

## RESOLUÇÃO DOS EXERCÍCIOS – LISTA 2

1.37



$$\Sigma F_y = 0$$

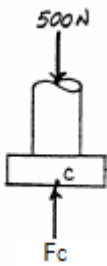
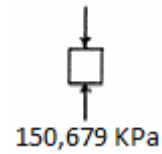
$$F_B - 500 = 0$$

$$F_B = 500 \text{ N}$$

$$\sigma_B = \frac{F_B}{A_B}$$

$$\sigma_B = \frac{500}{\frac{\pi \cdot (0,065)^2}{4}}$$

$$\sigma_B = 150,679 \text{ KPa}$$



$$\Sigma F_y = 0$$

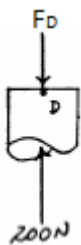
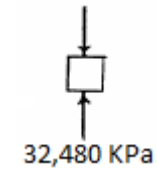
$$F_C - 500 = 0$$

$$F_C = 500 \text{ N}$$

$$\sigma_C = \frac{F_C}{A_C}$$

$$\sigma_C = \frac{500}{\frac{\pi \cdot (0,140)^2}{4}}$$

$$\sigma_C = 32,480 \text{ KPa}$$



$$\Sigma F_y = 0$$

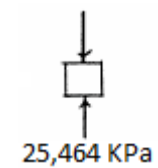
$$200 - F_D = 0$$

$$F_D = 200 \text{ N}$$

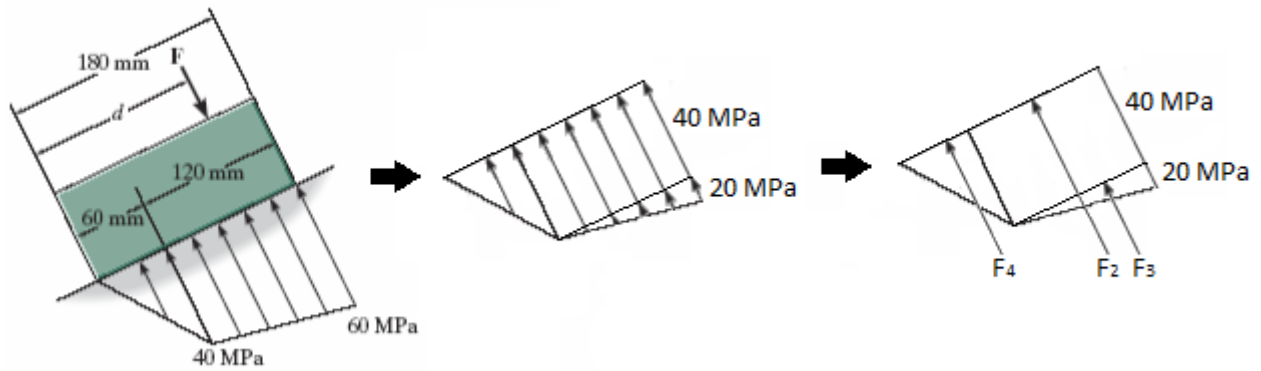
$$\sigma_D = \frac{F_D}{A_D}$$

$$\sigma_D = \frac{200}{\frac{\pi \cdot (0,100)^2}{4}}$$

$$\sigma_D = 25,464 \text{ KPa}$$



1.38



$$F_2 = w_2 \cdot L_2 \cdot e$$

$$F_2 = 40 \times 10^6 \frac{N}{m^2} \cdot 120 \times 10^{-3} m \cdot 5 \times 10^{-3} m$$

$$F_2 = 24 \text{ kN}$$

$$F_3 = w_3 \cdot \frac{L_3 \cdot e}{2}$$

$$F_3 = 20 \times 10^6 \frac{N}{m^2} \cdot \frac{120 \times 10^{-3} m \cdot 5 \times 10^{-3} m}{2}$$

$$F_3 = 6 \text{ kN}$$

$$F_4 = w_4 \cdot \frac{L_4 \cdot e}{2}$$

$$F_4 = 40 \times 10^6 \frac{N}{m^2} \cdot \frac{60 \times 10^{-3} m \cdot 5 \times 10^{-3} m}{2}$$

