



Inlet Currents and Tidal Elevations 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...

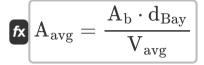




List of 28 Inlet Currents and Tidal Elevations Formulas

Inlet Currents and Tidal Elevations

1) Average Area over Channel Length for Flow through Inlet into Bay



Open Calculator 🗗

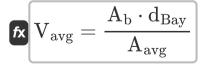
$$8.000533 \mathrm{m}^{_{2}} = \frac{1.5001 \mathrm{m}^{_{2}} \cdot 20}{3.75 \mathrm{m/s}}$$

2) Average Area over Channel Length using King's Dimensionless Velocity

$$\texttt{fx} \boxed{ A_{avg} = \frac{V'_m \cdot 2 \cdot \pi \cdot a_o \cdot A_b}{T \cdot V_m} }$$

Open Calculator 🗗

3) Average Velocity in Channel for Flow through Inlet into Bay



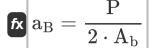
Open Calculator 🗗

$$ext{ex} 3.75025 ext{m/s} = rac{1.5001 ext{m}^2 \cdot 20}{8 ext{m}^2}$$





4) Bay Tide Amplitude given Tidal Prism Filling Bay

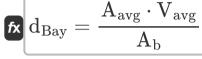


Open Calculator

$$= 10.66596 = \frac{32 \text{m}^3}{2 \cdot 1.5001 \text{m}^2}$$

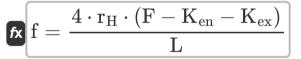
5) Change of Bay Elevation with Time for Flow through Inlet into Bay





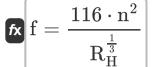
$$ext{ex} 19.99867 = rac{8 ext{m}^2 \cdot 3.75 ext{m/s}}{1.5001 ext{m}^2}$$





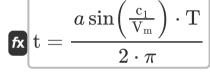


7) Dimensionless Parameter Function of Hydraulic Radius and Manning's Roughness Coefficient



Open Calculator 🗗

8) Duration of Inflow given Inlet Channel Velocity



Open Calculator

$$extbf{ex} 0.007821 ext{h} = rac{a \sin\left(rac{4.01 ext{m/s}}{4.1 ext{m/s}}
ight) \cdot 130 ext{s}}{2 \cdot \pi}$$

9) Entrance Energy Loss Coefficient given Inlet Impedance

$$\left| \mathbf{K}_{\mathrm{en}} = \mathrm{F} - \mathrm{K}_{\mathrm{ex}} - \left(\mathrm{f} \cdot rac{\mathrm{L}}{4 \cdot \mathrm{r_{H}}}
ight)
ight|$$

$$oxed{ex} 1.009636 = 2.246 - 0.1 - \left(0.03 \cdot rac{50 ext{m}}{4 \cdot 0.33 ext{m}}
ight)$$



10) Exit Energy Loss Coefficient given Inlet Impedance

 $\left[\mathbf{K}_{\mathrm{ex}} = \mathrm{F} - \mathrm{K}_{\mathrm{en}} - \left(\mathrm{f} \cdot rac{\mathrm{L}}{4 \cdot \mathrm{r_{H}}}
ight)
ight]$

Open Calculator 🖸

 $oxed{ex} 0.099636 = 2.246 - 1.01 - \left(0.03 \cdot rac{50 ext{m}}{4 \cdot 0.33 ext{m}}
ight)$

11) Hydraulic Radius given Dimensionless Parameter

 $m R_H = \left(116 \cdot rac{n^2}{f}
ight)^3$

Open Calculator 🖸

 $= 2.483384 \text{m} = \left(116 \cdot \frac{\left(0.0198\right)^2}{0.03}\right)^3$

12) Inlet Channel Velocity

 $\left|\mathbf{c}_{1}=\mathrm{V}_{\mathrm{m}}\cdot\sin\!\left(2\cdot\pi\cdotrac{\mathrm{t}}{\mathrm{T}}
ight)
ight|$

