Important Time Required to Empty a Reservoir with Rectangular Weir Formulas PDF

Formulas
Examples
with Units

List of 19
Important Time Required to Empty a Reservoir with Rectangular Weir Formulas

1) Bazins Constant given Time Required to Lower Liquid Surface Formula

Evaluate Formula

Formula

$$m = \left(\frac{2 \cdot A_R}{\Delta t \cdot \sqrt{2 \cdot g}} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$0.6021 = \left(\frac{2 \cdot 13\,\text{m}^2}{1.25\,\text{s} \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

2) Coefficient of Discharge for Time Required to Lower Liquid Surface Formula

Evaluate Formula

Formula

$$C_d = \left(\frac{2 \cdot A_R}{\left(\frac{2}{3}\right) \cdot \Delta t \cdot \sqrt{2 \cdot g \cdot L_w}} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$0.301 = \left(\frac{2 \cdot 13\,\text{m}^2}{\left(\frac{2}{3}\right) \cdot 1.25\,\text{s} \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2 \cdot 3\,\text{m}}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

3) Coefficient of Discharge given Time required to Lower Liquid for Triangular Notch Formula

Evaluate Formula

Formula

$$C_d = \left(\frac{\left(\frac{2}{3}\right) \cdot A_R}{\left(\frac{8}{15}\right) \cdot \Delta t \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right)} \right) \cdot \left(\left(\frac{1}{h_2^{\frac{3}{2}}} \right) - \left(\frac{1}{H_{Upstream}^{\frac{3}{2}}} \right) \right)$$

Example with Units

$$0.6101 = \left(\frac{\left(\frac{2}{3}\right) \cdot 13\,\text{m}^2}{\left(\frac{8}{15}\right) \cdot 1.25\,\text{s} \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30^\circ}{2}\right)} \right) \cdot \left(\left(\frac{1}{5.1\,\text{m}^{\frac{3}{2}}} \right) - \left(\frac{1}{10.1\,\text{m}^{\frac{3}{2}}} \right) \right)$$

4) Cross Sectional Area given Time required to Lower Liquid for Triangular Notch Formula

Evaluate Formula

Formula

$$A_R = \frac{\Delta t \cdot \left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right)}{\left(\frac{2}{3}\right) \cdot \left(\left(\frac{1}{h_2^{\frac{3}{2}}} \right) - \left(\frac{1}{H_{Upstream}^{\frac{3}{2}}} \right) \right)}$$

Example with Units

$$14.0636\,\text{m}^2 = \frac{1.25\,\text{s} \cdot \left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30^\circ}{2}\right)}{\left(\frac{2}{3}\right) \cdot \left(\left(\frac{1}{5.1\,\text{m}^{\frac{3}{2}}} \right) - \left(\frac{1}{10.1\,\text{m}^{\frac{3}{2}}} \right) \right)}$$

5) Cross Sectional Area given Time required to Lower Liquid Surface Formula

Evaluate Formula

Formula

$$A_R = \frac{\Delta t \cdot \left(\frac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w}{2 \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)}$$

Example with Units

$$28.5014\,\text{m}^2 = \frac{1.25\,\text{s} \cdot \left(\frac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 3\,\text{m}}{2 \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)}$$

6) Cross Sectional Area given time required to Lower Liquid Surface using Bazins Formula Formula

Evaluate Formula

Formula

$$A_R = \frac{\Delta t \cdot m \cdot \sqrt{2 \cdot g}}{\left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}}\right) \cdot 2}$$

Example with Units

$$8.7879\,m^2 = \frac{1.25\,s \cdot 0.407 \cdot \sqrt{2 \cdot 9.8\,m/s^2}}{\left(\frac{1}{\sqrt{5.1\,m}} - \frac{1}{\sqrt{10.1\,m}}\right) \cdot 2}$$

7) Head given Time Required to Lower Liquid Surface using Francis Formula Formula

Evaluate Formula

Formula

$$H_{Avg} = \frac{\left(\frac{2 \cdot A_R}{1.84 \cdot t_F}\right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}}\right) - L_w}{-0.1 \cdot n}$$

Example with Units

$$6.8882\,m = \frac{\left(\frac{2 \cdot 13\,m^2}{1.84 \cdot 7.4\,s}\right) \cdot \left(\frac{1}{\sqrt{5.1\,m}} - \frac{1}{\sqrt{10.1\,m}}\right) - 3\,m}{-0.1 \cdot 4}$$

8) Head1 given Time Required to Lower Liquid for Triangular Notch Formula

Evaluate Formula

Formula

$$H_{Upstream} = \left(\frac{1}{\left(\frac{1}{h_2^{\frac{3}{2}}}\right) - \left(\frac{\Delta t \cdot \left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right)}{\left(\frac{2}{3}\right) \cdot A_R}\right)}\right)^{\frac{2}{3}}$$