$$F_4 = 6 \text{ kN}$$

$$\Sigma F_y = 0$$

$$F_2 + F_3 + F_4 - F = 0$$

$$24 + 6 + 6 - F = 0$$

$$F = 36 \text{ N}$$

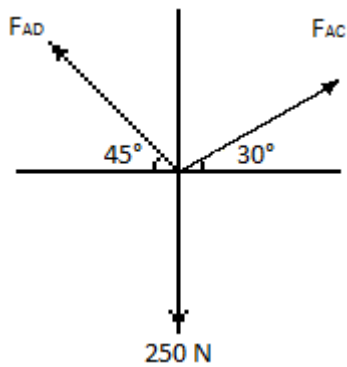
$$\Sigma M_A = 0$$

$$F_2 \cdot 0,12 + F_3 \cdot 0,14 + F_4 \cdot 0,04 - F \cdot d = 0$$

$$24 \cdot 0,12 + 6 \cdot 0,14 + 6 \cdot 0,04 - 36 \cdot d = 0$$

$$d = 0,11 \text{ m} = 110 \text{ mm}$$

1.42



$$F_{AB} = 250 \text{ N}$$

$$\Sigma F_x = 0$$

$$F_{AC} \cdot \cos(30^\circ) - F_{AD} \cdot \cos(45^\circ) = 0$$

$$0,866 \cdot F_{AC} - 0,707 \cdot F_{AD} = 0$$

$$0,707 \cdot F_{AD} = 0,866 \cdot F_{AC}$$

$$F_{AD} = \frac{0,866 \cdot F_{AC}}{0,707}$$

$$F_{AD} = 224,144 \text{ N}$$

$$\sigma_{AB} = \frac{F_{AB}}{A_{AB}}$$

$$\sigma_{AB} = \frac{250}{\frac{\pi \cdot (9)^2}{4}}$$

$$\sigma_{AB} = 3,93 \text{ MPa}$$

$$\sigma_{AC} = \frac{F_{AC}}{A_{AC}}$$

$$\sigma_{AC} = \frac{183,012}{\frac{\pi \cdot (6)^2}{4}}$$

$$\sigma_{AC} = 6,47 \text{ MPa}$$

$$\sigma_{AD} = \frac{F_{AD}}{A_{AD}}$$

$$\sigma_{AD} = \frac{224,144}{\frac{\pi \cdot (7,5)^2}{4}}$$

$$\sigma_{AD} = 5,07 \text{ MPa}$$

$$\Sigma F_y = 0$$

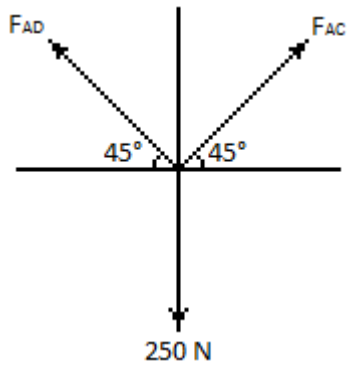
$$F_{AC} \cdot \sin(30^\circ) + F_{AD} \cdot \sin(45^\circ) - F_{AB} = 0$$

$$0,5 \cdot F_{AC} + 0,707 \cdot F_{AD} - 250 = 0$$

$$0,5 \cdot F_{AC} + 0,866 \cdot F_{AC} = 250$$

$$F_{AC} = 183,012 \text{ N}$$

1.43



$$F_{AB} = 250 \text{ N}$$

$$\Sigma F_x = 0$$

$$F_{AC} \cdot \cos(45^\circ) - F_{AD} \cdot \cos(45^\circ) = 0$$

$$0,707 \cdot F_{AC} - 0,707 \cdot F_{AD} = 0$$

$$F_{AD} = F_{AC}$$

$$F_{AD} = 176,777 \text{ N}$$

$$\sigma_{AB} = \frac{F_{AB}}{A_{AB}}$$

$$\sigma_{AB} = \frac{250}{\frac{\pi \cdot (9)^2}{4}}$$

$$\sigma_{AB} = 3,93 \text{ MPa}$$

$$\sigma_{AC} = \frac{F_{AC}}{A_{AC}}$$

$$\sigma_{AC} = \frac{176,777}{\frac{\pi \cdot (6)^2}{4}}$$

$$\sigma_{AC} = 6,252 \text{ MPa}$$

$$\sigma_{AD} = \frac{F_{AD}}{A_{AD}}$$

$$\sigma_{AD} = \frac{176,777}{\frac{\pi \cdot (7,5)^2}{4}}$$

$$\sigma_{AD} = 4,001 \text{ MPa}$$

$$\Sigma F_y = 0$$

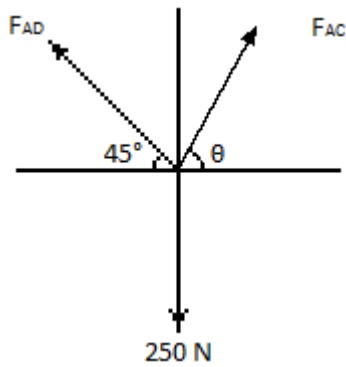
$$F_{AC} \cdot \sin(45^\circ) + F_{AD} \cdot \sin(45^\circ) - F_{AB} = 0$$

