calculatoratoz.com

unitsconverters.com

Force Exerted by Fluid Jet on Stationary Flat Plate 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 22 Force Exerted by Fluid Jet on Stationary Flat Plate Formulas

Force Exerted by Fluid Jet on Stationary Flat Plate ⌁

Flat Plate Inclined at an Angle to the Jet ⌁

1) Cross Sectional Area of Jet for given Dynamic Thrust Normal to Direction of Jet ⌁

Open Calculator ⌁

$$fx \quad A_{Jet} = \frac{F_Y \cdot [g]}{\gamma_f \cdot v_{jet}^2 \cdot \sin(\angle D) \cdot \cos(\angle D)}$$

$$ex \quad 1.408404m^2 = \frac{38kN \cdot [g]}{9.81kN/m^3 \cdot (12m/s)^2 \cdot \sin(11°) \cdot \cos(11°)}$$

2) Cross Sectional Area of Jet for given Dynamic Thrust Parallel to Direction of Jet ⌁

Open Calculator ⌁

$$fx \quad A_{Jet} = \frac{F_X \cdot [g]}{\gamma_f \cdot v_{jet}^2 \cdot (\sin(\angle D))^2}$$

$$ex \quad 1.944875m^2 = \frac{10.2kN \cdot [g]}{9.81kN/m^3 \cdot (12m/s)^2 \cdot (\sin(11°))^2}$$

3) Cross Sectional Area of Jet for given Thrust Exerted in Direction of Normal to Plate ⎘

fx $$A_{Jet} = \frac{F_p \cdot [g]}{\gamma_f \cdot v_{jet}^2 \cdot (\sin(\angle D))}$$

Open Calculator ⎘

ex $$1.41891 m^2 = \frac{39kN \cdot [g]}{9.81 kN/m^3 \cdot (12 m/s)^2 \cdot (\sin(11°))}$$

4) Discharge Flowing by Jet ⎘

fx $$Q = Q_{x,y} + Q_{x,y}$$

Open Calculator ⎘

ex $$1.02 m^3/s = 0.51 m^3/s + 0.51 m^3/s$$

5) Discharge Flowing in Direction Normal to Plate ⎘

fx $$Q_{x,y} = \left(\frac{Q}{2}\right) \cdot (1 + \cos(\angle D))$$

Open Calculator ⎘

ex $$1.000722 m^3/s = \left(\frac{1.01 m^3/s}{2}\right) \cdot (1 + \cos(11°))$$

6) Discharge Flowing in Direction Parallel to Plate ⎘

fx $$Q_{x,y} = \left(\frac{Q}{2}\right) \cdot (1 - \cos(\angle D))$$

Open Calculator ⎘

ex $$0.009278 m^3/s = \left(\frac{1.01 m^3/s}{2}\right) \cdot (1 - \cos(11°))$$

7) Force Exerted by Jet in Direction Normal to Plate 🔗

Open Calculator 🔗

$$fx \quad F_p = \left(\frac{\gamma_f \cdot A_{Jet} \cdot \left(v_{jet}^2 \right)}{[g]} \right) \cdot \sin(\angle D)$$

$$ex \quad 32.98306 kN = \left(\frac{9.81 kN/m^3 \cdot 1.2 m^2 \cdot \left((12 m/s)^2 \right)}{[g]} \right) \cdot \sin(11°)$$

8) Force Exerted by Jet Normal to Direction of Jet Normal to Plate 🔗

Open Calculator 🔗

$$fx \quad F_Y = \left(\frac{\gamma_f \cdot A_{Jet} \cdot v_{jet}^2}{[g]} \right) \cdot \sin(\angle D) \cdot \cos(\angle D)$$

ex

$$32.37707 kN = \left(\frac{9.81 kN/m^3 \cdot 1.2 m^2 \cdot (12 m/s)^2}{[g]} \right) \cdot \sin(11°) \cdot \cos(11°)$$

9) Force Exerted by Jet Parallel to Direction of Jet Normal to Plate 🔗

Open Calculator 🔗

$$fx \quad F_X = \left(\frac{\gamma_f \cdot A_{Jet} \cdot v_{jet}^2}{[g]} \right) \cdot (\sin(\angle D))^2$$

$$ex \quad 6.293464 kN = \left(\frac{9.81 kN/m^3 \cdot 1.2 m^2 \cdot (12 m/s)^2}{[g]} \right) \cdot (\sin(11°))^2$$

