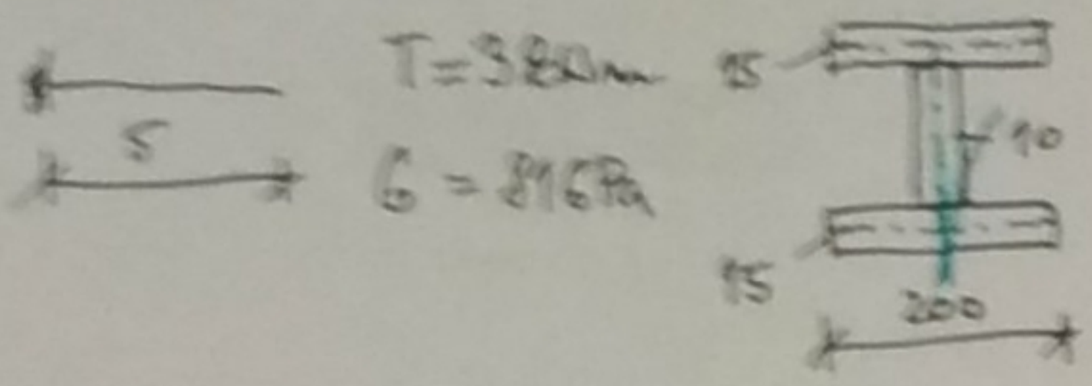


$\tau_{max} = ?$

$\varphi_l = ?$

$$I_t = \frac{1}{3}\sum t_i^3 h_i = \frac{1}{3}\left(15^3 \cdot 200 + 15^3 \cdot 200 + 10^3 \cdot 170\right) = 506{,}\overline{6} \cdot 10^3 \text{ mm}^4$$

$$\varphi_l = \frac{Tl}{GI_t} = \frac{3 \cdot 10^3 \cdot 5}{81 \cdot 10^9 \cdot 506{,}\overline{6} \cdot 10^{-9}} = \underline{0{,}365 \text{ rad}}$$

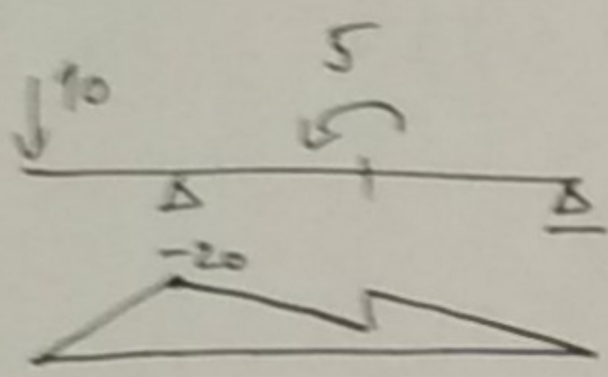
$$W_t = \frac{I_t}{t_{max}} = \frac{506{,}\overline{6} \cdot 10^3}{15} = 33{,}\overline{7} \cdot 10^3 \text{ mm}^3$$

$$\tau_{max} = \frac{T}{W_t} = \frac{3 \cdot 10^3}{33{,}\overline{7} \cdot 10^{-6}} = 88{,}816 \cdot 10^6 \text{ Pa} = \underline{88{,}816 \text{ MPa}}$$

HEB 200

$I_y = 57 \cdot 10^6 \text{ mm}^4$

$f_d = 235 \text{ MPa}$



$$\sigma = \frac{M}{I_y} z = \frac{M}{W} \qquad M_{Rd} = f_d \cdot W$$

$$W = \frac{I_y}{z} = \frac{57 \cdot 10^6}{100} = 57 \cdot 10^4 \text{ mm}^3$$

$$M_{Rd} = f_d \cdot W = 235 \cdot 10^6 \cdot 57 \cdot 10^{-5} = \underline{133{,}95 \text{ kNm}} > \underline{20 \text{ kNm}} \quad \text{vyhovi}$$

$$\sigma_I = \frac{-20 \cdot 10^3}{57 \cdot 10^{-6}} \cdot \left(100 \cdot 10^{-3}\right) = 35 \text{ MPa}$$

$$\sigma_{II} = \frac{-20 \cdot 10^3}{57 \cdot 10^{-6}} \cdot \left(-100 \cdot 10^{-3}\right) = 35 \text{ MPa}$$

$$\sigma_{III} = \frac{\sigma_{II}}{2} = 17{,}54 \text{ MPa}$$

$$\sigma_T = 0 \text{ MPa}$$