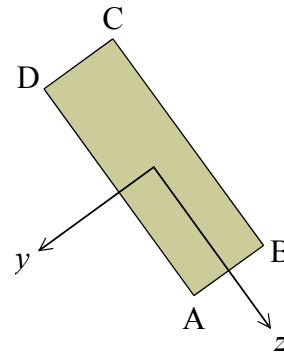


Opmerkingen: Zie §4.8, blz. 178 t/m 183

Antwoorden:



a. In het midden van de overspanning

b. $\sigma_{\max} = 13 \text{ N/mm}^2$

c. $\sigma_A = +13 \text{ N/mm}^2$ $\sigma_B = -5 \text{ N/mm}^2$
 $\sigma_C = -13 \text{ N/mm}^2$ $\sigma_D = +5 \text{ N/mm}^2$

e. vergelijking neutrale lijn: $6,75y + z = 0$

Toelichting:

Doorsnedegrootheden:

$$I_{yy} = 3,24 \times 10^6 \text{ mm}^4 \text{ en } I_{zz} = 29,16 \times 10^6 \text{ mm}^4$$

$$W_y = 108 \times 10^3 \text{ mm}^3 \text{ en } W_z = 324 \times 10^3 \text{ mm}^3$$

a. In het midden van de overspanning geldt:

$$M_y = \frac{1}{8}(0,6 \text{ kN/m})(3,6 \text{ m})^2 = +0,972 \text{ kNm}$$

$$M_z = \frac{1}{8}(0,8 \text{ kN/m})(3,6 \text{ m})^2 = +1,296 \text{ kNm}$$

b.
$$\sigma_{\max}^{(M)} = \left| \frac{M_y}{W_y} \right| + \left| \frac{M_z}{W_z} \right| = \frac{0,972 \times 10^6 \text{ Nmm}}{108 \times 10^3 \text{ mm}^3} + \frac{1,296 \times 10^6 \text{ Nmm}}{324 \times 10^3 \text{ mm}^3} = 13 \text{ N/mm}^2$$

c. ten gevolge van M_y :

$$\sigma_{\max}^{(M)} = \frac{0,972 \times 10^6 \text{ Nmm}}{108 \times 10^3 \text{ mm}^3} = 9 \text{ N/mm}^2; \text{ trek in AD en druk in BC}$$

ten gevolge van M_z :

$$\sigma_{\max}^{(M)} = \frac{1,296 \times 10^6 \text{ Nmm}}{324 \times 10^3 \text{ mm}^3} = 4 \text{ N/mm}^2; \text{ trek in AB en druk in CD}$$

Algemeen:

$$\sigma(y, z) = \frac{(0,972 \times 10^6 \text{ Nmm}) \times y}{3,24 \times 10^6 \text{ mm}^4} + \frac{(1,296 \times 10^6 \text{ Nmm}) \times z}{29,16 \times 10^6 \text{ mm}^4}$$

e. Vergelijking neutrale lijn: $\sigma(y, z) = 0 \Rightarrow 6,75y + z = 0$