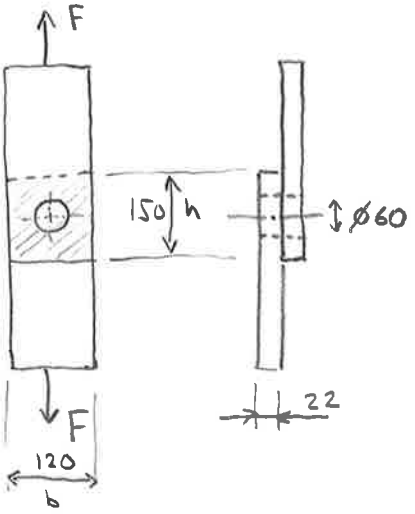
1.



Känt: $\tau_{lim} = 3 \left[\frac{N}{mm^2}\right]$

Sökt: F

formler:

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

$$\left.\begin{array}{l} F = \tau A \\ A = A_{\square} - A_o \\ A_o = \pi r^2 \\ r = 30 \end{array}\right| \Rightarrow$$

$$F = \tau (b \cdot h - \pi r^2)$$

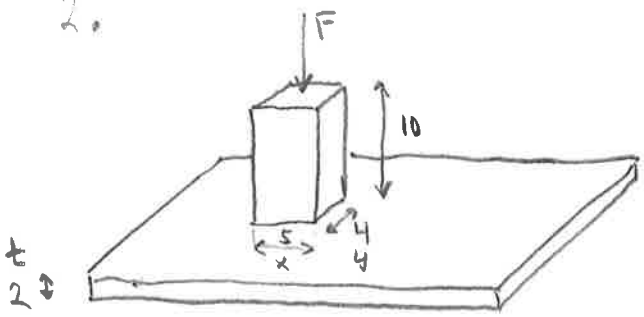
$$= 3 (120 \cdot 150 - \pi \cdot 30^2)$$

$$= 3 (18000 - 2827,..)$$

$$\approx 45517,7 > 45000$$

SVAR: Tål 45 kN

2.



sökt: F

givet: $\sigma_B = 220 \frac{N}{mm^2}$

$\tau_B = 0{,}6\,\sigma_B$

$= 0{,}6 \cdot 220$

$= 132$

formler

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

$A = 2tx + 2ty$

lösn

$A = 2 \cdot 2 \cdot 5 + 2 \cdot 2 \cdot 4$

$= 36$

$F = \tau \cdot A$

$F = 132 \cdot 36$

$= 4752 < 4800$

SVAR: F = 4,8 kN

stansen håller

sökt:

deformeras stansen?

känt: $\sigma_s = 500$

formler

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

$A = x \cdot y$

$\sigma = \frac{4800}{4.5} = 240 \frac{N}{mm^2}$

$< 500 \Rightarrow$ håller

figur 1 p 1

$\tau_B = 0{,}6\,\sigma_B$ (B) 1 p

rätt svar 1 p

rätt svar 1 p 4

rätt svar 1 p

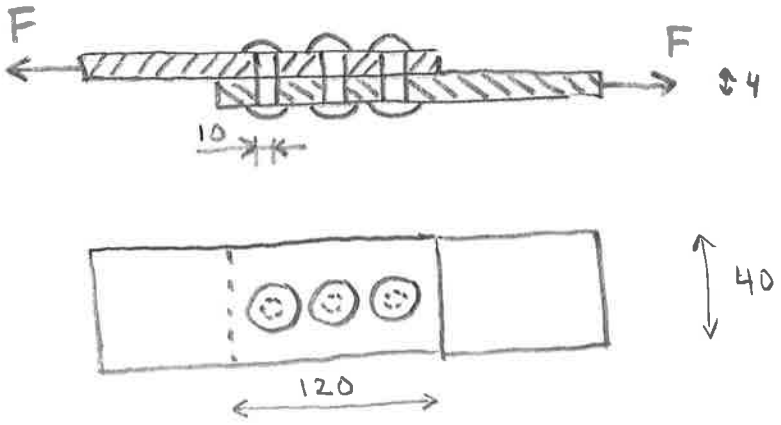
σ_s 1 p

rätt A 1 p

240 $\frac{N}{mm^2}$ 1 p 4

rätt slutsats 1 p

3.



sökt: τ (nit skjuvas)

känt: $F = 56$ kN

formler

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

$A = 3\pi r^2$ (skjuvarean)

$= 3\pi \cdot 5^2$

$= 235{,}6\ldots \rightarrow A$

$$\tau = \frac{56\,000}{235{,}6\ldots}$$

$\approx 237{,}67$

$< 240 \ \frac{N}{mm^2}$

sökt: håller nitem ?

