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Internal Water Pressure Formulas

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List of 11 Internal Water Pressure Formulas

Internal Water Pressure

1) Head of Water using Hoop Tension in Pipe Shell

$$fx \quad H_{\text{liquid}} = \frac{f_{\text{KN}}}{\frac{\gamma_{\text{water}} \cdot R_{\text{pipe}}}{h_{\text{curb}}}}$$

Open Calculator 

$$ex \quad 0.460284\text{m} = \frac{23.48\text{kN/m}^2}{\frac{9.81\text{kN/m}^3 \cdot 1.04\text{m}}{0.2\text{m}}}$$

2) Head of water using Water Pressure

$$fx \quad H_{\text{liquid}} = \frac{P_{\text{wt}}}{\gamma_{\text{water}}}$$

Open Calculator 

$$ex \quad 0.506626\text{m} = \frac{4.97\text{kN/m}^2}{9.81\text{kN/m}^3}$$

3) Hoop Tension in Pipe Shell

$$fx \quad f_{\text{KN}} = \frac{P_{\text{wt}} \cdot R_{\text{pipe}}}{h_{\text{curb}}}$$

Open Calculator 

$$ex \quad 25.844\text{kN/m}^2 = \frac{4.97\text{kN/m}^2 \cdot 1.04\text{m}}{0.2\text{m}}$$



4) Hoop Tension in Pipe Shell using Head of Liquid

$$f_{KN} = \left(\frac{\gamma_{\text{water}} \cdot H_{\text{liquid}} \cdot R_{\text{pipe}}}{h_{\text{curb}}} \right)$$

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

$$\text{ex } 23.46552 \text{ kN/m}^2 = \left(\frac{9.81 \text{ kN/m}^3 \cdot 0.46 \text{ m} \cdot 1.04 \text{ m}}{0.2 \text{ m}} \right)$$

5) Radius of Pipe given Hoop Tension in Pipe Shell

$$f_{KN} R_{\text{pipe}} = \frac{f_{KN} \cdot h_{\text{curb}}}{P_{\text{wt}}}$$

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

$$\text{ex } 0.944869 \text{ m} = \frac{23.48 \text{ kN/m}^2 \cdot 0.2 \text{ m}}{4.97 \text{ kN/m}^2}$$

6) Radius of Pipe using Hoop Stress and Head of Liquid

$$f_{KN} R_{\text{pipe}} = \left(\frac{f_{KN}}{\frac{\gamma_{\text{water}} \cdot H_{\text{liquid}}}{h_{\text{curb}}}} \right)$$

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

$$\text{ex } 1.040642 \text{ m} = \left(\frac{23.48 \text{ kN/m}^2}{\frac{9.81 \text{ kN/m}^3 \cdot 0.46 \text{ m}}{0.2 \text{ m}}} \right)$$



7) Thickness of Pipe given Hoop Tension in Pipe Shell 

$$fx \quad h_{\text{curb}} = \frac{P_{\text{wt}} \cdot R_{\text{pipe}}}{f_{\text{KN}}}$$

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


$$ex \quad 0.220136\text{m} = \frac{4.97\text{kN/m}^2 \cdot 1.04\text{m}}{23.48\text{kN/m}^2}$$

8) Thickness of Pipe using Hoop Stress and Head of Liquid 

$$fx \quad h_{\text{curb}} = \frac{\gamma_{\text{water}} \cdot H_{\text{liquid}} \cdot R_{\text{pipe}}}{f_{\text{KN}}}$$

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


$$ex \quad 0.199877\text{m} = \frac{9.81\text{kN/m}^3 \cdot 0.46\text{m} \cdot 1.04\text{m}}{23.48\text{kN/m}^2}$$

9) Unit Weight of Water given Water Pressure 

$$fx \quad \gamma_{\text{water}} = \frac{P_{\text{wt}}}{H_{\text{liquid}}}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$ex \quad 10.80435\text{kN/m}^3 = \frac{4.97\text{kN/m}^2}{0.46\text{m}}$$

10) Water Pressure given Hoop Tension in Pipe Shell 

$$fx \quad P_{\text{wt}} = \frac{f_{\text{KN}} \cdot h_{\text{curb}}}{R_{\text{pipe}}}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$ex \quad 4.515385\text{kN/m}^2 = \frac{23.48\text{kN/m}^2 \cdot 0.2\text{m}}{1.04\text{m}}$$



11) Water Pressure given Unit Weight of Water

$$\text{fx } P_{\text{wt}} = (\gamma_{\text{water}} \cdot H_{\text{liquid}})$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 4.5126\text{kN/m}^2 = (9.81\text{kN/m}^3 \cdot 0.46\text{m})$$







Variables Used

- **f_{KN}** Hoop Tension in Pipe Shell in KN/Square Meter (*Kilonewton per Square Meter*)
- **h_{curb}** Curb Height (*Meter*)
- **H_{liquid}** Head of Liquid in Pipe (*Meter*)
- **P_{wt}** Water Pressure in KN per Square Meter (*Kilonewton per Square Meter*)
- **R_{pipe}** Pipe Radius (*Meter*)
- **Y_{water}** Unit Weight of Water in KN per Cubic Meter (*Kilonewton per Cubic Meter*)



Constants, Functions, Measurements used

- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Pressure** in Kilonewton per Square Meter (kN/m^2)
Pressure Unit Conversion 
- **Measurement: Specific Weight** in Kilonewton per Cubic Meter (kN/m^3)
Specific Weight Unit Conversion 
- **Measurement: Stress** in Kilonewton per Square Meter (kN/m^2)
Stress Unit Conversion 



Check other formula lists

- [Internal Water Pressure Formulas](#) 
- [Stresses at Bends Formulas](#) 
- [Stresses Due to External Loads Formulas](#) 
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