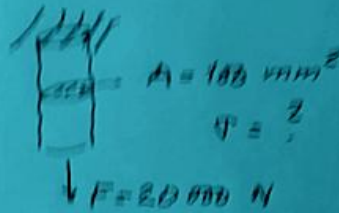


Lösningar till uppgifterna 3c, 4c, 5c, 8c, 4d, 5d, 11d, 6d, 8d, 9d

3c



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

$$\Rightarrow \sigma = \frac{200\,000}{100} = 200 \frac{\text{N}}{\text{mm}^2}$$

SVAR: $200 \frac{\text{N}}{\text{mm}^2}$

4c



SVAR: $125 \frac{\text{N}}{\text{mm}^2}$ (120)

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

$$A = 5^2 \Rightarrow$$

$$\sigma = \frac{F}{5^2} = \frac{50\,000}{25}$$

$$\sigma = 125 \frac{\text{N}}{\text{mm}^2}$$

5c



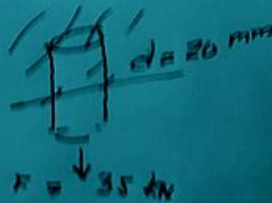
$$\sigma = \frac{200\,000}{\left(\frac{\pi \cdot 20^2}{4}\right)} = 6,366 \frac{\text{N}}{\text{mm}^2}$$

SVAR: $6,4 \frac{\text{N}}{\text{mm}^2}$

$$\sigma = \frac{F}{A} \quad A = \frac{\pi d^2}{4} \Rightarrow$$

$$\sigma = \frac{F}{\left(\frac{\pi d^2}{4}\right)}$$

8c



$$\sigma = \frac{35\,000}{\left(\frac{\pi \cdot 20^2}{4}\right)} = 111,408 \frac{\text{N}}{\text{mm}^2}$$

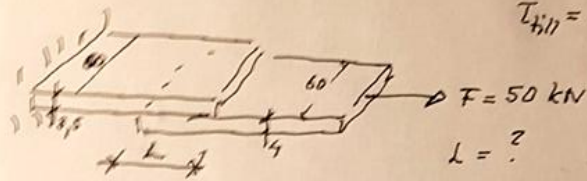
SVAR: $112 \frac{\text{N}}{\text{mm}^2}$
 (120)

$$\sigma = \frac{F}{A} \quad A = \frac{\pi d^2}{4} \Rightarrow$$

$$\sigma = \frac{F}{\left(\frac{\pi \cdot d^2}{4}\right)}$$

OBS! 1 MPa = 1 N/mm²

4d)



$\tau_{Hilf} = 10 \text{ MPa}$

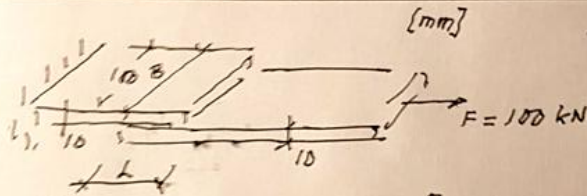
$L = ?$

$$\tau = \frac{F}{A} \quad | \quad A = B \cdot L \quad \Rightarrow \quad \tau = \frac{F}{B \cdot L} = \rho$$

$$\Rightarrow L = \frac{F}{B \cdot \tau} = \frac{50\,000}{60 \cdot 10} = 83,33 \text{ mm}$$

SVAR: 84 mm (90)

5d)



[mm]

$\tau_{Hilf} = 50 \text{ MPa}$

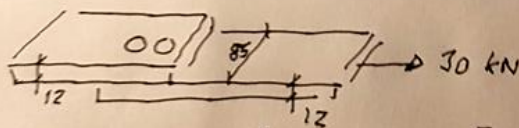
$L = ?$

$$\tau = \frac{F}{A} \quad A = B \cdot L \quad \Rightarrow \quad \tau = \frac{F}{B \cdot L} \Rightarrow$$

$$\Rightarrow L = \frac{F}{B \cdot \tau} = \frac{100\,000}{100 \cdot 50} = 20 \text{ mm}$$

