calculatoratoz.com

unitsconverters.com

Critical Flow and its Computation 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 20 Critical Flow and its Computation Formulas

Critical Flow and its Computation

1) Critical Depth for Parabolic Channel

Open Calculator

fx $$h_p = \left(3.375 \cdot \frac{\left(\frac{Q}{S}\right)^2}{[g]} \right)^{\frac{1}{4}}$$

ex $$143.2921\text{m} = \left(3.375 \cdot \frac{\left(\frac{14\text{m}^3/\text{s}}{0.0004}\right)^2}{[g]} \right)^{\frac{1}{4}}$$

2) Critical Depth for Rectangular Channel

Open Calculator

fx $$h_r = \left(\frac{q^2}{[g]} \right)^{\frac{1}{3}}$$

ex $$2.182934\text{m} = \left(\frac{(10.1\text{m}^2/\text{s})^2}{[g]} \right)^{\frac{1}{3}}$$

3) Critical Depth for Triangular Channel

Open Calculator

$$h_t = \left(2 \cdot \frac{\left(\frac{Q}{S} \right)^2}{[g]} \right)^{\frac{1}{5}}$$

$$47.81114\text{m} = \left(2 \cdot \frac{\left(\frac{14\text{m}^3/\text{s}}{0.0004} \right)^2}{[g]} \right)^{\frac{1}{5}}$$

4) Critical Depth given Critical Energy for Rectangular Channel

Open Calculator

$$h_r = \frac{E_r}{1.5}$$

$$2.16\text{m} = \frac{3.24\text{m}}{1.5}$$

5) Critical Depth given Critical Energy for Triangular Channel

Open Calculator

$$h_t = \frac{E_t}{1.25}$$

$$48\text{m} = \frac{60\text{m}}{1.25}$$

6) Critical Depth of Flow given Critical Energy for Parabolic Channel

Open Calculator

fx $$h_p = \frac{E_c}{\frac{4}{3}}$$

ex $$142.5\text{m} = \frac{190\text{m}}{\frac{4}{3}}$$

7) Critical Energy for Parabolic Channel

Open Calculator

fx $$E_c = \left(\frac{4}{3}\right) \cdot h_p$$

ex $$190.6667\text{m} = \left(\frac{4}{3}\right) \cdot 143\text{m}$$

8) Critical Energy for Rectangular Channel

Open Calculator

fx $$E_r = 1.5 \cdot h_r$$

ex $$3.27\text{m} = 1.5 \cdot 2.18\text{m}$$

9) Critical Energy for Triangular Channel

Open Calculator

fx $$E_t = h_t \cdot 1.25$$

ex $$59.75\text{m} = 47.8\text{m} \cdot 1.25$$

10) Critical Section Factor

Open Calculator

fx $$Z = \frac{Q}{\sqrt{[g]}}$$

ex $$4.470619\text{m}\hat{}2.5 = \frac{14\text{m}^3/\text{s}}{\sqrt{[g]}}$$

11) Discharge given Critical Depth for Parabolic Channel

Open Calculator

fx $$Q = \sqrt{\left(h_p^4\right) \cdot \left((S)^2\right) \cdot 0.29629629629 \cdot [g]}$$

ex $$13.94298\text{m}^3/\text{s} = \sqrt{\left((143\text{m})^4\right) \cdot \left((0.0004)^2\right) \cdot 0.29629629629 \cdot [g]}$$

12) Discharge given Critical Depth for Triangular Channel

Open Calculator

fx $$Q = \sqrt{\left(h_t^5\right) \cdot \left((S)^2\right) \cdot 0.5 \cdot [g]}$$

ex $$13.99185\text{m}^3/\text{s} = \sqrt{\left((47.8\text{m})^5\right) \cdot \left((0.0004)^2\right) \cdot 0.5 \cdot [g]}$$

13) Discharge given Critical Section Factor

Open Calculator

fx $$Q = Z \cdot \sqrt{[g]}$$

ex $$21.29459\text{m}^3/\text{s} = 6.8\text{m}\hat{}2.5 \cdot \sqrt{[g]}$$

14) Discharge per unit Width given Critical Depth for Rectangular Channel

Open Calculator

fx $$q = \left(\left(h_r^3\right) \cdot [g]\right)^{\frac{1}{2}}$$

ex $$10.07964\text{m}^2/\text{s} = \left(\left((2.18\text{m})^3\right) \cdot [g]\right)^{\frac{1}{2}}$$

15) Side Slope of Channel given Critical Depth for Parabolic Channel

Open Calculator

fx $$S = \left(3.375 \cdot \frac{(Q)^2}{\left(h_p^4\right) \cdot [g]}\right)^{\frac{1}{2}}$$

ex $$0.000402 = \left(3.375 \cdot \frac{(14\text{m}^3/\text{s})^2}{\left((143\text{m})^4\right) \cdot [g]}\right)^{\frac{1}{2}}$$

16) Side Slope of Channel given Critical Depth for Triangular Channel

Open Calculator

fx $$S = \left(2 \cdot \frac{(Q)^2}{\left(h_t^5\right) \cdot [g]}\right)^{\frac{1}{2}}$$

ex $$0.0004 = \left(2 \cdot \frac{(14\text{m}^3/\text{s})^2}{\left((47.8\text{m})^5\right) \cdot [g]}\right)^{\frac{1}{2}}$$

Section Factor

17) Hydraulic Depth given Section Factor

Open Calculator

fx $$D_{Hydraulic} = \left(\frac{Z}{A}\right)^2$$

ex $$0.073984\text{m} = \left(\frac{6.8\text{m}\hat{}2.5}{25\text{m}^2}\right)^2$$

18) Section Factor in open channel

Open Calculator

fx $$Z = 0.544331054 \cdot T \cdot \left(d_f^{1.5}\right)$$

ex $$6.852567\text{m}\hat{}2.5 = 0.544331054 \cdot 2.1\text{m} \cdot \left((3.3\text{m})^{1.5}\right)$$

19) Top Width given Section Factors

Open Calculator

fx $$T = \frac{A^3}{Z^2}$$

ex $$337.9109\text{m} = \frac{(25\text{m}^2)^3}{(6.8\text{m}\hat{}2.5)^2}$$

20) Wetted Area given Section Factor

Open Calculator

fx $$A = \frac{Z}{\sqrt{D_{Hydraulic}}}$$

ex $$3.925982\text{m}^2 = \frac{6.8\text{m}\hat{}2.5}{\sqrt{3\text{m}}}$$

Variables Used

- **A** Wetted Surface Area of Channel *(Square Meter)*
- d_f Depth of Flow *(Meter)*
- $D_{Hydraulic}$ Hydraulic Depth *(Meter)*
- E_c Critical energy of Parabolic Channel *(Meter)*
- E_r Critical Energy of Rectangular Channel *(Meter)*
- E_t Critical Energy of Triangular Channel *(Meter)*
- h_p Critical Depth of Parabolic Channel *(Meter)*
- h_r Critical Depth of Rectangular Channel *(Meter)*
- h_t Critical Depth of Triangular Channnel *(Meter)*
- **q** Discharge per unit Width *(Square Meter per Second)*
- **Q** Discharge of Channel *(Cubic Meter per Second)*
- **S** Bed Slope
- **T** Top Width *(Meter)*
- **Z** Section Factor *(Meter^2.5)*

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: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m²/s)
  Kinematic Viscosity Unit Conversion
- Measurement: **Section Factor** in Meter^2.5 (m^2.5)
  Section Factor 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

9/25/2023 | 7:42:14 AM UTC *Please leave your feedback here...*