Remarks: See §3.1.3, pages 77 till 82

Answers:

a. $a = 250$ mm

b. $h = 600$ mm

Explanation:

a. The centroid C is located under the hanging point. Thus the distance from the "top" of the flange to the centroid of the plate is:

$$\tan\varphi \times (200\text{ mm}) = 50\text{ mm}$$

$$a = (200\text{ mm}) + 50\text{ mm} = 250\text{ mm}$$

b. $A_{\text{flange}} = 80 \times 10^3\text{ mm}^2$

$$A_{web} = \{(h - (200\text{ mm})\}(200\text{ mm})$$

$$a = \frac{A_{\text{flange}} \times (100\text{ mm}) + A_{web} \times \{h + (200\text{ mm})\}/2}{A_{flange} + A_{\text{web}}} = 250\text{ mm}$$

$$h^2 - (500\text{ mm})h - (60000\text{ mm}^2) = 0 \;\Rightarrow\; h = 600\text{ mm}$$