$\tau_s = \sigma_s \cdot 0{,}6$

$= 500 \cdot 0{,}6$

$= 300$

$240 < 300 \Rightarrow$ håller

810 > 300 $\Rightarrow$ skjuvas av

sökt: hålkanttryck σ_h

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

$A = 3 \cdot 10 \cdot 4 = 120$ (3 st)

$$\sigma_h = \frac{56\,000}{120}$$

$\approx 466{,}7$

$\approx 470 \ \frac{N}{mm^2}$

tål $\sigma_h = 200 < 470 \Rightarrow$

hålet går sönder

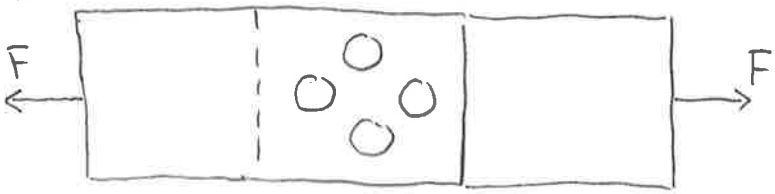
a) A 3 nitar +1p
nätt sum +1p
+1p — 3

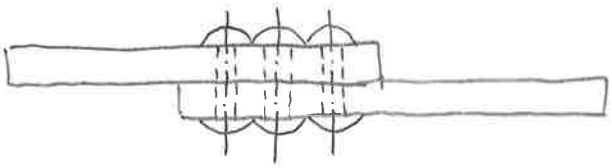
b) $\tau_s = 300$ +1p
nätt skuvad +1p — 2

c) $A = dt$ +1p
3 nitar +1p
nätt sum +1p — 3

d) tål $\sigma_h = 200$
jämförelse + slutsats +1p — 1

4.





Känt: nit $\sigma_s = 500 \left[\frac{N}{mm^2}\right]$

$\tau_s = 500 \cdot 0{,}6$ +1p

$= 300 \left[\frac{N}{mm^2}\right]$

plattjärn bredd
tjocklek } 1, 2, 3, 5, 10, 20, 50, 100

$\sigma_s = 200 \left[\frac{N}{mm^2}\right]$

$F = 190\ kN$

sökt: nitdiameter d

formler:

$\tau = \frac{F}{A}$ $\quad A = \frac{F}{\tau} = \frac{190000}{300} = 633{,}3\ldots$

$A = 4 \cdot \frac{\pi d^2}{4}$ (4 nitar) skjuvarea

$= \pi d^2$ } $\Rightarrow$ area +1p

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

$d = \sqrt{\frac{F}{\pi \tau}}$

$= \sqrt{\frac{190\,000}{\pi \cdot 300}}$

$\approx 14{,}2 < 15$

+1p +1p

a) +1+4+5

b) rimligt förslag +1
motiv +1

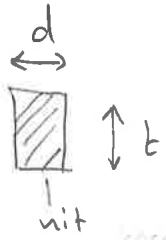
sökt: tjocklek t

hålkanttryck begränsar

$\sigma_h = 200$

formler

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



$A = 4 \cdot d \cdot t$

$= 4 \cdot 15 \cdot t$

$= 60t$

insättning i $\sigma_h = \frac{F}{A} \Rightarrow$

$200 = \frac{190\,000}{60t}$

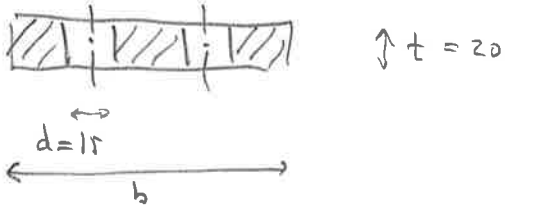
$t = \frac{190\,000}{60 \cdot 200}$

$\approx 15{,}83\ldots < \underline{20}$

+1p +1p

sök: plåtbredd

svagaste stället +1p



formler

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

$A = t(b - 2d)$ } $\Rightarrow$ area +1p

$20(b - 2 \cdot 15)$

$200 = \frac{190\,000}{20(b-30)}$ +1p

$b - 30 = \frac{190000}{20 \cdot 200}$ +1p

$b = \frac{190\,000}{4000} + 30 = 77{,}5 < \underline{100}$ +1p