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Flow Velocity in Sewers and Drains Formulas

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List of 21 Flow Velocity in Sewers and Drains Formulas

Flow Velocity in Sewers and Drains

Bazin's Formula

1) Chezy's Constant by Bazin's Formula

Open Calculator

fx $$C_b = \left(\frac{157.6}{181 + \left(\frac{K}{\sqrt{m}} \right)} \right)$$

ex $$0.867233 = \left(\frac{157.6}{181 + \left(\frac{2.3}{\sqrt{10m}} \right)} \right)$$

2) Hydraulic Mean Depth given Chezy's Constant by Bazin's Formula

Open Calculator

fx $$m = \left(\left(\frac{K}{\left(\frac{157.6}{C_b} \right) - 181} \right) \right)^2$$

ex $$9.810431m = \left(\left(\frac{2.3}{\left(\frac{157.6}{0.8672} \right) - 181} \right) \right)^2$$

Chezy's Formula

3) Chezy's Constant given Velocity of Flow by Chezy's Formula

Open Calculator

fx $$C = \frac{V_c}{\sqrt{S_c \cdot m}}$$

ex $$14.97024 = \frac{5.01\text{m/s}}{\sqrt{0.0112 \cdot 10\text{m}}}$$

4) Hydraulic Gradient given Velocity of Flow by Chezy's Formula

Open Calculator

fx $$S_c = \frac{(V_c)^2}{(C)^2 \cdot m}$$

ex $$0.011156 = \frac{(5.01\text{m/s})^2}{(15)^2 \cdot 10\text{m}}$$

5) Hydraulic Mean Radius of Channel

Open Calculator

fx $$m = \left(\frac{A_w}{P_w}\right)$$

ex $$10\text{m} = \left(\frac{120\text{m}^2}{12\text{m}}\right)$$

6) Hydraulic Mean Radius of Channel given Velocity of Flow by Chezy's Formula

Open Calculator

fx $$m = \frac{(V_c)^2}{(C)^2 \cdot S_c}$$

ex $$9.960357\text{m} = \frac{(5.01\text{m/s})^2}{(15)^2 \cdot 0.0112}$$

7) Velocity of Flow by Chezy's Formula

Open Calculator

fx $$V_c = C \cdot \sqrt{S_c \cdot m}$$

ex $$5.01996\text{m/s} = 15 \cdot \sqrt{0.0112 \cdot 10\text{m}}$$

8) Wetted Perimeter with known Hydraulic Mean Radius of Channel

Open Calculator

fx $$P_w = \left(\frac{A_w}{m}\right)$$

ex $$12\text{m} = \left(\frac{120\text{m}^2}{10\text{m}}\right)$$

Crimp and Burge's Formula

9) Bed Slope of Sewer given Flow Velocity by Crimp and Burge's Formula

Open Calculator

fx $$s = \left(\frac{V_{cb}}{83.5 \cdot (m)^{\frac{2}{3}}} \right)^2$$

ex $$0.000999 = \left(\frac{12.25 m/s}{83.5 \cdot (10m)^{\frac{2}{3}}} \right)^2$$

10) Flow Velocity by Crimp and Burge's Formula

Open Calculator

fx $$V_{cb} = 83.5 \cdot (m)^{\frac{2}{3}} \cdot \sqrt{s}$$

ex $$12.25612 m/s = 83.5 \cdot (10m)^{\frac{2}{3}} \cdot \sqrt{0.001}$$

11) Hydraulic Mean Depth given Flow Velocity by Crimp and Burge's Formula

Open Calculator

fx $$m = \left(\frac{V_{cb}}{\sqrt{s} \cdot 83.5} \right)^{\frac{3}{2}}$$

ex $$9.992506m = \left(\frac{12.25 m/s}{\sqrt{0.001} \cdot 83.5} \right)^{\frac{3}{2}}$$

Kutter's Formula

12) Chezy's Constant by Kutter's Formula

Open Calculator

fx $$C_k = \frac{\left(23 + \left(\frac{0.00155}{s}\right)\right) + \left(\frac{1}{n}\right)}{1 + \left(23 + \left(\frac{0.00155}{s}\right)\right) \cdot \left(\frac{n}{\sqrt{m}}\right)}$$

ex $$81.70236 = \frac{\left(23 + \left(\frac{0.00155}{0.001}\right)\right) + \left(\frac{1}{0.015}\right)}{1 + \left(23 + \left(\frac{0.00155}{0.001}\right)\right) \cdot \left(\frac{0.015}{\sqrt{10m}}\right)}$$

13) Hydraulic Mean Depth given Chezy's Constant by Kutter's Formula

Open Calculator

fx $$m = \left(\frac{C_k \cdot \left(23 + \left(\frac{0.00155}{s}\right)\right) \cdot n}{\left(\frac{1}{n}\right) + \left(23 + \left(\frac{0.00155}{s}\right)\right) - C_k}\right)^2$$

ex $$9.994473m = \left(\frac{81.70 \cdot \left(23 + \left(\frac{0.00155}{0.001}\right)\right) \cdot 0.015}{\left(\frac{1}{0.015}\right) + \left(23 + \left(\frac{0.00155}{0.001}\right)\right) - 81.70}\right)^2$$