$$0,707 \cdot F_{AC} + 0,707 \cdot F_{AD} - 250 = 0$$

$$0,707 \cdot F_{AC} + 0,707 \cdot F_{AC} = 250$$

$$F_{AC} = 176,777 \text{ N}$$

1.44



$$\sigma_{AC} = 2 \cdot \sigma_{AD}$$

$$\frac{F_{AC}}{A_{AC}} = 2 \cdot \frac{F_{AD}}{A_{AD}}$$

$$\frac{F_{AC}}{\frac{\pi \cdot (6)^2}{4}} = 2 \cdot \frac{F_{AD}}{\frac{\pi \cdot (7,5)^2}{4}}$$

$$\frac{F_{AC}}{36} = 2 \cdot \frac{F_{AD}}{56,25}$$

$$F_{AC} = \frac{72 \cdot F_{AD}}{56,25}$$

$$F_{AC} = 1,28 \cdot F_{AD}$$

$$\Sigma F_x = 0$$

$$F_{AC} \cdot \cos(\theta) - F_{AD} \cdot \cos(45^\circ) = 0$$

$$F_{AC} = \frac{\cos(45^\circ) \cdot F_{AD}}{\cos(\theta)}$$

$$1,28 \cdot F_{AD} = \frac{\cos(45^\circ)}{\cos(\theta)} \cdot F_{AD}$$

$$1,28 = \frac{\cos(45^\circ)}{\cos(\theta)}$$

$$1,28 = \frac{0,707}{\cos(\theta)}$$

$$\cos(\theta) = \frac{0,707}{1,28}$$

$$\theta = \arccos\left(\frac{0,707}{1,28}\right)$$

$$\theta = 56,466^\circ$$

$$F_{AC} = 1,28 \cdot F_{AD}$$

$$F_{AC} = 1,28 \cdot 140,919$$

$$F_{AC} = 180,376 \text{ N}$$

$$\Sigma F_y = 0$$

$$F_{AC} \cdot \sin(\theta) + F_{AD} \cdot \sin(45^\circ) - 250 = 0$$

$$F_{AC} \cdot \sin(56,466^\circ) + F_{AD} \cdot \sin(45^\circ) - 250 = 0$$

$$0,833 \cdot 1,28 \cdot F_{AD} + 0,707 \cdot F_{AD} - 250 = 0$$

$$F_{AD} = 140,919 \text{ N}$$

$$\sigma_{AB} = \frac{F_{AB}}{A_{AB}}$$

$$\sigma_{AB} = \frac{250}{\frac{\pi \cdot (9)^2}{4}}$$

$$\sigma_{AB} = 3,93 \text{ MPa}$$

$$\sigma_{AC} = \frac{F_{AC}}{A_{AC}}$$

$$\sigma_{AC} = \frac{180,376}{\frac{\pi \cdot (6)^2}{4}}$$

$$\sigma_{AC} = 6,379 \text{ MPa}$$

$$\sigma_{AD} = \frac{F_{AD}}{A_{AD}}$$

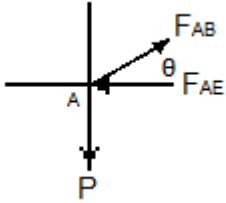
$$\sigma_{AD} = \frac{140,376}{\frac{\pi \cdot (7,5)^2}{4}}$$

$$\sigma_{AD} = 3,190 \text{ MPa}$$

1.58

$A = 780 \text{ mm}^2$   
 $P = 40 \text{ kN}$

Nó A:



