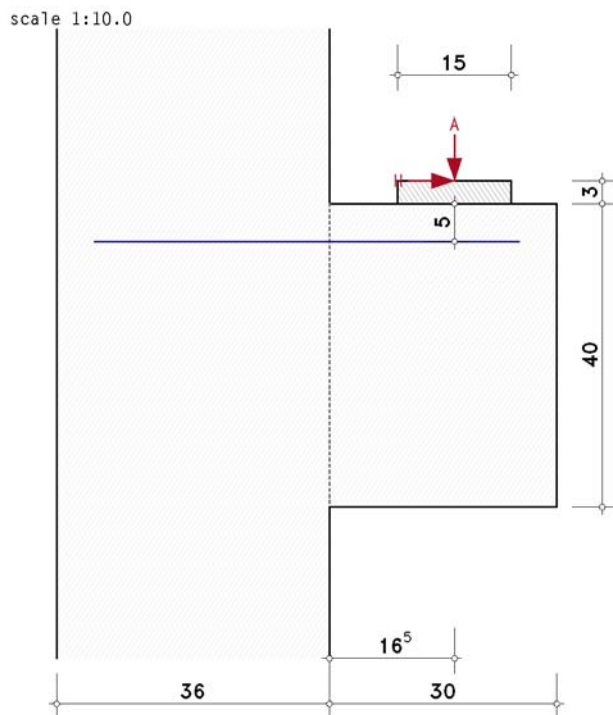


POS. 13: HEFT 599, 11.5.1

dimensioning a load bracket EC 2 (1.11), NA: Deutschland

1. input protocol



cross section (single bracket)

bracket on a column

column: $b = 30.0$ cm, $h = 36.0$ cm

bracket: $l_k = 30.0$ cm, $h_k = 40.0$ cm, center distance (design calculation): $d_{1k} = 5.0$ cm

bearing plate: $l_p = 15.0$ cm, $b_p = 20.0$ cm

material properties

concrete: C40/50, reinforcement: B500A

material safety factors

design situation: basic combination

design resistance: concrete $\gamma_c = 1.50$, reinforcement $\gamma_s = 1.15$

parameters

Load application for $\Delta a = 16.5$ cm, $\Delta h = 3.0$ cm

design method acc. to issue 600, DAfStb

load bracket, direct load application

bearing contact pressure: dry bearing joint

design calculation values (ULS)

lc 1: $A_{Ed} = 250.0$ kN

2. note

general reinforcement rules are not taken into account.

3. design calculation

3.1. lc 1

note (dry bearing joint): $H = 0.00$ kN $< 0.2 \cdot A \Rightarrow H = 0.2 \cdot A = 50.00$ kN !!

design calculation values: $A = 250.00$ kN, $H = 50.00$ kN

bearing contact pressure (dry bearing joint): $\sigma_p = 8.33$ N/mm² $< \sigma_{Rd,max} = 9.07$ N/mm² ok

verification of compression strut: $V_{Ed} = 250.0$ kN $< V_{Rd,max} = 630.0$ kN ok

tension belt reinforcement: $Z_{A+H} = 203.7$ kN $\Rightarrow$ req $A_{s,h} = 4.68$ cm²

tensile splitting reinforcement: horizontal stirrup reinforcement ($A_{sb,v}$ constr.)

