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Hydraulic Linear Actuators Formulas

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List of 10 Hydraulic Linear Actuators Formulas

Hydraulic Linear Actuators

1) Area of Piston given Force and Pressure

$$\text{fx } A_p = \frac{F}{p}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 0.003125\text{m}^2 = \frac{2.5\text{N}}{800\text{Pa}}$$

2) Discharge during Extension

$$\text{fx } Q = A_p \cdot v_{\text{piston}}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 3\text{m}^3/\text{s} = 0.05\text{m}^2 \cdot 60\text{m}/\text{s}$$

3) Discharge during Retraction

$$\text{fx } Q = (A_p - A_r) \cdot v_{\text{piston}}$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$\text{ex } 1.5\text{m}^3/\text{s} = (0.05\text{m}^2 - 0.025\text{m}^2) \cdot 60\text{m}/\text{s}$$

4) Force during Retraction

$$\text{fx } F = p \cdot (A_p - A_r)$$

[Open Calculator !\[\]\(83bbbd261710c59db0214aa27b2edc0d_img.jpg\)](#)

$$\text{ex } 20\text{N} = 800\text{Pa} \cdot (0.05\text{m}^2 - 0.025\text{m}^2)$$



5) Force Exerted onto Piston or by Piston

$$fx \quad F = p \cdot A_p$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 40N = 800Pa \cdot 0.05m^2$$

6) Power Developed during Extension

$$fx \quad P = F \cdot v_{piston}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 150W = 2.5N \cdot 60m/s$$

7) Pressure during Retraction

$$fx \quad p = \frac{F}{A_p - A_r}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 100Pa = \frac{2.5N}{0.05m^2 - 0.025m^2}$$

8) Pressure Exerted by Piston

$$fx \quad p = \frac{F}{A_p}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 50Pa = \frac{2.5N}{0.05m^2}$$



9) Velocity of Piston during Extension

$$\text{fx } v_{\text{piston}} = \frac{Q}{A_p}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 30\text{m/s} = \frac{1.5\text{m}^3/\text{s}}{0.05\text{m}^2}$$

10) Velocity of Piston during Retraction

$$\text{fx } v_{\text{piston}} = \frac{Q}{A_p - A_r}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 60\text{m/s} = \frac{1.5\text{m}^3/\text{s}}{0.05\text{m}^2 - 0.025\text{m}^2}$$









Variables Used

- **A_p** Area of Piston (Square Meter)
- **A_r** Area of Piston Rod (Square Meter)
- **F** Force Exerted (Piston) (Newton)
- **p** Pressure Exerted by Piston (Pascal)
- **P** Power Developed during Extension (Watt)
- **Q** Discharge (Cubic Meter per Second)
- **V_{piston}** Velocity of Piston (Meter per Second)



Constants, Functions, Measurements used

- **Measurement: Area** in Square Meter (m^2)
Area Unit Conversion 
- **Measurement: Pressure** in Pascal (Pa)
Pressure Unit Conversion 
- **Measurement: Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement: Power** in Watt (W)
Power Unit Conversion 
- **Measurement: Force** in Newton (N)
Force Unit Conversion 
- **Measurement: Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
Volumetric Flow Rate Unit Conversion 



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