50\text{m}^2 \cdot 1440}{1.4\text{m}^3/\text{s}}\right) - 1$$

17) Recirculation Ratio of Wastewater

Open Calculator

fx $$\alpha = \frac{Q_r}{W_w}$$

ex $$1.785714 = \frac{2.5\text{m}^3/\text{s}}{1.4\text{m}^3/\text{s}}$$

Volume of Filter

18) Volume of Filter Media given Efficiency of Second Filter Stage

Open Calculator

fx $$V_T = \left(\frac{W'}{F}\right) \cdot \frac{1}{\left(\left(\frac{1-E_1}{0.0561}\right) \cdot \left(\frac{100}{E_2} - 1\right)\right)^2}$$

ex $$2.2\text{E}\hat{}\text{-}7\text{m}^3 = \left(\frac{2.4\text{kg/d}}{0.4}\right) \cdot \frac{1}{\left(\left(\frac{1-100}{0.0561}\right) \cdot \left(\frac{100}{99} - 1\right)\right)^2}$$

Wastewater Flow

19) Wastewater Flow given BOD Loading for First Stage

Open Calculator

$$W_w = \frac{W'}{8.34 \cdot Q_i}$$

$$1.400029\text{m}^3/\text{s} = \frac{2.4\text{kg/d}}{8.34 \cdot 0.002379\text{mg/L}}$$

20) Wastewater Flow given Hydraulic Loading

Open Calculator

$$W_w = H \cdot A \cdot \frac{1440}{1+\alpha}$$

$$1.333333\text{m}^3/\text{s} = 4\text{m}^3/\text{d} \cdot 50\text{m}^2 \cdot \frac{1440}{1+1.5}$$

21) Wastewater Flow given Recirculation Ratio

Open Calculator

$$W_w = \frac{Q_r}{\alpha}$$

$$1.666667\text{m}^3/\text{s} = \frac{2.5\text{m}^3/\text{s}}{1.5}$$

© calculatoratoz.com. A softusvista inc. venture!

Variables Used

- **A** Area *(Square Meter)*
- **E** Overall Efficiency
- E_1 Efficiency of First Filter Stage
- E_2 Efficiency of Second Filter Stage
- E_f Efficiency of First Filter Stage BOD Loading
- **F** Recirculation Factor
- **H** Hydraulic Loading *(Cubic Meter per Day)*
- Q_i Influent BOD *(Milligram per Liter)*
- Q_{ie} Influent BOD Efficiency *(Milligram per Liter)*
- Q_o Effluent BOD *(Milligram per Liter)*
- Q_r Recirculation Flow *(Cubic Meter per Second)*
- V_T Volume *(Cubic Meter)*
- **W** BOD Loading to Filter *(Kilogram per Day)*
- $W_,$ BOD Loading to the Second Stage Filter *(Kilogram per Day)*
- W_w Waste Water Flow *(Cubic Meter per Second)*
- W' BOD Loading to Filter 2 *(Kilogram per Day)*
- **α** Recirculation Ratio

© calculatoratoz.com. A softusvista inc. venture!

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s), Cubic Meter per Day (m^3/d)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Mass Flow Rate** in Kilogram per Day (kg/d)
  Mass Flow Rate Unit Conversion
- Measurement: **Density** in Milligram per Liter (mg/L)
  Density Unit Conversion

Check other formula lists

- Design of a Chlorination System for Wastewater Disinfection Formulas
- Design of a Circular Settling Tank Formulas
- Design of a Plastic Media Trickling Filter Formulas
- Design of a Solid Bowl Centrifuge for Sludge Dewatering Formulas
- Design of an Aerated Grit Chamber Formulas
- Design of an Aerobic Digester Formulas
- Design of an Anaerobic Digester Formulas
- Design of Rapid Mix Basin and Flocculation Basin Formulas
- Design of Trickling Filter using NRC Equations Formulas
- Estimating the Design Sewage Discharge Formulas
- Noise Pollution Formulas
- Population Forecast Method Formulas
- Sanitary System Sewer Design Formulas

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

7/22/2024 | 8:26:18 AM UTC

Please leave your feedback here...

© calculatoratoz.com. A softusvista inc. venture!