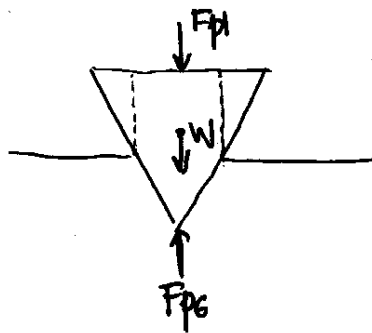


P1)

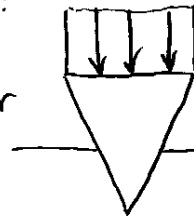
Equilibrio en el tapón



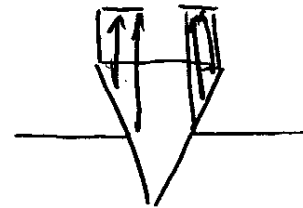
• peso:
 $W = M \cdot g = 147 \text{ N}$

• presión líquido:

Cara superior



Cara inferior



resultante: $\left[\rho_1 h_1 + \rho_2 (h_2 - h_T/2) \right] \cdot \pi \left(\frac{r_T}{2} \right)^2$

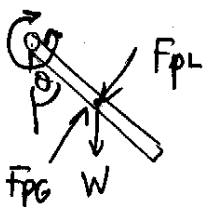
$- \rho_2 \left[\frac{\pi}{3} \left(\frac{h_T}{2} \right) \left[r_T^2 + r_T \cdot \left(\frac{r_T}{2} \right) + \left(\frac{r_T}{2} \right)^2 \right] - \pi \frac{h_T}{2} \left(\frac{r_T}{2} \right)^2 \right] = 63,12 \text{ N}$

• presión gas: $F_{pg} = P_{gas} \cdot \pi \left(\frac{r_T}{2} \right)^2$

$\Rightarrow F_{pl} + W = F_{pg}$

$\Rightarrow F_{pg} = 210,12 \text{ N} \Rightarrow P_G = 268 \times 10^4 \text{ [Pa]}$
 (presión relativa)

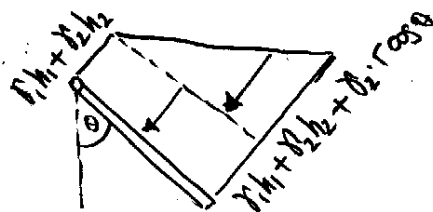
Equilibrio en la compuerta



Torque peso = $(W \sin \theta) \cdot \frac{r}{2}$

Torque $F_{pg} = \left[P_{gas} \cdot r \cdot b \right] \cdot \frac{r}{2}$

Torque F_{pl} :



$= \left(\left[\rho_1 h_1 + \rho_2 h_2 \right] \cdot r \cdot b \right) \cdot \frac{r}{2}$

$+ \left[\left(\rho_2 \cdot r \cos \theta \cdot r \cdot \frac{b}{2} \right) \right] \cdot \frac{2r}{3}$

$$\Rightarrow W \sin \theta \cdot \frac{r}{2} - P_{\text{gas}} \cdot b \cdot \frac{r^2}{2} + (\gamma_1 h_1 + \gamma_2 h_2) \cdot b \cdot \frac{r^2}{2} + \gamma_2 \cos \theta \cdot \frac{r^3}{3} b = 0$$

$$\Rightarrow \theta = 1,07 \text{ rad} = 61,15^\circ$$

$$\begin{aligned} \text{Volumen del gas} &= \underbrace{(L \cdot b \cdot r)}_{3 \text{ m}^3} + \underbrace{b \cdot \left(\frac{\theta}{2} \cdot r^2\right)}_{0,534 \text{ m}^3} - \underbrace{\frac{\pi}{3} \left(\frac{h_T}{2}\right) \left(\frac{r_T}{2}\right)^2}_{2,6 \times 10^{-4} \text{ m}^3} \\ &= 3,533 \text{ m}^3 \end{aligned}$$