$$\Sigma F_y = 0$$

$$F_{AB} \cdot \sin(\theta) - P = 0$$

$$F_{AB} \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - 40 = 0$$

$$0,6 \cdot F_{AB} - 40 = 0$$

$$F_{AB} = 66,6 \text{ kN (T)}$$

$$\Sigma F_x = 0$$

$$F_{AB} \cdot \cos(\theta) - F_{AE} = 0$$

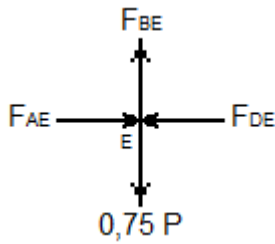
$$F_{AB} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} - F_{AE} = 0$$

$$0,8 \cdot F_{AB} - F_{AE} = 0$$

$$0,8 \cdot 66,6 - F_{AE} = 0$$

$$F_{AE} = 53,3 \text{ kN (C)}$$

Nó E:



$$\Sigma F_x = 0$$

$$F_{AB} - F_{AE} = 0$$

$$53,3 - F_{DE} = 0$$

$$F_{DE} = 53,3 \text{ kN (C)}$$

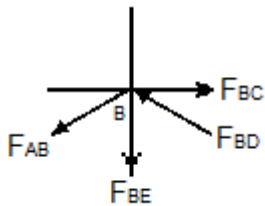
$$\Sigma F_y = 0$$

$$F_{BE} - 0,75 \cdot P = 0$$

$$F_{BE} - 0,75 \cdot 40 = 0$$

$$F_{BE} = 30 \text{ kN (T)}$$

Nó B:



$$\Sigma F_y = 0$$

$$F_{BD} \cdot \sin(\theta) - F_{AB} \cdot \sin(\theta) - 0,75 \cdot P = 0$$

$$F_{BD} \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - 66,6 \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - 0,75 \cdot 40 = 0$$

$$0,6 \cdot F_{BD} - 0,6 \cdot 66,6 - 30 = 0$$

$$F_{BD} = 116,6 \text{ kN (C)}$$

$$\Sigma F_x = 0$$

$$F_{BC} - F_{AB} \cdot \cos(\theta) - F_{BD} \cdot \cos(\theta) = 0$$

$$F_{BC} - F_{AB} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} - F_{BD} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} = 0$$

$$F_{BC} - 0,8 \cdot F_{AB} - 0,8 \cdot F_{BD} = 0$$

$$F_{BC} - 0,8 \cdot 66,6 - 0,8 \cdot 116,6 = 0$$

$$F_{BC} = 146,66 \text{ kN (T)}$$

$$\sigma_{AB} = \frac{F_{AB}}{A_{AB}}$$

$$\sigma_{AB} = \frac{66,6 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{AB} = 85,469 \text{ MPa (T)}$$

$$\sigma_{AE} = \frac{F_{AE}}{A_{AE}}$$

$$\sigma_{AE} = \frac{53,3 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{AE} = 68,376 \text{ MPa (C)}$$

$$\sigma_{BC} = \frac{F_{BC}}{A_{BC}}$$

$$\sigma_{BC} = \frac{146,6 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{BC} = 188,034 \text{ MPa (T)}$$

$$\sigma_{BD} = \frac{F_{BD}}{A_{BD}}$$

$$\sigma_{BD} = \frac{116,6 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{BD} = 149,571 \text{ MPa (T)}$$

$$\sigma_{BE} = \frac{F_{BE}}{A_{BE}}$$

$$\sigma_{BE} = \frac{30 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{BE} = 38,461 \text{ MPa (T)}$$

$$\sigma_{DE} = \frac{F_{DE}}{A_{DE}}$$

$$\sigma_{DE} = \frac{53,3 \times 10^3}{780 \times 10^{-6}}$$

$$\sigma_{DE} = 68,376 \text{ MPa (C)}$$



### 1.59

$$A = 780 \text{ mm}^2$$

$$\sigma_{adm.} = 140 \text{ MPa}$$

$$P_{m\acute{a}x.} = ?$$

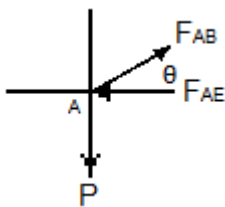
Maior tens\~ao ocorre na barra BC, conforme exerc\~cio 1.58:

$$\sigma_{BC} = \frac{F_{BC}}{A_{BC}}$$

$$140 \times 10^6 = \frac{F_{BC}}{780 \times 10^{-6}}$$

$$F_{BC} = 109,2 \text{ kN}$$

N\~o A:



