calculatoratoz.com

unitsconverters.com

Metering Flumes and Momentum in Open-Channel Flow Specific Force 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 15 Metering Flumes and Momentum in Open-Channel Flow Specific Force Formulas

Metering Flumes and Momentum in Open-Channel Flow Specific Force

Metering Flumes

1) Coefficient of Discharge through Flume given Discharge Flow through Channel

Open Calculator

fx $$C_d = \left(\frac{Q}{A_i \cdot A_f} \cdot \left(\sqrt{\frac{(A_i^2) - (A_f^2)}{2 \cdot [g] \cdot (h_i - h_o)}} \right) \right)$$

ex $$0.767462 = \left(\frac{14 m^3/s}{7.1 m^2 \cdot 1.8 m^2} \cdot \left(\sqrt{\frac{\left((7.1 m^2)^2\right) - \left((1.8 m^2)^2\right)}{2 \cdot [g] \cdot (20 m - 15.1 m)}} \right) \right)$$

2) Coefficient of Discharge through Flume given Discharge Flow through Rectangular Channel

Open Calculator

fx $$C_d = \left(\frac{Q}{A_i \cdot A_f} \cdot \left(\sqrt{\frac{(A_i^2) - (A_f^2)}{2 \cdot [g] \cdot (h_i - h_o)}} \right) \right)$$

ex $$0.767462 = \left(\frac{14 m^3/s}{7.1 m^2 \cdot 1.8 m^2} \cdot \left(\sqrt{\frac{\left((7.1 m^2)^2\right) - \left((1.8 m^2)^2\right)}{2 \cdot [g] \cdot (20 m - 15.1 m)}} \right) \right)$$

3) Depth of Flow given Discharge through Critical Depth Flume

Open Calculator

fx $$d_f = \left(\frac{Q}{W_t \cdot C_d} \right)^{\frac{2}{3}}$$

ex $$3.324125\text{m} = \left(\frac{14\text{m}^3/\text{s}}{3.5\text{m} \cdot 0.66} \right)^{\frac{2}{3}}$$

4) Discharge Coefficient given Discharge through Critical Depth Flume

Open Calculator

fx $$C_d = \frac{Q}{W_t \cdot \left(d_f^{1.5} \right)}$$

ex $$0.667251 = \frac{14\text{m}^3/\text{s}}{3.5\text{m} \cdot \left((3.3\text{m})^{1.5} \right)}$$

5) Discharge Flow through Channel

Open Calculator

fx $$Q = (C_d \cdot A_i \cdot A_f) \cdot \left(\sqrt{2 \cdot [g] \cdot \frac{h_i - h_o}{\left(A_i^2 \right) - \left(A_f^2 \right)}} \right)$$

ex

$$12.03969\text{m}^3/\text{s} = (0.66 \cdot 7.1\text{m}^2 \cdot 1.8\text{m}^2) \cdot \left(\sqrt{2 \cdot [g] \cdot \frac{20\text{m} - 15.1\text{m}}{\left((7.1\text{m}^2)^2 \right) - \left((1.8\text{m}^2)^2 \right)}} \right)$$

6) Discharge Flow through Rectangular Channel

Open Calculator

fx $$Q = (C_d \cdot A_i \cdot A_f) \cdot \left(\sqrt{2 \cdot [g] \cdot \frac{h_i - h_o}{(A_i^2) - (A_f^2)}} \right)$$

ex $$12.03969 m^3/s = (0.66 \cdot 7.1 m^2 \cdot 1.8 m^2) \cdot \left(\sqrt{2 \cdot [g] \cdot \frac{20 m - 15.1 m}{\left((7.1 m^2)^2\right) - \left((1.8 m^2)^2\right)}} \right)$$

7) Discharge through Critical Depth Flume

Open Calculator

fx $$Q = C_d \cdot W_t \cdot \left(d_f^{1.5}\right)$$

ex $$13.84787 m^3/s = 0.66 \cdot 3.5 m \cdot \left((3.3 m)^{1.5}\right)$$

8) Head at Entrance given Discharge through Channel

Open Calculator

fx $$h_i = \left(\frac{Q}{C_d \cdot A_i \cdot A_f \cdot \left(\sqrt{2 \cdot \frac{[g]}{A_i^2 - A_f^2}} \right)} \right)^2 + h_o$$

ex $$21.72555 m = \left(\frac{14 m^3/s}{0.66 \cdot 7.1 m^2 \cdot 1.8 m^2 \cdot \left(\sqrt{2 \cdot \frac{[g]}{(7.1 m^2)^2 - (1.8 m^2)^2}} \right)} \right)^2 + 15.1 m$$

