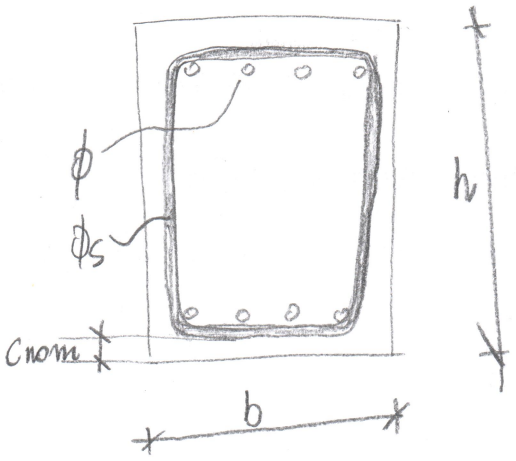
RC BEAM DESIGN EXAMPLE



GEOMETRY

$b = 400$ mm	BEAM WIDTH	
$h = 600$ mm	BEAM HEIGHT	
$C_{nom} = 30$ mm	NOMINAL COVER	[PN-EN 1992-1-1, p. 4.4.1.1]
$\phi = 20$ mm	LONGITUDINAL BAR DIAMETER	
$\phi_s = 10$ mm	SHEAR LINK DIAMETER	

FORCES

$M_{Ed} = 200$ kNm — DESIGN BENDING MOMENT

CONCRETE

C30/37 — CONCRETE CLASS [PN-EN 1992-1-1, TAB. 3.1]

$f_{ck} = 30$ MPa — CHARACTERISTIC VALUE OF CONCRETE COMPRESSIVE STRENGTH [..., TAB. 3.1]

$\gamma_c = 1.5$ — PARTIAL FACTOR FOR CONCRETE IN PERSISTEN & TRANSIENT SITUATION [..., TAB. 2.1N]

$\alpha_{cc} = 0.85$ — COEFFICIENT TAKING ACCOUNT OF LONG TERM EFFECTS [..., P. 3.1.6]

$$f_{cd} = \alpha_{cc} \frac{f_{ck}}{\gamma_c} = 0.85 \cdot \frac{30}{1.5} = 17 \text{ MPa}$$

DESIGN VALUE OF CONCRETE COMP. STRENGTH [..., P. 3.1.6]

$f_{ck} \leq 50$ MPa $\rightarrow$ $f_{ctm} = 0.30 f_{ck}^{2/3} = 0.30 \cdot 30^{2/3} = 2.9$ MPa

MEAN VALUE OF AXIAL TENSILE STRENGTH OF CONCRETE [..., TAB. 3.1]

STEEL

C - $f_{yk} = 500$ MPa — STEEL CLASS [..., FIG. 3.8]

$f_{yk} = 500$ MPa — CHARACTERISTIC YIELD STRENGTH OF REINFORCEMENT

$\gamma_s = 1.15$ — PARTIAL FACTOR FOR STEEL IN PERSISTENT & TRANSIENT SITUATION [..., TAB. 2.1N]

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{500}{1.15} = 434.8 \text{ MPa}$$

DESIGN YIELD STRENGTH OF REINFORCEMENT [..., FIG. 3.8]