Open Calculator

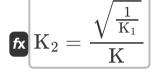
 $= 4.070106 \text{m/s} = 4.1 \text{m/s} \cdot \sin \left(2 \cdot \pi \cdot \frac{1.2 \text{h}}{130 \text{s}} \right)$

13) Inlet Friction Coefficient given Keulegan Repletion Coefficient 🗗

$$\mathbf{K}_1 = rac{1}{\left(\mathbf{K}\cdot\mathbf{K}_2
ight)^2}$$

Open Calculator 2

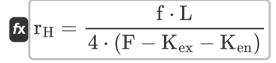
14) Inlet Friction Coefficient Parameter given Keulegan Repletion Coefficient



Open Calculator 2

ex
$$0.248452 = rac{\sqrt{rac{1}{28.8}}}{0.75}$$

15) Inlet Hydraulic Radius given Inlet Impedance 🗗



Open Calculator G

ex
$$0.330106 \mathrm{m} = rac{0.03 \cdot 50 \mathrm{m}}{4 \cdot (2.246 - 0.1 - 1.01)}$$



Open Calculator

Open Calculator

Open Calculator

Open Calculator

16) Inlet Impedance

 $\left| \mathbf{F} = \mathbf{K}_{ ext{en}} + \mathbf{K}_{ ext{ex}} + \left(\mathbf{f} \cdot rac{\mathbf{L}}{4 \cdot \mathbf{r}_{ ext{ff}}}
ight)
ight|$

$$2.246364 = 1.01 + 0.1 + \left(0.03 \cdot rac{50 ext{m}}{4 \cdot 0.33 ext{m}}
ight)$$

17) Inlet Length given Inlet Impedance 🗗

 $ag{L} = 4 \cdot ext{r}_{ ext{H}} \cdot rac{ ext{F} - ext{K}_{ ext{ex}} - ext{K}_{ ext{en}}}{ ext{f}}$

 $49.984 \text{m} = 4 \cdot 0.33 \text{m} \cdot \frac{2.246 - 0.1 - 1.01}{0.02}$

18) Keulegan Repletion Coefficient 🗗

 $K = rac{1}{K_2} \cdot \sqrt{rac{1}{K_1}}$

19) King's Dimensionless Velocity

 $extbf{K} extbf{V'}_{ ext{m}} = rac{ ext{A}_{ ext{avg}} \cdot ext{T} \cdot extbf{V}_{ ext{m}}}{2 \cdot \pi \cdot ext{A}_{ ext{a}} \cdot ext{A}_{ ext{b}}}$

ex
$$113.0986 = rac{8 ext{m}^2 \cdot 130 ext{s} \cdot 4.1 ext{m/s}}{2 \cdot \pi \cdot 4.0 ext{m} \cdot 1.5001 ext{m}^2}$$







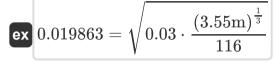


20) Manning's Roughness Coefficient using Dimensionless Parameter 💪

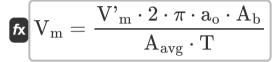




Open Calculator 🗗

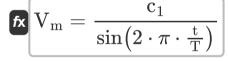


21) Maximum Cross-Sectionally Averaged Velocity during Tidal Cycle



Open Calculator

22) Maximum Cross-Sectionally Averaged Velocity during Tidal Cycle given Inlet Channel Velocity



Open Calculator

$$ext{ex} egin{aligned} 4.039452 ext{m/s} &= rac{4.01 ext{m/s}}{\sin \left(2 \cdot \pi \cdot rac{1.2 ext{h}}{130 ext{s}}
ight)} \end{aligned}$$



23) Ocean Tide Amplitude using King's Dimensionless Velocity 🗗

 $\mathbf{a}_{\mathrm{o}} = rac{\mathrm{A}_{\mathrm{avg}}\cdot\mathrm{V}_{\mathrm{m}}\cdot\mathrm{T}}{\mathrm{V'}_{\mathrm{m}}\cdot2\cdot\pi\cdot\mathrm{A}_{\mathrm{b}}}$

