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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 !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

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

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



Chezy's Formula

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

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

[Open Calculator !\[\]\(a03a7eb2f4046e1d3c76772003e549ea_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

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

5) Hydraulic Mean Radius of Channel

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

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

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

7) Velocity of Flow by Chezy's Formula

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

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

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

8) Wetted Perimeter with known Hydraulic Mean Radius of Channel

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

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

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



Crimp and Burge's Formula

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

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

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)

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

10) Flow Velocity by Crimp and Burge's Formula

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

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)

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



Kutter's Formula

12) Chezy's Constant by Kutter's Formula

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

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

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



Manning's Formula

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

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

[Open Calculator !\[\]\(83f22ed94ec5517769dd76d702c6bfd8_img.jpg\)](#)

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

15) Flow Velocity by Manning's Formula

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

[Open Calculator !\[\]\(3cb60d42b10e53f9522bb0b392c1c4cd_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(0d7ca0919e6c47bbd874bfa0189fe22e_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107_img.jpg\)](#)

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

William Hazen's Formula

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



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

[Open Calculator !\[\]\(e1c624d4757f08486e89482c18364c17_img.jpg\)](#)

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

19) Flow Velocity by William Hazen's Formula

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

[Open Calculator !\[\]\(e3f255517d37bb309a3a931ec4849e6a_img.jpg\)](#)

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



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



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

Open Calculator

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

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



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

Open Calculator

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






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** 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](#) 
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