Concrete Minimum Reinforcement Calculator

Calculate minimum reinforcement according to EC2 and other standards

Plates | Beams | Columns | Gulv på grunn

Geometry

h (mm): 200 Plate thickness

c (mm): 35 Concrete cover

b (mm): 1000 Plate width

Number of layers: 1

Layer spacing (mm): 0 Auto: 3×bar diameter

Material Parameters

Concrete Grade: B35 (:

f_{ctm} (MPa): 3.21

f_{yk} (MPa): 500 Steel yield strength

Analysis Scenarios

General Plate Reinforcement

- [x] Main rebars
- [ ] Crack control rebars

Areas with Max Moments & Concentrated Loads

- [ ] Main rebars
- [ ] Crack control rebars

Bar Diameter Selection

- [ ] ø5
- [ ] ø6
- [ ] ø7
- [ ] ø8
- [x] ø10
- [x] ø12
- [x] ø16
- [x] ø20
- [ ] ø25
- [ ] ø32

Calculation Results

Bar Ø	d (mm)	$A_{s,min}$ (mm²/m)	A_{bar} (mm²)	Governing Spacing (mm)	GENERAL PLATE REINFORCEMENT			
					Allowable (mm)	From As,min (mm)	EC2 Limit (mm)	Main Governs
ø10	160.0	267.1	78.5	294	294	294	400	As,min

Governs Column: EC2 = EC2 9.3.1.1(3) controls, As,min = reinforcement requirement controls

Bar Ø	d (mm)	$A_{s,min}$ (mm²/m)	A_{bar} (mm²)	Governing Spacing (mm)	GENERAL PLATE REINFORCEMENT			
					Allowable (mm)	From As,min (mm)	EC2 Limit (mm)	Main Governs
ø12	159.0	265.4	113.1	400	400	426	400	EC2
ø16	157.0	262.1	201.1	400	400	767	400	EC2
ø20	155.0	258.7	314.2	400	400	1214	400	EC2

Max Moments & Concentrated Loads
- Main: min(2h, 250mm) = min(2×100, 250) = 250mm
- Crack control: min(3h, 400mm) = min(3×67, 400) = 400mm

Input Parameters

h: 200 mm (plate thickness)
f_{ctm}: 3.21 MPa
f_{yk}: 500 MPa
c: 35 mm (concrete cover)
Analysis scenarios: General
b: 1000 mm (plate width)
Main Number of layers: 1

Calculation Formulas

Effective depth: $d = h - c - \varphi/2 - (n_{layers} - 1) \times layer\_spacing$

Minimum reinforcement (EC2-1-1 9.2.1.1): $A_{s,min} = \max(0.26 \times b \times d \times f_{ctm} / f_{yk}, 0.0013 \times b \times d)$

Bar area: $A_{bar} = \pi \times (\varphi/2)^2$

Maximum spacing: $c_{c,max} = A_{bar} \times b / A_{s,min}$

Maximum Spacing Requirements (EC2 9.3.1.1(3))

International Guideline (Eurocode 2):

Rules:

- **General areas: Main = min(3h, 400mm), Crack control = min(3.5h, 450mm)**
- **Concentrated loads: Main = min(2h, 250mm), Crack control = min(3h, 400mm)**

Free structural engineering calculator by Magnus Fjeld Olsen

Based on Eurocode 2 (EC2) standards

Note on Norwegian Standards:
The maximum spacing requirements shown in this calculator follow EC2 9.3.1.1(3) from the international guideline. These requirements are identical to those specified in the Norwegian National Annex to Eurocode 2.