9) Head at Entrance of Section given Discharge Flow through Channel

Open Calculator

fx $$h_o = h_i - \left(\frac{Q}{C_d \cdot A_i \cdot A_f \cdot \left(\sqrt{2 \cdot \frac{[g]}{A_i^2 - A_f^2}} \right)} \right)^2$$

ex $$13.37445\text{m} = 20\text{m} - \left(\frac{14\text{m}^3/\text{s}}{0.66 \cdot 7.1\text{m}^2 \cdot 1.8\text{m}^2 \cdot \left(\sqrt{2 \cdot \frac{[g]}{(7.1\text{m}^2)^2 - (1.8\text{m}^2)^2}} \right)} \right)^2$$

10) Width of Throat given Discharge through Critical Depth Flume

Open Calculator

fx $$W_t = \frac{Q}{C_d \cdot \left(d_f^{1.5} \right)}$$

ex $$3.538451\text{m} = \frac{14\text{m}^3/\text{s}}{0.66 \cdot \left((3.3\text{m})^{1.5} \right)}$$

Momentum in Open-Channel Flow-Specific Force

11) Specific Force

Open Calculator

fx $$F = \left(Q \cdot \frac{Q}{A_{cs} \cdot [g]} \right) + A_{cs} \cdot Y_t$$

ex $$304.3324\text{m}^3 = \left(14\text{m}^3/\text{s} \cdot \frac{14\text{m}^3/\text{s}}{15\text{m}^2 \cdot [g]} \right) + 15\text{m}^2 \cdot 20.2\text{m}$$

12) Specific Force given Top Width

Open Calculator

fx $$F = \left(\frac{A_{cs}^2}{T} \right) + A_{cs} \cdot Y_t$$

ex $$410.1429\text{m}^3 = \left(\frac{(15\text{m}^2)^2}{2.1\text{m}} \right) + 15\text{m}^2 \cdot 20.2\text{m}$$

13) Top Width given Specific Force

Open Calculator

fx $$T = \frac{A_{cs}^2}{F - A_{cs} \cdot Y_t}$$

ex $$2.102804\text{m} = \frac{(15\text{m}^2)^2}{410\text{m}^3 - 15\text{m}^2 \cdot 20.2\text{m}}$$

14) Vertical Depth of Centroid of Area given Specific Force

Open Calculator

fx $$Y_t = \frac{F - \left(Q \cdot \frac{Q}{A_{cs} \cdot [g]} \right)}{A_{cs}}$$

ex $$27.2445\text{m} = \frac{410\text{m}^3 - \left(14\text{m}^3/\text{s} \cdot \frac{14\text{m}^3/\text{s}}{15\text{m}^2 \cdot [g]} \right)}{15\text{m}^2}$$

15) Vertical Depth of Centroid of Area given Specific Force with Top Width

Open Calculator

fx $$Y_t = \frac{F - \left(\frac{A_{cs}^2}{T}\right)}{A_{cs}}$$

ex $$20.19048\text{m} = \frac{410\text{m}^3 - \left(\frac{(15\text{m}^2)^2}{2.1\text{m}}\right)}{15\text{m}^2}$$

Variables Used

- A_{cs} Cross-Sectional Area of Channel *(Square Meter)*
- A_f Cross Section Area 2 *(Square Meter)*
- A_i Cross Section Area 1 *(Square Meter)*
- C_d Coefficient of Discharge
- d_f Depth of Flow *(Meter)*
- F Specific Force in OCF *(Cubic Meter)*
- h_i Loss of Head at Entrance *(Meter)*
- h_o Loss of Head at Exit *(Meter)*
- Q Discharge of Channel *(Cubic Meter per Second)*
- T Top Width *(Meter)*
- W_t Width of Throat *(Meter)*
- Y_t Distance from Centroidal *(Meter)*

Constants, Functions, Measurements used

- Constant: **[g]**, 9.80665 Meter/Second²
  Gravitational acceleration on Earth
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Volume** in Cubic Meter (m³)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion

Check other formula lists

- **Computation of Uniform Flow Formulas**
- **Critical Flow and its Computation Formulas**
- **Geometrical Properties of Channel Section Formulas**
- **Metering Flumes and Momentum in Open-Channel Flow Specific Force Formulas**
- **Specific Energy and Critical Depth Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

2/1/2024 | 4:55:58 AM UTC

Please leave your feedback here...