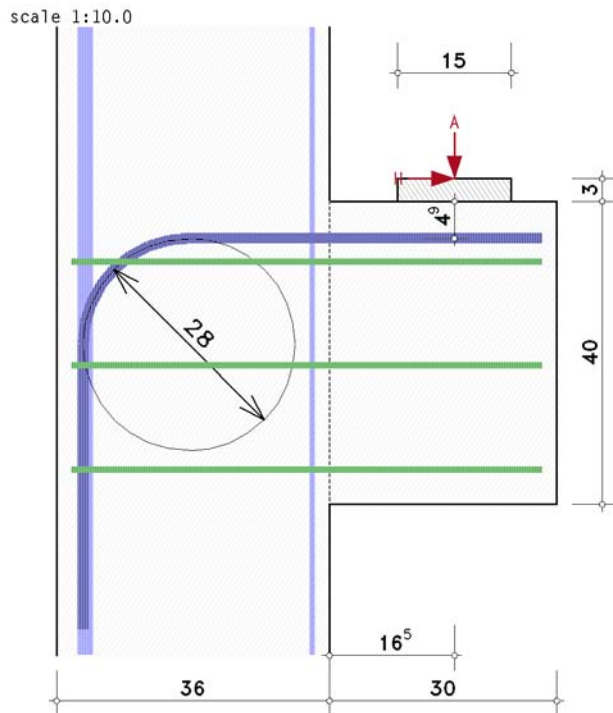
for $\Delta a \leq 0.5 \cdot h_k = 20.0$ cm and $V_{Ed} > 0.3 \cdot V_{Rd,max} = 189.0$ kN $\Rightarrow$ req $A_{sb,h} = 2.34$ cm²

total: $A_{s,h} = 4.68$ cm², $A_{sb,h} = 2.34$ cm² ($\Sigma A_{st} = 4.68$ cm²)

4. final result

maximum reinforcement: $A_{s,h} = 4.68 \text{ cm}^2$, $A_{sb,h} = 2.34 \text{ cm}^2$

5. selected reinforcement



calculation of the required anchorage lengths: bonding conditions good

concrete cover $c_{v,v} = 4.2 \text{ cm}$

concrete cover $c_{v,h} = 2.0 \text{ cm}$

column reinf. left $8\text{Ø}20$, exst $A_{sl} = 25.13 \text{ cm}^2$

column reinf. right $5\text{Ø}6$, exst $A_{sr} = 1.41 \text{ cm}^2$

main reinforcement $2\text{Ø}14$, $D_{\min,hor} = 5.6 \text{ cm}$, $D_{\min,ver} = 28.0 \text{ cm}$, exst $A_{s,h} = 6.16 \text{ cm}^2 > \text{req } A_{s,h} = 4.68 \text{ cm}^2$ **ok**, $d_v = 12.5 \text{ cm}$

(U-bents, 2-shear) anchorage lengths: bracket req $l_v = 14.7 \text{ cm} < \text{exst } l_v = 19.0 \text{ cm}$ **ok**

column $l_v = 37.7 \text{ cm}$

tensile splitting reinforcement horizontal $3\text{Ø}8$ (stirrup, 2-shear), exst $A_{sb,h} = 3.02 \text{ cm}^2 > \text{req } A_{sb,h} = 2.34 \text{ cm}^2$ **ok**

center distance exst $d_{1k} = 4.90 \text{ cm} < \text{clc } d_{1k} = 5.0 \text{ cm}$ **ok**

design resistance ensured

6. regulations

EN 1990, Eurocode 0: Grundlagen der Tragwerksplanung;

Deutsche Fassung EN 1990:2002 + A1:2005 + A1:2005/AC:2010, Ausgabe Dezember 2010

EN 1990/NA, Nationaler Anhang zur EN 1990, Ausgabe Dezember 2010

EN 1992-1-1, Eurocode 2: Bemessung und Konstruktion von Stahlbeton- und Spannbetonbauteilen -

Teil 1-1: Allgemeine Bemessungsregeln und Regeln für den Hochbau;

Deutsche Fassung EN 1992-1-1:2004 + AC:2010, Ausgabe Januar 2011

EN 1992-1-1/NA, Nationaler Anhang zur EN 1992-1-1, Ausgabe April 2013

Erläuterungen zu DIN EN 1992-1-1 and DIN EN 1992-1-1/NA, Teil 1

Deutscher Ausschuss für Stahlbeton, Heft 600, Beuth Verlag GmbH, 2020

Erläuterungen zu DIN 1045-1

Deutscher Ausschuss für Stahlbeton, Heft 525, Beuth Verlag GmbH, 2003