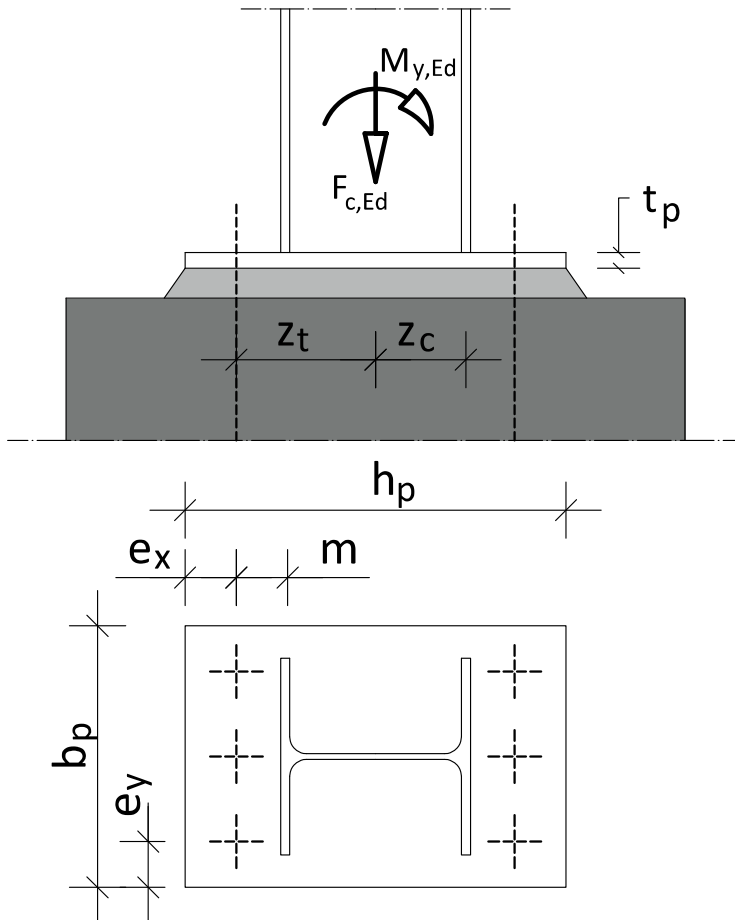


**Berekening kolomvoet**  
 NEN-EN 1993-1-8:2006

Geometrie



Profieltype	=	HEA
Gekozen profiel	=	HEA 300
Breedte voetplaat $b_p$ =		400 mm
Lengte voetplaat $h_p$ =		450 mm
Dikte voetplaat $t_p$ =		36 mm
dubbelzijdige hoeklassen a =		8 mm
$e_x$ =		40 mm
$e_y$ =		40 mm
Ankerbout	=	M27
Hoogte profiel h	=	290 mm
Breedte profiel b	=	300 mm
Dikte flens $t_f$	=	14,0 mm
$m = (h_p - h) / 2 - e_x$	=	40 mm
$A_s$	=	459 mm <sup>2</sup>

Materialen en veiligheidsfactoren

Staal	=	S235
Ankerkwaliteit	=	8.8
Beton	=	C20/25
$f_y$	=	235 N/mm <sup>2</sup>
$f_{ub}$	=	800 N/mm <sup>2</sup>
$f_{ck}$	=	20 N/mm <sup>2</sup>

$$\begin{aligned} \gamma_{M0} &= 1,00 \\ \gamma_{M2} &= 1,25 \\ \gamma_c &= 1,50 \\ f_{cd} &= f_{ck} / \gamma_c = 13 \text{ N/mm}^2 \end{aligned}$$

#### Belastingen

$$\begin{aligned} \text{Drukkracht in verbinding } F_{c,Ed} &= 225 \text{ kN} \\ \text{Moment in verbinding } M_{y,Ed} &= 230 \text{ kNm} \end{aligned}$$

#### Reactie krachten

$$\begin{aligned} z_C &= h / 2 - t_f / 2 = 138,0 \text{ mm} \\ z_T &= h_p / 2 - e_x = 185,0 \text{ mm} \\ z &= z_C + z_T = 323,0 \text{ mm} \\ \text{Trekkracht in ankerrij } F_{T,I,Ed} &= \frac{M_{y,Ed}}{z * 10^{-3}} - F_{c,Ed} * \frac{z_C}{z} = 616 \text{ kN} \\ \text{Drukkracht } F_{C,r,Ed} &= F_{c,Ed} + F_{T,I,Ed} = 841 \text{ kN} \end{aligned}$$