Open Calculator 2

24) Surface Area of Bay for Flow through Inlet into Bay

 $\mathbf{K} \mathbf{A}_{\mathrm{b}} = rac{\mathbf{V}_{\mathrm{avg}} \cdot \mathbf{A}_{\mathrm{avg}}}{\mathbf{d}_{\mathrm{Bav}}}$

Open Calculator

 $1.5 \mathrm{m}^2 = rac{3.75 \mathrm{m/s} \cdot 8 \mathrm{m}^2}{20}$

25) Surface Area of Bay given Tidal Prism Filling Bay 🖸

 $\left|\mathbf{A}_{\mathrm{b}} = rac{\mathrm{P}}{2 \cdot \mathrm{a}_{\mathrm{D}}}
ight|$

Open Calculator

4.324324m² = $\frac{32$ m³

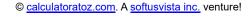
26) Surface Area of Bay using King's Dimensionless Velocity

 $\mathbf{K} \mathbf{A}_{\mathrm{b}} = rac{\mathbf{A}_{\mathrm{avg}} \cdot \mathbf{T} \cdot \mathbf{V}_{\mathrm{m}}}{\mathbf{V'}_{\mathrm{m}} \cdot 2 \cdot \pi \cdot \mathbf{a}_{\mathrm{o}}}$

Open Calculator

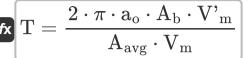
 $oxed{ex} 1.542356 \mathrm{m}^{_2} = rac{8 \mathrm{m}^{_2} \cdot 130 \mathrm{s} \cdot 4.1 \mathrm{m/s}}{110 \cdot 2 \cdot \pi \cdot 4.0 \mathrm{m}}$







27) Tidal Period using King's Dimensionless Velocity 🗗



Open Calculator

ex
$$126.4384\mathrm{s} = rac{2 \cdot \pi \cdot 4.0\mathrm{m} \cdot 1.5001\mathrm{m}^2 \cdot 110}{8\mathrm{m}^2 \cdot 4.1\mathrm{m/s}}$$

28) Tidal Prism Filling Bay



Open Calculator

$$\textbf{ex} \ 11.10074 \text{m}^{_3} = 2 \cdot 3.7 \cdot 1.5001 \text{m}^{_2}$$



Variables Used

- Aavg Average Area over the Channel Length (Square Meter)
- a_B Bay Tide Amplitude
- Ab Surface Area of Bay (Square Meter)
- ao Ocean Tide Amplitude (Meter)
- C₁ Inlet Velocity (Meter per Second)
- d_{Bav} Change of Bay Elevation with Time
- f Dimensionless Parameter
- F Inlet Impedance
- K Keulegan Repletion Coefficient [dimensionless]
- K₁ King's Inlet Friction Coefficient
- K₂ King's 1st Inlet Friction Coefficient
- Ken Entrance Energy Loss Coefficient
- K_{ex} Exit Energy Loss Coefficient
- L Inlet Length (Meter)
- n Manning's Roughness Coefficient
- P Tidal Prism Filling Bay (Cubic Meter)
- r_H Hydraulic Radius (Meter)
- R_H Hydraulic Radius of the Channel (Meter)
- **t** Duration of Inflow (Hour)
- T Tidal Period (Second)
- V_{avq} Average Velocity in Channel for Flow (Meter per Second)
- V_m Maximum Cross Sectional Average Velocity (Meter per Second)





ullet V'm King's Dimensionless Velocity





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Function: asin, asin(Number)

 The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given ratio.
- Function: sin, sin(Angle)

 Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- 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: Time in Second (s), Hour (h)
 Time Unit Conversion
- Measurement: Volume in Cubic Meter (m³)
 Volume 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

- Bay Superelevation, Effect of
 Inlet Currents and Tidal Freshwater Inflow, Multiple Inlets and Wave-Current Interaction Formulas
 - **Elevations Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

4/9/2024 | 9:50:10 AM UTC

Please leave your feedback here...