$$\Sigma F_y = 0$$

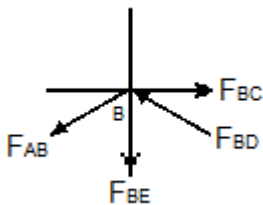
$$F_{AB} \cdot \text{sen}(\theta) - P = 0$$

$$F_{AB} \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - P = 0$$

$$0,6 \cdot F_{AB} - P = 0$$

$$F_{AB} = \frac{P}{0,6}$$

N\~o B:



$$\Sigma F_x = 0$$

$$F_{BC} - F_{AB} \cdot \text{cos}(\theta) - F_{BD} \cdot \text{cos}(\theta) = 0$$

$$109,2 - F_{AB} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} - F_{BD} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} = 0$$

$$109,2 - 0,8 \cdot F_{AB} - 0,8 \cdot F_{BD} = 0$$

$$0,8 \cdot (F_{AB} + F_{BD}) = 109,2$$

$$F_{AB} + F_{BD} = 136,5 \text{ kN}$$

$$F_{BD} = 136,5 - F_{AB}$$

$$\Sigma F_x = 0$$

$$F_{BC} - F_{AB} \cdot \cos(\theta) - F_{BD} \cdot \cos(\theta) = 0$$

$$109,2 - F_{AB} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} - F_{BD} \cdot \frac{1,2}{\sqrt{(1,2)^2 + (0,9)^2}} = 0$$

$$109,2 - 0,8 \cdot F_{AB} - 0,8 \cdot F_{BD} = 0$$

$$0,8 \cdot (F_{AB} + F_{BD}) = 109,2$$

$$F_{AB} + F_{BD} = 136,5 \text{ kN}$$

$$F_{BD} = 136,5 - F_{AB}$$

$$\Sigma F_y = 0$$

$$F_{BD} \cdot \sin(\theta) - F_{AB} \cdot \sin(\theta) - 0,75 \cdot P = 0$$

$$F_{BD} \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - F_{AB} \cdot \frac{0,9}{\sqrt{(1,2)^2 + (0,9)^2}} - 0,75 \cdot P = 0$$

$$0,6 \cdot F_{BD} - 0,6 \cdot F_{AB} - 0,75 \cdot P = 0$$

$$\frac{0,6 \cdot F_{BD} - 0,6 \cdot F_{AB} - 0,75 \cdot P}{0,6} = \frac{0}{0,6}$$

$$F_{BD} - F_{AB} - 1,25 \cdot P = 0$$

$$(136,5 - F_{AB}) - F_{AB} - 1,25 \cdot P = 0$$

$$136,5 - 2 \cdot F_{AB} - 1,25 \cdot P = 0$$

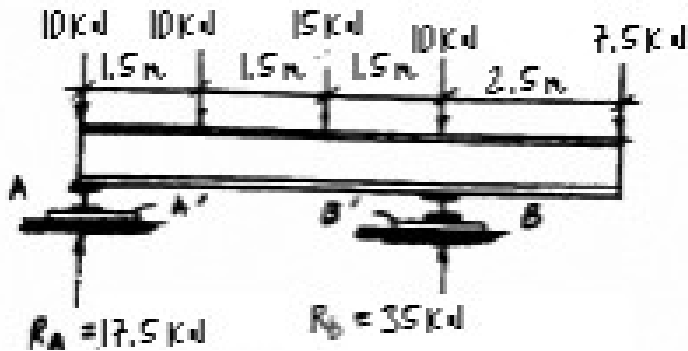
$$136,5 - 2 \cdot \left(\frac{P}{0,6}\right) - 1,25 \cdot P = 0$$