10) Velocity of Fluid given Thrust Exerted Normal to Plate ⤢

Open Calculator ⤢

$$fx \quad v_{jet} = \sqrt{\frac{F_p \cdot [g]}{\gamma_f \cdot A_{Jet} \cdot (\sin(\angle D))}}$$

$$ex \quad 13.04873 m/s = \sqrt{\frac{39kN \cdot [g]}{9.81 kN/m^3 \cdot 1.2m^2 \cdot (\sin(11°))}}$$

11) Velocity of Fluid given Thrust Normal to Jet ⤢

Open Calculator ⤢

$$fx \quad v_{jet} = \sqrt{\frac{F_Y \cdot [g]}{\gamma_f \cdot A_{Jet} \cdot (\sin(\angle D)) \cdot \cos(\angle D)}}$$

$$ex \quad 13.00033 m/s = \sqrt{\frac{38kN \cdot [g]}{9.81 kN/m^3 \cdot 1.2m^2 \cdot (\sin(11°)) \cdot \cos(11°)}}$$

12) Velocity of Fluid given Thrust Parallel to Jet ⤢

Open Calculator ⤢

$$fx \quad v_{jet} = \sqrt{\frac{F_X \cdot [g]}{\gamma_f \cdot A_{Jet} \cdot (\sin(\angle D))^2}}$$

$$ex \quad 15.27694 m/s = \sqrt{\frac{10.2kN \cdot [g]}{9.81 kN/m^3 \cdot 1.2m^2 \cdot (\sin(11°))^2}}$$

Flat Plate Normal to the Jet ☑
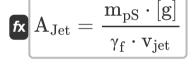
13) Area of Cross Section of Jet for Force Exerted by Stationary Plate on Jet ☑

$$fx \quad A_{Jet} = \frac{F_{St,\perp p} \cdot [g]}{\gamma_f \cdot v_{jet}^2}$$

$$ex \quad 1.200979 m^2 = \frac{173N \cdot [g]}{9.81 kN/m^3 \cdot (12 m/s)^2}$$
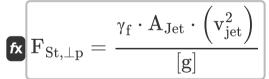
14) Area of Cross Section of Jet given Mass of Fluid ☑

$$fx \quad A_{Jet} = \frac{m_{pS} \cdot [g]}{\gamma_f \cdot v_{jet}}$$

$$ex \quad 1.19959 m^2 = \frac{14.4 kg/s \cdot [g]}{9.81 kN/m^3 \cdot 12 m/s}$$

15) Force Exerted by Stationary Plate on Jet ☑

$$fx \quad F_{St,\perp p} = \frac{\gamma_f \cdot A_{Jet} \cdot \left(v_{jet}^2\right)}{[g]}$$

$$ex \quad 172.859N = \frac{9.81 kN/m^3 \cdot 1.2 m^2 \cdot \left((12 m/s)^2\right)}{[g]}$$
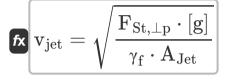
16) Mass Flow Rate of Fluid Striking Plate 🔗

$$fx \quad m_{pS} = \frac{\gamma_f \cdot A_{Jet} \cdot v_{jet}}{[g]}$$

$$ex \quad 14.40492 \text{kg/s} = \frac{9.81 \text{kN/m}^3 \cdot 1.2 \text{m}^2 \cdot 12 \text{m/s}}{[g]}$$
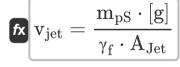
17) Velocity for Force Exerted by Stationary Plate on Jet 🔗

$$fx \quad v_{jet} = \sqrt{\frac{F_{St,\perp p} \cdot [g]}{\gamma_f \cdot A_{Jet}}}$$

$$ex \quad 12.00489 \text{m/s} = \sqrt{\frac{173 \text{N} \cdot [g]}{9.81 \text{kN/m}^3 \cdot 1.2 \text{m}^2}}$$

18) Velocity given Mass of Fluid 🔗

$$fx \quad v_{jet} = \frac{m_{pS} \cdot [g]}{\gamma_f \cdot A_{Jet}}$$

$$ex \quad 11.9959 \text{m/s} = \frac{14.4 \text{kg/s} \cdot [g]}{9.81 \text{kN/m}^3 \cdot 1.2 \text{m}^2}$$