SVAR: 20 mm

11d)



$\tau_{Hilf} = 80 \text{ MPa}$

$d = ?$

$$\tau = \frac{F}{A} \quad A = 2 \cdot \frac{\pi d^2}{4} \quad \Rightarrow \quad \tau = \frac{F}{\left(\frac{2 \cdot \pi \cdot d^2}{4}\right)}$$

lös ut d ! mellanl.d:

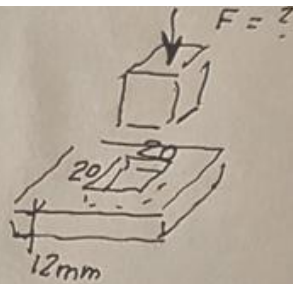
$$\tau = \frac{F \cdot 4}{2 \cdot \pi \cdot d^2}$$

$$d^2 = \frac{F \cdot 4}{2 \cdot \pi \cdot \tau} \quad \Rightarrow \quad d = \sqrt{\frac{F \cdot 4}{2 \cdot \pi \cdot \tau}}$$

$$d = \sqrt{\frac{30\,000 \cdot 4}{2 \cdot \pi \cdot 80}} = 15,451 \text{ mm}$$

SVAR: $d = 16 \text{ mm}$

6d)



$$\tau_B = 320 \text{ MPa}$$

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

$$A = \text{omkretsen} \times \text{höjd}$$

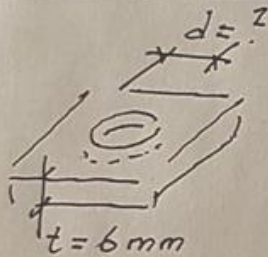
$$A = 4 \cdot s \cdot t$$

$$\Rightarrow \tau = \frac{F}{4 \cdot s \cdot t} \quad \text{lös ut } F = A \cdot \tau$$

$$F = \tau \cdot 4 \cdot s \cdot t = 320 \cdot 4 \cdot 20 \cdot 12 = 307\,200 \text{ N}$$

SVAR: 310 kN (400 kN med en värdesiffror)

8d)



Stanskraft $F = 100 \text{ kN}$

$$\tau_B = 320 \frac{\text{N}}{\text{mm}^2}$$

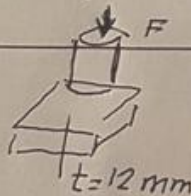
$$\tau = \frac{F}{A} \quad A = \text{omkretsen} \times \text{höjd} = \pi \cdot d \cdot b \quad \Rightarrow$$

$$\tau = \frac{F}{\pi \cdot d \cdot b} \quad \text{lös ut } d \quad d = \frac{F}{\pi \cdot \tau \cdot b} \quad \Rightarrow$$

$$d = \frac{100\,000}{\pi \cdot 320 \cdot 6} = 16,58 \text{ mm}$$

SVAR: 16 mm

9d)



$$d = 23 \text{ mm}$$

$$\tau_B = 350 \text{ MPa}$$

$$\tau = \frac{F}{A} \quad A = \pi \cdot d \cdot t$$

$$\Rightarrow \tau = \frac{F}{\pi \cdot d \cdot t} \quad \Rightarrow$$

$$\Rightarrow F = \tau \cdot \pi \cdot d \cdot t$$

$$F = 350 \cdot \pi \cdot 23 \cdot 12 = 303,478 \text{ kN}$$

OBS lite svårare uppgift

Sökes tryck sp. i verktyget

$$\text{enl. } \sigma = \frac{F}{A}$$

$$A = \frac{\pi d^2}{4}$$

OBS! verktygets tvärsnitt

$$\sigma = \frac{303,478}{\frac{\pi \cdot 23^2}{4}} = 730,43 \frac{\text{N}}{\text{mm}^2} \text{ (MPa)}$$

SVAR: 740 $\frac{\text{N}}{\text{mm}^2}$