Manning's Formula

14) Bed Slope of Sewer given Flow Velocity by Manning's Formula

Open Calculator

fx $$s = \left(\frac{V_m \cdot n}{(m)^{\frac{2}{3}}} \right)^2$$

ex $$0.000999 = \left(\frac{9.78\text{m/s} \cdot 0.015}{(10\text{m})^{\frac{2}{3}}} \right)^2$$

15) Flow Velocity by Manning's Formula

Open Calculator

fx $$V_m = \left(\frac{1}{n} \right) \cdot (m)^{\frac{2}{3}} \cdot \sqrt{s}$$

ex $$9.785328\text{m/s} = \left(\frac{1}{0.015} \right) \cdot (10\text{m})^{\frac{2}{3}} \cdot \sqrt{0.001}$$

16) Hydraulic Mean Depth given Flow Velocity by Manning's Formula

Open Calculator

fx $$m = \left(\frac{V_m \cdot n}{\sqrt{s}} \right)^{\frac{3}{2}}$$

ex $$9.991833\text{m} = \left(\frac{9.78\text{m/s} \cdot 0.015}{\sqrt{0.001}} \right)^{\frac{3}{2}}$$

17) Rugosity Coefficient given Flow Velocity by Manning's Formula

Open Calculator

fx $$n = \left(\frac{1}{V_m}\right) \cdot (m)^{\frac{2}{3}} \cdot \sqrt{s}$$

ex $$0.015008 = \left(\frac{1}{9.78\text{m/s}}\right) \cdot (10\text{m})^{\frac{2}{3}} \cdot \sqrt{0.001}$$

William Hazen's Formula

18) Bed Slope of Sewer given Flow Velocity by William Hazen's Formula

Open Calculator

fx $$s = \left(\frac{V_{wh}}{0.85 \cdot (m)^{0.63} \cdot C_H}\right)^{\frac{1}{0.54}}$$

ex $$0.001 = \left(\frac{10.43\text{m/s}}{0.85 \cdot (10\text{m})^{0.63} \cdot 119.91}\right)^{\frac{1}{0.54}}$$

19) Flow Velocity by William Hazen's Formula

Open Calculator

fx $$V_{wh} = 0.85 \cdot C_H \cdot (m)^{0.63} \cdot (s)^{0.54}$$

ex $$10.42976\text{m/s} = 0.85 \cdot 119.91 \cdot (10\text{m})^{0.63} \cdot (0.001)^{0.54}$$

20) Hydraulic Mean Depth given Flow Velocity by William Hazen's Formula

Open Calculator

fx
$$m = \left(\frac{V_{wh}}{0.85 \cdot C_H \cdot (s)^{0.54}} \right)^{\frac{1}{0.63}}$$

ex
$$10.00036\text{m} = \left(\frac{10.43\text{m/s}}{0.85 \cdot 119.91 \cdot (0.001)^{0.54}} \right)^{\frac{1}{0.63}}$$

21) William Hazen Coefficient given Flow Velocity by William Hazen's Formula

Open Calculator

fx
$$C_H = \left(\frac{V_{wh}}{0.85 \cdot (m)^{0.63} \cdot (s)^{0.54}} \right)$$

ex
$$119.9128 = \left(\frac{10.43\text{m/s}}{0.85 \cdot (10\text{m})^{0.63} \cdot (0.001)^{0.54}} \right)$$

Variables Used

- **A_w** Wetted Area *(Square Meter)*
- **C** Chezy's Constant
- **C_b** Chezy's Constant by Bazin's Formula
- **C_H** William Hazen Coefficient
- **C_k** Chezy's Constant by Kutter's Formula
- **K** Bazin's Constant
- **m** Hydraulic Mean Depth *(Meter)*
- **n** Rugosity Coefficient
- **P_w** Wetted Perimeter *(Meter)*
- **s** Bed Slope of Channel
- **S_c** Slope for Chezy's Formula
- **V_c** Flow Velocity for Chezy's Formula *(Meter per Second)*
- **V_{cb}** Flow Velocity for Crimp and Burge's Formula *(Meter per Second)*
- **V_m** Flow Velocity for Manning's Formula *(Meter per Second)*
- **V_{wh}** Flow Velocity for William Hazen's Formula *(Meter per Second)*

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: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion

Check other formula lists

- **Flow Velocity in Sewers and Drains Formulas**
- **Hydraulic Mean Depth Formulas**
- **Minimum Velocity to be Generated in Sewers Formulas**
- **Proportionate Hydraulic Elements for Circular Sewers Formulas**
- **Roughness Coefficient Formulas**

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