Remarks: See §5.5, example 2, pages 374 till 377

Answers:

a. $a = 133$ mm

b. $\tau_{\text{max;topflange}} = \tau_{\text{max;bottomflange}} = 4$ N/mm^2

$\tau_{web} = 0$

c. $R_{topflange} = 16$ kN

$R_{bottomflange} = 8$ kN

d. $b = 116,67$ mm

Explanation:

b. The shear stress distribution in the top and bottom flange is parabolic, with a maximum at the junction with the web ($y = 0$):

$$\tau_{\text{max;topflange}} = \frac{(24\times10^3 \text{ N})(225\times10^3 \text{ mm}^3)}{(20 \text{ mm})(67,5\times10^6 \text{ mm}^4)} = 4 \text{ N/mm}^2$$

$$\tau_{\text{max;bottomflange}} = \frac{(24\times10^3 \text{ N})(112,5\times10^3 \text{ mm}^3)}{(10 \text{ mm})(67,5\times10^6 \text{ mm}^4)} = 4 \text{ N/mm}^2$$

The shear stress is zero over the whole web because $S_y^a = 0$.

c. $R_{\text{topflange}} = \frac{2}{3}(300 \text{ mm})(4 \text{ N/mm}^2)(20 \text{ mm}) = 16 \text{ kN}$

$R_{bottomflange} = \frac{2}{3}(300 \text{ mm})(4 \text{ N/mm}^2)(10 \text{ mm}) = 8 \text{ kN}$

d. $$b = \frac{(8 \text{ kN})(350 \text{ mm})}{(24 \text{ kN})} = 116,67 \text{ mm}$$

e. The shear centre SC is located along the symmetric axis (in the web), at a distance b from the top flange.