#### Stuikdruk fundering

NEN 1992-1-1 6.7 (6.63)

$$\begin{aligned} f_{jd} &= \frac{2/3 * f_{cd} * 1,98}{c} = 17 \text{ N/mm}^2 \\ c &= t_p * \sqrt{\frac{f_y}{3 * f_{jd} * \gamma_{M0}}} = 77 \text{ mm} \\ b_{eff} &= \text{MIN}(2 * c + t_f; 2 * e_x + 2 * m + t_f) = 168 \text{ mm} \\ l_{eff} &= \text{MIN}(2 * c + b; b_p) = 400 \text{ mm} \\ F_{C,r,Rd} &= f_{jd} * b_{eff} * l_{eff} * 10^{-3} = 1142 \text{ kN} > F_{C,r,Ed} \end{aligned}$$

#### Voetplaat op buiging

Bepaling  $l_{eff,1-2}$  voor buitenste twee ankers

$$\begin{aligned} m_x &= m - 0,8 * a * \sqrt{2} = 30,9 \text{ mm} \\ w &= (b_p - 2 * e_y) / 2 = 160 \text{ mm} \\ l_{eff,cp} &= \text{MIN}(2 * \pi * m_x; \pi * m_x + w; \pi * m_x + 2 * e_y) = 177 \text{ mm} \\ l_{eff,nc} &= \text{MIN}(4 * m_x + 1,25 * e_x; e_x + 2 * m_x + 0,625 * e_x; 0,5 * b_p; 0,5 * w + 2 * m_x + 0,625 * e_x) = 127 \text{ mm} \\ l_{eff,1,buiten} &= \text{MIN}(l_{eff,cp}; l_{eff,nc}) = 127 \text{ mm} \end{aligned}$$

Bepaling  $l_{eff,1-2}$  voor midden anker

$$\begin{aligned} e &= w / 2 = 80 \text{ mm} \\ l_{eff,cp} &= \text{MIN}(2 * \pi * m_x; \pi * m_x + w; \pi * m_x + 2 * e) = 194 \text{ mm} \\ l_{eff,nc} &= \text{MIN}(4 * m_x + 1,25 * e_x; e + 2 * m_x + 0,625 * e_x; 0,5 * b_p; 0,5 * w + 2 * m_x + 0,625 * e_x) = 167 \text{ mm} \\ l_{eff,1,midden} &= \text{MIN}(l_{eff,cp}; l_{eff,nc}) = 167 \text{ mm} \\ \Sigma l_{eff,1} &= \text{MIN}(l_{eff,1,buiten} + l_{eff,1,midden} + l_{eff,1,buiten}; b_p) = 400 \text{ mm} \end{aligned}$$

Bezwijkvorm 1 en 2

$$\begin{aligned} M_{pl,Rd} &= 0,25 * l_{eff} * t_p^2 * \frac{f_y}{\gamma_{M0}} * 10^{-6} = 30 \text{ kNm} \\ F_{T,1,2,Rd} &= M_{pl,Rd} / m_x * 10^3 = 971 \text{ kN} \end{aligned}$$

Bezwijkvorm 3

$$F_{t,Rd} = \frac{0,9 * f_{ub} * A_s}{\gamma_{M2}} * 10^{-3} = 264 \text{ kN}$$

$$\begin{aligned}
 F_{T,3,Rd} &= 3 * F_{t,Rd} &= & 792 \text{ kN} \\
 F_{T,l,Rd} &= \text{MIN}( F_{T,1,2,Rd} ; F_{T,3,Rd} ) &= & 792 \text{ kN} \\
 \text{Toetsing voetplaat:} & F_{T,l,Ed} / F_{T,l,Rd} &= & 0,78 \leq 1
 \end{aligned}$$

Toetsing kolomvoet

$$\begin{aligned}
 e &= \frac{M_{y,Ed}}{-F_{c,Ed}} * 10^3 &= & -1022 \text{ mm} \\
 M_{j,Rd,1} &= \frac{F_{T,l,Rd} * z}{z_C / e + 1} * 10^{-3} &= & 296 \text{ kNm} \\
 M_{j,Rd,2} &= \frac{-F_{C,r,Rd} * z}{z_T / e - 1} * 10^{-3} &= & 312 \text{ kNm} \\
 M_{j,Rd} &= \text{MIN}(M_{j,Rd,1} ; M_{j,Rd,2}) &= & 296 \text{ kNm} \geq M_{y,Ed}
 \end{aligned}$$