



# 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 🗗

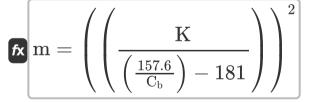
1) Chezy's Constant by Bazin's Formula

$$extbf{K} extbf{C}_{ ext{b}} = \left(rac{157.6}{181 + \left(rac{ ext{K}}{\sqrt{ ext{m}}}
ight)}
ight)$$

Open Calculator 🚰

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

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



Open Calculator

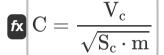
$$= \left( \left( \frac{2.3}{\left( \frac{157.6}{0.8672} \right) - 181} \right) \right)^{2}$$





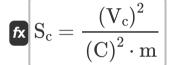
#### Chezy's Formula 🗗

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



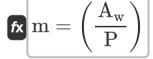
ex 
$$14.97024 = \frac{5.01 \mathrm{m/s}}{\sqrt{0.0112 \cdot 10 \mathrm{m}}}$$

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



$$oxed{ex} 0.011156 = rac{(5.01 ext{m/s})^2}{{(15)}^2 \cdot 10 ext{m}}$$

5) Hydraulic Mean Radius of Channel



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



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

 $\mathbf{m} = rac{(\mathrm{V_c})^2}{{(\mathrm{C})^2 \cdot \mathrm{S_c}}}$ 

Open Calculator

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

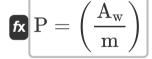
#### 7) Velocity of Flow by Chezy's Formula



Open Calculator

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

#### 8) Wetted Perimeter with known Hydraulic Mean Radius of Channel



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

#### Crimp and Burge's Formula 🗗

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

$$\mathbf{f}\mathbf{x} = \left( rac{V_{cb}}{83.5 \cdot (m)^{rac{2}{3}}} 
ight)^2$$

Open Calculator 🛂

10) Flow Velocity by Crimp and Burge's Formula



Open Calculator 🗗

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

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

$$\mathbf{m} = \left(rac{\mathrm{V_{cb}}}{\sqrt{\mathrm{s}\cdot 83.5}}
ight)^{rac{3}{2}}$$

Open Calculator 🗗

$$= 2.992506 \text{m} = \left(\frac{12.25 \text{m/s}}{\sqrt{0.001} \cdot 83.5}\right)^{\frac{3}{2}}$$





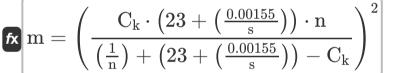
#### Kutter's Formula 🗗

#### 12) Chezy's Constant by Kutter's Formula

 $\mathbf{C}_{\mathrm{k}} = rac{\left(23 + \left(rac{0.00155}{\mathrm{s}}
ight)
ight) + \left(rac{1}{\mathrm{n}}
ight)}{1 + \left(23 + \left(rac{0.00155}{\mathrm{s}}
ight)
ight) \cdot \left(rac{\mathrm{n}}{\sqrt{\mathrm{m}}}
ight)}$ 

Open Calculator 🚰

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



Open Calculator 🚰



#### Manning's Formula 🗗

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

 $\mathbf{f}\mathbf{x} = \left(rac{V_{\mathrm{m}} \cdot \mathbf{n}}{(\mathrm{m})^{rac{2}{3}}}
ight)^{2}$ 

Open Calculator 🚰

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

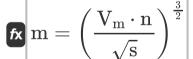
#### 15) Flow Velocity by Manning's Formula

 $V_{\mathrm{m}} = \left(rac{1}{n}
ight) \cdot (\mathrm{m})^{rac{2}{3}} \cdot \sqrt{\mathrm{s}}$ 

Open Calculator

 $ext{ex} \left[ 9.785328 ext{m/s} = \left( rac{1}{0.015} 
ight) \cdot (10 ext{m})^{rac{2}{3}} \cdot \sqrt{0.001} 
ight]$ 

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



Open Calculator 🗗

 $= 2.991833 \text{m} = \left(\frac{9.78 \text{m/s} \cdot 0.015}{\sqrt{0.001}}\right)^{\frac{3}{2}}$ 



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

 $\mathbf{f} \mathbf{x} \left| \mathbf{n} = \left( rac{1}{V_{\mathrm{m}}} 
ight) \cdot (\mathbf{m})^{rac{2}{3}} \cdot \sqrt{\mathbf{s}} 
ight|$ 

Open Calculator 🗗

 $oxed{ex} 0.015008 = \left(rac{1}{9.78 ext{m/s}}
ight) \cdot (10 ext{m})^{rac{2}{3}} \cdot \sqrt{0.001}$ 

#### William Hazen's Formula

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

 $\left|\mathbf{x}
ight| \mathbf{s} = \left(rac{V_{wh}}{0.85\cdot\left(\mathbf{m}
ight)^{0.63}\cdot C_{H}}
ight)^{rac{1}{0.54}}$ 

Open Calculator 🗗

 $oxed{ex} 0.001 = \left(rac{10.43 ext{m/s}}{0.85 \cdot \left(10 ext{m}
ight)^{0.63} \cdot 119.91}
ight)^{rac{1}{0.54}}$ 

19) Flow Velocity by William Hazen's Formula 🚰

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

Open Calculator

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



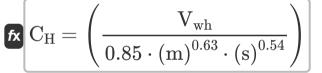
#### 20) Hydraulic Mean Depth given Flow Velocity by William Hazen's Formula

$$\mathbf{m} = \left(rac{V_{wh}}{0.85 \cdot C_{H} \cdot (s)^{0.54}}
ight)^{rac{1}{0.63}}$$

Open Calculator 🗗

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

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



Open Calculator 🖒

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



#### Variables Used

- A<sub>w</sub> Wetted Area (Square Meter)
- C Chezy's Constant
- Ch Chezy's Constant by Bazin's Formula
- CH William Hazen Coefficient
- C<sub>k</sub> 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
- Sc Slope for Chezy's Formula
- V<sub>c</sub> Flow Velocity for Chezy's Formula (Meter per Second)
- V<sub>ch</sub> Flow Velocity for Crimp and Burge's Formula (Meter per Second)
- V<sub>m</sub> Flow Velocity for Manning's Formula (Meter per Second)
- V<sub>wh</sub> 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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