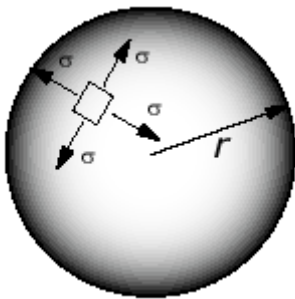


Thin-walled Pressure Vessel

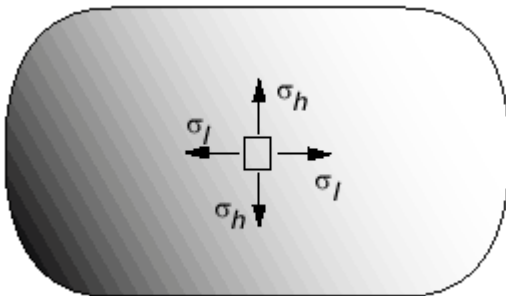
The formulas below are good for thin-walled pressure vessels. Generally, if its radius r is larger than 5 times its wall thickness t ($r > 5 \cdot t$), then it is considered to be “thin-walled”.

Spherical Pressure Vessel



$$\text{Stress} = \frac{p(\text{in MPa}) \cdot R(\text{mean radius in mm})}{2 \cdot t(\text{in mm})}$$

Cylindrical Pressure Vessel



$$\text{Longitudinal Stress} = \frac{p \cdot R}{2 \cdot t}$$

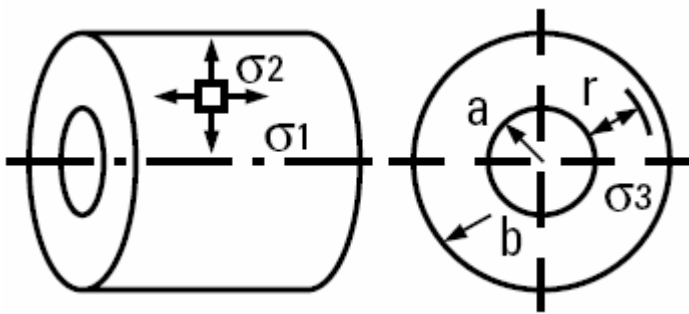
$$\text{Hoop Stress} = \frac{p \cdot R}{t}$$

When a vessel is subjected to external pressure, the above formulas are still valid. However, the stresses are now negative since the wall is in compression instead of tension.

Thick-walled Pressure Vessel

The formulas below are good for thick-walled pressure vessels. Generally, if its radius r is smaller than 5 times its wall thickness t ($r < 5 \cdot t$), then it is considered to be “thick-walled”.

Cylindrical Pressure Vessel



$$\text{Hoop Stress (Inside)} = p \cdot \frac{b^2 + a^2}{b^2 - a^2}$$

$$\text{Hoop Stress (Outside)} = p \cdot \frac{2 a^2}{b^2 - a^2}$$

$$\text{Longitudinal Stress (Capped End)} = p \cdot \frac{a^2}{b^2 - a^2}$$