

Betongegnekaper:

$$f_{ck} := 30 \text{ MPa}$$

$$\gamma_c := 1.5$$

$$f_{cd} := 0.85 \frac{f_{ck}}{\gamma_c} = 17 \text{ MPa}$$

$$E_{cm} := 33000 \text{ MPa}$$

Stålegnekaper:

$$f_{yk} := 500 \text{ MPa}$$

$$\gamma_s := 1.15$$

$$f_{yd} := \frac{f_{yk}}{\gamma_s} = 435 \text{ MPa}$$

$$\varnothing := 16 \text{ mm}$$

Geometri:

$$b := 1000 \text{ mm}$$

$$h := 200 \text{ mm}$$

$$L_s := 2700 \text{ mm}$$

$$A_c := b \cdot h = (2 \cdot 10^5) \text{ mm}^2$$

Laster:

$$L := 7.2 \text{ m}$$

$$\gamma_g := 1.2$$

$$\gamma_q := 1.5$$

$$g_{k.dekke} := 6.25 \frac{\text{kN}}{\text{m}^2}$$

$$g_{d.dekke} := g_{k.dekke} \cdot \gamma_g \cdot 3 = 22.5 \frac{\text{kN}}{\text{m}^2}$$

$$q_{k.dekke} := 2 \frac{\text{kN}}{\text{m}^2}$$

$$q_{d.dekke} := q_{k.dekke} \cdot \gamma_q \cdot 2 = 6 \frac{\text{kN}}{\text{m}^2}$$

$$S_k := 3.16 \frac{\text{kN}}{\text{m}^2}$$

$$S_d := S_k \cdot \gamma_q = 4.74 \frac{\text{kN}}{\text{m}^2}$$

$$q_d := \frac{(g_{d.dekke} + q_{d.dekke} + S_d) \cdot L}{2} = 119.7 \frac{\text{kN}}{\text{m}}$$

$$g_{k.vegg} := 13.75 \frac{\text{kN}}{\text{m}}$$

$$g_{d.vegg} := g_{k.vegg} \cdot \gamma_g \cdot 3 = 49.5 \frac{\text{kN}}{\text{m}}$$

Opplagerkrefter:

$$L_1 := 2 \text{ m} \quad L_2 := 7.4 \text{ m} \quad L_3 := 4.6 \text{ m}$$

$$A := (q_d + g_{d.vegg}) \cdot L_1 + \frac{(q_d + g_{d.vegg}) \cdot L_2}{2} = 964 \text{ kN}$$

$$B := \frac{(q_d + g_{d.vegg}) \cdot L_2}{2} + \frac{5}{8} \cdot (q_d + g_{d.vegg}) \cdot L_3 = 1112 \text{ kN}$$

$$C := \frac{3}{8} \cdot (q_d + g_{d.vegg}) \cdot L_3 = 292 \text{ kN}$$

$$N_{Ed} := B = 1112 \text{ kN}$$

Lengdearmering:

$$A_{s.min} := \max \left(0.2 \cdot A_c \cdot \frac{f_{cd}}{f_{yd}}, 0.01 A_c \right) = 2000 \text{ mm}^2 \quad (\text{EC2, NA.9.5.2})$$

$$n := \frac{A_{s.min}}{\pi \cdot \left(\frac{\phi}{2} \right)^2} = 9.9 \quad \text{Velger: } 10\phi 16$$

$$A'_s := 10 \pi \cdot \left(\frac{\phi}{2} \right)^2 = 2011 \text{ mm}^2$$

$$N_{Rd} := f_{cd} \cdot (A_c - A'_s) + f_{yd} \cdot A'_s = 4240 \text{ kN} \quad (\text{Sørensen (4.5)})$$

$$N_{Rd} > N_{Ed} \quad \text{Gir tilstrekkelig kapasitet}$$

M-N diagram:

$$e := \max\left(\frac{h}{30}, 20 \text{ mm}\right) = 20 \text{ mm} \quad (\text{EC2, 6.1(4)})$$

$$M_{Ed} := N_{Ed} \cdot e = 22.25 \text{ kN}\cdot\text{m}$$

$$n := \frac{N_{Ed}}{f_{ck} \cdot b \cdot h} = 0.2 \quad (\text{Sørensen (4.92)})$$

$$m := \frac{M_{Ed}}{f_{ck} \cdot b \cdot h^2} = 0.02 \quad (\text{Sørensen (4.93)})$$

Leser av M-N diagram gir:

$$w := 0$$

Gir tilstrekkelig kapasitet med $A_{s,\min}$

Horisontalarmering:

$$A_{s,h,\min} := 25\% \cdot A'_s = 503 \text{ mm}^2 \quad \phi := 10 \text{ mm} \quad (\text{EC2, 6.1.3(1)})$$

$$n := \frac{A_{s,h,\min}}{\pi \cdot \left(\frac{\phi}{2}\right)^2} = 6.4$$

$$c := \frac{L_s}{7} = 386 \text{ mm}$$

Velger $\phi 10c380$

Kontroll mot knekking:

$$L_k := L_s = 2700 \text{ mm}$$

$$I := \frac{b \cdot h^3}{12} = (6.667 \cdot 10^8) \text{ mm}^4$$

$$N_{kr} := \frac{\pi^2 \cdot E_{cm} \cdot I}{L_k^2} = 29785 \text{ kN} \quad (\text{Sørensen (6.3)})$$

$$N_{kr} > N_{Ed} \quad \text{Gir tilstrekkelig kapasitet}$$