Remarks: See §4.6, pages 168 till 170

Answers:

a. $\sigma_{max} = 15,75 \text{ N/mm}^2$

b. 50 mm

Explanation:

a. $M_{max} = 5,25 \text{ kNm}$

$W_z = \frac{1}{6} \times (200 \text{ mm})(100 \text{ mm})^2 = 333,33 \times 10^3 \text{ mm}^3$

$$\sigma_{max} = \frac{5,25 \times 10^6 \text{ Nmm}}{333,33 \times 10^3 \text{ mm}^3} = 15,75 \text{ N/mm}^2$$

b. $$\sigma_{max} = \frac{5,25 \times 10^6 \text{ Nmm}}{W_z} \leq 7 \text{ N/mm}^2 \Rightarrow W_z = \frac{1}{6} bh^2 \geq 750 \times 10^3 \text{ mm}^3$$

$$h^2 \geq \frac{6 \times (750 \times 10^3 \text{ mm}^3)}{200 \text{ mm}} \Rightarrow h \geq 150 \text{ mm}$$

The original thickness was 100 mm, thus the minimum required thickness of the wooden strip is 50mm