$$P = 29,781 \text{ kN}$$

1.94

$$(\sigma_a)_{adm.} = 2,8 \text{ MPa}$$

$$P = 7,5 \text{ kN}$$



$$\Sigma M_A = 0$$

$$F_B \cdot 4,5 - 10 \cdot 1,5 - 15 \cdot 3 - 10 \cdot 4,5 - 7 \cdot P = 0$$

$$F_B \cdot 4,5 - 10 \cdot 1,5 - 15 \cdot 3 - 10 \cdot 4,5 - 7,5 \cdot 7 = 0$$

$$4,5 \cdot F_B - 15 - 45 - 45 - 52,5 = 0$$

$$F_B = 35 \text{ kN}$$

$$\Sigma F_y = 0$$

$$F_A + F_B - 10 - 10 - 15 - 10 - P = 0$$

$$F_A + 35 - 10 - 10 - 15 - 10 - 7,5 = 0$$

$$F_A = 17,5 \text{ kN}$$

$$(\sigma_a)_{adm.} = \frac{F}{A}$$

$$A = \frac{F}{(\sigma_a)_{adm.}}$$

$$A_{\text{quadrado}} = L^2$$

$$A_A = \frac{F_A}{(\sigma_a)_{adm.}}$$

$$L_A^2 = \frac{17,5 \times 10^3}{2,8}$$

$$L_A^2 = 6250 \text{ mm}^2$$

$$L_A = 79,056 \text{ mm} \approx 80 \text{ mm}$$

$$A_B = \frac{F_B}{(\sigma_a)_{adm.}}$$

$$L_B^2 = \frac{35 \times 10^3}{2,8}$$

$$L_B^2 = 12500 \text{ mm}^2$$

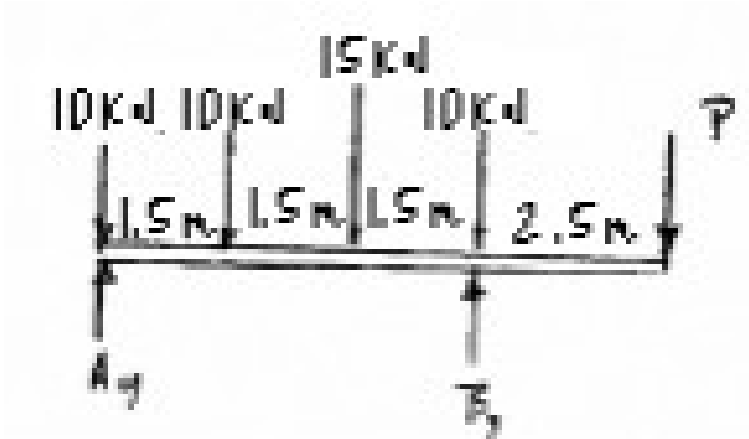
$$L_B = 111,803 \text{ mm} \approx 120 \text{ mm}$$

1.95

$$(\sigma_a)_{adm.} = 2,8 \text{ MPa}$$

$$L_A = 50 \text{ mm}$$

$$L_B = 100 \text{ mm}$$



$$(\sigma_a)_{adm.} = \frac{F}{A}$$

$$F = (\sigma_a)_{adm.} \cdot A$$

$$F_{m\acute{a}x.A} = 2,8 \times 10^6 \cdot (50 \times 10^{-3})^2$$

$$F_{m\acute{a}x.B} = 2,8 \times 10^6 \cdot (100 \times 10^{-3})^2$$

$$F_{m\acute{a}x.A} = 7 \text{ kN}$$

$$F_{m\acute{a}x.B} = 28 \text{ kN}$$

Considerando  $F_A = 7 \text{ kN}$  :

Considerando  $F_B = 28 \text{ kN}$  :