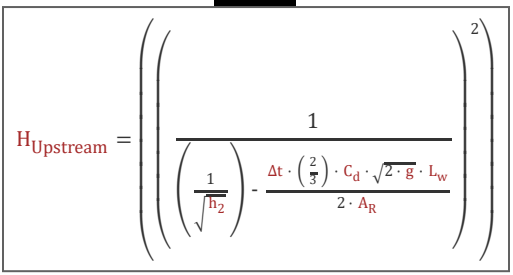
Example with Units

$$11.2224\,m = \left(\frac{1}{\left(\frac{1}{5.1\,m^{\frac{3}{2}}}\right) - \left(\frac{1.25\,s \cdot \left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,m/s^2} \cdot \tan\left(\frac{30°}{2}\right)}{\left(\frac{2}{3}\right) \cdot 13\,m^2}\right)}\right)^{\frac{2}{3}}$$

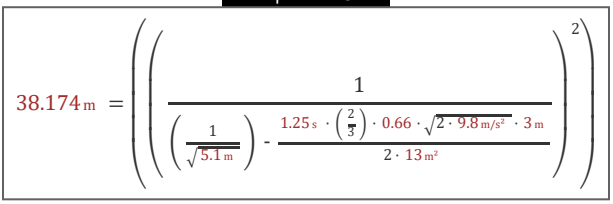
9) Head1 given Time Required to Lower Liquid Surface Formula

Evaluate Formula

Formula



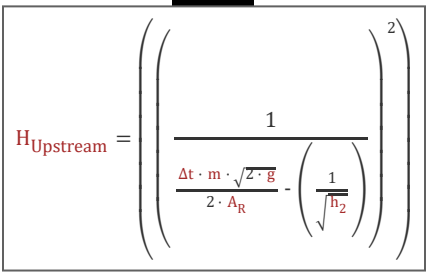
Example with Units



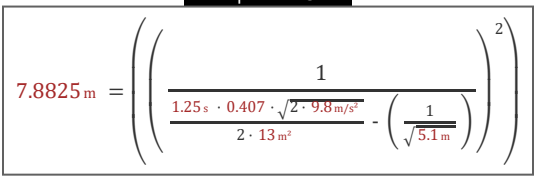
10) Head1 given Time Required to Lower Liquid Surface using Bazins Formula Formula

Evaluate Formula

Formula



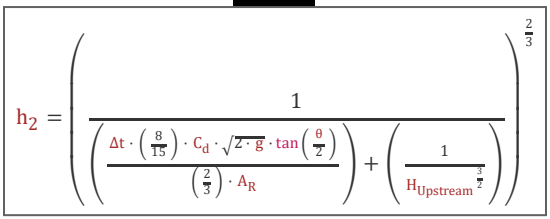
Example with Units



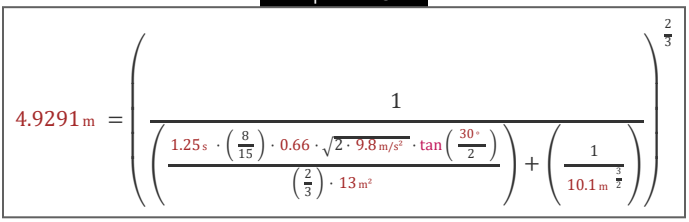
11) Head2 given Time Required to Lower Liquid for Triangular Notch Formula

Evaluate Formula

Formula



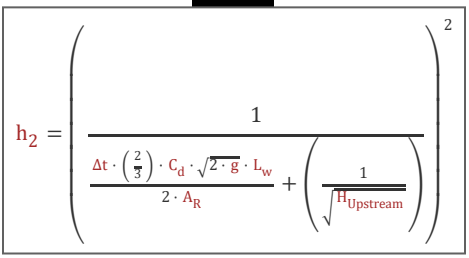
Example with Units



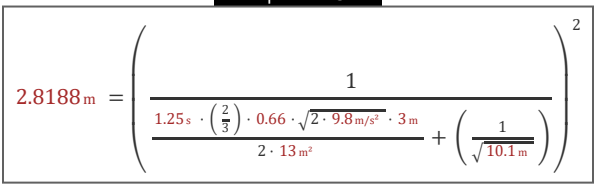
12) Head2 given Time Required to Lower Liquid Surface Formula

Evaluate Formula

Formula



Example with Units



13) Head2 given Time Required to Lower Liquid Surface using Bazins Formula Formula

Evaluate Formula

Formula

$$h_2 = \left(\frac{1}{\frac{\Delta t \cdot m \cdot \sqrt{2 \cdot g}}{2 \cdot A_R} + \left(\frac{1}{\sqrt{H_{Upstream}}} \right)} \right)^2$$

Example with Units

$$6.21\,\text{m} = \left(\frac{1}{\frac{1.25\,\text{s} \cdot 0.407 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2}}{2 \cdot 13\,\text{m}^2} + \left(\frac{1}{\sqrt{10.1\,\text{m}}} \right)} \right)^2$$

