

Important Flow Velocity in Sewers and Drains Formulas PDF



**Formulas
Examples
with Units**

List of 21 Important Flow Velocity in Sewers and Drains Formulas

1) Bazin's Formula Formulas

1.1) Chezy's Constant by Bazin's Formula Formula

Evaluate Formula

Formula

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

Example with Units

$$0.8672 = \left(\frac{157.6}{181 + \left(\frac{2.3}{\sqrt{10m}} \right)} \right)$$

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

Evaluate Formula

Formula

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

Example with Units

$$9.8104m = \left(\left(\frac{2.3}{\left(\frac{157.6}{0.8672} \right) - 181} \right) \right)^2$$

2) Chezy's Formula Formulas

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

Evaluate Formula

Formula

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

Example with Units

$$14.9702 = \frac{5.01m/s}{\sqrt{0.0112 \cdot 10m}}$$

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

Evaluate Formula

Formula

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

Example with Units

$$0.0112 = \frac{(5.01m/s)^2}{(15)^2 \cdot 10m}$$



2.3) Hydraulic Mean Radius of Channel Formula

Formula

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

Example with Units

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

Evaluate Formula 

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

Formula

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

Example with Units

$$9.9604_m = \frac{(5.01_{m/s})^2}{(15)^2 \cdot 0.0112}$$

Evaluate Formula 

2.5) Velocity of Flow by Chezy's Formula Formula

Formula

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

Example with Units

$$5.02_{m/s} = 15 \cdot \sqrt{0.0112 \cdot 10_m}$$

Evaluate Formula 

2.6) Wetted Perimeter with known Hydraulic Mean Radius of Channel Formula

Formula

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

Example with Units

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

Evaluate Formula 

3) Crimp and Burge's Formula Formulas

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

Formula

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

Example with Units

$$0.001 = \left(\frac{12.25_{m/s}}{83.5 \cdot (10_m)^{\frac{2}{3}}} \right)^2$$

Evaluate Formula 

3.2) Flow Velocity by Crimp and Burge's Formula Formula

Formula

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

Example with Units

$$12.2561_{m/s} = 83.5 \cdot (10_m)^{\frac{2}{3}} \cdot \sqrt{0.001}$$

Evaluate Formula 



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

Formula

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

Example with Units

$$9.9925_m = \left(\frac{12.25_{m/s}}{\sqrt{0.001} \cdot 83.5} \right)^{\frac{3}{2}}$$

Evaluate Formula 

4) Kutter's Formula Formulas

4.1) Chezy's Constant by Kutter's Formula Formula

Formula

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

Example with Units

$$81.7024 = \frac{\left(23 + \left(\frac{0.00155}{0.001} \right) \right) + \left(\frac{1}{0.015} \right)}{1 + \left(23 + \left(\frac{0.00155}{0.001} \right) \right) \cdot \left(\frac{0.015}{\sqrt{10_m}} \right)}$$

Evaluate Formula 

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

Formula

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

Example with Units

$$9.9945_m = \left(\frac{81.70 \cdot \left(23 + \left(\frac{0.00155}{0.001} \right) \right) \cdot 0.015}{\left(\frac{1}{0.015} \right) + \left(23 + \left(\frac{0.00155}{0.001} \right) \right) - 81.70} \right)^2$$

Evaluate Formula 

5) Manning's Formula Formulas

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

Formula

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

Example with Units

$$0.001 = \left(\frac{9.78_{m/s} \cdot 0.015}{(10_m)^{\frac{2}{3}}} \right)^2$$

Evaluate Formula 

5.2) Flow Velocity by Manning's Formula Formula

Formula

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

Example with Units

$$9.7853_{m/s} = \left(\frac{1}{0.015} \right) \cdot (10_m)^{\frac{2}{3}} \cdot \sqrt{0.001}$$

Evaluate Formula 



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

Formula

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

Example with Units

$$9.9918_m = \left(\frac{9.78_{m/s} \cdot 0.015}{\sqrt{0.001}} \right)^{\frac{3}{2}}$$

Evaluate Formula 

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

Formula

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

Example with Units

$$0.015 = \left(\frac{1}{9.78_{m/s}} \right) \cdot (10_m)^{\frac{2}{3}} \cdot \sqrt{0.001}$$

Evaluate Formula 

6) William Hazen's Formula Formulas

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

Formula

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

Example with Units

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

Evaluate Formula 

6.2) Flow Velocity by William Hazen's Formula Formula

Formula

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

Example with Units

$$10.4298_{m/s} = 0.85 \cdot 119.91 \cdot (10_m)^{0.63} \cdot (0.001)^{0.54}$$

Evaluate Formula 

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

Formula

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

Example with Units

$$10.0004_m = \left(\frac{10.43_{m/s}}{0.85 \cdot 119.91 \cdot (0.001)^{0.54}} \right)^{\frac{1}{0.63}}$$

Evaluate Formula 

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

Formula

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

Example with Units

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

Evaluate Formula 



Variables used in list of Flow Velocity in Sewers and Drains Formulas above

- **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** 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 in list of Flow Velocity in Sewers and Drains Formulas above

- **Functions:** **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 



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