$$\Sigma M_B = 0$$

$$\Sigma M_A = 0$$

$$10 \cdot 4,5 + 10 \cdot 3 + 15 \cdot 1,5 - F_A \cdot 4,5 - P \cdot 2,5 = 0$$

$$F_B \cdot 4,5 - 10 \cdot 1,5 - 15 \cdot 3 - 10 \cdot 4,5 - 7 \cdot P = 0$$

$$45 + 30 + 22,5 - 7 \cdot 4,5 - 2,5 \cdot P = 0$$

$$4,5 \cdot 28 - 15 - 45 - 45 - 7 \cdot P = 0$$

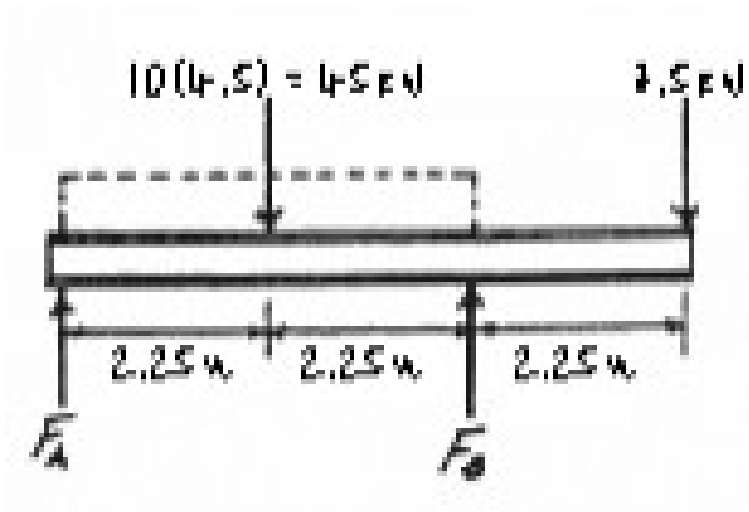
$$P = 26,4 \text{ kN}$$

$$P = 3 \text{ kN}$$

1.99

$$(\sigma_a)_{adm.} = 2,8 \text{ MPa}$$

$$P = 7,5 \text{ kN}$$



$$F_1 = w_1 \cdot L_1$$

$$F_1 = 10 \frac{\text{kN}}{\text{m}} \cdot 4,5 \text{ m}$$

$$F_1 = 45 \text{ kN}$$

$$\Sigma M_A = 0$$

$$F_B \cdot 4,5 - 7,5 \cdot 6,75 - F_1 \cdot 2,25 = 0$$

$$4,5 \cdot F_B - 50,625 - 45 \cdot 2,25 = 0$$

$$F_B = 33,75 \text{ kN}$$

$$\Sigma F_y = 0$$

$$F_A + F_B - F_1 - 7,5 = 0$$

$$F_A + 33,75 - 45 - 7,5 = 0$$

$$F_A = 18,75 \text{ kN}$$

$$(\sigma_a)_{adm.} = \frac{F}{A}$$

$$A = \frac{F}{(\sigma_a)_{adm.}}$$

$$A_{\text{quadrado}} = L^2$$

$$A_A = \frac{F_A}{(\sigma_a)_{adm.}}$$

$$A_B = \frac{F_B}{(\sigma_a)_{adm.}}$$

$$L_A^2 = \frac{18,75 \times 10^3}{2,8}$$

$$L_B^2 = \frac{33,75 \times 10^3}{2,8}$$

$$L_A^2 = 6696,428 \text{ mm}^2$$

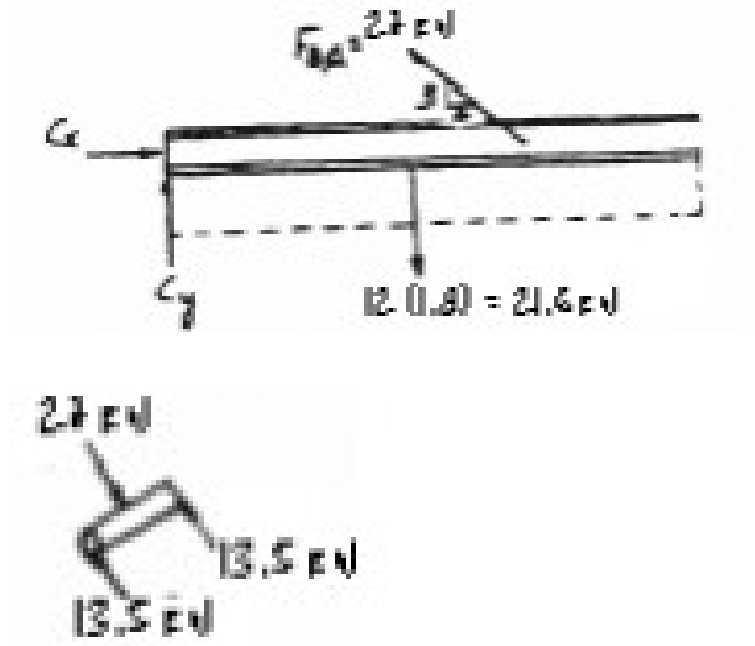
$$L_B^2 = 12053,571 \text{ mm}^2$$

$$L_A = 81,831 \text{ mm} \approx 90 \text{ mm}$$

$$L_B = 109,788 \text{ mm} \approx 110 \text{ mm}$$

1.101

- $w = 12 \frac{kN}{m}$
- $\phi_{parafuso} = 10 \text{ mm}$
- $\phi_{hasteAB} = 12 \text{ mm}$
- $\tau_c = 175 \text{ MPa}$
- $\sigma_e = 266 \text{ MPa}$
- $\tau_{parafuso} = ?$
- $\sigma_{hasteAB} = ?$
- $F.S. = ?$