14) Length of Crest for time required to Lower Liquid Surface Formula

Evaluate Formula

Formula

$$L_w = \left(\frac{2 \cdot A_R}{\left(\frac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \Delta t} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$1.3684\,\text{m} = \left(\frac{2 \cdot 13\,\text{m}^2}{\left(\frac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 1.25\,\text{s}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

15) Length of Crest given Time Required to Lower Liquid Surface using Francis Formula Formula

Evaluate Formula

Formula

$$L_w = \left(\left(\frac{2 \cdot A_R}{1.84 \cdot t_F} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right) \right) + \left(0.1 \cdot n \cdot H_{Avg} \right)$$

Example with Units

$$2.4447\,\text{m} = \left(\left(\frac{2 \cdot 13\,\text{m}^2}{1.84 \cdot 7.4\,\text{s}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right) \right) + \left(0.1 \cdot 4 \cdot 5.5\,\text{m} \right)$$

16) Time Required to Lower Liquid Surface Formula

Evaluate Formula

Formula

$$\Delta t = \left(\frac{2 \cdot A_R}{\left(\frac{2}{3}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot L_w} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$0.5701\,\text{s} = \left(\frac{2 \cdot 13\,\text{m}^2}{\left(\frac{2}{3}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot 3\,\text{m}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

17) Time Required to Lower Liquid Surface for Triangular Notch Formula

Evaluate Formula

Formula

$$\Delta t = \left(\frac{\left(\frac{2}{3}\right) \cdot A_R}{\left(\frac{8}{15}\right) \cdot C_d \cdot \sqrt{2 \cdot g} \cdot \tan\left(\frac{\theta}{2}\right)} \right) \cdot \left(\left(\frac{1}{h_2^{\frac{3}{2}}} \right) - \left(\frac{1}{H_{Upstream}^{\frac{3}{2}}} \right) \right)$$

Example with Units

$$1.1555\,\text{s} = \left(\frac{\left(\frac{2}{3}\right) \cdot 13\,\text{m}^2}{\left(\frac{8}{15}\right) \cdot 0.66 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2} \cdot \tan\left(\frac{30^\circ}{2}\right)} \right) \cdot \left(\left(\frac{1}{5.1\,\text{m}^{\frac{3}{2}}} \right) - \left(\frac{1}{10.1\,\text{m}^{\frac{3}{2}}} \right) \right)$$

18) Time Required to Lower Liquid Surface using Bazins Formula Formula

Evaluate Formula

Formula

$$\Delta t = \left(\frac{2 \cdot A_R}{m \cdot \sqrt{2 \cdot g}} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$1.8491\,\text{s} = \left(\frac{2 \cdot 13\,\text{m}^2}{0.407 \cdot \sqrt{2 \cdot 9.8\,\text{m/s}^2}} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

19) Time Required to Lower Liquid Surface using Francis Formula Formula

Evaluate Formula

Formula

$$t_F = \left(\frac{2 \cdot A_R}{1.84 \cdot \left(L_w - \left(0.1 \cdot n \cdot H_{Avg} \right) \right)} \right) \cdot \left(\frac{1}{\sqrt{h_2}} - \frac{1}{\sqrt{H_{Upstream}}} \right)$$

Example with Units

$$2.2635\,\text{s} = \left(\frac{2 \cdot 13\,\text{m}^2}{1.84 \cdot \left(3\,\text{m} - \left(0.1 \cdot 4 \cdot 5.5\,\text{m} \right) \right)} \right) \cdot \left(\frac{1}{\sqrt{5.1\,\text{m}}} - \frac{1}{\sqrt{10.1\,\text{m}}} \right)$$

Variables used in list of Time Required to Empty a Reservoir with Rectangular Weir Formulas above

- A_R Cross-Sectional Area of Reservoir *(Square Meter)*
- C_d Coefficient of Discharge
- **g** Acceleration due to Gravity *(Meter per Square Second)*
- h_2 Head on Downstream of Weir *(Meter)*
- H_{Avg} Average Height of Downstream and Upstream *(Meter)*
- $H_{Upstream}$ Head on Upstream of Weir *(Meter)*
- L_w Length of Weir Crest *(Meter)*
- **m** Bazins Coefficient
- **n** Number of End Contraction
- t_F Time Interval for Francis *(Second)*
- **Δt** Time Interval *(Second)*
- **θ** Theta *(Degree)*

Constants, Functions, Measurements used in list of Time Required to Empty a Reservoir with Rectangular Weir 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.
- Functions: **tan**, tan(Angle)
  The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s²)
  Acceleration Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion

Download other Important Flow Over Notches and Weirs PDFs

- Important Broad Crested Weir Formulas
- Important Flow Over a Trapizoidal and Triangular Weir or Notch Formulas
- Important Flow Over Rectangular Sharp Crested Weir or Notch Formulas
- Important Submerged Weirs Formulas
- Important Time Required to Empty a Reservoir with Rectangular Weir Formulas

Try our Unique Visual Calculators

- Percentage share
- HCF of two numbers
- Improper fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

9/23/2024 | 11:36:37 AM UTC