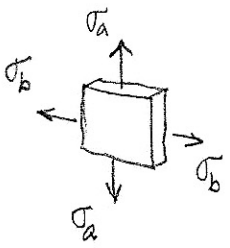


a) Tensão  $\sigma_a$

$$\sigma_a = \frac{N}{A_{anel}}$$



$$\begin{aligned}
 N &= R_{cp} + R_{cf} + R_{pa} = \underbrace{(2\pi R_{ep} \times 600 + \pi R_{ef}^2)}_{\text{Vol. parede}} \rho_{al} + \underbrace{900}_{\text{preenchi d'agua}} \pi R^2 \\
 &= (2\pi \times 300 \times 1 \times 600 + \pi \times 300^2 \times 5) \times 2,7 \times 10^{-5} + 900 \times 1 \times 10^{-5} \times \pi \times 300^2 \\
 &= 68,71 + 2544,69 \\
 &= 2613,40 \text{ N} \quad \Rightarrow \quad \sigma_a = \frac{N}{2\pi R_{ep}} = \frac{2613,40}{2\pi \times 300,1} = \underline{1,386 \text{ MPa}}
 \end{aligned}$$

b) Tensão  $\sigma_b$  (tensão circunferencial)

$$\sigma_b = \frac{pR}{e} = \frac{(300 \times 1 \times 10^{-5}) \times 300}{1} = \underline{0,900 \text{ MPa}}$$

c) Máxima tensão tangencial

$$\sigma_3 \leq \sigma_2 \leq \sigma_1$$

$$-3 \times 10^{-3} \text{ MPa} \leq 0,900 \leq 1,386$$

(P)

$$\tau_{max} = \frac{\sigma_1 - \sigma_3}{2} = \underline{0,695 \text{ MPa}}$$