$$F_1 = w \cdot L$$

$$F_1 = 12 \frac{kN}{m} \cdot 1,8 m$$

$$F_1 = 21,6 \text{ kN}$$

$$\Sigma M_C = 0$$

$$F_{Ay} \cdot 1,2 - F_1 \cdot 0,9 = 0$$

$$F_{Ay} \cdot 1,2 - 21,6 \cdot 0,9 = 0$$

$$F_{Ay} = 16,2 \text{ kN}$$

$$\frac{F_{Ax}}{1,2} = \frac{F_{Ay}}{0,9}$$

$$\frac{F_{Ax}}{1,2} = \frac{16,2}{0,9}$$

$$F_{Ax} = 21,6 \text{ kN}$$

$$F_A = \sqrt{(F_{Ax})^2 + (F_{Ay})^2}$$

$$F_A = \sqrt{(21,6)^2 + (16,2)^2}$$

$$F_A = 27 \text{ kN}$$

$$\tau_{parafuso} = \frac{F}{A}$$

$$\tau_{parafuso} = \frac{\frac{F_A}{2}}{A_{parafuso}}$$

$$\tau_{parafuso} = \frac{\frac{27}{2} \times 10^3}{\frac{\pi(10)^2}{4}}$$

$$\tau_{parafuso} = 171,887 \text{ MPa}$$

$$F.S. = 1,018$$

$$\sigma = \frac{F}{A}$$

$$\sigma_{hasteAB} = \frac{F_A}{A_{hasteAB}}$$

$$\sigma_{hasteAB} = \frac{27 \times 10^3}{\frac{\pi(12)^2}{4}}$$

$$\sigma_{hasteAB} = 238,732 \text{ MPa}$$

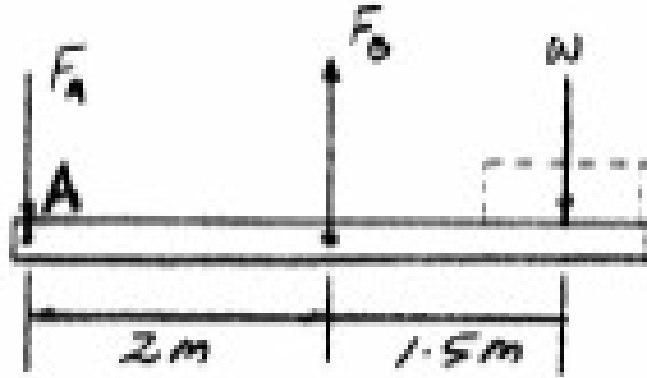
$$F.S. = 1,114$$

1.107

$$\tau_{adm.} = 125 \text{ MPa}$$

$$x = 1 \text{ m}$$

$$\phi_{pinos} = 8 \text{ mm}$$



$$\tau_{m\acute{a}x.A} = \frac{F_{m\acute{a}x.A}}{A_A}$$

$$\tau_{m\acute{a}x.A} = \frac{F_{m\acute{a}x.A}}{\frac{\pi \cdot (8)^2}{4}}$$

$$F_{m\acute{a}x.A} = 6283,185 \text{ N}$$

$$\tau_{m\acute{a}x.B} = \frac{F_{m\acute{a}x.B}}{A_B}$$

$$\tau_{m\acute{a}x.B} = \frac{F_{m\acute{a}x.B}}{\frac{\pi \cdot (8)^2}{4}}$$

$$F_{m\acute{a}x.B} = 12566,370 \text{ N}$$

$$\Sigma M_C = 0$$

$$F_A \cdot 3,5 - F_B \cdot 1,5 = 0$$

$$F_B = \frac{3,5}{1,5} \cdot F_A$$

$$F_B = \frac{7}{3} \cdot F_A$$

$$12566,370 = \frac{7}{3} \cdot F_A$$

$$F_A = 5385,587 \text{ N}$$

$$\Sigma F_y = 0$$

$$F_B - F_A - F_1 = 0$$

$$12566,370 - 5385,587 - F_1 = 0$$

$$F_1 = 7180,783 \text{ N}$$

$$F_1 = w \cdot x$$

$$7180,783 \text{ N} = w \cdot 1 \text{ m}$$

$$w = 7180,783 \frac{\text{N}}{\text{m}} \approx 7,181 \frac{\text{kN}}{\text{m}}$$