Jet Striking a Symmetrical Stationary Curved Vane at the Centre ⎘

19) Cross Sectional Area for Force Exerted on Plate in Direction of Flow of Jet ⎘

Open Calculator ⎘

$$\textit{fx} \quad A_{Jet} = \frac{F_{jet} \cdot [g]}{\gamma_f \cdot v_{jet}^2 \cdot (1 + \cos(\theta_t))}$$

$$\textit{ex} \quad 1.196157 m^2 = \frac{320N \cdot [g]}{9.81 kN/m^3 \cdot (12 m/s)^2 \cdot (1 + \cos(31°))}$$

20) Force Exerted on Plate in Direction of Flow of Jet on Stationary Curved Vane ⎘

Open Calculator ⎘

$$\textit{fx} \quad F_{jet} = \left(\frac{\gamma_f \cdot A_{Jet} \cdot v_{jet}^2}{[g]} \right) \cdot (1 + \cos(\theta_t))$$

$$\textit{ex} \quad 321.0281N = \left(\frac{9.81 kN/m^3 \cdot 1.2 m^2 \cdot (12 m/s)^2}{[g]} \right) \cdot (1 + \cos(31°))$$

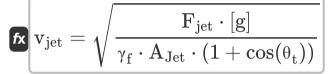## 21) Force Exerted on Plate in Direction of Flow of Jet when Theta is Zero 🔗

Open Calculator 🔗

$$fx \quad F_{jet} = \frac{2 \cdot \gamma_f \cdot A_{Jet} \cdot v_{jet}^2}{[g]}$$

$$ex \quad 345.7181N = \frac{2 \cdot 9.81 kN/m^3 \cdot 1.2 m^2 \cdot (12 m/s)^2}{[g]}$$

22) Velocity for Force Exerted on Plate in Direction of Flow of Jet 🔗

Open Calculator 🔗

$$fx \quad v_{jet} = \sqrt{\frac{F_{jet} \cdot [g]}{\gamma_f \cdot A_{Jet} \cdot (1 + \cos(\theta_t))}}$$

$$ex \quad 11.98077 m/s = \sqrt{\frac{320N \cdot [g]}{9.81 kN/m^3 \cdot 1.2 m^2 \cdot (1 + \cos(31°))}}$$

Variables Used

- $\angle D$ Angle between Jet and Plate *(Degree)*
- A_{Jet} Cross Sectional Area of Jet *(Square Meter)*
- F_{jet} Force on Plate in Dir of Jet on Stat Curved Vane *(Newton)*
- F_p Force Exerted by Jet Normal to Plate *(Kilonewton)*
- $F_{St,\perp p}$ Force by Stationary Plate on Jet $\perp$ Plate *(Newton)*
- F_X Force by Jet Normal to Plate in X *(Kilonewton)*
- F_Y Force by Jet Normal to Plate in Y *(Kilonewton)*
- m_{pS} Mass Flow Rate of Jet *(Kilogram per Second)*
- Q Discharge by Jet *(Cubic Meter per Second)*
- $Q_{x,y}$ Discharge in any Direction *(Cubic Meter per Second)*
- v_{jet} Fluid Jet Velocity *(Meter per Second)*
- γ_f Specific Weight of Liquid *(Kilonewton per Cubic Meter)*
- θ_t Half of Angle Between Two Tangent to Vane *(Degree)*

Constants, Functions, Measurements used

- Constant: **[g]**, 9.80665 Meter/Second²
  Gravitational acceleration on Earth

- Function: **cos**, cos(Angle)
  Trigonometric cosine function

- Function: **sin**, sin(Angle)
  Trigonometric sine function

- Function: **sqrt**, sqrt(Number)
  Square root function

- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion

- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion

- Measurement: **Force** in Kilonewton (kN), Newton (N)
  Force Unit Conversion

- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion

- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion

- Measurement: **Mass Flow Rate** in Kilogram per Second (kg/s)
  Mass Flow Rate Unit Conversion

- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
  Specific Weight Unit Conversion

Check other formula lists

- **Force Exerted by Fluid Jet on Moving Curved Vane Formulas** 🔗
- **Force Exerted by Fluid Jet on Moving Flat Plate Formulas** 🔗
- **Force Exerted by Fluid Jet on Stationary Flat Plate 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 | 2:40:05 PM UTC

Please leave your feedback here...